4.2.A Outline Construction Environmental Management Plan

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1. INTRODUCTION

1.1 Background

1.1.1 National Grid Electricity Transmission plc (NGET) is submitting planning applications under the Town and Country Planning Act 1990 (TCPA) to Gwynedd Council for the construction and operation of developments which comprise parts of the Pentir to Trawsfynydd Reinforcement Project (the 'Project'). The Project comprises the following elements:

- Installing new and replacing underground cables and other equipment within the existing substation site at Pentir and Trawsfynydd;
- Constructing a new substation south of Bryncir;
- Replacing one side of the overhead line between Bryncir and Trawsfynydd;
- Replacing the underground cables that run beneath the Glaslyn Estuary at Porthmadog from Wern to Minfordd; and
- Connecting the new Glaslyn cables to the EVIP cables at Minffordd with new equipment and removing the existing equipment nearby.

1.1.2 This Outline Construction Environmental Management Plan (CEMP) focuses on the Glaslyn Cables section of the Project, referred to herein as the 'Proposed Works' and will subject to agreement with the Gwynedd Council. This Outline CEMP details the mitigation measures identified in the Environmental Statement[1] and sets out a variety of control measures for managing the potential effects of the Proposed Works including control and management of noise, dust, surface water runoff, waste and pollution control.

1.1.3 The Contractor shall carry out all mitigation and enhancements included in this draft Outline CEMP and comply with all limits and thresholds where specified.

1.1.4 The detailed CEMP shall be prepared later and shall need to be submitted for acceptance by National Grid in consultation with the relevant stakeholders prior to construction. The detailed CEMP is to include a Pollution Incident Plan which shall state the procedures for pollution control and emergency response measures in the event of accidental spillage or leakage during construction. The Contractor shall undertake the Works in accordance with the CEMP and employ an Environmental Manager.

1.1.5 Proposed monitoring which will be undertaken during construction is defined within the relevant sections of the CEMP and relevant supporting plans to be produced before commencement of the Proposed Works.

1.2 The Proposed Works

1.2.1 The Proposed Works would run between the existing Wern cable sealing end compound and the existing Garth cable sealing end compound, Porthmadog (the

[1] Pentir to Trawsfynydd Reinforcement Project (Environmental Statement, Volume 4: Glaslyn Cables)

'Glaslyn works site'). The Glaslyn works includes the installation of replacement 400 kV cables, the Minffordd CSEC and Tunnel Head House, and the extension of the Wern CSEC, as well as the decommissioning of the existing 132 kV and 400 kV cable circuits including the Garth CSEC. The Glaslyn works site, shown on **Figure 1-1**, covers an area approximately 106.4 hectares (ha). The land within the Glaslyn works site comprises access roads, turning areas, construction compounds and laydown areas required for the construction and operation of the works. Between the existing Wern and Garth CSECs, the Proposed Works site would comprise approximately 6 km of works of variable widths.

1.2.2 The Proposed Works site comprises undulating land and is characterised by predominantly rural land uses with scattered woodland.

1.2.3 The eastern extent of the Proposed Works site would cross the Glaslyn Site of Special Scientific Interest (SSSI), which is designated for its biological interest including floodplain grassland, riverine habitat, vascular plant and breeding bird assemblage and broadleaved woodland, particularly alluvial wet woodland. The Glaslyn works site also intersects part of the Coedydd Derw, a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods, and Bat Sites Special Area of Conservation (SAC) which is designated for a variety of habitats including woodland, heath and rivers, and the lesser horseshoe bat. A very small area of Ysbyty Bron y Garth SSSI is crossed by the existing 400 kV and 132 kV cables and Glaslyn works site, the existing cables would be left in-situ.

1.2.4 The Proposed Works site crosses several Public Rights of Way (PRoW) including the Dolbenmaen No 107, Porthmadog No 6 and 11 footpaths and Porthmadog No 10 and 37 bridleways. In addition, there are numerous other PRoW's in the wider area. Generally, access will be maintained, with temporary local diversions for short durations during duct installation.

1.2.5 The Proposed Works site intersects National Cycle Network (NCN) Route 8, which runs through the centre of Porthmadog. A temporary track, surfaced with fine quarried material will be provided to the west of the current location during the works.

1.2.6 The Proposed Works include the following principal elements which have been described in the Environmental Statement[2] and **Table 1-1**:

Table 1-1: The Proposed Works (Glaslyn Works Site)

Proposed Works	Description
Wern CSEC (Sealing End Compound)	• The existing CSEC would be modified to accommodate 12 replacement cables comprising two cable circuits each containing three phases, with two cables per phase. Works include new foundations for high voltage plant and support steelwork, high voltage electrical equipment, a surge arrestor, earth switches and cable sealing ends. This work would require an extension to the existing Wern CSEC, including an extension to the earth mat (a mesh of metallic conductors shallowly buried). Drainage, access and hard standings would also form part of the works.

[2] Pentir to Trawsfynydd Reinforcement Project, Environmental Statement Volume 4: Glaslyn Cables

- The compound would be extended to the east, increasing the size from approximately 50 m by 23 m to 52 m by 49 m. The existing fence would be removed, and 2.4 m high fencing would be reinstalled around the larger footprint.
- Some trees would need to be removed to the east of the current CSEC to accommodate the extension.

1.2.7 A new permanent access road would be built from the west of the A498, approximately 1.26 km long and 5 m wide. The current access is restricted and would not be able to support the delivery of equipment and plant needed for the works. The access road would cross three ditches via permanent short span beam bridges. The new road would provide access to the CSEC along the eastern boundary via a 6 m wide, manually operated gate. The access road would also pass around the northern boundary of the CSEC, to the west of the CSEC where it splits into two short sections creating a 'hammerhead', allowing for vehicle turning. Four gates would be erected along the access road, one near the entrance from the A498, one after the first ditch crossing and two further gates after the second ditch crossing. The new access road would connect with two existing accesses, 180 m and 280 m east of the extended CSEC, that provide access to the fields north of the Nant yr Afon-oer.

- A filter trench would run in parallel to the access road from the CSEC to the A498 and would comprise headwalls at ditch crossings and periodic 450 millimetres (mm) inspection chambers.

1.2.8 To provide a low voltage electricity supply, SP Energy Network would relocate the existing 11 kV overhead line currently 25 m east of the existing Wern CSEC adjacent to the 4ZC overhead line to a position 10 m north-west of the existing Wern CSEC adjacent the access road.

Glaslyn Cables

- The redundant 132 kV cables and 400 kV cables would be removed in part with some sections being left *in situ* due to amenity and ecological sensitivities.
- The existing cables use oil-impregnated paper as thermal and electrical insulation and the oil is kept under pressure from tanks installed along the route. Removing redundant cables requires full excavation of the cables in the ground and so is avoided in areas where this could cause damage to sensitive habitats, such as in designated sites, or would cause disturbance to protected species where this can be reasonably avoided. Where existing cables are to be left *in situ*, they will be cut at predetermined locations (low points and joint bays), drained of oil and purged by flushing with nitrogen to extract as much oil as possible before being

capped. These cut and capped cables are then housed in monitoring pits. Monitoring pits will be installed at low points and joint bays with sumps to collect any oil that escapes. Periodic visits will be made to remove oil that has collected, initially at six-months' intervals.

- Where the existing cables are being removed there is a risk of oil leaking from the cables. This risk needs to be managed by the same process of draining and capping the cables, prior to removal from the ground, to minimise the likelihood of leaks during cables removal.
- The replacement 400 kV cables will be cross-linked polyethylene (XLPE) cables which do not contain oil-impregnated paper or oil. They do not require oil tanks and there is no risk of oil escape during installation, operation or when they are redundant.
- The lengths of replacement cables that can be installed beneath land depend on the extent of cable that can fit on a drum which can be transported to the installation sites. Each section of cable needs to be ‘jointed’ to the next. Cable jointing is a carefully controlled work activity which requires very clean conditions to avoid contaminating the cable and risking failure and compromising operation. Cable jointing is carried out in joint bays in which the joints are sealed on completion and then buried. The design has taken cable length, accesses and transportation restrictions into consideration in the placing of joint bays along the route.
- The cables may have induced currents on their metallic sheaths which can give rise to losses and difficulties during operation. This risk is greatly reduced by making a cross bonding of the cable sheaths, the cables are cross bonded using copper bonding leads joining the differing phases of the cable joints at the joint bay location.
- The temperature of cables is monitored by thermocouples installed at joint bays. The information is relayed by the fibre optic cable installed with the electricity cables and which connects to the fibre optic carried along the earthwire of the 4ZC overhead line.

1.2.9 Link pillars would be installed above ground at each joint bay to allow monitoring of the replacement cables. Due to the flood risk in the area some link pillars would be installed above the existing ground level, by creating a ‘mound’ using existing material which has been excavated from the joint bay as well as imported material. The link pillars will be light grey (RAL 7032). On the existing cables these are metal boxes or kiosks which are visible at intervals. The redundant above ground link

pillars will be removed even where cables are being left *in situ*.

- The position of the cables at road crossings and at other locations along the route is indicated by occasional cable markers which typically are concrete and approximately 77 centimetres (cm) high x 16 cm wide x 7.5 cm deep visible above the ground.

1.2.10 Each of the existing cables is marked below ground with warning tape and with cable protection tiles below the tape and above the cable. In line with the requirements of the Energy Networks Association Technical Specification (ENA TS 97-1), any excavation above a cable would disturb first the warning tape and then, below the tape, the solid warning tiles.

1.2.11 The replacement cables would be installed in plastic polyvinyl chloride (PVC) ducts which would be pre-installed prior to sections of cables being pulled through between joint bays. To place the PVC ducts, the ground is first excavated to the required dimensions and then cement bound sand (CBS) is installed as duct bedding. The PVC ducts are then installed onto the bedding and connected together in 6 m lengths via push-fit connections that are IP68 rated Interference Ring Seal (IRS) fit. Above the ducts a layer of CBS is installed as 'surround' material. The plastic marker tiles are then placed above the CBS, with the warning tape above this as the backfill process is completed.

Cable Decommissioning Works

400 kV Cables

- A 2.6 km section of the existing 400 kV cables between the Wern CSEC and a point 140 m south-east of the Porthmadog Roundabout would be removed. A monitoring pit would be installed at the end of this section.
- A 20 m section of existing 400 kV cables which crosses a north-south running watercourse, east of Ysgol Eifionydd would be decommissioned and removed. The cables would be cut and plumbed into the monitoring pits that would be installed on both sides of the watercourse. The cable bridge would be decommissioned and removed.
- Two thermo coupler pits would be decommissioned and removed, a third would be decommissioned and left in situ due to its location within the Glaslyn SSSI.
- A 255 m section of existing 400 kV cables beneath agricultural fields 105 m west of the Garth CSEC would be removed. Within this section one cable marker, two joint bays and two thermo coupler pits would be decommissioned and removed. The decommissioned

cables would be cut and plumbed into the monitoring pit at the end of the section.

- A 75 m section of the existing 400 kV cables beneath an agricultural field, a block of woodland which forms part of the Ysbyty Bron y Garth SSSI and the Garth CSEC access road, 30 m west of Garth CSEC, would be left in situ. In this section three cable markers would be replaced for decommissioned high voltage cable markers if access could be easily gained; if not the cable markers would be left in situ. The decommissioned cables would be cut and plumbed into the monitoring pit at the end of the section.
- A 60 m section of the existing 400 kV cables between the Garth CSEC access road and the Garth CSEC will be removed.

132 kV Cables

A 1.2 km section of existing 132 kV cables between the Wern CSEC and 20 m west of the A498, would be decommissioned and removed. A monitoring pit would be installed at the end of the section.

A 3.9 km section of the existing 132 kV cables between a point 20 m west of the A498, through Porthmadog, to a point 210 m north-west of the new Minffordd CSEC would be left in situ. At the end of this section the decommissioned cables would be cut and capped and a monitoring pit would be installed. Stop Joint will need to be removed and cables capped circa 50 m east of the crossing point under the railway, south of the school. Also cables to be cut and capped at Joint bay 11/12 within existing joint bay chamber.

A 255 m section of the existing 132 kV cables beneath agricultural fields 105 m west of the Garth CSEC would be removed. At the end of this section the decommissioned cables would be cut and capped and a monitoring pit would be installed.

An 80 m section of the existing 132 kV cables beneath an agricultural field, a block of woodland which forms part of the Ysbyty Bron y Garth SSSI and the Garth CSEC access road, 30 m west of Garth CSEC, would be left in situ. Three cable markers would be removed if easy access can be gained i.e. due to dense vegetation; if not the markers would be left in situ. At the end of this section the decommissioned cables would be cut and capped and monitoring pits would be installed at either end.

A 115 m section of the existing 132 kV cables between the Garth CSEC access road and the Garth CSEC itself would be removed. A thermo coupler pit would also be decommissioned and removed.

All redundant sections of the Glaslyn Cables will be made safe before being left in situ. The oil would be drained from the cables and a monitoring pits installed. Monitoring would be carried out initially at six-month intervals

Cable Installation Works

New 400 kV Cables

- The replacement cables route, approximately 6 km long. For the most part the cable route is in agricultural fields although it crosses roads, railway and watercourses.

1.2.12 The replacement cables would be installed in ducts via either open cut or trenchless methodology. The proposed open cut technique would be trenching and backfill, which would be employed for approximately half of the cable route including some road and rail crossings. Horizontal Directional Drill (HDD) methodology would be used for rest of the cable route where it crosses roads, railway lines and rivers. Small sections of cable within the joint bays at Wern and Minffordd CSEC's would be installed through direct burial of the cable.

- The route exits Wern CSEC in a south-easterly direction and runs parallel to the existing cable alignment and Nant yr Afon-oer to the north and the A497 to the south, approximately 1.2 km from the Wern CSEC, until it reaches the A498, crossing the Afon Bontfaen along the route. The route briefly turns north-east, crossing the A498, near Pont Pen-amser.

- Following the A498 crossing the route continues in a north-easterly direction towards the A487. The route crosses the Y Cyt and then Porthmadog No 6 footpath and NCN Route 8 between Tremadog and Porthmadog. The route then turns in a south-easterly direction and runs in parallel to the existing cables to the south for approximately 320 m. It the turns north-east to cross the existing cable route and gas main before continuing south-east towards the Porthmadog Roundabout, which connects the A487 Porthmadog Bypass and High Street.

- After the Porthmadog Roundabout the route continues south-east towards Ysgol Eifionydd and its associated playground. At this location the replacement cables split into two sections, one set of cables turns north-east immediately north of Ysgol Eifionydd, crossing the existing cable route and A487 Porthmadog Bypass. The second set of cables also crosses the existing cable route and A486 Porthmadog Bypass but from a location 110 m east of Ysgol Eifionydd. The two sets of replacement cables cross the route of the gas main and then reconverge at a location immediately south of the Porthmadog No 37 bridleway.

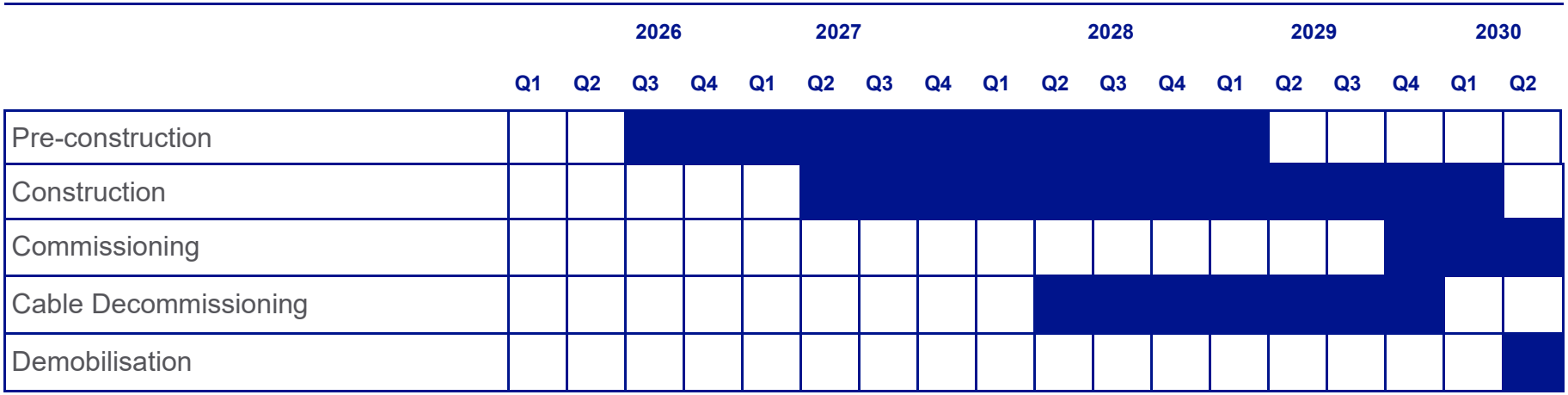
1.2.13 The route continues east crossing the Welsh Highland Heritage Railway and Ffestiniog Railway south of the Pen-y-Mount Junction Station, Porthmadog No 11 footpath, Porthmadog No 37 bridleway for a second time and Porthmadog No 10 footpath. The route passes along

	the northern boundary of Clwb Chawaraeon Madog Sports Club and fields before turning in a south-easterly direction towards the A487 Porthmadog Bypass. • The route then crosses the A487 Porthmadog Bypass, Cambrian Railway Line, and the Afon Glaslyn on a curve over a distance of approximately 850 m. This section of the route would intersect the Glaslyn SSSI and Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC. At the end of the curved section of route, the route would continue in a north-east direction before terminating at the new Minffordd CSEC, north-west of Minffordd.
Crossings	The following features would be crossed by the cables: • 18 drainage ditches/watercourses at various locations • Roads (A498, Porthmadog Roundabout, junction between A487 Porthmadog Bypass and High Street, A487 Porthmadog Bypass, and A487 Porthmadog Bypass); • PRoW (Porthmadog No 6 footpath and NCN Route 8, Porthmadog No 11 footpath, Porthmadog No 37 and No 10 bridleways); • Public Open Space (Bound by the A487 Porthmadog Bypass to the north and High Street to the west); • Bodawen Playground; • School playing field (Ysgol Eifionydd Secondary School, south-east of the Porthmadog Roundabout); • Railway (Welsh Highland Heritage Railway and Ffestiniog Railway); and • Afon Glaslyn.River.
Garth CSEC	• All the infrastructure in the Garth CSEC compound would be removed to a depth of 1 m, including underground services, foundations, earthing and platform granular material, and the area would be reinstated. Landscaping works would include woodland, woodland edge, scrub and grassland planting.
Minffordd Tunnel Head House (THH) and CSEC	• The proposed Minffordd CSEC will be constructed on land of which part was previously identified for landscape works to the north of the consented EVIP Minffordd THH. • The Minffordd CSEC works will include new foundations, cable sealing end structures, high voltage plant and steel works and earth mat.

The Proposed Works are planned to be carried out over a period of approximately 36 months from the start of 2026 to the end of 2029. Access to the site will be granted 01 July 2026, to

install main compound with some vegetation clearance and later in 2026 Bellmouth accesses will be provided. Construction activities have been summarised below:

Table 1-2 Construction Programme



- Pre-construction – site mobilisation, management plans, procurement, design, notices, ecological mitigation and vegetation clearance.
- Construction – compounds (main and construction), temporary and permanent accesses, haul roads, HDD compounds, crossings, duct and cable installation, Wern and Minffordd CSECs.
- Commissioning of the proposed cables.
- Cable decommissioning – removal of the existing 132 kV and 400 kV cables.
- Demobilisation - removal of all temporary structures, construction compounds, fencing and equipment, reinstatement of topsoil and landscape.

1.3 Purpose of Outline Construction Environmental Management Plan

1.3.1 This document presents the approach and application of environmental management and mitigation for the construction of the Proposed Works. The Outline CEMP aims to ensure that adverse effects on the environment and local communities, from the construction phase of the Proposed Works, are minimised.

1.3.2 This Outline CEMP has been prepared in accordance with the mitigation measures identified in the Environmental Statement and in accordance with National Grid's Environmental Management System (EMS) to reduce the adverse effects of the Proposed Works on the environment during the construction phase.

1.3.3 A detailed CEMP will be developed adopting all requirements laid-out in this Outline CEMP.

1.4 Objectives

1.4.1 The objectives of the CEMP are to:

- Provide a mechanism for ensuring the delivery of mitigation measures, to reduce environmental effects identified in the environmental assessment phase;
- Ensure compliance with legislation and identify where it will be necessary to obtain authorisation from relevant statutory bodies;
- Provide a framework for compliance auditing and inspection to ensure the agreed environmental aims are being met; and
- Ensure a prompt response to any non-compliance with legislative and planning conditions, including reporting, remediation and any additional mitigation measures required to prevent a recurrence.

1.5 Supporting Plans

1.5.1 This Outline CEMP references a range of supporting documentation including a series of subject specific management plans for specific environmental topics and the environmental management measures that have been identified as mitigation requirements within the environmental assessment.

1.5.2 The following supporting plans will be developed to set out in detail the management systems, procedures, and approaches that will be implemented during construction comply with the Outline CEMP. These subject specific management plans shall be incorporated within the detailed CEMP:

- Site Waste Management Plan (SWMP);
- Materials Management Plan (MMP);
- Soil Management Plan (SMP);
- Dust Management Plan (DMP);
- Outline Construction Traffic Management Plan (CTMP);
- Landscape and Ecological Management Plan (LEMP);
- Biosecurity Management Plan (BMP);
- Pollution Prevention Plan (PPP);
- Water Management Plan;
- Flood Evacuation Plan (FEP);
- Pollution Incident Response Plan (PIRP);
- Construction Phase Safety, Health and Environmental (SHE) Plan;
- Emergency Response Plan (ERP);
- Health and Safety Plan (HSP); and
- Construction Logistics Plan (CLP).

1.6 Structure of the Outline CEMP

1.6.1 Chapter 2 of this Outline CEMP provides information on general environmental management procedures and conformance, roles and responsibilities (including a summary of the specific management plans to be produced by the Contractor) and compliance with legislation and consents.

1.6.2 Chapter 3 describes the environmental baseline, potential impact and industrial best practices to overcome any potential impacts during construction.

1.6.3 Chapter 4 describes the site-specific environmental management measures (as recommended in the Environmental Statement) that will be implemented during construction.

2. ENVIRONMENT MANAGEMENT

2.1 Conformance with Corporate and Project EMS

2.1.1 National Grid take their responsibilities for Environmental Sustainability very seriously. As a minimum, National Grid will meet compliance obligations but will aspire to world class performance.

2.1.2 National Grid maintain an Environmental Management System (EMS) to provide a framework within which to manage and reduce their effects on the environment. The EMS is accredited to ISO14001:2015. National Grid's Environmental Sustainability Policy is provided in **Appendix xx.**

2.1.3 The EMS sets out the overall processes for:

- Environmental responsibilities;
- Identifying environmental aspects;
- Setting and achieving environmental objective and targets;
- Controlling environmental impact;
- Meeting the conditions of environmental consents and permits; and
- Preparing and responding to environmental emergencies and incidents.

2.1.4 The Contractor will prepare their own project-based EMS in accordance with National Grid's EMS prior to construction commencing. The Contractors' EMS will detail their framework for managing the environment. National Grid will approve the Contractor's EMS prior to construction.

2.1.5 The Contractors' EMS will address:

- The environmental aspects identified in the Environmental Appraisal and Outline CEMP;
- Compliance with environmental consents and permits;
- Overall compliance with environmental legislation, approved codes of practice and industry best practice;
- Compliance with the detailed CEMP, including roles and responsibilities;
- Monitoring and review arrangements;
- Emergency procedures that are defined and adopted; and
- Appropriate training and information for personnel.

2.2 Conformance with Planning Conditions

2.2.1 . National Grid Electricity Transmission plc (NGET) is submitting planning applications under the Town and Country Planning Act 1990 (TCPA) to Gwynedd Council for the

construction and operation of developments which comprise parts of the Pentir to Trawsfynydd Reinforcement Project (the 'Project'). The Planning Application will allow for construction compounds associated with these works.

2.2.2 Any conditions imposed through the planning system will be appropriately discharged at the relevant stage of the Proposed Works by the Contractor.

2.3 Compliance with Legislation, Standards and Guidance

2.3.1 Once developed the detailed CEMP will be kept under review and updated as required as a result of new or amended legislation, standards and National Grid guidance and issued to its Contractors.

2.4 Consent and Licenses

2.4.1 A number of sections of this Outline CEMP reference consents, permits and licences that will be required during construction. A Consents Register will be maintained by the Contractor's Environmental Manager which will document all existing consent conditions, record all new applications made and the status of the applications.

2.5 Roles and Responsibilities

2.5.1 Establishing roles and responsibilities on site is important to ensure the successful construction of the Proposed Works, including the implementation of including the implementation of the detailed CEMP.

2.5.2 The responsibilities of the personnel who will be responsible for implementing, monitoring, responding to, and updating the detailed CEMP are described at **Table 2-1**.

Table 2-1: Responsibilities of the Contractor

Role	Responsibility
Project Manager	• Overall responsibility for ensuring conformance with the Outline CEMP; and incident investigation.
Safety, Health, Environment, Security and Quality (SHESQ) Manager	• Reviewing risk assessments and method statements (RAMS); • Manager of the Safety, Health and Environment (SHE) Plan; • Reviewing, updating and issuing the detailed CEMP; • Incident investigation; • Liaison with the emergency services; • Site inspection; • Reviewing applications for environmental consents and permits; and • Sensible monitoring.
Environmental Manager	• Ensure management plans are implemented; • Oversee environmental mitigation;

	• Site inspection; • Preparing and submitting applications for environmental consents and permits; • Maintaining a consents register; • Liaison with third parties and licensing authorities; • Organising environmental surveys; and • Progress monitoring.
Ecological Clerk of Works (ECoW)	• Oversee ecological mitigation works.

2.5.3 Prior to construction commencing, management plans shall be prepared as detailed in **Table 2-2.**

Table 2-2: Management Plans to be prepared

Management Plan	Description
Construction Environmental Management Plan (CEMP)	Details the environmental mitigation measures that will be implemented during each stage of the construction works and will be in accordance with this Outline CEMP.
Contractor Environmental Management System (EMS)	Details the framework for managing the environment.
Pollution Incident Control Plan (PICP)	Identifies how the risk of pollution due to construction works, materials and extreme weather events will be controlled and identifies the remedial actions in the event of an incident.
Construction Phase Safety, Health and Environmental (SHE) Plan	Details relevant safety, health and environmental information relating to all construction activities.
Site Waste Management Plan (SWMP)	Sets out details developed from the Outline CEMP to identify site-specific measures for the collection, segregation, treatment and disposal of waste.
Emergency Response Plan (ERP)	Describes the procedure to be followed in the event of an emergency.
Water Management Plan	Identifies drainage arrangements to ensure that surface water runoff-off (i.e. volume, rate and quality) during the construction phase will be sustainably managed throughout the extent and duration of all construction activities.

2.5.4 The plans will be made available to any person working on the Proposed Works.

2.5.5 Any identified environmental issues that arise either before or during the construction of the Proposed Works will be reviewed at the inaugural and subsequent regular meetings held by the Contractor. Where necessary, toolbox talks will be included in the Daily Briefing / Point of Works Risk Assessment (PoWRA) held by the Contractors to inform the construction staff of any environmental concerns and any changes to the plans.

2.5.6 The Contractor shall ensure that a Considerate Constructors Scheme will be in place to ensure that everything is done, where practicable, to reduce the effect on the environment and this will include awareness-raising, through toolbox talks.

2.5.7 The Contractor will ensure that all staff, including sub-contractors are trained and competent in the management of environmental impacts to a level that is appropriate to their role.

2.5.8 National Grid will convene regular meetings with the Consultees. These will be open discussions and will be attended by engineering and environmental staff from WSP/National Grid. The Contractor shall also liaise closely with Natural Resources Wales (NRW) and other key stakeholders throughout the construction phase of the project.

2.6 Environmental Procedures

Audits and Inspections

2.6.1 The Contractor shall undertake weekly site inspections, where appropriate, which will include monitoring conformance with the Outline CEMP. Daily assessment forms will be completed during the daily checks. Checks on equipment will be undertaken to reduce the risk of incidents occurring (for example oil leaks). As a minimum the following equipment and receptors will be inspected:

- Fencing,
- Waste storage facilities;
- Oil separators;
- Chemical storage facilities;
- Bund integrity;
- Foul water storage facilities;
- Silt traps;
- Drainage ditches and watercourses or other nearby environmental receptors;
- Storage vessels (including pumps, gauges, pipework and hoses);
- Secondary containment (for example, secondary skins for oil tanks);
- Spill response materials;
- Equipment with potential to leak oils and other liquids, for example, compressors and transformers; and
- Signage, fencing and condition of any diverted Public Rights of Way and associated temporary bridges.
- Daily risk assessment forms;
- Faults and defects to be identified and rectified; and
- Data for performance monitoring.

2.6.2 Contractor shall carry out weekly inspections jointly with National Grid. The objective of these weekly inspections to verify and monitor contractors daily site inspections.

2.6.3 Environmental performance data (potential ground gas accumulations, groundwater, etc.) will be collected and collated into the SHE Plan by the Contractor.

2.6.4 Immediate action including ceasing of all works, if necessary, will be taken should any significant incidents or non-conformance with the Outline CEMP be found during inspection.

2.6.5 All monitoring reports will be made available to statutory and non-statutory bodies on request subject to General Data Protection Regulation (GDPR).

Incident Procedure

Pollution Incident Control Plan (PICP)

2.6.6 The Contractor shall provide and maintain a PICP which will detail their response in the event of any incident on site, which will include details on how incidents and adverse environmental effects are managed describe the procedure to be followed in the event of an incident (in accordance with the 'Incident Response' procedure below);

- Describe the procedure for the notification of appropriate emergency services, authorities and personnel on the construction site;
- Describe the procedure for the notification of relevant statutory bodies, environmental regulatory bodies, local authorities and local water and sewer providers;
- Provide maps showing the locations of local emergency services facilities such as police stations, fire authorities, medical facilities, other relevant authorities, such as NRW and also the address and contact details for each service and authority;
- Provide contact details for the persons responsible on the construction site for pollution incident response;
- Provide contact details of a competent spill response company which can be contacted at short notice for an immediate response;
- Ensure that site drainage plans, and flood risk management plans are available on site and are kept up-to date; and
- Ensure staff competence and awareness in implementing plans and using pollution response kit.

Incident Response

2.6.7 The Contractor shall adequately resource and maintain an Environment Incident Response Team for immediate response and attendance at environmental incidents or aspects. Out of hours contact names and telephone numbers for the Environment Incident Response Team shall be made available to the Project Manager.

2.6.8 All incidents associated with the Proposed Works including environmental incidents will be reported and investigated using the PICP.

2.6.9 The following procedure will be followed in the event of an incident and will be detailed further in the PICP:

- Related works will stop;

- The Environmental Manager and SHESQ Manager will be contacted;
- The size of the incident will be assessed;
- If the incident is controllable by staff on Site, remedial action will be taken immediately in accordance with the PICP;
- If the incident cannot be controlled by the staff on Site, emergency assistance will be sought;
- The appropriate enforcing authority will be contacted and informed, as appropriate including:
    - NRW for incidents affecting rivers, groundwater, marine environment, major emissions to atmosphere and protected species;
    - The local sewerage undertaker for incidents affecting sewers; and
    - The Local Authority Environmental Health Department for incidents that could affect the public or other assets.

2.6.10 Following the control of an incident, below steps will be taken:

- The Project Manager and SHESQ Manager will instigate an investigation into the occurrence of the incident;
- The findings will be sent to the appropriate enforcing authority where necessary; and
- An action plan will be prepared to determine why the incident occurred and whether any modifications to working practices are required to prevent a recurrence. If necessary, the Outline CEMP, PICP and SHE Plan will be updated (and any other plans as appropriate) and all workers will be notified.

Training

2.6.11 The Contractor will ensure that all site personnel and sub-contractors are aware of their responsibilities with respect to the detailed CEMP and its appropriate implementation.

2.6.12 All staff, site visitors and delivery drivers will receive a relevant and proportionate project induction by the Contractor to ensure they are aware of site hazards and health, safety and environmental management requirements. Site staff will be briefed daily by the Contractors prior to work commencing. Site-specific risk assessments will be carried out to ensure the risk strategy of the frequently changing workplace remains relevant.

2.6.13 Where required, environmental training commensurate to the work task, work location and work phase, will be provided by the Contractor.

2.6.14 Toolbox talks will be given to site personnel with information provided to the workforce to ensure that staff are aware of environmental issues and how to manage them in accordance with the detailed CEMP.

3. ENVIRONMENT MANAGEMENT OF SITE OPERATIONS

3.1 Introduction

3.1.1 This chapter of the Outline CEMP describes the environmental management measures that will be implemented during the construction of the Proposed Works to minimise adverse effects on the terrestrial and aquatic environment. These are based on current best practice guidance, Guidance for Pollution Prevention (GPP) documents[3], and mitigation measures as identified during the Environmental Appraisal process.

3.2 General

3.2.1 The Contractor will set up and maintain a register with details of consents, permits and licences required for the Proposed Works.

3.2.2 The Contractor will prepare and implement appropriate measures to control the risk of pollution due to construction activities, materials and extreme weather events.

3.2.3 The Contractor will investigate and provide a report to the Applicant in the event a pollution incident does occur, including the following:

- A description of the pollution incident, including its location, the type and quantity of contaminant and the likely receptor(s);
- Contributory causes;
- Adverse effects and the measures implemented to mitigate adverse effects; and
- Recommendations to reduce the risk of reoccurrence.

3.2.4 The Contractor will consult with the relevant organisations, statutory bodies and other relevant parties when preparing response measures and provide Suitable Experience Personnel (SEP) to monitor and manage works for which they are responsible.

3.2.5 The Contractor will have an Environment Management System (EMS) certified to BS EN ISO 14001.

3.2.6 Site inspections will be recorded in an environmental logbook, incorporating all environmental areas.

3.3 Working Hours

3.3.1 Generally, construction activities would be carried out from Monday to Friday 7am-7pm (including an hour set up and hour shut down) and 8am-6pm on Saturdays. Prior

[3] *Guidance for Pollution Prevention (GPPs) are a series of documents that provide environmental good practice and regulatory guidance in Wales, they are directly replacing a series of guidance documents called Pollution Prevention Guidelines (PPGs) that were administered by the Environment Agency. Where no GPP is yet available information provided within the relevant PPGs is still considered as best practice.*

agreement will be required from the Local Planning Authority for any works on a Sunday. During the summer months maximum advantage of day light hours will be used, however during the winter months working hours may be reduced to suit available daylight, for certain activities.

3.3.2 24-hour working will be required for critical activities such as HDD, cable pulling, jointing and terminating.

3.3.3 The following operations may take place outside the core working hours referred to above (exempt activities):

- Completion of operations commenced during the core working hours which cannot safely be stopped;
- Any highway works requested by the highway authority or requested by third parties such as network rail, police escorts etc;
- Security monitoring;
- The completion of works delayed or held up by severe weather conditions which disrupted or interrupted normal construction activities;
- Getting workers to and from the site, and activities such as briefings, setting to work, maintenance of equipment and machinery (excludes running engines) etc.; and
- Any surveys such as continuous baseline monitoring or ecology surveys which are required to take place at night.

3.3.4 HGV movements to/from the Glaslyn Works site will be occur throughout the day and will minimise the impact during the network peak hours. In the interests of road safety and reducing possible nuisance, where required due to sensitive receptors such as schools, HGV construction traffic will be subject to a timing restriction whereby vehicles will not be able to gain access into the proposed work area or depart from the proposed work area at certain times of the day. This may include, for example, peak congestion times on the LRN and local school drop off/pick up times where practical.

3.4 Lighting

3.4.1 Works outside of daylight hours are not expected other than at the HDD compound, construction compound, and during cable pulling, jointing, terminating and testing. Where lighting is required, it would be temporary task lighting with security and safety lighting required at construction compounds and along worker access routes to work sites. Light spill in the SSSI where night time working in the HDD compound is expected will be task lighting. No other designated sites or ancient woodlands will be impacted by night working.

3.4.2 Contractor shall provide and maintain all lighting for the construction works and the site welfare and site security cabins shall include low level lighting. Motion sensor lighting shall be used in areas of high security risk and access and egress. Construction lighting will follow BS EN 12464 (Parts 1 and 2) and guidance notes from the Institution of Lighting Professionals.

3.4.3 The following measures shall be applied by the Contractor at all times for any lighting provided at or above ground level:

- Lights installed will be of the minimum brightness and/or power rating capable of performing the desired function;
- Light fittings will be used that reduce the amount of light emitted above the horizontal;
- Light fittings will be positioned correctly and directed downwards;
- Direction of lights will seek to avoid spillage onto neighbouring properties; and
- Unnecessary lights will be switched off.

3.4.4 The Contractor will ensure that construction works will be restricted to daylight hours wherever practicable, to remove the need for artificial lighting, with focussed task-specific lighting provided where this is not practicable. Task-specific and fixed general lighting will likely be required in months with reduced daylight hours (early mornings and up to 7.00 pm for general workforce) to meet safety requirements. During construction, general low-level lighting for access will be required at the temporary construction compounds.

3.5 Security

3.5.1 The Contractor will provide as appropriate safe working conditions and security of the Construction Compounds and working areas. Site security will likely be posted at Centralised Compounds and will ensure an appropriate amount of lighting for the safe movement of personnel between welfare facilities. Construction lighting including security lighting will be provided in works areas and construction compounds. For further details on lighting, see section 3.4.

3.6 Welfare

3.6.1 The main construction compound would be to the west of the A498. It would be approximately 1.9 ha and would be split into two sections. The western section would comprise a laydown area and stockpiles; the eastern section would contain office buildings, health and welfare facilities, and vehicle parking.

3.6.2 No living accommodation shall be permitted on the construction site. Welfare facilities will be kept clean and tidy. The Contractor shall control rodents encountered on site and shall inform the local authority's pest control officer upon their discovery.

3.6.3 A Construction Traffic Management Plan (CTMP) will be prepared and will provide details of procedures for construction related traffic.

3.6.4 The public will be informed of the nature, timing and duration of particular construction activities and the duration of the construction works by newsletters and liaison with the Contractor.

3.6.5 Construction Compounds will be set out and managed so as to reduce impacts on access to/from private property and housing, and community facilities as far as practicable.

3.6.6 Clear signage and directions for any alternative routes and appropriate alternative diversions will be provided and diversions clearly publicised to maintain access. Signage to advertise that businesses are open and operating as normal will also be provided where required.

3.6.7 Community facilities will be consulted prior to construction where access arrangements will be directly affected. Traffic management systems and diversion routes will be put in place to maintain access to identified community facilities.

3.6.8 Vehicular access will be maintained at all times to community facilities which perform emergency service activities.

3.6.9 Construction activities taking place at public access parks, where practicable will be outside of the peak holiday seasons (e.g. peak summer season (July – August) as well as half terms and Easter holidays).

3.7 Unexploded Ordnance

3.7.1 A detailed Unexploded Ordnance (UXO) Threat and Risk Assessment has been undertaken for the Glaslyn Works Site. The Contractor shall undertake construction risk assessments and prepare an emergency response plan based on this information.

3.7.2 The majority of the area was considered low risk except for the area immediately north-east of Porthmadog to Afon Glaslyn which was assessed as medium risk from accidental dumping, land service ammunition and small arms ammunition due to World War 1 British military camps and rifle range.

3.7.3 Recommended mitigation comprises UXO emergency response plan, UXO safety awareness briefing and an on-call Explosive Ordnance Disposal engineer.

3.7.4 An Unexploded Ordnance (UXO) emergency response plan will be prepared and used during the production of all risk assessments and method statements.

3.8 Pollution Prevention/Storage and Plant

3.8.1 The Contractor shall demonstrate application of appropriate industry best practice and published guidelines to reduce pollution.

Table 3-1: Summary of Guidance Documents

Title	Details
PPG1: Understanding your environmental responsibilities	An introduction to pollution prevention including containment, waste and emergency planning.
GPP2: Above ground oil storage tanks.	This will advise the correct storage of oils across the Areas for permanent and temporary works, particularly within the proposed Sealing End Compound (SEC) and Contractor compounds to minimise the risk of causing pollution.
GPP5: Works and maintenance in or near water.	Given the proximity of several streams and ponds to the proposed areas of temporary and permanent works there is the potential to cause pollution, transfer non-native species and can impact on the bed and banks of a watercourse.
PPG 6: Working at construction and demolition sites.	An overarching document providing best practise principles and examples to be used as guidance on how to prevent pollution.

PPG 7: Safe Storage – the safe operation of refuelling facilities	Including guidance on small scale liquid refuelling of plant and machinery on site to prevent damage to surface waters, ground water, land and air.
GPP8: Safe storage and disposal of used oils.	The correct handling of waste during the construction period and during ongoing maintenance, including waste oils, must be safe and secure. Waste minimisation is the preferred option. Waste is regulated under the Duty of Care Regulations. Oil storage is regulated under the Oil Storage Regulations (see GPP2).
GPP13: Vehicle washing and cleaning.	Effluent and run-off from vehicle washing and cleaning can damage the environment and pollute rivers, streams, burns and ground water. It may be a legal requirement to arrange the collection and disposal of effluent and run off. If vehicle wash areas are required on site these should be managed appropriately.
/GPP19: Vehicles: Service and Repair.	The repair and maintenance of machinery and plant must be conducted in an appropriate location and properly managed.
PPG 20: Dewatering underground ducts and chambers	Protection of controlled waters during any dewatering works to avoid pollution.
GPP21: Pollution incident response planning.	Production of a plan will help to prevent or reduce environmental damage of such an incident occurs. A template is available to assist the production.
PPG 26: Safe Storage – drums and intermediate bulk containers (IBCs)	Good practice guidance for the safe storing and handling of small containers and IBCs to reduce the risk of pollution from sites to land, surface waters and ground water.

3.8.2 The Contractor shall make available a suitable quantity of pollution control equipment, including consumable items such as sorbent pads and sorbent granules or similar material. These materials shall be readily available at the Site always and a regular check during the weekly inspections made to see that they are available. Adequate provision shall be made to ensure that sorbent pads, booms and granules are kept dry prior to use.

3.8.3 The Contractor shall make provisions for access to more sophisticated containment/clean-up equipment such as sorbent booms, river booms etc.; which shall be 'boxed' and readily transportable at the construction base/site establishment and available for immediate dispatch to a spillage.

Storage and Handling Requirements

3.8.4 Details on the storage of waste will be provided in the SWMP. Facilities will be provided for the collection, segregation, treatment and disposal of solid and liquid waste.

3.8.5 The following measures shall be implemented on site for the storage of materials by the Contractor:

- All oil and diesel storage facilities will be at least 10m from any watercourse including surface water drains; and at least 50m from any borehole or well; Oil storage containers include:
    - Oil drums and fixed tanks;
    - Intermediate bulk containers (IBCs);
    - Mobile bowsers - containers designed to store and dispense oil that can be moved between locations but not under their own power; and
    - Some types of generator and transformer.
- Spill kits and drip trays will be provided for all equipment and at locations where any liquids are stored and dispensed.
- All static plant, such as pumps and generators, shall have integral drip-trays where possible or as a secondary requirement external drip trays, that are to be checked and emptied daily in accordance with the Pollution Prevention & Control Plan or Waste Management Plan. All drip trays for static plant refuelling and servicing shall be of sufficient size to retain 10% of the total volume of liquids being 'handled'. Interceptor drip trays shall only be used for oil-based products. They are ineffective for water soluble products.
- For larger items of Plant or mobile Plant such as side-booms, excavators etc, where the continuous. use of drip trays is not practical, the Plant shall undergo daily inspections by a competent person to check for defects, such as leaking hoses, interference by others etc. Records of inspections shall be maintained and held on file by the Contractor. Where defects are evident the item of Plant shall be removed from the Site immediately; and serviced or replaced as soon as possible.
- Storage facilities will be provided for solid materials, including waste soils, to prevent deterioration of the materials and their escape (via surface run off or wind blow);
- Storage facilities will be kept secure to prevent acts of vandalism that could result in leaks or spills; and
- All containers of any size will be correctly labelled indicating their contents and any hazard warning signs.

Fuel Tanks, Mobile Bowsers and Bunds

3.8.6 In accordance with the Control of Pollution (Oil Storage) (Wales) Regulations 2016 the following measures shall be implemented by the Contractor:

- Fuel tanks and mobile bowsers (and any other equipment that contains oil and other fuels) shall have secondary containment;
- Fuel fill pipes will not extend beyond the bund wall and will have a lockable cap secured with a chain;
- Any tap or valve permanently attached to a tank or bowser through which fuel can discharge, will be fitted with a lock;
- Where fuel is delivered through a pipe permanently attached to a tank or bowser:
    - The pipe will be fitted with a manually operated pump or a valve at the delivery end which closes automatically when not in use;

- The pump or valve will be fitted with a lock;
- The pipe will be fitted with a lockable valve at the end where it leaves the tank or bowser;
- The pipework will pass over and not through bund walls;
- Tanks and bunds will be protected from vehicle impact damage; and
- Tanks will be labelled with contents and capacity information.

- All valves, pumps and trigger guns will be turned off and locked when not in use.

3.8.7 Suitable precautions will be taken to prevent spillages from equipment containing small quantities of hazardous substances (for example, chainsaws and jerry cans) including:

- Each container or piece of equipment will be stored in its own drip tray made of a material suitable for the substance being handled; and
- Containers and equipment will be stored on a firm, level surface.

Drum Storage

3.8.8 In accordance with the Control of Pollution (Oil Storage) (Wales) Regulations 2016, where oil drums are over 200 litres it will be ensured that:

- Multiple drums and containers have suitable secondary containment with sufficient capacity to contain at least 25% of the total volume of the containers or 110% of the largest container, whichever is the greatest;
- Drum storage areas will be covered to prevent rainwater getting into bunds and drum pallets;
- Drums will be labelled and positioned such that leaks cannot overshoot the bund or drip tray wall; and
- All containers are stored securely when the site is unattended.

Flammable and Hazardous Substances

3.8.9 The Contractor shall ensure that all flammable and hazardous substances will be kept in accordance with the Control of Substances Hazardous to Health Regulations (COSHH) 2002 (as amended) and any substance specific safety data sheets, which would be expected to contain measures such as, within a secure bunded cupboard, cabinet or tank constructed of materials which are chemically resistant to its contents.

Deliveries and Dispensing

3.8.10 For deliveries and dispensing activities, it will be ensured that:

- Site-specific procedures are in place for bulk deliveries;
- Delivery points and vehicle routes are clearly marked;
- Emergency procedures are displayed, and a suitably sized spill kit is available at all delivery points, and staff are trained in these procedures and the use of spill kits;
- Suitable facilities (for example, drip trays, drum trolleys, funnels) meet the sites specific dispensing needs and are maintained and used;

- Tank capacities and current contents levels are checked prior to accepting a delivery to ensure that they are not overfilled;
- All deliveries are supervised throughout the delivery operation;
- Spill prevention equipment is used during dispensing activities; and
- All spillages occurring during dispensing and handling activities are cleared up and reported via the SHESQ Manager and are dealt with in accordance with Section 2.6 of this Outline CEMP.

Vehicles and Plants

3.8.11 The Contractor shall ensure:

- Vehicles and plant provided for use on the site will be in good working order to ensure optimum fuel efficiency and are free from leaks. Plant with integral bunding and/or drip trays will be specified;
- Throughout construction phase the Contractor shall ensure as a minimum that all vehicles that access the construction site shall carry an "Emergency Grab Pack"/ spill kit) for immediate use in the event of a pollution incident. All fuel bowsers and emergency vehicles shall carry larger spill kits including sorbent pads and sorbent material to deal with any small spillages, in addition to polythene sacks for gathering spent absorbents. The Contractor shall make provisions for access to more sophisticated containment/clean-up equipment such as sorbent booms, river booms etc.; which shall be 'boxed' and readily transportable at the construction base/ site establishment and available for immediate dispatch to a spillage;
- Any hired vehicles and plant will be checked on delivery and not accepted if they are not in good working order for example, leaking, excessive fumes, excessive noise and/or smoke;
- Vehicles and plant will be regularly maintained to ensure that they are working at optimum efficiency and are promptly repaired when not in good working order;
- Vehicles and plant will not park near or over drains;
- Employee- owned vehicles will not be driven or parked in construction areas unless authorised to do so;
- Fuel/ oil refilling of vehicles and plant will be carried out on hardstanding using drip trays and not over or near drains, or, where this is not reasonably practicable, drip trays and/or drain covers will be used to reduce the risk of spills;
- Vehicles and plant will not be overfilled with fuel; and
- Plant containing oils will be inspected daily and maintained to both prevent and identify leaks.

Road Sweeping

3.8.12 Road sweeping will be undertaken as required to remove deposits of silt from roads and reduce the risk of silt being washed into surface water gullies and watercourses. The frequency of road sweeping will be based on the risk involved with the on-going activities.

3.9 Material/Resource and Waste Management

3.9.1 One Category 1 and one Category 2 Aggregate Safeguarding Areas were identified within the Glaslyn works site. Best working practices and measures to manage the wastes produced during the construction phase of Proposed Works have been provided below.

3.9.2 A SWMP will be prepared for the Proposed Works. The SWMP will adhere to all relevant legislation and the Applicant's waste management procedures including technical guidance note (AMTE TG 010). The SWMP will set out the principles and procedures for the management of waste during the construction of the Proposed Works where appropriate, Materials Management Plans (MMP) will ne prepared, for each Principal Contractor and their associated works.

3.9.3 A series of site-specific mitigation measures recommended to be adopted during construction phase of Proposed Works have been provided in **Table 4-1**.

3.9.4 The Contractor will ensure that the application of circular economy principles will be followed, including:

- Design solutions to prevent the production of waste where feasible, and to send the waste produced for recovery where possible;
- Considering all phases of construction, operation and decommissioning in a lifecycle approach; and
- Identification of resource streams that might be considered by-products (i.e. not wastes, as per applicable legislation) and reused or recycled.

3.9.5 The Contractor will ensure that waste storage areas will be incorporated into the design with waste segregation measures are in place.

3.9.6 The Contractor will ensure that Identification and specification of material resources that can be acquired responsibly, in accordance with BES 6001 Responsible Sourcing of Construction Products.

3.9.7 The proposed works would aim to prioritise waste prevention, followed by preparing for reuse, recycling and other recovery and lastly disposal to landfill as per the waste hierarchy illustrated in **Figure 2**.

3.9.8 The following standard construction practices are relevant to this assessment:

Implementation of a 'just-in-time' material delivery system to avoid materials being stockpiled where possible, which increases the risk of their damage and disposal as waste.

Attention to material quantity requirements to avoid over-ordering and generation of waste materials.

Segregation of waste at source where practical.

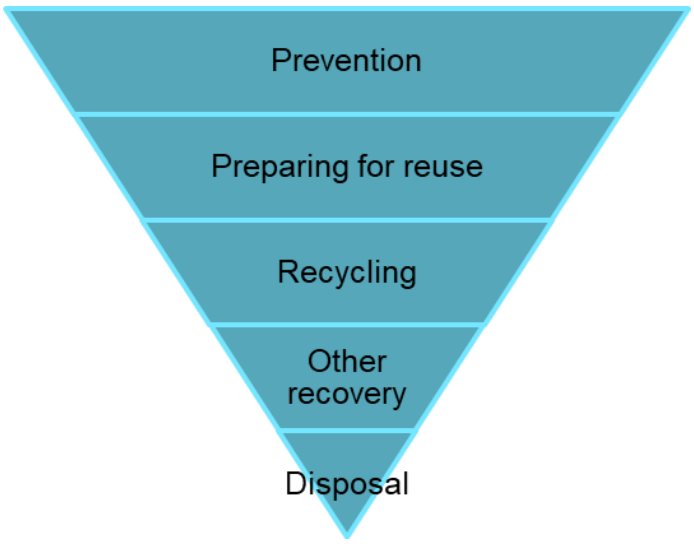


Figure 1 The Waste Hierarchy

3.10 Geology, Hydrogeology, Land Use and Agriculture (Soils)

3.10.1 It is anticipated that where the proposed works cross existing infrastructure (such roads, railway lines, and in the vicinity of residential and commercial properties) that Made Ground or Artificial Deposits are likely to be encountered. The existing cables are buried on average between 0.9 – 1.2 m below ground level (m bgl). Alluvium underlies the entire Glaslyn works site. There are two faults which cross the proposed works east of Porthmadog harbour.

3.10.2 There are two geological SSSIs close to the west of the Glaslyn works site. One Category 1 and one Category 2 Aggregate Safeguarding Areas were identified within the Glaslyn works site. There are five areas across the Glaslyn works site which are known to have underground mining or considered likely within or very close to the proposed works.

3.10.3 Contamination could be present in localised areas of Made Ground. Activities relating to trenching, foundation construction, earthworks and associated transportation activities and material storage have the potential to expose construction workers to contaminants in soil, dust, vapours or groundwater excavations. Potential impacts may result from the accidental leak of fuels, oils or chemicals from plant or from stored liquids. The potential mobilisation of existing contamination via the exposure of soils or increases in rainwater infiltration and run-off through changes in ground cover or in excavations or bulk earthworks and stockpiling.

3.10.4 The Proposed Works will lead to some permanent loss of land which will result in the potential for a permanent reduction in agricultural land area that can be farmed. The detailed CEMP will include a number of best practice techniques for the prevention of pollution, drainage and soil management which will also mitigate the potential effects to land use and agriculture.

3.10.5 There are eight receptors which would experience temporary land take: the Ysgol Eifionydd playing field, the Ysgol Eifionydd Secondary School car park, the Bodawen

Playground, the Porthmadog Esiteddfod Stone Circle Park, a home at the former Porthmadog Golf Range, the Porthmadog Caravan Site off Snowdon Street and the railway used by the Welsh Highland Heritage Railway and the Ffestiniog Heritage Railway. Agricultural land holdings may also experience temporary land take. The receptors would be closed for approximately 8 weeks. Compensation will be paid for the loss of service appropriate to when the works can be done.

3.10.6 A series of site-specific mitigation measures recommended to be adopted during construction phase of Proposed Works have been provided in **Table 4-1**.

Ground Investigation

3.10.7 An intrusive ground investigation of targeted areas of the Glaslyn works site will be carried out, as part of the embedded mitigation measures, in accordance with the relevant guidance and legislation including BS 10175:2011 and Land Contamination Risk Management (LCRM).

3.10.8 If areas of the Glaslyn works site are shown to pose a risk to infrastructure in contact with the ground, mitigation measures would be identified and implemented.

Contaminated Land

3.10.9 A method statement will be prepared for dealing with potential contamination being present during construction. The method statement will be informed by proposed ground investigation works, agreed with the regulatory authorities (including the Local Authority and NRW) and prepared before ground works start. It is anticipated that this will be a condition of the grant of planning permission.

3.10.10 Potential impacts specific to construction workers (and any adjacent site users) during the construction phase would be controlled and mitigated by the following measures and through working in accordance with CIRIA C811:

- Measures to minimise dust generation and run-off.
- Provision of Personal Protective Equipment (PPE), such as gloves, barrier cream, overalls etc. to minimise direct contact with soils.
- Provision of adequate hygiene facilities and clean welfare facilities for all construction site workers.
- Monitoring of confined spaces for potential ground gas accumulations, restricting access to confined spaces, i.e. to suitably trained personnel only, and use of specialist PPE, where necessary.
- Preparation and adoption of a site and task specific health and safety plan as is required under Health and Safety legislation.

3.10.11 If temporary stockpiling of excavated materials is proposed by the Contractor, then it shall be required to segregate obviously contaminated materials and stockpile these separately from materials that are uncontaminated and/or suspected of being uncontaminated until verification testing has been undertaken. The Contractor shall stockpile materials displaying obvious signs of contamination on an impermeable surface and prevent leaching of contaminants to ground and water. The Contractors method for handling and stockpiling contaminated materials on site (including for example, containment measures, such as bunding, membranes, temporary drainage, and alternative pollution prevention methods) shall be forwarded to the Project Manager for approval prior to the commencement of such works.

3.10.12 The permanent storage of contaminated materials on site shall not be permitted.

3.10.13 The Contractor will ensure that:

- Good hygiene practices are implemented to reduce risk to human health in areas of known contamination;
- Work will stop in the vicinity of any previously unidentified contamination encountered until the nature and concentration of the contaminant(s) are determined and appropriate risk control measures implemented;
- Clay bungs or other vertical barriers will be constructed within trench excavations where deemed necessary to prevent the creation of preferential drainage pathways or to prevent the creation of preferential migration pathways for contaminants (where suspected); and
- Guidance on the assessment of risks from potentially contaminated land will be followed in line with the Model Procedures for the Management of Land Contamination (CLR11).

3.10.14 The contaminated land assessment as detailed in Chapter 7(Geology, Soils and Contaminated Land) of the ES identifies the potential residual impact relating to the hazardous accumulation of ground gas. The Contractor shall undertake suitable ground investigation to ascertain the ground conditions at the Proposed Works areas including the assessment of soil conditions and a suitable programme of gas monitoring to ascertain the gas regime (see **Sections 3.10.7** and **3.10.8**). The investigation should also include the assessment and potential remediation of contamination encountered.

3.10.15 Any waste materials generated as a result of the Proposed Works will be disposed of satisfactorily by registered waste carriers and in accordance with Section 34 of the Environmental Protection Act 1990 and NRW relevant guidance on waste management. Uncontrolled disposal or discharge of waste is strictly forbidden, and compliance of all activities related to the management of waste with all existing local laws and regulations shall be assessed and assured by the subsidiary.

3.10.16 Acute exposure to potential contamination will be mitigated through normal working practice using appropriate Risk Assessment Method Statement (RAMS) and use of standard PPE and hygiene best practice. Where contamination is suspected, construction workers will be provided with appropriate PPE or Respiratory Protective Equipment (RPE) (over and above the standard PPE) to prevent direct contact. Earthworks will be completed in accordance with a Contaminated Land: Applications in Real Environments (CL:AIRE) compliant Materials Management Plan (MMP) to ensure re-used material does not present a risk to human health or the environment and complies with UK waste legislation regulations. An earthworks specification will be produced that will include protocols for testing and limiting values to ensure that imported materials are suitable for their intended use in terms of their chemical quality. stion or inhalation of potential soil or groundwater contamination.

3.10.17 Incorporation of a temporary surface water drainage strategy will limit any contaminated run-off entering surrounding surface watercourses.

3.10.18 New service trenches and the drainage system will be designed to prevent the migration of contaminants if identified.

3.10.19 If, during the trenched ploughing, unexpected contamination is encountered, the open trench will be lined in order to inhibit water percolation and subsequent leachate generation.

3.10.20 An inspection and discovery strategy will be devised and agreed with the regulatory authorities (including the Local Authority and NRW) if required, for implementation during the construction works should unexpected contamination be identified.

Use of Drilling/Support Fluids

3.10.21 Drilling fluids shall be limited to either clean water or water-based muds with inert and non-toxic additives only. The Contractor must be able to demonstrate that any drilling fluids/additives shall be acceptable for use on the project by the prevailing Environmental Regulator (i.e. NRW). The Contractor to supply details of all such additives to the Environmental Regulator for their acceptance.

3.10.22 Any facilities for the storage of oils, fuels or chemicals will be sited on impervious bases and surrounded by impervious bund walls. The volume of the bunded compound should be 110% of the capacity of the tank, all filling points, gauges, vents and sight glasses will be located within the bund. Associated pipework should be located above ground and protected from accidental damage. All filling points and tank overflow pipe outlets will be detailed to discharge downwards into the bund and refuelling will be supervised at all times, preferably on an impermeable surface. This system will reduce the potential for the addition of new contaminants to the existing baseline environment (e.g., spill or leak).

3.10.23 Where practicable appropriate drainage at the proposed infrastructure will be implemented to prevent contamination migration into and then via any trench fill where required.

Soil Management Measures

3.10.24 Materials excavated during construction will be re-used on-site where possible. Whilst the approach will need to be confirmed by the construction works contractor, this typically involves the preparation of a plan for materials management following the protocols within the Contaminated Land Application in the Real Environment (CL:AIRE) Definition of Waste: Development Industry Code of Practice to ensure that excavated materials are re-used appropriately, sustainably and remain outside the waste hierarchy. Materials which need to be removed from the Glaslyn works site will be disposed of to an appropriately permitted facility. The materials management plan will be prepared along with a qualified person declaration to CL:AIRE prior to the construction works commencing.

3.10.25 Any material imported to the Glaslyn works site, such as for supporting foundations, will be natural quarried stone or, if recycled, the material will undergo chemical testing. The suite of contaminants and site use criteria will be agreed with regulatory authorities, in order to demonstrate that the material is suitable for use on the Glaslyn works site and does not pose a risk to human health or the environment.

3.10.26 There is potential for asbestos to be present in Made Ground within the Glaslyn works site (albeit low). Any Made Ground found to be contaminated with asbestos will require suitable management if it is to be retained on-site or removed (in line with the CAR 2012, and CAR-SOIL 2016). As asbestos only presents a risk if it is disturbed, it is considered that the highest risk would be during the construction stage of the Proposed Works. An asbestos management plan will need to be prepared by a suitably competent person before carrying out works involving asbestos and include methods to be used to prevent or reduce exposure to asbestos and clearly describe how disturbance and spread of asbestos will be minimised or prevented.

3.10.27 During construction the principal impacts relate to the potential for contamination of soils or controlled waters through spillages during construction and damage to soils through construction activities and excavation works. The Contractor will follow DEFRA guidance (in particular, DEFRA Code of Good Agricultural Practice for the Protection of Soil, 1998) and will include, but not be restricted to, the following measures, where required:

- Construction traffic will be restricted to operating on the designated access roads and not on unprotected soils;
- Topsoil stripping will be restricted to the extent of the permanent and temporary elements of the Proposed Works (where required);
- Appropriate geotextile membranes, wooden matting or aluminium trackways will be used over particularly sensitive areas;
- In peaty and soft saturated clay soils, where the use of geotextile membranes is not appropriate, wheeled vehicles may be fitted with low ground pressure bearing pneumatic tyres to allow a greater distribution of weight;
- Soil loosening techniques such as deep-tine cultivation will be used to break up any compaction which has occurred;
- Subsoil and different superficial deposits will be stored separately to prevent mixing and will be reinstated in reverse order of excavation;
- Topsoil and subsoil movements will only be undertaken in suitable conditions, for example, when it is not too wet;
- Soil stabilising methods will be undertaken to reduce the risk of erosion, the creation of leachate and potential water quality issues; early re-seeding of the reinstated ground will be undertaken to help re-establish and stabilise the structure of the topsoil;
- Soils will not be stockpiled within 10m of surface water features. Stockpiled soils will be protected by appropriate measures, for example, membranes, spraying or seeding to reduce the risk of windblown dust, surface water run-off and to reduce the risk of overland migration of silt and sediment to surface waters. Any potentially contaminated soils should be covered and stored on an appropriate impermeable surface material;

3.10.28 A buffer strip will be left along watercourse/ditch banks to prevent the sediment yield generated by the works to enter the river system. Silt and sediment control and trapping measures would be used as appropriate; and

- Construction will not be undertaken during extreme wet weather where it may lead to erosion of sediments or could increase the risk of flooding.

3.10.29 Any unexpected disused below ground tanks, structures and/or pipework/services encountered during construction that cannot be avoided will be appropriately decommissioned and removed (where necessary) by an appropriately qualified person as appointed by the Contractor.

3.10.30 Temporary installation or upgrade of existing access tracks for the Construction Compounds and work-fronts will be set up Options include provision of bog matts (where wet soil conditions are anticipated) and compacted gravel tracks (where road-going vehicles or heavy traffic is anticipated).

3.10.31 Any concrete used in below ground infrastructure will be selected based on the appropriate sulphate classifications.

3.10.32 A suitable remediation strategy will be produced following the additional Ground Investigation of point sources of contamination or if unexpected Made Ground is encountered during the construction phase. The remediation strategy will be approved by the Local Authority (FCC / NRW) prior to being implemented to mitigate unacceptable contaminated land related risks.

3.10.33 Hazardous materials will be stored in designated locations with specific measures to prevent leakage and the release of their contents. This will include a requirement for storage areas to be set back an appropriate distance from surface water features and drains to prevent any uncontrolled discharge (and take into consideration the positions of any groundwater abstraction wells), on an impermeable base with an impermeable bund that has no outflow and is of adequate capacity to contain at least 110% of the contents. Valves and trigger guns will be protected from vandalism and kept locked when not in use.

3.10.34 Only well-maintained plant and other equipment will be used during construction to minimise the potential for accidental pollution from leaking machinery or damaged equipment. Static machinery and plant are expected to be stored on hardstanding areas when not in use and, where necessary, to make use of drip trays beneath oil tanks, engines, gearboxes and hydraulics. Spill response kits containing equipment that is appropriate to the types and quantities of materials being used and stored during construction will be maintained within the Proposed Works site for the duration of the works.

3.10.35 A Soil Management Plan will be prepared and followed, consistent with guidance in the Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (or updated version thereof) and other relevant documents such as The Institute of Quarrying's Good Practice Guide for Handling Soils in Mineral Workings.

3.10.36 Where dewatering is required, a dewatering scheme will be developed prior to construction to demonstrate that there is an effective strategy to manage water arising from the operations and, where required, sufficient proposals to treat the water prior to controlled discharge. Any such assessment will consider the effects of any draw down or impacts on nearby abstractions or resources along with ground instability. Dewatering will be developed in consultation with NRW and other stakeholders if appropriate.

3.10.37 Additional mitigation measures include as follows:

- The mineral resource across the Glaslyn works site would not be sterilised by the Proposed Works or render the sites inaccessible for future use.
- Subsoil stockpiles would be stored on exposed subsoil, from which topsoil had been stripped, to avoid soil mixing. Soil storage would be as close as practicable to the point of excavation. Reinstatement would match local subsoil and topsoil depths.

3.10.38 A sump is to be installed at the site where the redundant cables will remain *in situ* to capture any residual oil from the cables which will be monitored annually.

Land use Mitigation Measures

3.10.39 Liaison with affected landowners will be undertaken with regard to identifying potential constraints and barriers to construction including providing temporary means of access to severed fields for animals and machinery.

3.10.40 Compensation as a form of mitigation will be paid to agricultural land holdings intersected by the Proposed Works. These measures will primarily be in the form of financial compensation, for example to allow animal feed to be bought in where loss of land makes that necessary.

3.10.41 The Contractor shall take all reasonable precautions to ensure that livestock is kept away from the construction zone and protected from dust, and excessive noise.

3.10.42 All land taken for the temporary works shall be reinstated back to its original condition upon completion of the main works.

3.11 Water Quality, Resources and Flood Risk

3.11.1 The Y Cyt/Nant Yr Afon Oer is a NRW Main River, originates in the western section of the proposed cable route near Penmorfa and flows through Porthmadog. The Afon Glaslyn is a NRW Main River that arises on the slopes of Yr Wyddfa (formerly Mount Snowdon) and drains southwards to the Irish Sea at Porthmadog. There are a series of ditches draining the agricultural land in the western sections of the Glaslyn works site. the bedrock geology underlying the Glaslyn works site is a Secondary B aquifer.

3.11.2 Temporary watercourse crossings, above ground joint bay link pillars, temporary stockpiles and construction compounds, and raised access tracks within floodplain areas have the potential to influence watercourse conveyance, runoff rates, flow pathways, and volumetric displacement of flood water. There is potential for accidental contamination entering watercourses from leakage or spillage of fuels and chemicals from stores, HDD works and vehicles onsite.

3.11.3 A series of site-specific mitigation measures recommended to be adopted during construction phase of Proposed Works have been provided in **Table 4-1**.

3.11.4 Appropriate industry best practice and published guidelines will be followed to reduce pollution and sediment movement during construction.

Surface Water Resources

3.11.5 The Contractor shall review the information in the Outline CEMP and the Environmental Appraisal and use it to develop a project specific Water Management Plan for the construction phase. Information in the Water Management Plan shall be updated to incorporate relevant findings from site investigations and any water quality monitoring. When developing the Plan, the Contractor shall refer to the following publications CIRIA C648- Control of Water Pollution for linear construction projects. Technical Guidance dated 2006 and the accompanying site guide (CIRIA C649).

3.11.6 No works (near, in, over or under) will be carried out within the vicinity of a Main river without technical environmental advice regarding the requirement for a permit (Flood Risk Activity Permit (FRAP)). This includes all HDD works under NRW Main Rivers. Works will only proceed once appropriate mitigation (within technical environmental advice and/or FRAP) has been installed and all conditions have been met.

3.11.7 The Contractor shall ensure that storage and handling of hazardous substances (including fuels) should not occur within 10 m of any inland freshwater or coastal waters, or within 50 m from a well or borehole. This includes the Afon Glaslyn and its associated

area of salt marsh, Y Cyt/Nant yr Afon Oer, and the network of drainage channels and ditches around Porthmadog.

3.11.8 A Pollution Prevention Plan (PPP) will be prepared to minimise the risk to surface and groundwater quality during construction, operation and maintenance.

3.11.9 A Pollution Incident Response Plan (PIRP) will be prepared to minimise and mitigate the magnitude of change on potential receptors. Where watercourses are not crossed via HDD, trenched crossings will be used. However, for all trenched crossings over pumping or fluming will be implemented to maintain the flow regime downstream of the crossing.

3.11.10 When documenting the Water Management Plan the Contractor shall do the following as a minimum but is not restricted to;

- List water treatment methods/technologies and identify which treatment methodologies are applicable for different conditions e.g. use in different soil types;

3.11.11 Have a system in place for separating, storing and disposing of clean water (for example water from dewatering wells if it has not come into contact with construction materials) and dirty water. Obtain any transfer or discharge licences associated with water discharges;

- Document areas at risk for water pollution from surface water runoff. Best practice is to annotate strip maps to do this;
- Rank the risk areas;
- Use strip maps to identify and document the specific location and design of mitigation required to deal with "worst case scenario" for each area at risk;
- Establish the requirement for and the position of water stops; and
- Construction activities may adversely affect the quality of surface water or ground water as a result of contaminated runoff, or spillages.

3.11.12 The Contractor shall take all necessary precautions to ensure that oil or other deleterious matter shall not enter any existing drainage system or water courses and shall not by his operations, pollute or injuriously affect any drainage systems, water supply, groundwater aquifers, streams, rivers or estuary. All liquids contaminated by oil or other deleterious matter shall be passed through approved interceptors to remove contamination.

3.11.13 The Contractor will ensure adequate management of surface water run-off (including volume and quality) and prevent pollution of controlled waters. Best practice measures to be implemented include:

- Where the Proposed Works interacts with existing hydraulic structures, every effort will be made to preserve these in their current form, or else these will be refurbished and/or reinstated accordingly and the appropriate consents obtained;
- Geotextile to be used on the ground in the immediate vicinity of watercourse/ drain crossings to reduce damage to the surrounding ground and vegetation and reduce erosion;
- Permanent surface water/ agricultural drains will be re-installed to reinstate any pre-existing field drainage systems to pre-construction condition;

- Dewatering and discharge of water will be carefully controlled to prevent the risk of sediment laden run-off entering watercourses;
- Water removed from terrestrial excavations will be treated in a suitable manner to avoid the passage of silt into local watercourses. If there is a requirement to discharge to surface water an Environmental Permit will be sought from NRW prior to undertaking such operations; no silty water will be pumped directly into any watercourse but to be allowed to settle out (for example, in settlement lagoons) or filtered (for example, using straw bales to filter out coarse particles) prior to discharge;
- Where settlement or filtering is not practicable or effective, alternative disposal options will be considered, for example discharge onto a grassed area (with consent from the landowner and following NRW consultation), and discharge to foul sewer (with consent from the local sewerage undertaker);
- If clean water is discharged into a watercourse, a baffle will be fitted to the discharge point to prevent disturbance of the watercourse bed;
- Watercourses will be protected from surface water run-off by using French drains, cut off ditches, grips, silt fences or bunds round the edge of watercourses. Numerous small, passive mitigation measures will be installed in preference to one large treatment system to prevent large-scale water build-up;
- Existing and new surface water drains will be kept clear of silt or weed build-up;
- Roads and hard surfaces will be kept clean, to prevent a build-up of mud and sediment that could contaminate surface water;
- All soils will be stored a minimum of 10m from watercourses and any potentially contaminated soil will be stored on an impermeable surface and covered to reduce leachate generation and potential migration to surface waters;
- Clay bungs or other vertical barriers will be constructed within trench excavations where deemed necessary to prevent the creation of preferential drainage pathways or to prevent the creation of preferential migration pathways for contaminants (where suspected);
- Ensure construction compounds, areas of storage (with the exception of limited quantities of uncontaminated topsoil) and parking bays are located outside of any Source Protection Zone 1 (SPZ1) and the discharge location of construction runoff is not directed into SPZ1;
- Ensure construction compounds, areas of storage (including topsoil where possible) and parking bays are located outside of any areas vulnerable to flooding;
- No refuelling or storage of hazardous materials within 10m of a watercourse or 50m of a well, spring or borehole;
- The detailed CEMP will contain pollution prevention measures to safeguard water quality in the Afon Glaslyn River during construction activities;
- Where appropriate, and if required, watercourses or drains will be crossed by temporary/permanent hydraulic structures at right angles to the watercourse using as short a distance as possible while avoiding flow obstruction in order to minimise land surface disturbance and to reduce the cross-sectional area of the

crossing. Temporary/permanent hydraulic structures (e.g. culverts/ flumes for crossings) would be appropriately sized, and construction timed, where possible, to coincide with periods of low flow. Temporary/permanent watercourse crossings will be implemented in accordance with the relevant Land Drainage Consent applications;

- All watercourse/ ditch crossing points would be visually inspected to ensure that construction (or otherwise) debris does not block the crossing point; and
- After re-grading of the working areas to reflect the original profile, a replacement drainage scheme would be installed, where appropriate, following discussions with the landowner/ occupier. The design of these drainage schemes should pay particular attention to the need to ensure that the drains do not act as new pathways to watercourses for sediment/contamination or cause flooding off-site.

Groundwater Compliance

3.11.14 It is the Contractor's responsibility to ensure compliance with the Groundwater Regulations 1998 (SI 2746) and other relevant guidelines for protection of groundwater.

3.11.15 In accordance with the Groundwater Regulations the Contractor shall implement procedures to:

- Prohibit the use of construction materials containing List I substances that come into contact with groundwater; and
- Control the use of construction materials containing List II substances that come into contact with groundwater by demonstrating that List II substances do not leach out such as to create groundwater pollution or otherwise prohibit their use.

3.11.16 Tests to demonstrate that listed substances do not leach out of construction materials may need to be conducted in order to satisfy NRW.

Other Discharges

3.11.17 Other effluents may be produced that need to be properly managed and controlled in order to prevent contamination of surface water or groundwater. As part of best practice measures, the Contractor will ensure that:

- Washing of equipment using detergent is carried out at commercial facilities only;
- Washing of vehicles and equipment without the use of detergent is only carried out at either commercial facilities, or at purpose-built wash stations where the water is contained for controlled disposal; and
- All foul effluent will be contained; and the foul effluent container will be subject to daily inspection and a maintenance and emptying schedule as recommended by the manufacturer. The effluent will be removed by tanker and disposed of at a licensed facility.

3.11.18 The Contractor shall not be permitted to make discharges of any kind to watercourses or sewers without the prior written consent of the appropriate authority and shall comply with all their requirements in respect of discharges. Requests for permission to discharge to watercourses or sewers shall be made by the Contractor to NRW, Welsh Water, their Agents, or other appropriate authorities. Discharges to ground via soak aways shall not be permitted under any circumstances.

3.11.19 The Contractor shall provide settlement tanks of sufficient capacity to ensure that discharge water meets standards required by NRW, Welsh Water, or their Agents.

3.11.20 Special measures will be required for areas where excavated material is stored. Any water within the excavated material and water run-off from the excavated material storage and transfer areas shall be passed through settlement tanks before disposal.

3.11.21 The Contractor shall manage all surface water from paved areas or roofs, which shall otherwise flow into the working area and shall ensure that surface run-off is not permitted to enter any excavation. Pumping shall be provided as necessary.

3.11.22 The Contractor shall record details of all existing drains within excavated areas and the drains shall be reinstated where necessary on completion of the Works.

3.11.23 The Contractor shall, whilst he is responsible for the care of the Works, maintain all interior surfaces of pipes and manholes free from any liquid or solid deposits and shall prevent any such deposits from.

Drainage

3.11.24 Land drainage may be encountered and adversely affected during construction activities. To minimise impacts on the drains, the following best practice measures will be implemented:

- The measures in Section 3.10 of this Outline CEMP (Soil Management) will be prepared in advance of construction to ensure protection, conservation and reinstatement of soil material, its physical and chemical properties and functional capacity for agricultural use;
- Following completion of construction operations all agricultural land will be fully reinstated to as near as practically possible to its former condition. Topsoil will be prepared and seeded using an appropriate seed mix or returned to previous cultivation;
- Permanent surface water/ agricultural drains will be re-installed to reinstate any pre-existing field drainage systems to pre-construction condition;
- Extended excavations will be arranged so as not to create preferential drainage pathways with the potential to cause flooding of lower land;
- Appropriate measures will be implemented such as the introduction of baffles or creation of sumps to reduce the risk of preferential drainage paths being created;
- Where drains are encountered they will be either repaired or diverted to ensure that preferential pathways are not created; and
- Ensure that all reinstated surfaces have the same runoff properties and are at the same elevation as existing as far as practically feasible.

Permitted Discharges

3.11.25 Discharges (including potentially uncontaminated surface water run-off) will require a permit from NRW (for discharges to controlled waters, including rivers, estuaries, other watercourses and soakaways) or the local sewerage undertaker (for discharges to sewer). A Transfer Licence may be required to discharge ‘clean’ groundwater from tunnel shafts to surface water systems. Discharges will not be made without prior

consent from NRW or sewerage undertaker. To ensure discharges are appropriately authorised, the following best practice measures will be followed:

- Consult with the appropriate consenting body before any discharge is required from the site and obtain a permit, or where a permit is not required, obtain written confirmation that one is not required;
- Ensure that any permitted discharge is sampled and analysed at the frequency specified in the permit to ensure compliance and that monitoring results are kept. More frequent analysis may be required if analytical results indicate that limits are being approached or exceeded;
- Ensure that the consenting body is advised if results indicate that limits are being exceeded and report the occurrence as an incident in accordance with the Outline CEMP. Take immediate steps to rectify the situation; check receiving water for pollution resulting from exceedance; and
- Carry out any remediation works necessary.

Flooding

3.11.26 A Flood Consequence Assessment (FCA) has been carried out (Flood Risk Assessment) as part of the Proposed Works as presented in **Appendix N** of the Environmental Statement. The FCA sets out mitigation measures as follows:

- The Contractor shall make use of existing flood risk information to help to safely plan and manage the construction phase works in these areas;
- During construction check local and national weather forecasts, and NRW website (https://naturalresources.wales/flooding/check-flood-warnings/?lang=en) to check the live flood warning map (which is updated every 15 minutes to show flood alerts and warnings). The five-day flood outlook can also be checked on the NRW website);
- Show consideration for potential of groundwater flood risk;
- The development of a construction phase drainage strategy that may need to include temporary attenuation storage, infiltration drainage, and sediment trapping techniques as appropriate and should be driven by source control techniques where possible;
- The monitoring of groundwater has been undertaken prior to construction. There may be a requirement to continue this monitoring during and following construction to:
    a) phase construction stage activities to avoid the need for significant groundwater de watering as required; and
    b) assess the impact of the underground assets on the local groundwater levels.
- The location of access and egress routes will be designed to avoid areas at risk of flooding, wherever possible;
- Following the completion of all construction works, the land temporarily used within the working area will be fully reinstated as near as practically possible to its former condition, and where possible all reinstated surfaces will have the same runoff properties and elevation as existing or as agreed with landowners

and stakeholders in advance (this will include the reinstatement of drainage ditches and existing culverts);

3.11.27 Where possible, the temporary elements of the Proposed Works will be located outside the flood zones, the areas at risk of surface water flooding and the areas at risk of groundwater flooding.

- Where possible, soils will be stored at least 10m away from watercourses, and outside of areas of floodplain. Where this is not possible, gaps will be provided in stored topsoil to prevent the impoundment of flood water (all year around); best practice measures will be applied where required to ensure that stockpiled soil will not be eroded/ transported by overland flow and will not enter any water bodies (such as berms, vegetated strips and silt traps will be included where required);
- Regular monitoring will be put in place to ensure that mitigation measures function as intended and check on any drainage systems to ensure flows are not impeded. This can take the form of regular visual inspections to check that watercourses have not become blocked by debris and should be used to trigger immediate remedial action in the event of debris accumulation;
- Geotextile will be used on the ground in the immediate vicinity of watercourse/drain crossings to reduce damage to the surrounding ground and vegetation and reduce erosion;

3.11.28 Where possible access roads / routes, parking bays, hardstanding areas (i.e. those that may be required for temporary access, maintenance or repairs) are laid at existing elevations and not raised compared to existing or surrounding ground levels.

3.11.29 A Flood Evacuation Plan will ensure that all personnel will be evacuated before a potential flood event. Details of evacuation plans would be developed prior to commencing construction and would detail the procedure to be followed once a flood warning is received:

- Evacuation of personnel from the working areas at risk of flooding- this is the primary safety consideration, and is the highest priority in the unlikely event that there is insufficient time to undertake the following activities;
- Making the site safe and prior to evacuation – this would include appropriate storage of equipment and materials, securing items within site compounds to prevent them being mobilised in flood water; and

3.11.30 Removal of critical plant and equipment from Flood Zone 3 – this may be removal from the haul roads or from the compounds and could include raising critical items above the design flood level or removing them from the floodplain completely to a suitable alternative compound. At construction stage, the Contractor would identify the need (or not) to remove equipment from working areas based on the flood warnings.

3.11.31 The Contractor will monitor conditions closely during heavy rain, especially regarding flood warnings issued by Natural Resources Wales (NRW). If there is an imminent risk of flooding, they will evacuate the area identified as being at risk. This will include amending construction activities so that they take place during periods of normal to low flow conditions to avoid conveyance-related flood risk effects.

3.11.32 Floodplain compensation will be implemented to account for volumetric displacement of flood water from raised temporary stockpiles, raised construction compound areas, raised joint bay link pillars and raised access tracks within floodplain areas.

3.12 Historic Environment

3.12.1 Historic Assets have been identified in close proximity to the Proposed Works, including a World Heritage Site located 70 m south-east, a Scheduled Monument located 98 m north-east, a Grade II listed building and registered park and garden located within the Glaslyn works site and other designated historical assets within 100m of the Proposed Works. The Proposed Works are located with Aberglaslyn, registered historic landscape.

3.12.2 Construction activities have the potential to impact upon the character and setting of the World Heritage Site, scheduled monuments, listed buildings, registered parks and gardens and historical landscape. Ground intrusive works have potential to truncate or remove previously unrecorded buried archaeological remains.

3.12.3 The Contractor shall minimise archaeological, and heritage impacts during construction in accordance with relevant legislation and guidance and as advised by the relevant authorities and statutory undertakers.

3.12.4 In summary mitigation measures include:

- It may be required to undertake a watching brief by a professional archaeologist during construction to observe groundworks and provide an opportunity for the archaeological investigation and recording of any deposits of significance which are exposed;
- In all instances where archaeological remains are identified the creation of a permanent record will be required, including public dissemination of the results prior to their removal; and
- Prior to construction, walkover surveys will be undertaken where necessary to allow historic assets to be avoided and/or recorded.

3.12.5 The scope of mitigation will be set out in a WSI and agreed with the Archaeological Advisor for Heneb once full details of the construction works have been agreed and prior to works commencing.

3.12.6 A series of site-specific mitigation measures recommended to be adopted during construction phase of Proposed Works have been provided in **Table 4-1**.

3.13 Traffic and Transport

3.13.1 Several roads on the local and strategic highway network have been identified as likely routes for traffic associated with the proposed works. These roads cover potential routes from the SRN and from local and regional population centres within a 30–45-minute drive time of the Glaslyn works site, which represents the expected catchment area for construction traffic.

3.13.2 The Glaslyn works site intersects several PRoWs and National Cycle Network (NCN) Route 8 crosses through the centre of the Glaslyn works site. To install ducts, there may be a requirement to temporarily divert the PRoW for a short duration while construction activities are underway. A more extensive diversion will be required for the NCN, in the form of a temporary surfaced track to the west of its current location, spanning the full extent of the Glaslyn works site.

3.13.3 The potential construction impacts associated with the proposed works include construction traffic increase, severance of communities, non-motorised user amenity,

fear and intimidation, road vehicle driver and passenger delay and road user and pedestrian safety.

3.13.4 Mitigation measures include traffic management where construction vehicles interact with the public road network, restricting the use of certain roads, restricting arrivals and departures to avoid peak traffic flow, implementing a Delivery Management System to control deliveries, encouraging car sharing. Following the implementation of embedded mitigation measures, impacts would not be significant at any of the assessed roads in the Study Area. Detailed mitigation measures have been provided in **Table 4-1**.

3.13.5 An Outline Construction Traffic Management Plan (CTMP) has been prepared for the Proposed Works and is available in **Appendix XX**. The detailed CTMP shall ensure that all traffic associated with the project's construction works operate in a safe and compliant manner at all times and shall be signed by the Contractor and the relevant highway authority.

3.13.6 Access locations have been selected to be located along routes that are suitable for the category of traffic proposed to use it. Accesses have been designed to accommodate the category of traffic to be served from each access. Visibility splays have been provided in accordance with TAN18 requirements and informed by speed survey data where relevant. Outline construction traffic routes have been selected to reduce, where possible, traffic effects on links that would be more sensitive to changes in traffic volumes.

3.13.7 The detailed CTMP shall ensure that all traffic associated with the project's construction works operate in a safe and compliant manner at all times and shall be signed by the Contractor and the relevant highway authority. The detailed CTMP shall include working procedures and measures to:

- Ensure the effects on local residents, properties, businesses and schools caused by construction traffic, where practicable, are kept to an absolute minimum;
- Maximise safety in all aspects of the project associated with the movement of traffic;
- Ensure all third-party traffic interfacing with the project are kept safe from the on-going works;
- Include clear liaison with the Local Authority regarding traffic caused by construction works;
- Identify suitable signage and traffic controls to be used for all access points; and
- Include a Driver Information Pack covering a variety of topics and providing information on the requirements of working on the project.; and
- Use of traffic marshals to manage HGV movements with local traffic and pedestrians/cyclists to minimise exposure for these groups to construction traffic.

3.13.8 A copy of the access route plans shall be provided to all suppliers and haulage operators by the Contractor when orders are placed to ensure that drivers are fully briefed on the required route to take. The supplier would be made aware that these routes are required to be followed at all times unless agreed or alternate diversions are in place.

3.13.9 Information regarding construction traffic activities and movements would be provided to the public. The means of communication would include online updates, letter drops, information boards and details of key contacts.

3.13.10 The Contractor will implement a Travel plan to include measures to reduce single occupancy car trips via a car sharing scheme and the use of minibuses to transport workers to compounds and access locations.

3.14 Air Quality and Emissions

3.14.1 Several sensitive receptors including residential properties, commercial properties and ecological receptors have been identified within 250m of the Proposed Works. Sections of Meirionnydd Oakwoods and Bat Sites SAC are in the Glaslyn works site, as are sections of the Ysbyty Bron y Garth SSSI. The Tyn-Llan SSSI is approximately 50 m north-west of an access road into the Glaslyn works site.

3.14.2 The source of potential Air Quality and Emissions effects during the construction phase includes construction dust emissions and site plant emissions. Earthworks, construction activities and track out are anticipated to have minor impact on air quality at identified receptors.

3.14.3 The Contractor shall carry out work in accordance with dust assessment and minimise air quality impacts from the construction works, any spoil transport systems installed and mitigation measures to reduce the effect of dust and emissions from construction activities.

3.14.4 A series of site-specific mitigation measures recommended to be adopted during construction phase of Proposed Works have been provided in **Table 4-1**.

3.14.5 The following mitigation measures are highly recommended by the IAQM and required by the Contractor to be adopted during the construction phase:

- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.
- Display the name and contact details of person(s) accountable for air quality and dust issues on the Glaslyn works site.
- Display the head or regional office contact information.
- Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the local authority. The level of detail will depend on the risk and will include as a minimum the highly recommended measures in this document. The desirable measures will be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real time PM10 continuous monitoring and visual inspections.
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.
- Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.

- Hold regular liaison meetings with other high risk construction sites within 250 m of the Glaslyn works site, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.

3.14.6 Undertake regular monitoring as required, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This would include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of the Glaslyn works site, with cleaning to be provided if necessary.

- Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.
- Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.
- Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the local authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.
- Plan site layout so that machinery and dust causing activities are away from receptors, as far as is possible.
- Erect solid screens or barriers around dusty activities or the Glaslyn works site that are at least as high as any stockpiles on site.
- Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers and scaffolding clean using wet methods.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.
    - Cover, seed or fence stockpiles to prevent wind whipping.
- Ensure all vehicles switch off engines when stationary - no idling vehicles.
- Avoid where practicable the use of diesel or petrol powered generators and use mains electricity or battery powered equipment.
- Impose and signpost a maximum-speed-limit of 15-mph on surfaced and 10-mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.

- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.
- Use enclosed chutes and conveyors and covered skips.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.
- Avoid bonfires and burning of waste materials.
- Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.
- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Re-vegetate earthworks and exposed areas or soil stockpiles to stabilise surfaces as soon as practicable.
- Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.

3.14.7 Only remove the cover in small areas (section-wise) during work and not all at once.

- Avoid scabbling (roughening of concrete surfaces) if possible.
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.
- Avoid dry sweeping of large areas.
- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.
- Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.
- Record all inspections of haul routes and any subsequent action in a site log book.
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).
- Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.
- Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permit.
- Access gates to be located at least 10 m from receptors where possible.

3.15 Noise and Vibration

3.15.1 There are multiple sensitive receptors (see Section 3.14) which have the potential to experience construction related noise and vibration effects. In addition, there are three footpaths and two bridleways within the Glaslyn works site, and NCN 8 runs through the centre of the Glaslyn works site.

3.15.2 Prior to commencement of work, the contractor will submit an application for prior consent to carry out noisy work under Section 61 of the Control of Pollution Act 1974 to demonstrate that noise and vibration has been minimised as far as reasonably practicable. The Section 61 application will set out the specific method of working, the actual working hours required, noise (and if necessary, vibration) monitoring locations, details of communication measures and the mitigation measures implemented to minimise noise and vibration impacts. As required by the Control of Pollution Act 1974, Best Practicable Means (BPM) will be employed and demonstrated through the construction, programme, the method used to construct the Proposed Works and noise (and vibration) predictions to the local authority in the Section 61 consent application. Should the contractor fail to follow the agreed methodology set out in the Section 61 application, the Local Authority will have the power to request the contractor to cease works and review methodology.

3.15.3 Measures to control noise as defined in Annex B of BS 5228-1 and measures to control vibration as defined in Section 8 of BS 5228-2 will be adopted where reasonably practicable. These measures represent BPM and will be implemented during construction works as presented below:

- All appropriate processes, procedures and measures will be in place to minimise noise before works begin and throughout the construction programme.
- Contractor to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2) which would form a prerequisite of their appointment.
- Noise and vibration will be controlled at source (e.g. the selection of inherently quiet plant and low vibration equipment) through a review of the construction programme and methodology to consider quieter methods and consideration of the location of equipment on-site and control of working hours.
- Modern plant that complies with applicable UK noise emission requirements will be used.
- Hydraulic techniques for breaking concrete will be used in preference to percussive techniques.
- Drop heights of materials will be minimised.
- Plant and vehicles will be sequentially started up rather than all together.
- Off-site pre-fabrication where reasonably practicable.
- Regular and effective maintenance by trained personnel will be carried out to keep plant and equipment working to manufacturer's specifications.
- All construction plant and equipment to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use.
- Loading and unloading of vehicles, dismantling of site equipment or moving equipment or materials around the Glaslyn works site to be conducted in such a manner as to minimise noise generation.

3.15.4 All vehicles used on-site shall incorporate reversing warning devices per Murphy Plant policy.

- Provision of information to the relevant local authority and local residents to advise of potential noisy works that are due to take place.
- Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use.
- Plant will always be used in accordance with manufacturers' instructions. Care will be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be carried out away from such areas.

3.15.5 Temporary barriers would be used to screen construction noise emissions as follows:

- At the compound to the west of the Welsh Highland Heritage Railway during all works.
- At Minffordd CSEC during enabling works.
- South of the haul road to the north of Maes Gerddi.

3.15.6 Temporary barriers will be set up close to the drilling rig to maximise their effectiveness at attenuating noise emissions. This barrier set up would completely screen the drilling rig from sensitive receptors. Additionally, other plant such as mixers, generators and

pumps can be similarly screened and a reduction in HDD noise of 10 dB at receptors would be achieved. Temporary barriers would sufficiently reduce HDD noise at sensitive receptors such that the 50 dB LAeq,T threshold would only be exceeded by up to 2 dB at two receptors.

3.15.7 Where practicable, HDD operations will be scheduled such that the specific tasks can be worked on and completed during core working hours. New HDD tasks will not be commenced where it is not feasible to complete during core working hours. However, on longer drills where each operation (drilling and reaming) will occur over multiple days, 24-hour working may be required. Ultimately, night-time working requirements would not be normal working practice and will be determined by on-site ground conditions.

3.15.8 Communication would be provided to occupants of affected properties as far as reasonably practicable before any out of core work hours. When accounting for this along with the fact that the construction significance threshold exceedances are small, out of core work hours activities would not be typical, residual construction noise effects are not identified as significant.

3.15.9 Noise levels shall be monitored by the methods set out in Appendix E of BS5228 series. All measurements shall be made on a noise level meter to BS5969. BS7580-1:1997 shall also be referred to. When required, noise levels at any building subjected to noise resulting from any operation by the Contractor either on or off site and concerned in any way with the Proposed Works shall be measured 1m from the nearest facade.

3.15.10 The Contractor shall ensure that audible warning systems, e.g. vehicle reversing sirens, are switched off between 11:30 pm and 7:00 am.

3.15.11 The use of metal chains shall be avoided during nighttime working (1900 to 0700).

3.15.12 A series of site-specific mitigation measures recommended to be adopted during construction phase of Proposed Works have been provided in **Table 4-1**.

3.16 Ecology and Nature Conservation

3.16.1 Prior to any stage of construction works commencing an appropriately qualified Ecological Clerk(s) of Works (ECoW) will be appointed by the contractor who will be responsible for ensuring that any mitigation proposed in the Environmental Appraisal is implemented.

3.16.2 The following ecological sensitivities are anticipated to get affected due to Proposed Works:

- Coedydd Derw a Safleoedd Ystlumod Meirion/ Meirionnydd Oakwoods and Bat Sites SAC;
- Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC, Morfa Harlech a Morfa Dyffryn SAC
- Afon Ddu SSSI, Morfa Harlech SSSI and NNR Tiroedd a Glannau Rhwng Cricieth ac Afon Glaslyn SSSI, Glaslyn SSSI, Ysbyty Bron y Garth SSSI;
- Pen y Banc LNR;
- Northern Cardigan Bay/ Gogledd Bae Ceredigion SPA;
- Traeth Glaslyn NWWT Reserve;

- Coed Bryn-twr/ Wern cWS;
- Ancient Woodland;
- Veteran and Ancient trees;
- HoPI {Coastal Floodplain grazing marsh (CFGM), Saltmarsh, Lowland dry acid grassland purple moor grass and rush pasture, Coastal and floodplain grazing marsh, Lowland fen and reedbed, Traditional orchard};
- Semi-natural broadleaved woodland, planted broadleaved woodland, and planted mixed woodland;
- Semi-improved neutral grassland, Marshy grassland;
- Marginal and Inundation vegetation – marginal vegetation
- Standing open water (ponds)
- Running water, including rivers, field drains, streams and wet ditches
- Hedgerows- Species-poor and species-rich hedgerows (intact and defunct), comprising both Important and non-important hedgerows.
- Protected and notable flora;
- Terrestrial Invertebrates;
- Aquatic Macroinvertebrates, Aquatic Macrophytes, Fish;
- Breeding and non-breeding birds;
- Bats, Badger, Otter
- Reptiles (slow worm, common lizard, grass snake and adder); and
- Other mammals (hedgehog, brown hare, harvest mouse and polecat) and common amphibians.

3.16.3 Works have been designed to avoid ancient woodland as far as practicable. Minor tree trimming will be carried out in an area mapped as ancient woodland at the junction with the A497 to maintain the existing visibility splay. This woodland area is, in fact, established on made ground adjacent to the railway line and is unlikely to comprise ancient woodland soils. In addition, some of the likely clearance will include removal of scrub along the woodland edge which includes rhododendron. This edge of the woodland is likely to be subject to periodic vegetation trimming as part of the highway maintenance required for the A497. Decommissioning of the existing cables in other locations will leave in longer sections (capped at each end) to avoid direct effects on additional areas of ancient woodland through which the existing cables lie. HDD has also been incorporated into the design in other shorter sections to avoid loss of small areas of semi-natural woodland.

3.16.4 Where open cut techniques are proposed, water flow will be maintained through either fluming or over pumping.

3.16.5 The Proposed Works have been designed to avoid IEFs present in or adjacent to the Glaslyn works site as far as is practicable.

  - 15 m from woodlands; to prevent incursion into Root Protection Areas (RPAs).

- 5 m from hedgerows increasing to 15 m where there are hedgerow trees to prevent incursion into RPAs.
- To prevent incursion into RPAs to protect the tree and reduce the likelihood of disturbing any roosting bats that could be present, an appropriate distance (as per the RPA) will be kept.

3.16.6 A LEMP will be implemented which will include all design-based measures and construction best practice mitigation.

3.16.7 A series of site-specific mitigation measures recommended to be adopted during construction phase of Proposed Works have been provided in **Table 4-1**.

3.16.8 Embedded mitigation taken into account within Chapter 5 of the Environmental Statement includes the following:

- Vegetation clearance will be carried out in advance of construction and to avoid the nesting bird period which is from March to August inclusive. This will prevent birds nesting within the Proposed Works area prior to construction. Ground nesting species will be dissuaded from nesting within the construction footprint by removing the surface vegetation (including grassland) before the breeding season commences.
- Where vegetation clearance (including grassland and scrub habitats that may support ground-nesting bird species) cannot be scheduled outside the bird breeding season, the area will be surveyed by a suitably experienced ornithologist prior to any works. If active nests are identified, appropriate buffer zones will be established, and the area will be monitored until the young have fledged. Confirming the absence of nesting activity can be particularly challenging in habitats such as marsh and grassland, which may result in potential localised project delays.
- Measures will be carried out to ensure there is no incursion into statutory and non-statutory designated sites outside of required construction areas. Security and protection fencing will be erected early in the construction process. The fence design will include gaps at the base to allow mammals that may use retained habitats, including, badger, brown hare, and hedgehog, to pass underneath at strategic locations to avoid fragmentation of habitats, where appropriate. Any temporary fencing present during construction will also allow continued movement of otter along watercourses where they have been found to be present.
- Works will be restricted to daylight hours wherever practicable, to remove the need for artificial lighting, with focussed task-specific lighting provided where this is not practicable e.g. 24-hour HDD drilling operations. However, task-specific and fixed ‘general’ lighting will likely be required in months with reduced daylight hours (early mornings and up to 19:00 for general workforce) to meet safety requirements. Outside of core working hours PIR controlled lights (motion sensors) will be used at construction compounds and at welfare areas.
- Where lighting is required, it will conform to best practice guidelines with respect to minimising light spill into adjacent habitats to prevent disturbance to bats and other species. This will include the Institute of Lighting Professionals Guidance Notes, in particular GN08/23 Bats and Artificial Lighting at Night and GN-1: Reduction of Obtrusive Light which will be followed in so far as it is reasonably practicable. The following measures will be taken:

    - Lights installed will be of the minimum brightness or power rating capable of performing the desired function.
    - Light fittings will be used that reduce the amount of light emitted above the horizontal (reduce upward lighting).
    - Light fittings will be positioned correctly, inward facing and directed downwards, and away from watercourses or dry ditches.
    - Direction of lights will seek to avoid spillage onto neighbouring properties, habitats, highway or waterway.
    - PIR controlled lights (motion sensors) will be used except where temporary focussed task specific lighting is required.
- Where watercourses and ditches (and Main Rivers) are crossed by cabling works and open cut techniques are required, habitats that are temporarily lost will be reinstated after installation, as soon as works are completed in that location.
- Hedgerow removal will be kept to a minimum to minimise habitat fragmentation. Where temporary removal of a section of hedgerow is required, new sections of hedgerow (with the same species mix and of the same or improved condition) will be planted, to maintain habitat connectivity and connectivity for species, such as commuting bats. It is acknowledged that these sections will take some years to mature.
- Where grassland vegetation removal is required, underlying topsoil and subsoil will be stripped and stored appropriately, omitting the use of glyphosate. Once the works are completed, the topsoil and subsoil will be backfilled promptly, retaining the original soil profile and seed bank. Correct handling of soils and associated seedbanks and reinstatement of the habitat will ensure that for most of the Glaslyn works site, any loss is temporary for the duration of the construction period only. Where watercourses and ditches (including Main Rivers) are crossed by cabling works and open cut techniques are required, habitats that are temporarily lost will be reinstated after installation, ideally as soon as works are completed in that location.
- Temporary noise attenuation fencing will be installed within the Glaslyn works site, including around HDD working areas, to minimise potential disturbance to sensitive receptors. This is required to reduce potential effects for human receptors but will also benefit a range of species including otter and bats.
- Pre-construction surveys, such as (but not limited to) an updated Phase 1 habitat survey, otter and badger walkovers and bat roost assessments of any affected trees or structures, will be carried out to support the baseline findings. Checks for nesting birds will also be carried out. The purpose of these pre-construction surveys is to ensure mitigation during construction is based on the latest protected species information. This will also be required for any protected species licensing that may be identified as being necessary prior to commencement of works in any area.
- Appropriate buffers in the Proposed Works area will be built, where possible; 30 m around any identified active badger setts and 15 m around trees with bat roost suitability.

- Mammal proof fencing around excavations, covering excavations left open over night or providing a means of escape as appropriate regarding the depth of excavation, will be implemented.

3.16.9 Pre-commencement checks of woodland (including woodland edges) will be carried out by an appointed ECoW with a view to avoid working in areas where bluebell is present and to map their presence in the appropriate season, when they are visible (late April to early June). Should it not be possible to avoid working in some areas where bluebell are present, turves containing this species will be removed, unless undertaken when the plants are visible and can be uprooted with as much surrounding soil as possible. If the works in this location are very temporary, these will be safely stored, watered and reinstated following completion of the works in this immediate area and then fenced off to protect any further encroachment. If this will be longer term then consideration will be given instead to translocating the plants or turves further into the adjoining woodland in an area unaffected, but not already containing bluebells. Bluebell seed may also be harvested, if seasons are appropriate (May to June), to assist re-establishment of the plant in other suitable locations.

3.16.10 Suitable freshwater pearl habitat was only identified within the Y-Cyt (NRW.MR.04) with their presence in all other impacted coursed deemed unlikely due to the impacted watercourses being classified as unsuitable due to being dry or ephemeral, poor water quality, and/or containing a lack of suitable substrate. However, those that are being crossed will require pre-commencement checks to be carried out by an ECoW to determine that these watercourses remain unsuitable for freshwater pearl mussel. Where conditions may have changed between the aquatic assessment surveys and construction, then additional surveys might be required resulting in potentially further mitigation required where identified. For example, if they are found then culverts will need to be either box culverts or bottomless arch culverts to prevent damaging the riverbed.

3.16.11 All in-channel works to be overseen by an ECoW with suitable aquatic experience to ensure no damage to notable species.

3.16.12 Prior to construction, pre-construction surveys to be completed to identify dwarf spikerush specimens (and any additional protected macrophytes that may have established between the aquatic surveys and construction). Any specimens identified to be removed and where practicable kept for reinstatement following the works or reinstated upstream of the works away from potential impacts to naturally propagate if this is not possible.

3.16.13 Pre-reinstatement fish rescues will also be required for all watercourses where flume pipes are proposed to maintain the flow within the watercourses. These surveys will need to complete immediately before trenching, and before reinstatement to ensure all fish within the impacted area are safely removed to avoid mortality.

3.16.14 Where over pumping is proposed to be used to maintain the flow within the watercourses, the pumps used will need to be fish friendly (i.e. Rotorflush or equivalent), to comply with the Eel Regulations 2009. Specifically, this will require the pumps to have a suitable mesh size and approach velocities to ensure entrainment and impingement risks are reduced/removed, respectively.

3.16.15 Where flume pipes are proposed to be used to maintain the flow within the watercourses during open trenching, the invert of the flume pipe will be set below the existing watercourse bed to ensure continued longitudinal connectivity and fish passage.

3.16.16 Where the two temporary culverts, and new crossings using culverts are proposed, culvert design will need to comply with best practise for fish passage which involves installing either box culverts or bottomless arch culverts. Where this is not possible then the culvert invert will need to be set below the existing watercourse bed to ensure continued longitudinal connectivity and fish passage through the culvert.

3.16.17 In watercourses deemed suitable for the notable fish species, the installation of watercourse crossings will need be completed outside the migration and spawning seasons of brown/sea trout and Atlantic salmon, and the migration window of European eel. In addition, areas of suitable spawning habitat will need to be avoided, if present (to be identified through pre-construction checks). If watercourses are deemed unsuitable for these species, and suitable spawning habitat is not present, the avoidance of both the migration and spawning season will not be required. A summary of these ecologically sensitive periods are provided below:

- Atlantic salmon (smolt migration): March to May.
- Atlantic salmon (adult migration – main run): August to November.
- Atlantic salmon (spawning): November to December.
- Sea trout (smolt migration): March to May.
- Sea trout (adult migration): June to October.
- Brown/sea trout (spawning): October to December.
- European eel (elver/glass eel migration): April to October.
- European eel (silver eel migration): August to October.

3.16.18 To minimise disturbance at other badger setts within the Glaslyn works site (but outside of proposed working areas), a 30 m exclusion zone, (not conflicting with licensable works), around the sett entrances will be enforced. The exclusion zone will be delineated by appropriate above ground fencing or ground markings, agreed with the ECoW (this will be the licence named ecologist or any accredited agents authorised to act on their behalf), who will manage works activities alongside the contractor(s).

3.16.19 Where the removal or reduction of trees with Low bat roost suitability is unavoidable (trees that are identified as PRF – I), these trees will be section felled in accordance with an approved Method Statement, under an ecological watching brief delivered by a suitably licensed ecologist.

3.16.20 Works will take place close to a derelict barn that provides a day roost for a small number of soprano pipistrelle bats. There is the potential for roosting bats to be disturbed by the Proposed Works and an NRW licence for disturbance to a roost will be required to permit the works to proceed.

3.16.21 New roost structures (bat boxes) will be provided (with landowner consent) on retained trees within the Glaslyn works site where possible. No known bat roost will be lost as part of the works and the installation of bat boxes does not need to be relied on for mitigation unless a roost is found during pre-construction surveys. However it would replace potential features on trees removed as part of the works, providing alternatives until such time new trees planted mature or other retained trees develop features suitable for use.

3.16.22 Ongoing monitoring of habitats and species will be carried out throughout construction, over seen by an appointed ECoW of suitable qualifications and experience. The ECoW

will have the appropriate authority to review reasonable avoidance measures, oversee works and recommend action as appropriate, including temporarily stopping works where non-compliant working is observed, e.g. to safeguard protected species and their habitats, or where any other breaches of environmental legislation are likely to occur.

3.16.23 The implementation of a Biosecurity Management Plan that will set out procedures to ensure that no INNS are brought onto the Glaslyn works site or areas of existing INNS are spread, will demonstrate compliance with legislation. Pre-construction surveys will be carried out to provide an update on the presence and location of any INNS previously identified

3.16.24 Additional ecological mitigation includes the following as detailed in Chapter 5 of the Environmental Appraisal:

- There will be localised narrowing of the easement around T71, protective fencing around the full RPA and spoil generated will be stored outside of the RPA.
- Where watercourses and ditches (including Main Rivers) are crossed by cabling works and open cut techniques are required, habitats that are temporarily lost will be reinstated after installation, ideally as soon as works are completed in that location.
- Hedgerows will be enhanced where possible and with landowner permission.
- Where hedge removals are necessary, 'dead hedging' or alternative will be used, where practicable, in the interim periods to retain connectivity during construction. Dead hedging can comprise vegetation arisings or artificial provision, such as willow screening panels, stock proof fencing or Heras fencing with branches woven into them.
- An NRW licence is required to permit works that would close or disturb affected badger setts. Mitigation will include seasonal restrictions in the timing of the works, and staged closures of the setts monitored by the appointed named ecologist on the licence.
- The pumps to be used for over pumping will need to be 'fish friendly' to comply with the Eel Regulations 2009 and reduce the entrainment and impingement risks.
- Where flume pipes are proposed to be used, the invert of the flume pipe will be set below the existing watercourse bed to ensure continued longitudinal connectivity and fish passage.
- In-channel stream works to be completed outside the migration and spawning seasons.
- Culvert design will follow good practice for fish passage which involves either box culverts or bottomless arch culverts. Where this is not possible then the culvert invert will be set below the existing watercourse bed to ensure continued longitudinal connectivity and fish passage through the culvert.

3.16.25 Prior to construction, a team of suitably qualified and experienced Ecological Clerks of Works (ECoWs), will be appointed to support, oversee and monitor the Contractor with the implementation of measures defined within the Outline CEMP. Multiple ECoWs may be required during construction to ensure appropriate oversight of multiple active works locations. Broadly, the ECoW will:

- Provide ecological advice to the Contractor over the entire construction programme, at all times as required.
- Undertake or oversee pre-construction surveys for protected species in the areas affected by the Proposed Works.
- Monitor ecological conditions during the Construction Stage to identify additional constraints that may arise as a result of natural changes to ecological baseline over time, e.g., the monitoring of badger activity within and in close proximity to construction works.
- Provide ecological advice to the Contractor over the entire construction programme, at all times as required.
- Undertake or oversee pre-construction surveys for protected species in the areas affected by the Proposed Works.
- Monitor ecological conditions during the Construction Stage to identify additional constraints that may arise as a result of natural changes to ecological baseline over time, e.g., the monitoring of badger activity within and in close proximity to construction works.

3.16.26 Micrositing of Localised Compounds, the Equipment Yard and the Centralised Compound will be employed to minimise habitat loss and disturbance.

3.16.27 Construction works will be restricted to daylight hours, as far as practicable, to avoid the need for any artificial lighting during the works. The exception would be in winter when artificial lighting is likely to be required for part of the day due to daylight hours being reduced.

3.16.28 A lighting management plan will be developed outlining measures to avoid unnecessary lighting disturbances to bats and will follow best practice guidance. Measures include:

- Sensitive positioning of lighting to avoid unnecessary spill onto any confirmed active roosts or any suitable commuting foraging/commuting habitat, such as trees and hedgerows;
- The use of covers/cowls and reducing the height and angle of lighting columns to avoid unnecessary spill;
- As mentioned previously, the use of sensor-activated or manual lighting to avoid the use of permanent lighting; and
- Use of lighting sources with a lower UV output.

3.16.29 To minimise the likelihood of any indirect impacts to otters, the following mitigation should be implemented:

- All works will be at least 8m back from watercourses where practicable, with appropriate noise, vibration, pollution, and (where necessary) lighting controls in place;
- Construction materials will be stored away from the watercourses and secured so that otters are unable to gain access;
- All tools, food, litter and construction materials and packaging that may constitute a hazard to otters will be removed daily from the site;

3.16.30 As far as possible trenches will not be left open overnight. If trenches are left open over night, they will be securely fenced off and mammal ladders will be placed in to the trenches / excavations to allow any trapped animals to escape ; and

- Appropriate working hours will be adopted to reduce the potential for disturbance to otter, with construction works to commence no sooner than one hour after sunrise and finish no later than one hour before sunset.

Invasive Species

3.16.31 To control the spread of invasive weeds in accordance with the Wildlife and Countryside Act 1981, any plant or machinery that has been used in areas infested with invasive species (both terrestrial and aquatic), such as Japanese knotweed, will be thoroughly cleaned. Water used to clean vehicles will be controlled to prevent the spread of the plant (through seeds, rhizomes, fragments, etc.). The area will be cordoned off to prevent any inadvertent spreading.

3.16.32 The Contractor will ensure all site personnel are vigilant with regards to awareness of measures contained within the Biosecurity Risk Assessment through site briefings, inductions, training and toolbox talks.

3.16.33 The measures within the biosecurity risk assessment must be abided by the contractor throughout construction of the Proposed Works.

3.16.34 High-level recommendations for the treatment and removal of INNS will be identified, and will include the following:

- Prior to the start of works, an updated survey of all terrestrial working areas will be undertaken by a suitably qualified person to map the current extent of INNS. This must be carried out during the main vegetative growing season (April – September) to allow for maximum visibility of any plants present and ensure that their extents are fully captured;
- Any invasive plant species recorded within the working areas will be demarcated and avoided during the works as far as feasible;
- The non-native invasive entire-leaved cotoneaster will be removed from the potential site;
- Where complete avoidance of invasive species INNS within working areas may not be feasible, an appropriate treatment and removal programme (appropriate to the specific species in question) will be agreed and implemented and an INNS management plan will be produced, prior to any construction works being carried out; and
- Any plant, equipment or PPE that comes into contact with invasive plant material will be thoroughly cleaned before being removed from the working area.

3.17 Socio-Economics

3.17.1 There are six PRoWs that cross and partially run within the Glaslyn works site. There is one informal recreational route, Cob Crwn hiking area and Gwynedd long distance trail coastal path within 500 m of the Glaslyn works site. Ysgol Eifionydd Secondary School's car park and playground are within the Glaslyn works site. There is one residential property, two visitor attractions (Welsh Highland Heritage Railway and Ffestiniog Railway) and 14 agricultural land holdings located within the Glaslyn works site.

3.17.2 The construction of the proposed works may result in closures and diversions of PRoWs and recreational routes within the Glaslyn works site. There is the potential for significant direct effects on other private and community assets due to land take in construction as well as traffic related impacts. Construction phase impacts range from minor beneficial for skills uplift to minor adverse in relation to temporary and permanent land take of open spaces.

3.17.3 Site-specific measures to reduce impacts on socio-economic receptors during construction phase have been provided in **Table 4-1**.

3.18 Climate Change

3.18.1 The GHG assessment uses the current condition of the Glasynn works site, which consists of the carbon stock and sources of greenhouse gas emissions as the baseline. It is estimated the 90% of all emissions from the proposed work will arise from the pre-product, product and construction process stages. Based on a qualitative assessment, the impact of greenhouse gas emissions associated with the proposed works is minor adverse and not significant.

3.18.2 A series of site-specific mitigation measures recommended to be adopted during construction phase of Proposed Works have been provided in **Table 4-1**.

3.18.3 Best working practices and measures to reduce impacts on climate change during construction phase have been provided below:

- The proposed works will be designed and operated in accordance with the risks and mitigation measures outlined in National Grid Electricity Transmission's Climate Resilience Strategy;
- The Contractor will ensure that welfare facilities are cooled to reduce effects on the construction site and workers and machineries are switched off when not in use;
- The Contractor will ensure that adequate rest, shade and Personal Protective Equipment (PPE) is provided to the construction workers;
- The Contractor will ensure that the construction compounds drainage has sufficient capacity;
- Consider adjusting the programme of activities and reviewing the wind speed Iprior to any work at height;
- Construction materials will be sourced from local suppliers and local waste disposal facilities will be used where available and practicable to minimise the distance materials are transported from source to site and from site to disposal;
- Avoid disposal of construction waste to landfill, maximising recycling, and reuse of waste where possible;
- Using modern and efficient low emission construction plant and delivery vehicles, and/or those powered by electricity from alternative/lower carbon fuels (as far as practicable). The Contractor will ensure high performance of plant and equipment through correct and efficient operation, maintenance, and servicing of vehicle fleet to avoid polluting emissions;

- Training policies will be in place during site induction to avoid idling of engines, spills of fuels (for example, when refuelling) and safe/environmentally sensitive driving techniques to maximise fuel saving; and
- The sustainability credentials of suppliers and companies in the supply chain will be considered as part of the procurement process.

3.18.4 To reduce the level of energy consumption used during construction, innovative construction methods will be utilised where practicable. These may include:

3.18.5 Avoiding sharp acceleration and braking to conserve fuel;

3.18.6 Adjusting haul and access road/points to smoother gradients to avoid unnecessary fuel usage; and

3.18.7 Only using plant when required (including future planning as to what plant is required, and when).

3.19 Landscape and Visual

3.19.1 The construction works would introduce some elements of Proposed Works which may result in Landscape and Visual amenity effects. The Contractor shall minimise landscape and visual impacts during construction in accordance with relevant legislation and guidance and as advised by the relevant authorities and statutory undertakers.

3.19.2 A Landscape and Ecological Management Plan (LEMP) is to be produced prior to construction based on the Outline LEMP submitted with the planning application.

3.19.3 A series of site-specific mitigation measures recommended to be adopted during construction phase of Proposed Works have been provided in **Table 4-1**.

3.19.4 Embedded mitigation taken into account within Chapter 4 of the Environmental Statement includes the following:

- The extents of the Proposed Works have been minimised as far as possible to reduce land take and allow retention of existing vegetation and other landscape features.
- Incorporation of new and additional planting such as hedgerow and tree planting to help tie the Proposed Works at the Wern CSEC and Minffordd CSEC into the existing landscape character and provide localised screening.
- Optimising zones within construction compounds to minimise their temporary impact on the landscape and views, including at night.
- Returning and reinstating land used temporarily to its former condition and profiles, where appropriate.
- Confining lighting on the Glaslyn works site and construction compounds to locations where safety is a priority to minimise the potential for light spill in night-time views.
- Keeping the use of tall cranes and plant machinery to the minimum practicable time to reduce the duration of any landscape and visual impacts.
- Designing permanent structures, such as the CSEC, other infrastructure, and security fencing in a way that minimises their visual impact and achieves good

visual appearance. This may include selection of a muted colour palette that appears recessive within views.

- Construction programme to be kept to the minimum practicable time to reduce the duration of any landscape and visual impacts and areas will be cleared for construction as close as possible to works commencing and top-soiling, reseeding and planting shall be carried out as soon as practicable after sections of work are complete.

3.19.5 A suitably experienced Environmental Manager will be appointed for the duration of the construction phase. In addition, a qualified and experienced Environmental Clerk of Works (ECoW) will be available during the construction phase to advise, supervise and report on the delivery of the mitigation methods and controls provided in the detailed CEMP. The ECoW will monitor that the works proceed in accordance with relevant environmental requirements and adhere to the required good practice and mitigation measures. The ECoW will be supported as necessary by appropriate specialists, including ecologists and arboriculturists.

3.19.6 Land used temporarily will be reinstated where practicable to its pre-construction condition and use, unless agreed otherwise.

3.19.7 Earthworks and stockpiled soil will be protected by covering, seeding or using water suppression where appropriate.

3.19.8 Working areas will be appropriately fenced. The type of fencing installed may also serve to provide acoustic and visual screening of the Glaslyn works site and reduce the potential for disturbance of users in the surrounding areas. Fencing will be regularly inspected and maintained and removed as part of the demobilisation unless otherwise specified.

3.19.9 The Contractor will retain vegetation where practicable. Where vegetation is lost and cannot be replaced due to restrictions associated with underground services or wayleaves, reinstatement in accordance with the Outline LEMP and outline Landscape Design shall be followed.

3.19.10 The Contractor will apply the relevant protective principles set out in British Standard (BS) 5837:2012: Trees in relation to design, demolition and construction. This will be applied to trees within the Glaslyn works site which will be preserved through the construction phase, and to trees outside where such measures do not hinder or prevent the use of the relevant working width for construction.

3.19.11 A five-year aftercare period will be established for all reinstatement and mitigation planting.

3.19.12 Separation and storage of subsoil and topsoil to ensure no degradation in quality and reinstatement undertaken as soon as possible after completion of construction of each section or area of works.

3.19.13 Temporary and separate placement of topsoil and subsoil will be stored with the additional height of the subsoil storage used on whichever side of the Glaslyn works site requires greater screening benefit, where practicable.

3.19.14 To control the spread of invasive weeds in accordance with the Wildlife and Countryside Act 1981, any plant or machinery that has been used in areas infested with invasive species (both terrestrial and aquatic), such as Japanese knotweed and Russian olive, will be thoroughly cleaned. Water used to clean vehicles will be controlled to prevent the

spread of the plant (through seeds, rhizomes, fragments, etc.). The area will be cordoned off to prevent any inadvertent spreading.

3.19.15 Construction Compound sites will be located to avoid being in close proximity to residential properties to minimise the number of receptors that could be affected.

3.19.16 Arable land not required in operation will be cultivated and returned to agricultural use upon completion of construction. Fenced boundaries will be reinstated and gaps in hedgerows will be replanted. Grassland will be cultivated and reinstated. Protective fencing to areas of grassland reinstatement would typically remain in place for up to 12 months to exclude livestock and allow re-seeded grass to establish. It is considered that the majority of agricultural landscape will return to its previous use and form within a year of construction, if not earlier.

3.19.17 Reinstatement planting will be carefully considered and will incorporate species that are appropriate to the local area informed by tree and hedgerow surveys.

3.19.18 The Contractor will implement augmentation of the existing landscape features through reinstatement plan. This could, for example include:

- The reinstatement of sections of hedgerow where they are currently relatively species poor with a more varied species mix to increase species diversity;
- Creation of species rich field margins, though seeding of species rich grassland;
- Reinstatement of an existing field boundary through the filling of gaps with native hedgerow planting; and
- An increase in the number of hedgerow trees, through inclusion of native species within the planting mix.

3.19.19 Where mature trees unavoidably need to be removed, they will be replaced using an agreed method with the relevant LPA.

3.19.20 Affected road verges will be reinstated and, where appropriate, enhanced through the addition of species rich grass mixes for the benefit of biodiversity.

3.20 Major Accidents and Disasters

3.20.1 The construction stage(s) of the Proposed Works will be managed through the implementation of the Construction Phase Plan (required under the CDM Regulations 2015).

3.20.2 The Contractor shall ensure that the design, installation, commissioning, operation and maintenance of plant, drainage systems, equipment, and machinery, including associated systems, will consider Good Engineering Practice.

3.20.3 The Proposed Works will be managed in accordance with Environmental, Health & Safety Management systems.

3.20.4 The Contractor shall ensure that all construction risks will be managed in accordance with the CDM Health & Safety Plan and Construction Phase Plan.

4. CONSTRUCTION MANAGEMENT AND MITIGATION

3.20.1 This section of the Outline CEMP sets out the mitigation and management measures outlined in the Environmental Statement and Register of Environmental Actions and Commitments (REAC) during the Construction Phase. These measures are included as a minimum requirement; they illustrate how the monitoring strategy will be undertaken and who is responsible for each of the measures listed.

3.20.2 **Tables 4-1** of this Outline CEMP outlines they key construction mitigation and control measures within the REAC that will in incorporated into the topic specific management plans as part of the detailed CEMP.

Table 4-1 Construction Management and Mitigation

Unique Reference	Action/Commitment/Mitigation (including Monitoring Requirements)	Objective	Organisation/Individual Delivering Measure
Description of the TCPA Proposed Development			
G-GW-001	The Minffordd site drainage will use a Sustainable Drainage System (SuDS) to ensure that the rate of discharge into the existing ditch to the south remains at 'greenfield' rates. This will be achieved by using an attenuation pond to the north of the ditch into which the CSEC area, the Minffordd THH and its surrounds will drain.	To ensure rate of discharge remains at greenfield rates	The Applicant / Construction Contractor
G-GW-002	During installation, the Contractor would operate under a detailed site-specific Construction Environmental Management Plan (CEMP). It would, as a minimum, implement the mitigation measures identified within this ES. The detailed CEMP would set out a variety of control measures for managing the potential environmental effects of installation works including control and management of noise, dust, surface water runoff, waste and pollution control.	To ensure mitigation and management measures are followed correctly during the construction stage of works.	Construction Contractor
G-GW-003	Works outside of daylight hours are not expected other than at the HDD compound, construction compound, and during cable pulling, jointing, terminating and testing. Where lighting is required it would be temporary task lighting with	To reduce disturbance to fauna, landscape and visual impacts and ensure safety.	Construction Contractor

	security and safety lighting required at construction compounds and along worker access routes to work sites. Light spill in the SSSI where night time working in the HDD compound is expected will be task lighting. No other designated sites or ancient woodlands will be impacted by night working.		
G-GW-004	Subject to geotechnical testing, excavated materials would be re-used on site wherever possible. Where waste materials are to be disposed of off-site this would be at licensed waste disposal facilities in accordance with a Site Waste Management Plan (SWMP).	Limit permanent removal of soils during construction phase and to reduce adverse impacts on land and soil	Construction Contractor
G-GW-005	The joint bay compounds and the HDD compounds between Wern CSEC and Tremadog would have surface levels approximately 20 cm above existing ground level. The HDD compounds between Ysgol Eifionydd and Minffordd CSEC would be raised by a minimum of 3.2 m AOD for flood protection. Material will be sourced from local quarries and when working areas are reinstated will either be returned to the quarry or provided for other projects in the area.	Ensure that where possible materials used have been sustainably sourced.	Construction Contractor
G-GW-006	A temporary haul road would continue along the length of the underground cables as far as possible so that construction traffic can run on dedicated routes and avoid public highways.	Maintain the safe and effective flow of traffic on the road network	Construction Contractor

G-GW-007	The topsoil would be stored along the working area and would be reinstated once the installation of the ducts is complete.	Limit permanent removal of soils during construction phase and to reduce adverse impacts on land and soil	Construction Contractor
G-GW-008	Fibre optic cables would be placed in the trenches with the cables to ensure the connection can be monitored from above ground. Above the CBS, protective tiles would be laid to protect the cables from any future excavation works. As an additional warning, marker tape would be placed into each trench to indicate that cables lay beneath.	To monitor the connection from above ground and protect cables from future excavation works	Construction Contractor
G-GW-009	Following the installation the HDD equipment would be removed from Glaslyn works site and the working areas reinstated.	To minimise landscape and visual impacts of the scheme once operational	Construction Contractor
G-GW-010	On completion of the construction works, the temporary access roads would be removed, any stone walls, wildlife fencing and kerbing would be reinstalled, and any construction road markings or traffic signs would be removed	To minimise landscape and visual impacts of the scheme once operational	Construction Contractor
G-GW-011	Generally, construction activities would be carried out from Monday to Friday 7am-7pm (including an hour set up and hour shut down) and 8am-6pm on Saturdays. Prior agreement will be required from the Local Planning Authority for	To minimise construction impacts on sensitive receptors	Construction Contractor

	any works on a Sunday. During the summer months maximum advantage of day light hours will be used, however during the winter months working hours may be reduced to suit available daylight, for certain activities. 24-hour working will be required for critical activities such as HDD, cable pulling, jointing and terminating.		
G-GW-012	The CSECs would be unmanned. Visual checks would be carried out on a monthly inspection visit to the site. Maintenance inspections of the CSECs would take place following any issues identified during inspection, typically every xx years, involving electrical isolation of equipment before it is worked on. If the CSEC required refurbishment or replacement works, vehicles would be used to carry workers in and out of the site and suitable vehicles would be used to bring new materials and equipment to site and remove old equipment.	To ensure safety and effective operation	The Applicant
Landscape and Visual			
G-LV-001	The extents of the proposed works have been minimised as far as possible to reduce land take and allow retention of existing vegetation and other landscape features.	Reduce land take and allow retention of existing vegetation / other landscape features	The Applicant
G-LV-002	Incorporation of new and additional planting such as hedgerow and tree planting to help tie the proposed works at the Wern CSEC and	Tie the proposed works into the existing landscape character and	The Applicant / Construction Contractor

	Minffordd CSEC into the existing landscape character and provide localised screening.	provide localised screening to minimum landscape and visual impacts	
G-LV-003	Optimising zones within construction compounds to minimise their temporary impact on the landscape and views, including at night.	Minimise the landscape and visual impacts of construction compounds	Construction Contractor
G-LV-004	Returning and reinstating land used temporarily to its former condition and profiles, where appropriate.	To minimise landscape and visual impacts of the scheme once operational	Construction Contractor
G-LV-005	Confining lighting on the Glaslyn works site and construction compounds to locations where safety is a priority to minimise the potential for light spill in night-time views.	Reduce light spill to minimise landscape and visual impacts on night time views	Construction Contractor
G-LV-006	Keeping the use of tall cranes and plant machinery to the minimum practicable time to reduce the duration of any landscape and visual impacts.	Reduce the duration of landscape and visual impacts	Construction Contractor
G-LV-007	Designing permanent structures, such as the CSEC, other infrastructure, and security fencing in a way that minimises their visual impact and achieves good visual appearance. This may include selection of a muted colour palette that appears recessive within views.	To minimise landscape and visual impacts of the scheme once operational	The Applicant

G-LV-008	Construction programme to be kept to the minimum practicable time to reduce the duration of any landscape and visual impacts and areas will be cleared for construction as close as possible to works commencing and top-soiling, reseeding and planting shall be carried out as soon as practicable after sections of work are complete.	Reduce the duration of landscape and visual impacts	Construction Contractor
G-LV-009	A Landscape and Ecological Management Plan (LEMP) is to be produced prior to construction based on the Outline LEMP submitted with the planning application.	To minimise landscape and ecological impacts	Construction Contractor
G-LV-010	A suitably experienced Environmental Manager will be appointed for the duration of construction. In addition, a qualified and experienced Environmental Clerk of Works (ECoW) will be available during construction to advise, supervise and report on the delivery of the mitigation methods and controls outlined in the detailed CEMP. The ECoW will monitor that the works proceed in accordance with relevant environmental requirements and adhere to the required good practice and mitigation measures. The ECoW will be supported as necessary by appropriate specialists, including ecologists and arboriculturists.	To ensure implementation of mitigation measures, track compliance with commitments and legal requirements	The Applicant / Construction Contractor
G-LV-011	Land used temporarily will be reinstated where practicable to its pre-construction condition and use, unless agreed otherwise.	To minimise landscape and visual impacts of the	Construction Contractor

		scheme once operational	
G-LV-012	Earthworks and stockpiled soil will be protected by covering, seeding or using water suppression where appropriate.	To minimise landscape and visual impacts	Construction Contractor
G-LV-013	Working areas will be appropriately fenced. The type of fencing installed may also serve to provide acoustic and visual screening of the work sites and reduce the potential for disturbance of users in the surrounding areas. Fencing will be regularly inspected and maintained and removed as part of the demobilisation unless otherwise specified.	To minimise landscape and visual impacts	Construction Contractor
G-LV-014	The contractor will retain vegetation where practicable. Where vegetation is lost and cannot be replaced due to restrictions associated with underground services or wayleaves, reinstatement in accordance with the outline LEMP and outline Landscape Design shall be followed.	To minimise landscape and visual impacts	Construction Contractor
G-LV-015	The contractor will apply the relevant protective principles set out in British Standard (BS) 5837:2012: Trees in relation to design, demolition and construction. This will be applied to trees within the works site which will be preserved through the construction phase, and to trees outside where such measures do not hinder or prevent the use of the relevant working width for construction.	To minimise landscape and visual impacts and impacts on trees and woodland features	Construction Contractor

G-LV-016	A five-year aftercare period will be established for all reinstatement and mitigation planting.	To minimise landscape and visual impacts of the scheme once operational	The Applicant
G-LV-017	Separation and storage of subsoil and topsoil to ensure no degradation in quality and reinstatement carried out as soon as possible after completion of construction of each section/area of works.	Reduce the duration of landscape and visual impacts	Construction Contractor
G-LV-018	3.20.3 Temporary and separate placement of topsoil and subsoil will be stored with the additional height of the subsoil storage used on whichever side of the Glaslyn works site requires greater screening benefit, where practicable.	To minimise landscape and visual impacts	Construction Contractor
G-LV-019	3.20.4 To control the spread of invasive weeds in accordance with the Wildlife and Countryside Act 1981 , any plant or machinery that has been used in areas infested with invasive species (both terrestrial and aquatic), such as Japanese knotweed, will be thoroughly cleaned. Water used to clean vehicles will be controlled to prevent the spread of the plant (through seeds, rhizomes, fragments, etc.). The area will be cordoned off to prevent any inadvertent spreading.	To control the spread of INNS	Construction Contractor
Ecology and Nature Conservation			

G-EC-001	The design for the installation of replacement cables largely avoids the Glaslyn SSSI and the Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC by using HDD, allowing the works to pass beneath the SAC and the majority of the SSSI.	To minimise adverse impacts on the Glaslyn SSSI and Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC	The Applicant
G-EC-002	The need for works in Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC has been minimised, by retaining the existing cables which pass through the site, and decommissioning them in situ, rather than removing them. This section of cables will be capped at each end and left in place, with only minor works required in the SAC at the existing kiosks. An existing road will be used for access and will not require any modifications or vegetation clearance. Works will be restricted to the existing kiosk locations and will comprise minor scrub removal in the immediate vicinity of each kiosk, and no tree removal or excavation. The above ground element of the kiosk will be removed, and works will be carried out in the existing cable box beneath, before fixing a new cover.	To minimise adverse impacts on the Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC	The Applicant
G-EC-003	Works within the remainder of Glaslyn SSSI will be minimised, with the existing cables retained and decommissioned in situ. Small scale works will be required at 500 m intervals to create monitoring pits to enable the cables to remain safely in place, however these works will be	To minimise adverse impacts on the Glaslyn SSSI	The Applicant / Construction Contractor

	localised, temporary and approximately 24 m x 10 m in area.		
G-EC-004	Works in Ysbyty Bron y Garth SSSI have been avoided by retaining the existing cables, which bisect the site, and decommissioning them in situ, rather than removing them. This section of cable will be capped at each end and left in place. The oil from the existing cables will be drained from a pit outside of the SSSI and in the adjacent field.	To minimise adverse impacts on the Ysbyty Bron y Garth SSSI	The Applicant / Construction Contractor
G-EC-005	Coed Bryn-twr/Wern cWS, part of which is recorded as ancient woodland lies along the route of an existing road that will be used temporarily prior to construction of the permanent access road to Wern CSEC. No works will be carried out to this road to facilitate temporary access. Minor tree trimming will be carried out at the junction with the A497 to maintain the existing visibility splay. No further vegetation clearance or tree trimming is anticipated.	To minimise adverse impacts on Coed Bryn-twr/Wern cWS	The Applicant / Construction Contractor
G-EC-006	Works have been designed to avoid ancient woodland as far as practicable. Minor tree trimming will be carried out in an area mapped as ancient woodland at the junction with the A497. Decommissioning of the existing cables in other locations will leave in longer sections (capped at each end) to avoid direct effects on additional areas of ancient woodland through which the existing cables lie. HDD has also been incorporated into the design in other shorter	To minimise impacts to ancient woodland and avoid loss of semi-natural woodland	The Applicant / Construction Contractor

	sections to avoid loss of small areas of semi-natural woodland.		
G-EC-007	Works have been designed to reduce the overall number of water body crossings and the avoidance of open trenching on main rivers through the use of HDD techniques. Where open cut techniques are proposed, water flow will be maintained through either fluming or over pumping.	To avoid open trenching on main rivers and reduce impacts on watercourses.	The Applicant / Construction Contractor
G-EC-008	The proposed works have been designed to avoid IEFs present in or adjacent to the Glaslyn works site as far as is practicable. The following minimum buffers from key habitat features will be applied to reduce the likelihood of significant ecological effects, where practicable: - 15 m from woodlands; to prevent incursion into Root Protection Areas (RPAs). - 5 m from hedgerows increasing to 15 m where there are hedgerow trees to prevent incursion into RPAs. - 15 m from individual retained trees to prevent incursion into RPAs to protect the tree and reduce the likelihood of disturbing any roosting bats that could be present. Further details regarding unavoidable works in tree RPAs is contained in the Arboricultural Impact Assessment Report. Precautionary measures discussed in that report include protective fencing and temporary ground protection measures (where necessary) and ensuring all soil storage remains outside RPAs. - A minimum of 10 m stand-off buffers from	To avoid and minimise adverse impacts to habitats.	Construction Contractor

	watercourses (bank tops) and ponds, including dry ditches, to protect riparian habitats and to mitigate for potential hazards such as chemical and spoil spills into watercourses or water bodies, with the exception of where watercourses and ditches (including seven Main Rivers) are crossed by cabling works and open cut techniques are required, or where bridge construction is required to facilitate creation of the permanent haul road, or where existing cable requiring removal is already in the buffer. - A minimum of 50 m from Afon Glaslyn bankside (in Glaslyn SSSI) to reduce the likelihood of disturbance to otter, which are a feature of this statutory designated site.		
G-EC-009	The detailed CEMP will include measures to manage the environmental effects of the proposed works and demonstrate compliance with environmental legislation. The detailed CEMP will detail the measures required to mitigate construction related effects on IEFs, including those associated with construction dust deposition, air pollution, pollution incidents, water quality, light, noise and vibration.	To ensure mitigation and management measures are followed correctly during the construction stage of works.	Construction Contractor
G-EC-010	A LEMP will be implemented which will include all design-based measures and construction best practice mitigation.	To minimise landscape and ecological impacts	Construction Contractor
G-EC-011	Vegetation clearance will be carried out in advance of construction and to avoid the nesting bird period which is from March to August inclusive. This will prevent birds nesting within	To minimise adverse impacts on nesting birds	Construction Contractor

	the proposed construction works area prior to construction. Ground nesting species will be dissuaded from nesting within the construction footprint by removing the surface vegetation (including grassland) before the breeding season commences. Where vegetation clearance (including grassland and scrub habitats that may support ground-nesting bird species) cannot be scheduled outside the bird breeding season, the area will be surveyed by a suitably experienced ornithologist prior to any works. If active nests are identified, appropriate buffer zones will be established, and the area will be monitored until the young have fledged. Confirming the absence of nesting activity can be particularly challenging in habitats such as marsh and grassland, which may result in potential localised project delays.		
G-EC-012	Precautionary working methods will be adhered to in areas of habitat suitable for reptiles, common amphibians and common mammals (including tall grassland and ruderal habitats, watercourses and ditches and their associated riparian habitat) to avoid the incidental killing or injury of any such species that may be present. All habitats suitable for reptiles, common amphibians and common mammals will be subject to two-stage habitat manipulation. Firstly, vegetation will be cut to approximately 150 mm (with the arisings removed), overseen by a suitably experienced appointed ecologist and the area left for a minimum of one day to allow any such species to naturally disperse. Secondly, vegetation will be cleared down to ground level,	To minimise adverse impacts on reptiles, amphibians and common mammals	Construction Contractor

	which will be overseen by the ecologist. Vegetation will be cleared using appropriate equipment based on the type of vegetation to be removed, the area affected, and the risk of killing or injuring reptiles, common amphibians and common mammals. Construction works can commence immediately after completion of the second stage. Reptile hibernacula will be retained and protected during construction where practicable. Any habitat features which could be concealing sheltering reptiles and amphibians (e.g. log piles, rubble mound bunds, any other debris) would not be dismantled during their inactive season (i.e. November to February inclusive) if they cannot be retained.		
G-EC-013	Measures will be carried out to ensure there is no incursion into statutory and non-statutory designated sites outside of required construction areas. Security and protection fencing will be erected early in the construction process. The fence design will include gaps at the base to allow mammals that may use retained habitats, including, badger, brown hare, and hedgehog, to pass underneath at strategic locations to avoid fragmentation of habitats, where appropriate. Any temporary fencing present during construction will also allow continued movement of otter along watercourses where they have been found to be present.	To minimise adverse impacts on statutory and non-statutory designated sites and avoid fragmentation of habitats.	Construction Contractor
G-EC-014	It is anticipated that during construction, works will be restricted to daylight hours wherever practicable, to remove the need for artificial lighting, with focussed task-specific lighting	To reduce disturbance to	Construction Contractor

	provided where this is not practicable e.g. 24-hour HDD drilling operations. However, task-specific and fixed 'general' lighting will likely be required in months with reduced daylight hours (early mornings and up to 19:00 for general workforce) to meet safety requirements. Outside of core working hours PIR controlled lights (motion sensors) will be used at construction compounds and at welfare areas.	nocturnal and crepuscular species	
G-EC-015	During operation, the Glaslyn works site will not require artificial lighting other than during temporary periods of maintenance or repair. All routine maintenance activities will be scheduled for daylight hours as far as is practicable, and focussed task specific lighting would only be required in the event of emergency works such as equipment failure requiring night-time working.	To reduce disturbance to nocturnal and crepuscular species	The Applicant
G-EC-016	Where lighting is required, it will conform to best practice guidelines with respect to minimising light spill into adjacent habitats to prevent disturbance to bats and other species. This will include the Institute of Lighting Professionals Guidance Notes, in particular GN08/23 Bats and Artificial Lighting at Night. and GN-1: Reduction of Obtrusive Light which will be followed in so far as it is reasonably practicable. The following measures will be taken: - Lights installed will be of the minimum brightness or power rating capable of performing the desired function. - Light fittings will be used that reduce the amount of light emitted above the horizontal	To reduce disturbance to nocturnal and crepuscular species	Construction Contractor / The Applicant

	(reduce upward lighting). - Light fittings will be positioned correctly, inward facing and directed downwards, and away from watercourses or dry ditches. - Direction of lights will seek to avoid spillage onto neighbouring properties, habitats, highway or waterway. - PIR controlled lights (motion sensors) will be used except where temporary focussed task specific lighting is required.		
G-EC-017	Where watercourses and ditches (and Main Rivers) are crossed by cabling works and open cut techniques are required, habitats that are temporarily lost will be reinstated after installation, as soon as works are completed in that location.	To minimise impacts on species around watercourses	Construction Contractor
G-EC-018	Hedgerow removal will be kept to a minimum to minimise habitat fragmentation. Where temporary removal of a section of hedgerow is required, new sections of hedgerow (with the same species mix and of the same or improved condition) will be planted, to maintain habitat connectivity and connectivity for species, such as commuting bats. It is acknowledged that these sections will take some years to mature.	To minimise habitat fragmentation	Construction Contractor
G-EC-019	Where grassland vegetation removal is required, underlying topsoil and subsoil will be stripped and stored appropriately, omitting the use of glyphosate. Once the works are completed, the topsoil and subsoil will be backfilled promptly, retaining the original soil profile and seed bank.	To minimise adverse impacts to habitats	Construction Contractor

	Correct handling of soils and associated seedbanks and reinstatement of the habitat will ensure that for most of the Glaslyn works site, any loss is temporary for the duration of the construction period only. Further detail on the recommended methodologies will be contained within the LEMP. Small scale permanent habitat loss will be compensated with the creation of replacement habitats or habitat management in the Glaslyn works site through NBB		
G-EC-020	Temporary noise attenuation fencing will be installed within the Glaslyn works site adjacent to sensitive receptors, including around HDD working areas, to minimise potential disturbance to sensitive receptors. This is required to reduce potential effects for human receptors, but will also benefit a range of species including otter and bats. It is anticipated that this measure will achieve a noise reduction of at least 5 decibels (dB).	To minimise noise disturbance to sensitive receptors	Construction Contractor
G-EC-021	To comply with relevant wildlife legislation, pre-construction surveys, such as (but not limited to) an updated Phase 1 habitat survey, otter and badger walkovers and bat roost assessments of any affected trees or structures, will be carried out to support the baseline findings. Checks for nesting birds will also be carried out. The purpose of these pre-construction surveys is to ensure mitigation during construction is based on the latest protected species information. This will also be required for any protected species licensing that may be identified as being necessary prior to commencement of works in	To avoid adverse impacts to protected species and comply with conservation legislation	The Applicant / Construction Contractor

	any area. These surveys will also provide an update on the presence and location of any INNS, the findings of which will inform the implementation of measures to prevent their spread into the wild and will be secured through the detailed CEMP. Reasonable Avoidance Measures, will be implemented. These include establishing appropriate buffers in the proposed works area, where possible; 30 m around any identified active badger setts and 15 m around trees with bat roost suitability. Measures to avoid animals being injured or killed in construction working areas, such as the inclusion of mammal proof fencing around excavations, covering excavations left open over night or providing a means of escape as appropriate regarding the depth of excavation, will be implemented.		
G-EC-022	Enhancement of hedgerows will be carried out as through NBB	To enhance hedgerows	The Applicant / Construction Contractor
G-EC-023	Works are proposed in the RPA of one veteran tree (T71). At this location, there will be a localised narrowing of the easement, protective fencing of the full RPA and all spoil generated will be stored outside of the RPA.	To minimise impacts on a veteran tree	Construction Contractor
G-EC-024	Pre-commencement checks of woodland (including woodland edges) will be carried out by an appointed ECoW with a view to avoid working in areas where bluebell are present and to map their presence in the appropriate season, when	To minimise adverse impacts to protected and notable flora	Construction Contractor

	they are visible (late April to early June). Should it not be possible to avoid working in some areas where bluebell are present, turves containing this species will be removed, unless undertaken when the plants are visible and can be uprooted with as much surrounding soil as possible. If the works in this location are very temporary, these will be safely stored, watered and reinstated following completion of the works in this immediate area and then fenced off to protect any further encroachment. If this will be longer term then consideration will be given instead to translocating the plants or turves further into the adjoining woodland in an area unaffected, but not already containing bluebells. Bluebell seed may also be harvested, if seasons are appropriate (May to June), to assist re-establishment of the plant in other suitable locations.		
G-EC-025	Suitable freshwater pearl habitat was only identified within the Y-Cyt (NRW.MR.04) with their presence in all other impacted courses deemed unlikely due to the impacted watercourses being classified as unsuitable due to being dry or ephemeral, poor water quality, and/or containing a lack of suitable substrate. However, those that are being crossed will require pre-commencement checks to be carried out by an ECoW to determine that these watercourses remain unsuitable for freshwater pearl mussel. Where conditions may have changed between the aquatic assessment surveys and construction, then additional surveys might be required resulting in potentially	To minimise adverse impacts to aquatic macroinvertebrates	Construction Contractor

	further mitigation required where identified. For example, if they are found then culverts will need to be either box culverts or bottomless arch culverts to prevent damaging the riverbed. All in-channel works to be overseen by an ECoW with suitable aquatic experience to ensure no damage to notable species.		
G-EC-026	Prior to construction, pre-construction surveys to be completed to identify dwarf spikerush specimens (and any additional protected macrophytes that may have established between the aquatic surveys and construction). Any specimens identified to be removed and where practicable kept for reinstatement following the works, or reinstated upstream of the works away from potential impacts to naturally propagate if this is not possible. All in-channel works to be overseen by an ECoW with suitable aquatic experience to ensure no damage to notable species.	To minimise adverse impacts to aquatic macrophytes	Construction Contractor
G-EC-027	Pre-construction surveys to be carried out to support the baseline survey findings and inform any additional mitigation requirements. For example, a fish habitat assessment will be completed to assess if crossing points represent areas of suitable spawning habitat for the protected migratory fish assemblage. Pre-construction fish rescues will be required at all watercourses proposed to be open trenched. Additionally, pre-reinstatement fish rescues will also be required for all watercourses where flume pipes are proposed to maintain the flow within the watercourses. These surveys will need	To minimise adverse impacts to fish	Construction Contractor

	to complete immediately before trenching, and before reinstatement to ensure all fish within the impacted area are safely removed to avoid mortality. Where over pumping is proposed to be used to maintain the flow within the watercourses, the pumps used will need to be fish friendly (i.e. Rotorflush or equivalent), to comply with the Eel Regulations 2009. Specifically, this will require the pumps to have a suitable mesh size and approach velocities to ensure entrainment and impingement risks are reduced/removed, respectively. Where flume pipes are proposed to be used to maintain the flow within the watercourses during open trenching, the invert of the flume pipe will be set below the existing watercourse bed to ensure continued longitudinal connectivity and fish passage. Where the two temporary culverts, and new crossings using culverts are proposed, culvert design will need to comply with best practise for fish passage which involves installing either box culverts or bottomless arch culverts. Where this is not possible then the culvert invert will need to be set below the existing watercourse bed to ensure continued longitudinal connectivity and fish passage through the culvert. In watercourses deemed suitable for the notable fish species, the installation of watercourse crossings will need be completed outside the migration and spawning seasons of brown/sea trout and Atlantic salmon, and the migration window of European eel. In addition, areas of suitable spawning habitat will need to be avoided, if present (to be identified through pre-		

	construction checks). If watercourses are deemed unsuitable for these species, and suitable spawning habitat is not present, the avoidance of both the migration and spawning season will not be required. A summary of these ecologically sensitive periods are provided below: - Atlantic salmon (smolt migration): March to May. - Atlantic salmon (adult migration – main run): August to November. - Atlantic salmon (spawning): November to December. - Sea trout (smolt migration): March to May. - Sea trout (adult migration): June to October. - Brown/sea trout (spawning): October to December. - European eel (elver/glass eel migration): April to October. - European eel (silver eel migration): August to October. All in-channel works will need to be overseen by an ECOW with suitable aquatic experience to ensure no damage to notable species.		
G-EC-028	Field surveys recorded one active annex and two disused outlier setts in the proposed works area which will be directly impacted. Those setts found to be active pre-construction will require closure under NRW licence, that can be applied for once planning permission has been granted, with wildlife related conditions having been closed out. Badger sett exclusion can only occur during the non-breeding period July and November (inclusive). Sett closures will be	To minimise adverse impacts to badgers	Construction Contractor

	undertaken by installing one way gates over each entrance, with wire mesh surrounding the gates to prevent badger from digging around them. A period of monitoring of each sett for 21 days is required before fully closing the sett. This will be undertaken by the appointed licence named ecologist or any accredited agents on the licence, to ensure that no new entrances have been created. If the closure has been found to be successful, the sett will be removed to the extent required, under a watching brief to ensure no badger remain within. Additional time will be required before the sett is removed if badger have been found to re enter the sett. Works will need to cease if a removed sett is re-established.		
G-EC-029	Two active main setts (one natural and one artificial), two active subsidiaries, three disused outliers and one active outlier setts are within 30 m of proposed works. Direct impacts are not anticipated, however where disturbance is likely to result from the proposed works, a licence from NRW will be sought. This will also come with required timing restrictions as previously noted. Pre-construction surveys will be required to confirm the latest status of each sett (active to disused), presence of any new setts, and which setts will be directly impacted, not directly impacted but at risk of disturbance, and not impacted directly or disturbed.	To minimise adverse impacts to badgers	Construction Contractor
G-EC-030	To minimise disturbance at other badger setts within the Glaslyn works site (but outside of proposed working areas), a 30 m exclusion zone, (not conflicting with licensable works), around the	To minimise adverse impacts to badgers	Construction Contractor

	sett entrances will be enforced. The exclusion zone will be delineated by appropriate above ground fencing or ground markings, agreed with the ECoW (this will be the licence named ecologist or any accredited agents authorised to act on their behalf), who will manage works activities alongside the contractor(s).		
G-EC-031	Two emergence-re-entry surveys of Tree 800 will be conducted pre-construction to determine if roosting bats are present. Although Tree 800 was initially outside of the proposed works area, subsequent changes to working areas mean it may now be directly impacted, unless the access road can be adjusted back to avoid a direct impact. Further pre-construction surveys will be carried out to support the baseline survey findings where tree removal or reduction cannot be avoided, including where trimming of trees for the visibility splays will be required. Where impacts to roosting bats cannot be avoided a licence from NRW will be obtained and suitable mitigation put in place. Mitigation will likely include the requirement to install bat boxes in the area. Where the removal or reduction of trees with Low bat roost suitability is unavoidable (trees that are identified as PRF – I), these trees will be section felled in accordance with an approved Method Statement, under an ecological watching brief delivered by a suitably licensed ecologist. Works will take place close to a derelict barn that provides a day roost for a small number of soprano pipistrelle bats. There is the potential for roosting bats to be disturbed by the proposed	To minimise adverse impacts to bats	Construction Contractor

	works and an NRW licence for disturbance to a roost will be required to permit the works to proceed.		
G-EC-032	Pre-construction surveys will be carried out to support the baseline survey findings where intrusive crossing methods of watercourses are proposed within the Glaslyn works site. Where direct impacts to newly identified otter resting places (should they be present) cannot be avoided a licence from NRW will be obtained and suitable mitigation put in place. Where indirect impacts such as disturbance to newly identified otter resting places are unavoidable, further mitigation will be put in place, such as acoustic fencing. Otter will be have continued unobstructed use of watercourses.	To minimise adverse impacts to otters	Construction Contractor
G-EC-033	The implementation of a Biosecurity Management Plan that will set out procedures to ensure that no INNS are brought onto the Glaslyn works site or areas of existing INNS are spread, will demonstrate compliance with legislation. Pre-construction surveys will be carried out to provide an update on the presence and location of any INNS previously identified (see Table 5-5). This will inform the implementation of measures to prevent their further spread, such as biosecurity measures, exclusion zones or treatment. These procedures will be outlined in the detailed CEMP	To prevent the spread of invasive species and manage other biosecurity concerns.	Construction Contractor

G-EC-034	New roost structures (bat boxes) will be provided (with landowner consent) on retained trees within the Glaslyn works site where possible. No known bat roost will be lost as part of the works and the installation of bat boxes does not need to be relied on for mitigation unless a roost is found during pre-construction surveys. However it would replace potential features on trees removed as part of the works, providing alternatives until such time new trees planted mature or other retained trees develop features suitable for use.	Enhancement	Construction Contractor
G-EC-035	Pre-construction surveys will be carried out during the appropriate seasons prior to the construction of the proposed works. These will inform detailed design where needed, provide up to date status of protected species that require mitigation during site clearance, and inform any protected species licensing that may be required should species distribution change or detailed design result in licencing requirements for species such as bats, badger or otter.	To inform detailed design and any protected species licencing requirements	The Applicant / Construction Contractor
G-EC-036	Ongoing monitoring of habitats and species will be carried out throughout construction, over seen by an appointed ECoW of suitable qualifications and experience. The ECoW will have the appropriate authority to review reasonable avoidance measures, oversee works and recommend action as appropriate, including temporarily stopping works where non-compliant working is observed, e.g. to safeguard protected species and their habitats, or where any other	To ensure implementation of mitigation measures, track compliance with commitments and legal requirements.	The Applicant / Construction Contractor

	breaches of environmental legislation are likely to occur.		
G-EC-037	Post-construction monitoring will be carried out in accordance with protected species licences granted for the works. Post-construction monitoring of habitat reinstatement, enhancement and creation will be undertaken in line with landscape provisions and NBB requirements as per the LEMP	To avoid adverse impacts to protected species and comply with conservation legislation	The Applicant
Historic Environment			
G-HE-001	While no significant effect has been identified on potential below ground archaeological remains, ground-breaking works will impact non-designated assets of post-medieval date, which consist of hedges, banks, ditches, and culverts. These are historic landscape features associated with the early 19th-century reclamation of Traeth Mawr. Additional mitigation in the form of archaeological watching brief on selected ground works may be required to determine the value and spatial extent of these remains. Potential impacts to these historic landscape features that cannot be avoided by design can be mitigated through a proportionate programme of archaeological investigation, recording and reporting, such as archaeological excavation in advance of construction, which would form additional mitigation measures. This would not result in a reduction in the physical impacts to archaeological remains but would mitigate the impact by providing a greater understanding and	To minimise impacts to archaeological remains ensure that no archaeological remains are removed or damaged without record.	Construction Contractor

	appreciation of the evidential value of archaeological remains.		
G-HE-002	Considerations of size, materials, distribution, lighting and screening in the final designs of the alterations to the existing Wern CSEC, the construction of the new Minffordd CSEC, the increased height of the Minffordd EVIP tunnel head house and the removal of the Garth CSEC will ensure that impact on the setting of designated historic assets will be kept to a minimum.	Minimise impacts to the setting of designated historic assets	The Applicant / Construction Contractor
G-HE-003	The scope of mitigation will be set out in a WSI and agreed with the Archaeological Advisor for Heneb once full details of the construction works have been agreed and prior to works commencing.	To prevent potential impacts to archaeological remains	Construction Contractor
Geology, Hydrogeology, Land Use and Agriculture (Soils)			
G-GH-001	A detailed CEMP will be developed and implemented and will form the basis of the approach to mitigating potential effects on the natural and built environment and the local community. The detailed CEMP will include a range of standard site management and construction techniques which have been identified in Chapter 2: Glaslyn Cables Works to minimise the risk to construction workers, and pollution of uncontaminated strata and controlled waters (groundwater and surface waters). Measures contained within the detailed CEMP will limit the	To ensure mitigation and management measures are followed correctly during the construction stage of works.	Construction Contractor

	potential for dispersal and accidental releases of potential contaminants, soil-derived dusts and uncontrolled run-off to occur during construction. For example, the detailed CEMP will set out how material is to be excavated, segregated, and stockpiled to minimise the potential for run-off, soil quality degradation and wind dispersal of dusts. The detailed CEMP will also establish procedures for dealing with unexpected soil or groundwater contamination that may be encountered.		
G-GH-002	An intrusive ground investigation of targeted areas of the Glaslyn works site will be carried out, as part of the embedded mitigation measures, in accordance with the relevant guidance and legislation including BS 10175:20. If areas of the Glaslyn works site are shown to pose a risk to infrastructure in contact with the ground, mitigation measures would be identified and implemented.	To determine the ground condition, assess the nature, extent and magnitude of contamination, assess the risks from potential contaminants to human health/controlled waters and assess the ground gas regime to allow design and construction of foundations and structures.	The Applicant / Construction Contractor
G-GH-003	A method statement will be prepared for dealing with potential contamination being present during construction. The method statement will be informed by proposed ground investigation	To mitigate unacceptable contaminated land related risks to the	Construction Contractor

	works, agreed with the regulatory authorities (including the Local Authority and NRW) and prepared before ground works start. It is anticipated that this will be a condition of the grant of planning permission. Potential impacts specific to construction workers (and any adjacent site users) during the construction phase would be controlled and mitigated by the following measures and through working in accordance with CIRIA C811: - Measures to minimise dust generation and run-off. - Provision of Personal Protective Equipment (PPE), such as gloves, barrier cream, overalls etc. to minimise direct contact with soils. - Provision of adequate hygiene facilities and clean welfare facilities for all construction site workers. - Monitoring of confined spaces for potential ground gas accumulations, restricting access to confined spaces, i.e. to suitably trained personnel only, and use of specialist PPE, where necessary. - Preparation and adoption of a site and task specific health and safety plan as is required under Health and Safety legislation.	environment and construction workers and ensure works are legally compliant	
G-GH-004	A materials management plan will be prepared and implemented following the protocols within the CL:AIRE Definition of Waste: Development Industry Code of Practice to ensure that excavated materials are re-used appropriately, sustainably and remain outside the waste hierarchy. Materials which need to be removed	Limit permanent removal of soils during construction phase, re-use excess material and to reduce adverse impacts on land and soil	The Applicant / Construction Contractor

	from the Glaslyn works site will be disposed of to an appropriately permitted facility.		
G-GH-005	Any material imported to the Glaslyn works site, such as for supporting foundations, will be natural quarried stone or, if recycled, the material will undergo chemical testing. The suite of contaminants and site use criteria will be agreed with regulatory authorities to demonstrate that the material is suitable for use within the Glaslyn works site and does not pose a risk to human health or the environment.	To ensure that contaminants do not enter the ground.	Construction Contractor
G-GH-006	The disposal of soil waste contaminated or otherwise, to landfill sites would be mitigated by minimisation of the overall quantities of waste generated during construction, and by considering whether that excavated material consigned to landfill cannot, as an alternative, could be put to use either on the Glaslyn works site or on other sites. Where there is a requirement to dispose of surplus excavated materials off-site as waste, the material will be characterised to determine firstly whether it is Hazardous or Non-Hazardous waste in accordance with the Technical Guidance WM3 and then once this is established, the appropriate disposal facility will be determined through Waste Acceptance Criteria analysis, as required.	To ensure that contaminants do not enter the ground.	Construction Contractor
G-GH-007	Any Made Ground found to be contaminated with asbestos will be suitably managed if it is to be	To minimise risk of site workers coming	Construction Contractor

	retained on-site or removed in line with guidance provided in CAR-SOIL 2012. The main risk from asbestos would be during construction and decommissioning of the proposed works, should the asbestos be disturbed. Asbestos management will be included within the detailed CEMP.	into contact with asbestos on site.	
G-GH-008	A Soil Management Plan will be prepared and followed, consistent with the guidance in the Defra (2009) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (or updated version thereof) and other relevant documents such as The Institute of Quarrying's Good Practice Guide for Handling Soils in Mineral Workings as an appendix to the detailed CEMP.	Limit permanent removal of soils during construction phase, re-use excess material and to reduce adverse impacts on land and soil	The Applicant / Construction Contractor
G-GH-009	A Water Management Plan will be in place to mitigate potential impacts to identified receptors by ensuring surface water run-off quality and quantity is managed effectively. This includes intercepting surface run-off from the works areas by filters and 'header' drains running along the edge of the temporary haul roads being discharged to appropriate surface watercourses (subject to agreement from the relevant regulators).	To reduce the potential effects associated with fuels, oils and chemicals required during construction	The Applicant / Construction Contractor
G-GH-010	A Pollution Prevention Plan which will outline pollution mitigation measures to be adopted including a Control of Substances Hazardous to Health assessment, fuel inventory and the key personnel contacts to be notified in the event of a	To reduce the potential effects associated with fuels, oils and	The Applicant / Construction Contractor

	significant pollution incident, which could lead to the contamination of controlled waters or soils.	chemicals required during construction	
G-GH-011	Any hazardous materials will be stored in designated locations with specific measures to prevent leakage and the release of their contents. This will include a requirement for storage areas to be set back an appropriate distance from surface water features and drains to prevent any uncontrolled discharge (and take into consideration the positions of any groundwater abstraction wells), on an impermeable base with an impermeable bund that has no outflow and is of adequate capacity to contain at least 110% of the contents. Valves and trigger guns will be protected from vandalism and kept locked when not in use.	To reduce the potential effects associated with fuels, oils and chemicals required during construction	To reduce the potential effects associated with fuels, oils and chemicals required during construction
G-GH-012	Only well-maintained plant and other equipment will be used during construction to minimise the potential for accidental pollution from leaking machinery or damaged equipment. Static machinery and plant are expected to be stored on hardstanding areas when not in use and, where necessary, to make use of drip trays beneath oil tanks/engines/gearboxes/hydraulics. Spill response kits containing equipment that is appropriate to the types and quantities of materials being used and stored during construction will be maintained within the Glaslyn works site for the duration of the works.	To reduce the potential effects associated with fuels, oils and chemicals required during construction	Construction Contractor
G-GH-013	An understanding of groundwater throughout the Glaslyn works site will be obtained from ground	To minimise the risk of groundwater	Construction Contractor

	investigation and monitoring including before, during and after construction. A more detailed hydrogeological assessment will be carried out where HDD, trenchless techniques or dewatering is required in higher sensitivity groundwater environments (Secondary A aquifer, for example) or where dewatering is required to facilitate open cut installation. Where dewatering is required, a dewatering scheme will be developed prior to construction to demonstrate that there is an effective strategy to manage water arising from the operations and, where required, sufficient proposals to treat the water prior to controlled discharge. Any such assessment will consider the effects of any draw down or impacts on nearby abstractions or resources.	flooding and impacts from dewatering to groundwater receptors	
G-GH-014	Redundant cable sections which have been made safe and had the oil drained from them will be monitored annually for any residual effects due to potential leaks from the sump installed during construction to capture any residual oil.	To monitor potential leaks and capture residual oil.	The Applicant
Water Quality, Resources and Flood Risk			
G-WR-001	No works (near, in, over or under) will be carried out within the vicinity of a Main River without technical environmental advice regarding the requirement for a permit (Flood Risk Activity Permit (FRAP)). This includes all HDD works under NRW Main Rivers. Works will only proceed once appropriate mitigation (within technical environmental advice and/or FRAP)	To minimise the impacts to water quality and flood risk	Construction Contractor

	has been installed and all conditions have been met.		
G-WR-002	Storage and handling of hazardous substances (including fuels) should not occur within 10 m of any inland freshwater or coastal waters, or within 50 m from a well or borehole. This includes the Afon Glaslyn and its associated area of salt marsh, Y Cyt/Nant yr Afon Oer, and the network of drainage channels and ditches around Porthmadog.	To reduce the potential effects associated with fuels, oils and chemicals required during construction	Construction Contractor
G-WR-003	A Flood Evacuation Plan will ensure that all personnel will be evacuated before a potential flood event.	To ensure safety of construction staff in the event of a flood	Construction Contractor
G-WR-004	Construction works will take place during periods of normal to low flow conditions to avoid conveyance-related flood risk effects.	To avoid increasing flood risk as a result of construction activities	Construction Contractor
G-WR-005	Floodplain compensation will be implemented to account for volumetric displacement of flood water from raised temporary stockpiles, raised construction compound areas, raised joint bay link pillars and raised access tracks within floodplain areas.	To avoid increasing flood risk as a result of construction activities	Construction Contractor
G-WR-006	A Pollution Prevention Plan (PPP) will be prepared to minimise the risk to surface and groundwater quality during construction, operation and maintenance.	To reduce the potential effects associated with fuels, oils and	The Applicant / Construction Contractor

		chemicals required during construction	
G-WR-007	In the unlikely event of a pollution incident, a Pollution Incident Response Plan (PIRP) will have been prepared to minimise and mitigate the magnitude of change on potential receptors.	To mitigate the magnitude impacts as a result of a pollution incident	Construction Contractor
G-WR-008	Where watercourses are not crossed via HDD, trenched crossings will be used. However, for all trenched crossings over pumping or fluming will be implemented to maintain the flow regime downstream of the crossing.	To maintain the flow regime	Construction Contractor
G-WR-009	Temporary crossings will be appropriately designed to not impact flow conveyance and flood risk. These crossings will be temporary and in place for short durations and constructed in line with permits from NRW/Lead Local Flood Authority	To maintain the flow regime and avoid impacts to flow conveyance and flood risk	Construction Contractor
G-WR-010	The location of statutory undertaker assets (including water supply and sewer pipes, water and waste treatment works etc.) will be confirmed through inspection of detailed plans from the undertakers. All assets potentially affected by the proposed works would be identified, with particular consideration to access roads and crossings.	To identify and minimise impacts on statutory undertaker assets	Construction Contractor
G-WR-011	Dewatering of trench excavations will be carefully monitored, and groundwater flow disruption and drawdown would be minimised via good construction practices. The time any	Minimise groundwater flow disruption and	Construction Contractor

	excavation is open would be kept to a minimum to minimise ingress of water and dewatering requirements.	drawdown and ingress of water	
G-WR-012	Dewatering of excavations will be carried out in line with good practice. Effects of dewatering on potential receptors will be incorporated into the proposed approaches for each piece of infrastructure. Appropriate treatment would be installed before discharge to surface or groundwater, this would include the use of siltbusters (or similar) before discharge to surface waters. Appropriate licences and permits will be applied for if required.	To minimise the impacts on surface water and groundwater quality	Construction Contractor
G-WR-013	During HDD activities, the drilling fluid engineer will carefully monitor the fluid usage in the recycling system and will quickly identify if fluid is being lost into the strata. If fluid loss is identified there are a number of measures that can be taken to seal the bore, including the following: - Modifying the drilling fluid properties to increase the effectiveness of the bentonite clay filter cake that lines the wall of the borehole. - Standard process and procedures in place for drilling, data collection and communication. - Appropriate drill fluid monitoring (fluid properties, fluid volume and flow, and downhole annular pressure). - Addition of stop-loss materials to bridge and seal larger voids in the soil. - Modifying the mud weight (drilling fluid density) to either balance or counter the groundwater pressure depending on ground conditions.	To minimise the impacts on surface water and groundwater quality	Construction Contractor

G-WR-014	For trenchless crossings detailed pre-drilling planning of methods and processes will be carried out. The extensive pre-drill planning would include the compilation of potential sub-surface structures along the route, environmental due diligence of the sites of the entry and exit holes, a geotechnical investigation along the proposed route to determine geological conditions with an emphasis on identifying sensitive areas and problematic ground conditions, and the analytical analysis of fluid pressures versus depth of cover to determine adequate depths of cover to minimise breakouts.	To minimise the impacts on surface water and groundwater quality	Construction Contractor
G-WR-015	Techniques will be employed by the Contractor to manage the risk of drilling fluid breakout or losses into the deposits or strata surrounding the HDD bore. Drilling fluids would be used to seal permeable deposits or strata. The naturally occurring bentonite clay would be used as the base for the drilling fluid, which would line the bore wall, preventing fluid loss and near-surface groundwater ingress.	To minimise the impacts on surface water and groundwater quality	Construction Contractor
G-WR-016	If water being pumped from excavations is suspected to be contaminated, appropriate measures would be taken in accordance with NRW guidance and the Environmental Permitting Regulations to prevent uncontrolled or unauthorised releases of this water to ground or to the water environment.	To minimise the impacts on surface water and groundwater quality	Construction Contractor

G-WR-017	Any temporary crossings would be in place for the minimal time possible and consents obtained where relevant.	To minimise the impacts of surface water quality, groundwater and flood risk.	Construction Contractor
G-WR-018	All permanent cable crossings would pass beneath the bed of watercourses (there will be no 'within bank' crossings). Sufficient depth between the bed of the watercourse and the top of the cable (whether trenchless or open cut) would be provided to ensure no potential for exposure of cable due to scour.	To minimise the impacts of surface water quality, groundwater and flood risk.	Construction Contractor
G-WR-019	HDD techniques would be used for the crossing of the Afon Glaslyn and detailed pre-drilling planning of methods and processes will be carried out. The extensive pre-drill planning would include the compilation of potential sub-surface structures along the proposed route, environmental due diligence of the sites of the entry and exit holes, a geotechnical investigation along the proposed route to determine geological conditions with an emphasis on identifying sensitive areas and problematic ground conditions, and the analytical analysis of fluid pressures versus depth of cover to determine adequate depths of cover to minimise breakouts. Best practice techniques and methodologies will be carried out during the implementation of HDD works. The HDD works are to be carried out in accordance with Pipeline Design for Installation of Horizontal directional drilling (Manual of Practice) by ASCE Oct 2014 or similar.	To minimise the impacts of surface water quality, groundwater and flood risk.	Construction Contractor

Traffic and Transport			
G-TT-001	Any access points requiring the creation of a junction bell mouth would be designed in accordance with the relevant standards outlined in the DMRB CS 123 Geometric Design of At-Grade Priority and Signal-Controlled Junctions, and in consultation with the local highway authority. This would help mitigate any potential safety risks associated with construction activities.	To reduce, where possible, traffic effects on links that would be more sensitive to changes in traffic volumes.	Construction Contractor
G-TT-002	Swept path analysis for AILs and HGVs would be carried out to ensure suitable routeing.	Maintain the safe and effective flow of traffic on the road network	The Applicant / Construction Contractor
G-TT-003	HGVs and AILs will follow the designated routes	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
G-TT-004	Utilising internal routes in the proposed works to avoid using the existing road network where practicable.	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
G-TT-005	Traffic management would be employed where construction vehicles need to interact with the public road network, including providing adequate visibility splays between construction traffic and other road users. Measures such as advanced signage to notify the public of works,	Maintain the safe and effective flow of traffic on the road network	Construction Contractor

	and manned controls at crossing points (e.g. marshals) will be implemented. Construction traffic generally will give priority to other road users, and the same approach will apply where construction traffic intersects with PRoWs.		
G-TT-006	Restricting HGV movements to certain routes as follows: A487 – A498; A487 – Porthmadog High Street; A487 – Brittania Terrace/A497.	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
G-TT-007	Route a proportion of inbound staff vehicles via A487 – A498; A487 – Porthmadog High Street; A487 – Brittania Terrace/A497.	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
G-TT-008	Restricting HGV movements to ensure arrivals and departures between 9.00 am – 5 pm to avoid increasing traffic levels on the surrounding highway network during the typical weekday peak hours.	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
G-TT-009	Implementing a Delivery Management System to control the bookings of HGV deliveries from the start of the construction period. This would be used to regulate the arrival times of HGVs via timed delivery slots, as well as to monitor compliance with HGV routing. In addition, adequate space would be made available in the Glaslyn works site to ensure no queuing back onto the surrounding road network occurs.	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
G-TT-010	Implementing a monitoring system to record the route of all HGVs travelling to and from the	Maintain the safe and effective flow of	Construction Contractor

	Glaslyn works site, to record any non-compliance with the agreed routing strategy/delivery hours and to communicate any issues to the relevant suppliers to ensure the correct routes and times are followed.	traffic on the road network	
G-TT-011	Construction staff (e.g. non-HGV vehicles) would be directed to take the most direct route to the proposed works using 'higher' order roads, such as A and B classified roads or the SRN.	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
G-TT-012	Encouraging construction workers to car share to reduce single occupancy car trips would promote the benefits of car sharing, such as reduced fuel costs and an environmental impact. A car share system would be implemented to match potential sharers and to help staff identify any colleagues who could potentially be collected along their route to/from the Glaslyn works site.	Maintain the safe and effective flow of traffic on the road network and encourage sustainable behaviour	Construction Contractor
G-TT-013	Providing limited (but sufficient) on-site car and cycle parking to accommodate the expected parking demand of workers on the Glaslyn works site.	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
G-TT-014	A specialised haulage service would be employed to allow AILs to transport components with the necessary escort, permits and traffic management, with the contractor consulting the relevant highways authorities to ensure the correct permits are obtained. The police will be given advanced notification under the Road	Maintain the safe and effective flow of traffic on the road network	Construction Contractor

	Vehicle Authorisation of Special Types Order 2003		
Air Quality and Emissions			
G-AQ-001	- Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	To ensure sensitive receptors are informed of construction activities	Construction Contractor
G-AQ-002	Display the name and contact details of person(s) accountable for air quality and dust issues on the Glaslyn works site.	To ensure the project air quality contacts are known.	Construction Contractor
G-AQ-003	Display the head or regional office contact information.	To ensure the project air quality contacts are known.	Construction Contractor
G-AQ-004	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the local authority. The level of detail will depend on the risk and will include as a minimum the highly recommended measures in this document. The desirable measures will be included as appropriate for the site. The DMP may include monitoring of dust deposition, dust flux, real time PM10 continuous monitoring and visual inspections.	To monitor and minimise air quality impacts	The Applicant / Construction Contractor

G-AQ-005	- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-006	Make the complaints log available to the local authority when asked	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-007	Record any exceptional incidents that cause dust and air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-008	Hold regular liaison meetings with other high risk construction sites within 250 m of the Glaslyn works site, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised. It is important to understand the interactions of the off-site transport/deliveries which might be using the same strategic road network routes.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-009	Undertake regular on-site and off-site inspection as necessary, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This would include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of the Glaslyn works site, with cleaning to be provided if necessary.	To monitor and minimise air quality impacts	Construction Contractor

G-AQ-010	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-011	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-012	Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the local authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-013	Plan site layout so that machinery and dust causing activities are away from receptors, as far as is possible.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-014	Erect solid screens or barriers around dusty activities or the Glaslyn works site that are at least as high as any stockpiles on site.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-015	Fully enclose site or specific operations where there is a high potential for dust production and the site is actives for an extensive period.	To monitor and minimise air quality impacts	Construction Contractor

G-AQ-016	Avoid site runoff of water or mud.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-017	Keep site fencing, barriers and scaffolding clean using wet methods.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-018	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-019	Cover, seed or fence stockpiles to prevent wind whipping	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-020	Ensure all vehicles switch off engines when stationary - no idling vehicles	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-021	Avoid where practicable the use of diesel or petrol powered generators and use mains electricity or battery powered equipment	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-022	Impose and signpost a maximum-speed-limit of 15-mph on surfaced and 10-mph on unsurfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the	To monitor and minimise air quality impacts	Construction Contractor

	nominated undertaker and with the agreement of the local authority, where appropriate).		
G-AQ-023	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-024	Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-025	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-026	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-027	Use enclosed chutes and conveyors and covered skips.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-028	Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	To monitor and minimise air quality impacts	Construction Contractor

G-AQ-029	Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-030	Avoid bonfires and burning of waste materials.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-031	Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-032	Avoid explosive blasting, using appropriate manual or mechanical alternatives	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-033	Bag and remove any biological debris or damp down such material before demolition.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-034	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	To monitor and minimise air quality impacts	Construction Contractor

G-AQ-035	Ensure effective water suppression is used during demolition operations. Handheld sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-036	Avoid explosive blasting, using appropriate manual or mechanical alternatives	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-037	Bag and remove any biological debris or damp down such material before demolition.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-038	Re-vegetate earthworks and exposed areas or soil stockpiles to stabilise surfaces as soon as practicable.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-039	Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-040	Only remove the cover section-wise during work and not all at once.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-041	Avoid scabbling (roughening of concrete surfaces) if possible.	To monitor and minimise air quality impacts	Construction Contractor

G-AQ-042	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-043	Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-044	Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-045	Avoid dry sweeping of large areas	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-046	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-047	Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable	To monitor and minimise air quality impacts	Construction Contractor

G-AQ-048	Record all inspections of haul routes and any subsequent action in a site log book	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-049	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-050	Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-051	Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permit	To monitor and minimise air quality impacts	Construction Contractor
G-AQ-052	Access gates to be located at least 10 m from receptors where possible	To monitor and minimise air quality impacts	Construction Contractor
Socio-Economics			
G-SE-001	Raised link boxes will be required to be installed in some locations on agricultural land. Where this occurs, the area will be fenced off and compensation will be provided as part of the easement. Agricultural land will also be acquired at Wern and Minffordd for the proposed works,	To minimise potential Socio-Economic impacts and compensate for any losses	The Applicant / Construction Contractor

	where appropriate compensation will also be provided.		
G-SE-002	Stone Circle Park. This playground will be closed for approximately two years whilst the cables beneath the playground are removed. Upon completion of the proposed works, the current facilities will be reinstated to its original condition.	To minimise long term adverse impacts once operational	The Applicant / Construction Contractor
G-SE-003	Sections of the Porthmadog Stone Circle Park itself will need to be temporarily closed during construction. With regards to the stones themselves, if it possible for them to be left in then they will be fenced off. If removal is necessary, only the stones close to the works will be removed. They will be carefully stored and subsequently reinstated post construction.	To minimise long term adverse impacts once operational	The Applicant / Construction Contractor
G-SE-004	The railway that is used by the Welsh Highland Heritage Railway and the Ffestiniog Heritage Railway is east of High Street in Porthmadog. The railway will be closed for 8 weeks and compensation will be paid for the loss of service appropriate to when the works can be done. The works will be scheduled to avoid peak visitor times and minimise impacts.	To minimise potential Socio-Economic impacts and compensate for any losses	The Applicant / Construction Contractor
G-SE-005	The Ysgol Eifionydd Secondary School playing field will be closed for a maximum of 2.5 years during the construction period to accommodate excavating works to install cables. After the construction phase, the field will be returned to its previous use	To minimise long term adverse impacts once operational	The Applicant / Construction Contractor

G-SE-006	The residence in the former Porthmadog Golf Range has the potential to be affected by the construction work, for example through access restrictions, disruption or disturbance to the individual(s) living there. If impacts occur, compensation will be provided in the form of an easement payment or temporary accommodation depending on the severity of the works.	To minimise potential Socio-Economic impacts and compensate for any losses	The Applicant / Construction Contractor
G-SE-007	Porthmadog Caravan Site off Snowden Street has the potential to be affected by the construction works associated with the removal of the existing cables. The works will last for a minimal length of time, approximately one to two days, with potentially one to two vehicles passing through the site during this time. Appropriate compensation will be paid by the Applicant for the access and disruption to the site.	To minimise potential Socio-Economic impacts and compensate for any losses	The Applicant / Construction Contractor
G-SE-008	There is potential for impacts from temporary land take during construction on agricultural land holdings around the Glaslyn works site. The Applicant will carry out pre-construction meetings with landowners at risk of impact to gather information on farming practices. This information will be used to develop appropriate mitigation to avoid impacts where possible. Where mitigation is not possible, the Applicant will provide compensation on a proven loss basis.	To minimise potential Socio-Economic impacts and compensate for any losses	The Applicant / Construction Contractor
G-SE-009	The Hochtief site office for the EVIP project is in the Glaslyn works site . The Applicant will co-ordinate with the EVIP scheme to ensure any	To minimise potential cumulative impacts	The Applicant / Construction Contractor

	potential disruption to its activities are anticipated and mitigated.	on sensitive receptors	
Noise and Vibration			
G-NV-001	Prior to commencement of work, the contractor will submit an application for prior consent to carry out noisy work under Section 61 of the Control of Pollution Act 1974 to demonstrate that noise and vibration has been minimised as far as reasonably practicable. The Section 61 application will set out the specific method of working, the actual working hours required, noise (and if necessary, vibration) monitoring locations, details of communication measures and the mitigation measures implemented to minimise noise and vibration impacts. As required by the Control of Pollution Act 1974, Best Practicable Means (BPM) will be employed and demonstrated through the construction, programme, the method used to construct the proposed works and noise (and vibration) predictions to the local authority in the Section 61 consent application. Should the contractor fail to follow the agreed methodology set out in the Section 61 application, the Local Authority will have the power to request the contractor to cease works and review methodology.	To minimise noise and vibration impacts and comply with Section 61 of the Control of Pollution Act 1974	Construction Contractor
G-NV-002	All appropriate processes, procedures and measures will be in place to minimise noise before works begin and throughout the construction programme.	To minimise noise and vibration impacts	Construction Contractor

G-NV-003	All contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2) which would form a prerequisite of their appointment.	To minimise noise and vibration impacts	Construction Contractor
G-NV-004	Noise and vibration will be controlled at source (e.g. the selection of inherently quiet plant and low vibration equipment) through a review of the construction programme and methodology to consider quieter methods and consideration of the location of equipment on-site and control of working hours.	To minimise noise and vibration impacts	Construction Contractor
G-NV-005	Modern plant that complies with applicable UK noise emission requirements will be used.	To minimise noise and vibration impacts	Construction Contractor
G-NV-006	Hydraulic techniques for breaking concrete will be used in preference to percussive techniques.	To minimise noise and vibration impacts	Construction Contractor
G-NV-007	Drop heights of materials will be minimised	To minimise noise and vibration impacts	Construction Contractor
G-NV-008	Plant and vehicles will be sequentially started up rather than all together	To minimise noise and vibration impacts	Construction Contractor
G-NV-009	Off-site pre-fabrication where reasonably practicable	To minimise noise and vibration impacts	Construction Contractor
G-NV-010	Regular and effective maintenance by trained personnel will be carried out to keep plant and	To minimise noise and vibration impacts	Construction Contractor

	equipment working to manufacturer's specifications		
G-NV-011	All construction plant and equipment to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use	To minimise noise and vibration impacts	Construction Contractor
G-NV-012	Loading and unloading of vehicles, dismantling of site equipment or moving equipment or materials around the Glaslyn works site to be conducted in such a manner as to minimise noise generation	To minimise noise and vibration impacts	Construction Contractor
G-NV-013	All vehicles used on-site shall incorporate reversing warning devices as opposed to the typical tonal reversing alarms to minimise noise disturbance	To minimise noise and vibration impacts	Construction Contractor
G-NV-014	Provision of information to the relevant local authority and local residents to advise of potential noisy works that are due to take place	To minimise noise and vibration impacts	Construction Contractor
G-NV-015	Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use	To minimise noise and vibration impacts	Construction Contractor
G-NV-016	Plant will always be used in accordance with manufacturers' instructions. Care will be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be carried out away from such areas	To minimise noise and vibration impacts	Construction Contractor

G-NV-017	The effect of noise and vibration on nearby sensitive receptors can be minimised through a good communication strategy. Prior to works being carried out, liaison will be carried out with occupiers of sensitive receptors that may be adversely affected by construction noise and vibration. Providing information of construction works and notice of when high noise and/or vibration generating activities are taking place can reduce adverse effects. All communications will contain contact details of persons to whom to direct any questions or complaints. The spatial coverage of communications will be agreed with the Local Authority through the Section 61 process.	To notify sensitive receptors of construction works	Construction Contractor
G-NV-018	BS 5228-1 assumes an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier, and of 10 dB when the noise screen completely hides the sources from the receiver. Temporary barriers should be used to screen receptors experiencing significant effects. Temporary barriers would be used to screen construction noise emissions as follows: - At the compound to the west of the Welsh Highland Heritage Railway during all works. - At Minffordd CSEC during enabling works. - South of the haul road to the north of Maes Gerddi. It is assumed that temporary barriers could screen line-of-sight from construction activities to sensitive receptors and would provide at least 5 dB attenuation. Moderate Adverse effects identified during NGA1, NGA2, NGA4, NGA6	To minimise noise and vibration impacts	Construction Contractor

	and NGA 7 would be reduced to Minor Adverse and not significant. Locations, heights and alignments of barriers will be included in the detailed CEMP.		
G-NV-019	Occupiers of nearby properties will be notified of the timings and duration of construction activities.	Minimise noise disturbance to sensitive receptors during preliminary works, establishment of compounds and construction of access roads	Construction Contractor
G-NV-020	As HDD is static works, temporary barriers will be set up close to the drilling rig to maximise their effectiveness at attenuating noise emissions. other plant such as mixers, generators and pumps can be similarly screened. To be effective at reducing noise form HDD activities, barriers would be installed as close as practicable to HDD sites.	Minimise noise disturbance to sensitive receptors during HDD activities	Construction Contractor
G-NV-021	Where practicable, HDD operations will be scheduled such that the specific tasks can be worked on and completed during core working hours. New HDD tasks will not be commenced where it is not feasible to complete during core working hours. However, on longer drills where each operation (drilling and reaming) will occur over multiple days, 24-hour working may be required. Ultimately, night-time working requirements would not be normal working practice and will be determined by on-site ground	Minimise noise disturbance to sensitive receptors during HDD activities	Construction Contractor

	conditions. Communication would be provided to occupants of affected properties as far as reasonably practicable before any out of core work hours.		
G-NV-022	For PPV vibration levels exceeding 1.0 mm/s, prior warning will be provided on the timings and duration of vibration generating activities.	To notify sensitive receptors of construction works	Construction Contractor
G-NV-023	The need for noise and vibration monitoring and potential monitoring locations will be identified in the Section 61 application and will be the subject of discussion between the contractor, the NGET and the local authority prior to submission of the Section 61.	To monitor noise and vibration and minimise potential impacts	Construction Contractor
Climate change			
G-CC-001	To minimise GHG emissions, materials will be sourced locally where possible, and logistics optimised to reduce journeys and improve efficiency.	To minimise GHG emissions	The Applicant / Construction Contractor
G-CC-002	Waste generated during the construction phase will be managed in line with industry best practices and NGET's waste management strategy, prioritising reuse, recycling, and recovery.	To comply with waste disposal best practice and minimise impacts of waste	Construction Contractor
G-CC-003	Operational efficiency will be maintained through regular equipment inspections, with replacement	To ensure operational efficiency	The Applicant

	of components carried out as required to prevent deterioration.	and prevent deterioration	
G-CC-004	The proposed works will be designed and operated in accordance with the risks and mitigation measures outlined in National Grid Electricity Transmission's Climate Resilience Strategy	To minimise adverse impacts to climate resilience	The Applicant
G-CC-005	A detailed CEMP is to be developed which outlines mitigation measures to appropriately manage the environmental impacts associated with the construction site.	To manage risks associated with flooding (pluvial, fluvial and coastal)	The Applicant / Construction Contractor
G-CC-006	Toolbox Talks will be held by the contractor to highlight any potential conditions that could create health and safety hazards for workers and mitigation measures.	To ensure safety of construction workers in the event of extreme heat and heatwaves	Construction Contractor
G-CC-007	A Dust Management Plan will be developed for the construction period to minimise dust generated onsite. The plan would outline a number of dust mitigation measures that will be implemented on the construction site.	To minimise dust following storm events	The Applicant / Construction Contractor
G-CC-008	An Operational Environmental Management Plan will be prepared, incorporating appropriate mitigation measures and emergency response plans to minimise the impacts of flood events during operation. The Minffordd CSEC includes an attenuation pond to manage surface water runoff and reduce flood risk by temporarily storing and gradually	To minimise the impacts of flooding (pluvial, fluvial and coastal) in operation	The Applicant

	releasing excess rainwater. The attenuation pond is expected to reduce flood risk to nearby elements of the proposed works.		
G-CC-009	Trees and other vegetation in the areas surrounding key assets should be monitored and pruned to make sure there is a safe distance between the greenery and the asset.	To ensure a safe distance between greenery and key assets	The Applicant
G-CC-010	A Health and Safety Plan will be in place detailing safety procedures, emergency plans, and guidelines to ensure the safety of staff and the public.	To ensure safety of staff and the public in operation	The Applicant
Material/Resource and Waste Management			
G-MW-001	Design for reuse and recovery: identifying, securing and using materials that already exist on-site, or can be sourced from other projects (e.g. reuse of excavated soil for landscaping).	Ensure where possible that materials used have been sustainably sourced	The Applicant / Construction Contractor
G-MW-002	Design for materials optimisation: simplifying layout and form to minimise material use, using standard design parameters, balancing cut and fill, maximising the use of renewable materials and materials with recycled content.	To maximise the potential for highest value reuse and recycling.	The Applicant / Construction Contractor
G-MW-003	Design for off-site construction: maximising the use of prefabricated structure and components, encouraging a process of assembly rather than construction where practicable.	Ensure where possible that materials used have	The Applicant / Construction Contractor

		been sustainably sourced	
G-MW-004	Design for the future (deconstruction and flexibility): identify how materials can be designed to be more easily adapted over an asset lifetime and how de-constructability and de-mountability of elements can be maximised at end of first life.	To ensure effective design for the future	The Applicant / Construction Contractor
G-MW-005	Design for Waste and Material asset efficient procurement.	To ensure efficient procurement of materials and appropriate waste disposal.	The Applicant / Construction Contractor
G-MW-006	The proposed works would aim to prioritise waste prevention, followed by preparing for reuse, recycling and other recovery and lastly disposal to landfill as per the waste hierarchy	To maximise the potential for highest value reuse and recycling.	Construction Contractor
G-MW-007	Implementation of a ‘just-in-time’ material delivery system to avoid materials being stockpiled where possible, which increases the risk of their damage and disposal as waste.	To avoid stockpiling of materials	Construction Contractor
G-MW-008	Attention to material quantity requirements to avoid over-ordering and generation of waste materials.	To avoid stockpiling of materials	Construction Contractor
G-MW-009	Segregation of waste at source where practical.	To manage waste effectively	Construction Contractor

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Murphy Power Networks Ltd.

Glaslyn Cable Uprating

Options Appraisal Report

Reference: GLAS-ARUP-DS-ZZ-RP-X-0004

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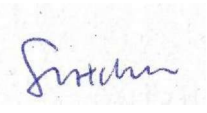
		Signature			

Issue Document Verification with Document ☑

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Appendices

Appendix A A-1
Trenchless Options Report A-1

1. Executive Summary

The 2012 Strategic Options Report by National Grid (Ref 2-1) addresses the imperative to enhance the electricity transmission system in North Wales, driven by contractual obligations to connect significant new generation projects. The report evaluates each of the five strategic options based on technical, environmental, socio-economic, and cost factors. Emphasising the need for ongoing detailed appraisal, consultation, and scrutiny of assumptions. The report informs National Grid's preliminary preferred option, involving an overhead line between Wylfa and Pentir and an underground cable between Wern and Y Garth; where the Glaslyn Cable Uprating Project is located. This decision strives for a delicate balance between technical feasibility, economic considerations, amenity, and environmental impacts, with visual and landscape effects and costs identified as pivotal factors influencing the decision-making process.

The scope of this project focuses on underground cable uprating and replacement between Wern CSEC at tower 4ZC044 and Garth CSEC at tower 4ZC037. This option appraisal report completed a structured analysis of options for the proposed underground cable route within the allotted Project.

National Grid have specified in the Works Information that that the definite permanent works will be built wholly within the Project Area, which is defined in 2 parts. The Primary area has been established historically and has had most surveys and investigations undertaken and is presented as such within the Site Information. A Secondary Area could also be considered if found suitable in the appraisal. This Project Area is also split into 5 sections, Section A to E, in which many route options were initially considered. A few options were then identified and drawn in the project GIS map for further consideration and analysis in this report.

This appraisal follows the general principles set out in National Grid's document 'Our approach to Options Appraisal'. This document sets out a framework by which multiple assessment criteria can be used to make project options. Several sub-topics have been scoped out of this assessment due to the nature of the project, characteristics of the section area, or because they would not be helpful in differentiating between options. The approach described in the document has been modified as outlined in this report.

Each option has been ranked within each criteria and then compared in a final table for each Project Area Section. Some options have been discarded if it is found that the route is unfeasible. A summary of the overall rankings is shown below.

Table 1: Summary of Options Ranking

Section	Option								
	1	2	3	4	5	6	7	8	9
A	Rank 1	Rank 3	Rank 2						
B	Rank 3	Rank 2	Rank 1						
C	Rank 3	Rank 2	Discarded	Rank 1					
D	Rank 1	Rank 3	Rank 2	Rank 4	Discarded	Discarded	Discarded	Discarded	Rank 5
E	Rank 1	Discarded	Discarded	Discarded					

As indicated by the table above, Options A1, B3, C4, D1, and E1 have been selected as the preferred option for each section. It is expected that minor adjustments will be made to the route during preliminary design to avoid hazards, reduce risk, and limit impact of the proposed works. Following this Options Appraisal Report, engagement will continue with relevant stakeholders and landowners. A proposed design will be put forward for the preferred route that can be taken forward to the consenting stage.

2. Introduction

2.1 Project Background

To enable power generated by a proposed offshore windfarm to reach the rest of National Grid's transmission network, upgrades will be required on the Pentir – Trawsfynydd 4ZC route to increase circuit capacity. While the overall investment comprises multiple projects, the scope of this project (collectively known as Glaslyn Cables) is to:

- Uprate existing National Grid 400kV Glaslyn Cables (4ZC Pentir - Traws Circuit 1st Circuit) by replacing the existing 1x cable per phase oil-filled 400kV Glaslyn Cable circuit from Wern SEC at tower 4ZC044 to Garth SEC at Tower 4ZC037 with new 400kV XLPE cables.
- Replace the 2 existing 132kV SPEN Glaslyn cables with new 400kV XLPE cables (Pentir - Traws 2nd Circuit) from Wern SEC at tower 4ZC044 to Garth SEC at Tower 4ZC37

The above works are designated using a pink arrow and circle in Figure 1 below.

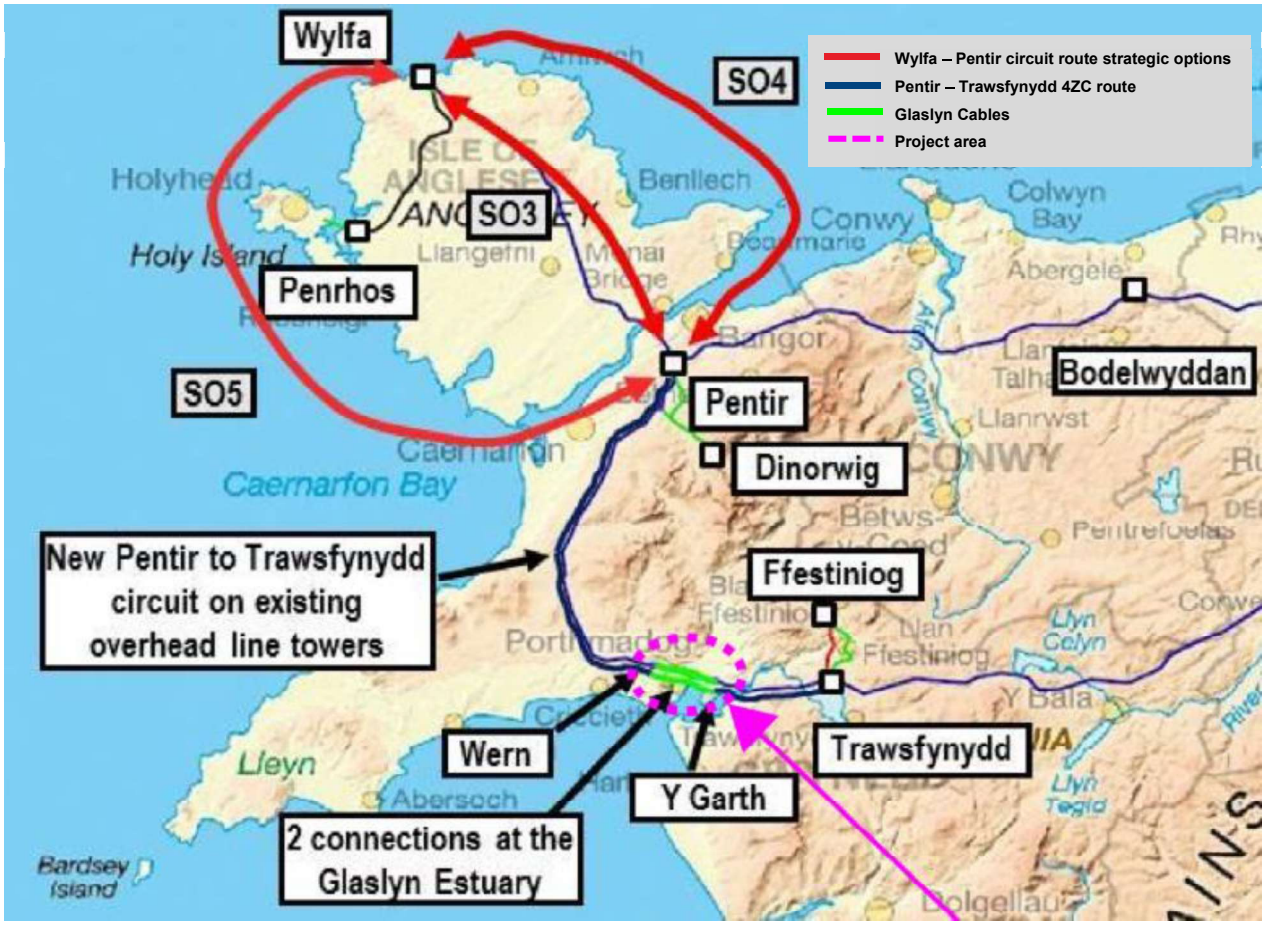

Figure 1: Location of Project along Pentir - Trawsfynydd route in North Wales

2.2 Purpose & Appraisal Constraints

The purpose of this options appraisal report is to perform a structured analysis of options for the proposed underground cable route within the allotted Project Area (described in Section 2.3 below). This options appraisal does not consider the use of different cable types outside of what has been outlined in the Project Specific Scope. Trenchless options have been considered for specific complex crossings but have not been considered for the entirety of the route. National Grid previously reviewed this project at a higher level as documented in *North Wales Connections Strategic Options Report* (Ref 2-1). Within this document, National Grid has already noted that "an underground cable between Wern and Y Garth is likely to achieve the most appropriate balance between its technical, economic, amenity and environmental obligations." This project

will eventually interface with the western tunnel headhouse near Minffordd for Snowdonia Visual Impact Provision (SVIP) project, for which an options appraisal was completed in 2020 (Ref 2-2).

2.3 Project

As part of this project, National Grid have specified in the Works Information that the defined permanent works will be built wholly within the Project Area, which is defined in 2 parts. The Primary area has been established historically and has had most surveys and investigations undertaken and is presented as such within the Site Information. The Secondary Area has no historic information available and offers the Contractor the opportunity to identify alternative routing if it would present a more advantageous approach to the Primary Area. The Primary and Secondary Areas have been shown in red and blue in Figure 2 below, respectively.

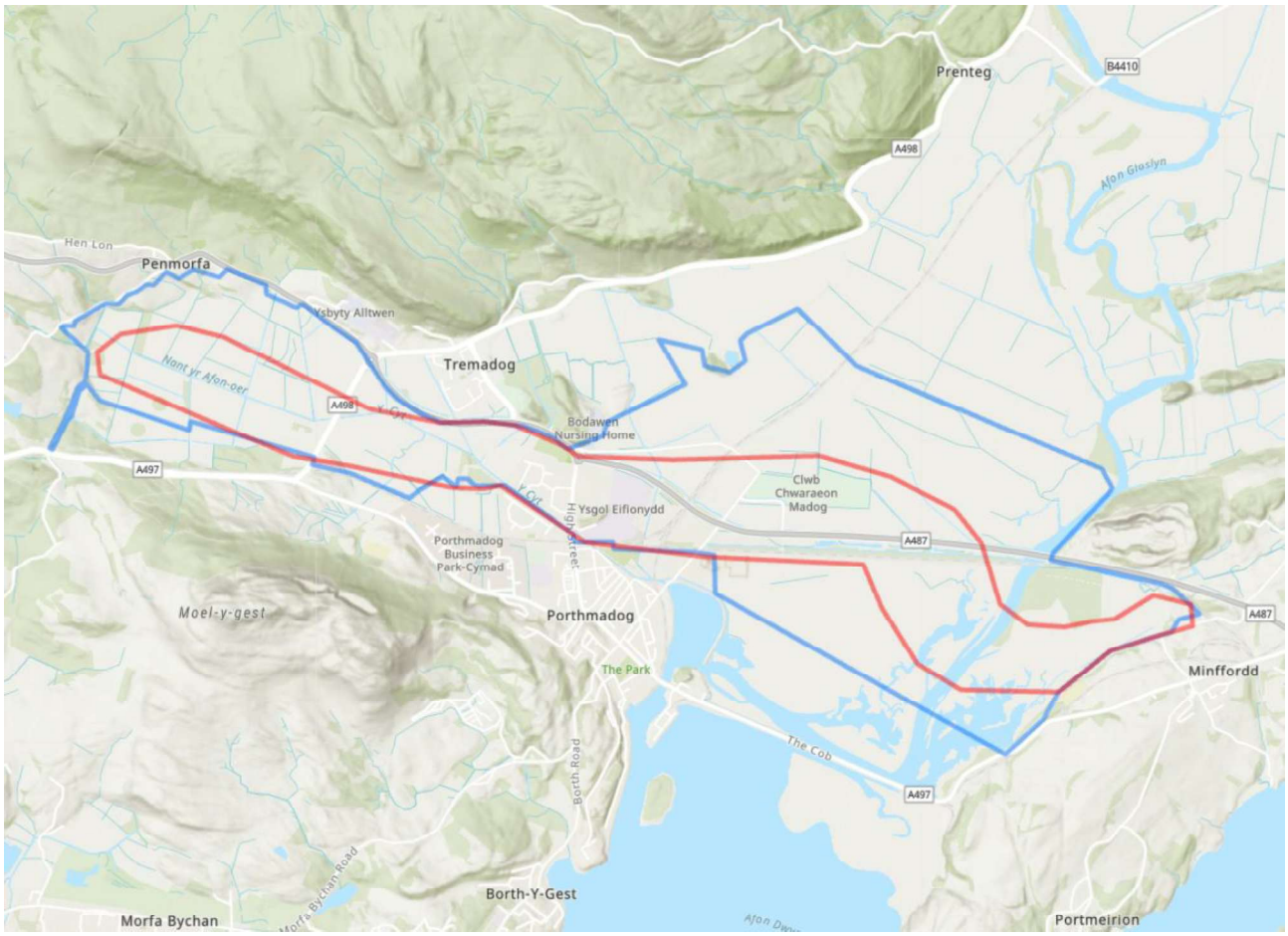

Figure 2: Primary and Secondary Project Areas

2.3.1 Sections

For the purposes of the project, and since the route will encompass a length of approximately 6km or more, the project area has been split into 5 sections, as shown in Figure 3 below.

Section A – Wern CSEC to A498

This section (shaded red in Figure 3 below) encompasses the area between Wern Cable Sealing End Compound (CSEC) and the A498 Highway. It is bound by the A487 to the north and by woodland and farmland plots north of Network Rail to the south.

Section B - A498 to Trunk Road Island

This section includes the area between A498 and the A487 Roundabout connecting the by-pass to Porthmadog High Street (shaded green in Figure 3 below). This section is south of the A487 and north of the woodland near Pensyflog and Porthmadog. The cable routes in this section will cross National Cycle Route 8, a stone circle feature used by the local community, and a playground in close vicinity to the roundabout.

An offshoot of Section B towards the southeast covers the existing alignment of the 132kV cables. Due to development in this area, the Project Area is significantly restricted at the roundabout.

Section C - Trunk Road Island to Heritage Railways

To the east of the roundabout, Section C encompasses all areas up to the interface with Snowdon Street (shaded orange in Figure 3 below). This section includes the current alignments of the existing 132kV and 400kV cables, but also includes a significant portion of land to the north of the A487 which can be considered for the proposed cable route. This section will require interface with the A487, Ffestiniog Railway (Welsh Highland Steam Railway), the Welsh Highland Heritage Railway, school playing fields.

Section D - Heritage Railway to East of Afon Glaslyn

Section D begins at Snowdon Street and encompasses all areas until after the SSSI and the River Glaslyn crossing, shown in light blue in Figure 3 below. This is the largest of the Project sections, giving flexibility to the optioneering due to the multiple constraints and major crossings within this area. At the western end, there is the Clwb Chwaraeon Madog (sports facilities) and Porthmadog Football Club. The area is then relatively open, bound to the south by the A487 Porthmadog bypass that crosses the Estuary. This section will require crossing of the by-pass and the Network Rail line before crossing the SSSI and River Glaslyn. This area is lower lying and is prone to flooding.

Section E - East of Afon Glaslyn to Minffordd

This final section includes the interface with Garth CSEC and Minffordd CSEC, shown in light yellow in Figure 3 below.

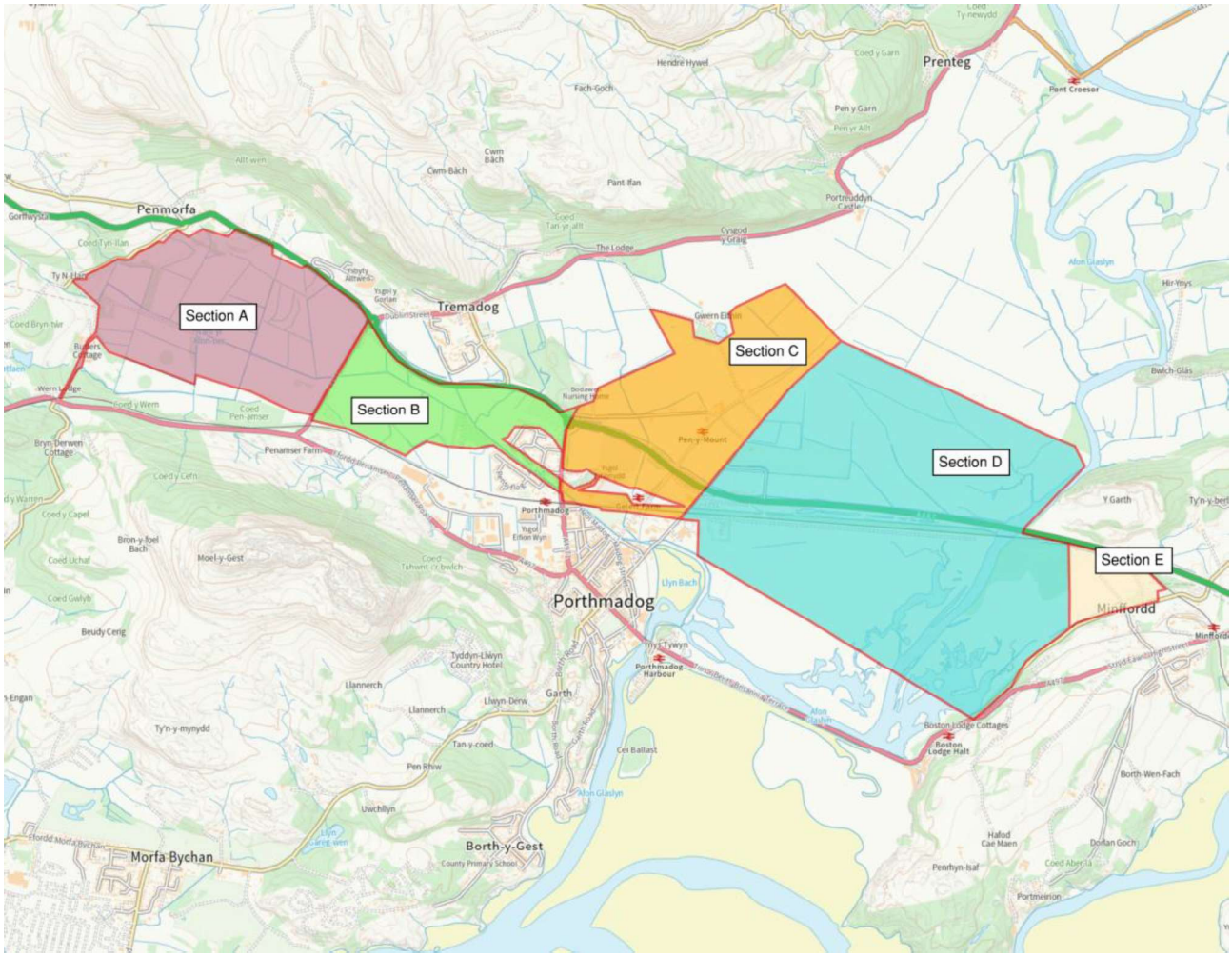

Figure 3: Project Area Sections

2.4 Overview of Design Options

Many route options were considered within each Project Area section. A few options were then identified and drawn in the project GIS map for further consideration and analysis, as shown in Figure 4 and Figure 5 below. 3 options were considered in Section A, 3 in Section B, 4 in Section C, 9 in Section D, and 4 in Section E.

As each route option connects to the adjacent Project Area sections at different points, there are some options that are only compatible with certain routes from adjacent sections. This was considered during the review and resulted in some of the options being eliminated due to impracticality.

Each option will be considered individually and scored based on the criteria described in National Grid's *Our Approach to Options Appraisal* document (Ref 2-3). It should be noted that minor deviation from the proposed alignments below is expected during design development. In the context of the assessment, it is essential to emphasise that scoring of the different routes is intended solely for guidance and to facilitate a qualitative assessment, to support the option appraisal commentary. The methodology is further explained in Section 33.3 of this report.



Figure 4: Section A and B of Design Options in GIS model



Figure 5: Section C, D and E of Design Options in GIS Model

2.5 References

- Ref 2-1: North Wales Connections Strategic Options Report – National Grid (2012)
- Ref 2-2: Visual Impact Provision (VIP) Snowdonia Project Options Appraisal – National Grid (2020)
- Ref 2-3: Our Approach to Options Appraisal – National Grid (2012)

3. Options Appraisal Methodology

3.1 Process

This appraisal follows the general principles set out in National Grid's document 'Our approach to Options Appraisal' (Ref 2-3). This document sets out a framework by which multiple assessment criteria can be used to make project options. The assessment topics and sub-topics are outlined in Table 2 below. As advocated in S2.3 of the 2012 guidance, several sub-topics have been scoped out of this assessment due to the nature of the project, characteristics of the section area, or because they would not be helpful in differentiating between options. The assessment was conducted based on the information available during the development of the report. It is noteworthy that in-depth elaboration on the environmental assessment will be developed in the Environmental Impact Assessment stage. Health and safety consideration have also been incorporated due to its importance when designing and implementing such a large construction project. This approach has been discussed and agreed with National Grid as a suitable way forward.

In this methodology, the objective is to evaluate and rank multiple route options across the assessment topics in Table 2 below. To facilitate this evaluation, a consistent scoring system is established, typically ranking from 1 (representing the best performance) to 5 (indicating the worst performance) for each topic. After reviewing the relevant data and our Route Options Selection Spreadsheet, rankings are assigned to each route option based on the option appraisal commentary within each topic. To visually represent the rankings, different shades of green are employed, with the darkest shade representing the top-performing option and the lightest shade for the lowest-performing one. This structured approach ensures a transparent and systematic decision-making process, allowing stakeholders to easily identify the best and worst options across the various evaluation criteria. This approach was discussed and agreed following review by Murphy Power Networks Ltd and National Grid.

Table 2: Appraisal Criteria Scoping

Assessment Criteria	Project Area Section					Comments
	A	B	C	D	E	
Technical						
Technical Complexity	✓	✓	✓	✓	✓	
Construction Delivery	✓	✓	✓	✓	✓	
Project Delivery	✓	✓	✓	✓	✓	
Carbon				✓		Was not considered in some sections as the options are very similar in terms of cable length and construction methodology.
Suitability of Technology				✓		Not applicable for this review, apart from a trenchless technology standpoint, which was reviewed on a case-by-case basis.
Network Capacity						The project scope has defined parameters to be met by this project.
Network Efficiency						The project scope has defined parameters to be met by this project.
Environmental						
Landscape / Visual Amenity	✓	✓	✓	✓		Not considered for Section E due to the limited area.
Ecology	✓	✓	✓	✓	✓	
Historic Environment	✓	✓	✓	✓	✓	While major historic environments are not anticipated within the actual route, it should be noted that historic environment have been observed in the vicinity.
Local Air Quality						Since the project scope requires undergrounding the cables, there is little difference for air quality for the shortlisted routes.
Noise & Vibration				✓		While this will be considered by the design, the only location where noise and vibration is expected to influence the options appraisal is within Section D due to the trenchless options and SSSI area.
Soils & Geology				✓		Initial feedback from GI suggests that the soils and land types for construction in the Primary Area are consistent enough to not be applicable for the assessment. Only considered for trenchless options in Section D.
Water	✓	✓	✓	✓	✓	While noted that Section E is still within fluvial and tidal Flood Zones, no assessment in Section E is generally required due to the limited area.
Socio Economic						

Assessment Criteria	Project Area Section					Comments
	A	B	C	D	E	
Economic Activity	✓	✓	✓	✓	✓	
Traffic Congestion	✓	✓	✓	✓	✓	
Transport Corridors	✓	✓	✓	✓	✓	
Aviation						Not applicable for the project area and options.
Defence						Not applicable for the project area and options.
Cost						
Capital Cost	✓	✓	✓	✓	✓	
Lifetime Cost						Was not considered due to lack of sufficient information during the development of this report.
Health & Safety						
Design Risk	✓	✓	✓	✓	✓	
Construction Risk	✓	✓	✓	✓	✓	
Operations & Maintenance	✓	✓	✓	✓	✓	
Demolition & Decommissioning	✓	✓	✓	✓	✓	

3.2 Data Sources

In this assessment, the information from the following sources have been used to inform the appraisal, as available at the time of production of the first version of this report. No further information has been used in producing this appraisal.

- Glaslyn Cable Crossing Desk Based Utility Report – RSK (2023)
- Glaslyn Cable Scheme Pre-Construction Information - National Grid (2022)
- FG Land Ownership Plans – National Grid (2023)
- Glaslyn Trenching & HDD Rates – Murphy Power Networks Ltd (2023)
- Glaslyn Geographic Information – DataMapWales by Welsh Government (2023)

3.3 Route Options Selection Spreadsheet

To inform the option appraisal commentary, a spreadsheet was produced to exhibit quantitative information for each route option. While this was not seen as the only driver for the selection process, it provided a useful tool which facilitated differentiation between routes which, at first, appear quite similar from a high-level. The data noted within this tool included the following:

- Cable and access road lengths
- Number of crossings of utilities, ecological/conservation areas, watercourses, hedgerows/vegetated areas
- Length of potential Open Cut Construction and Trenchless Construction
- Number of landowners affected by construction and their potential openness to the proposed works

3.4 Typical Construction Swathe

3.4.1 Good Agricultural Land Conditions

At the time of development of this report, typical construction swathes for the high-level review included a 6m between circuit centerlines and 1m between cables. The central separation could be increased to 8m to allow for 5m haul road in the centre as needed. It is estimated that up to 30m on either side of the cable swathe would be needed for temporary works, including staging and stockpiling. This provides an

approximate total construction swathe of 84m in good agricultural land installation conditions with cable depths at 1m.

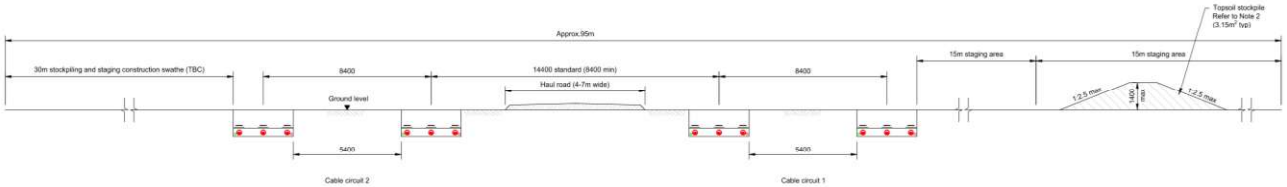

Figure 6: Typical section details

3.4.2 HDD Installation Conditions

Preliminary electrical analysis using CYMCAP software at the time of preparation of this report concluded that depth in excess of 8m from existing ground levels and cable spacing less than 10m would result in less desirable or unacceptable operational conditions and cable temperatures. Therefore, the proposed HDD route for the purposes of this options appraisal is as follows:

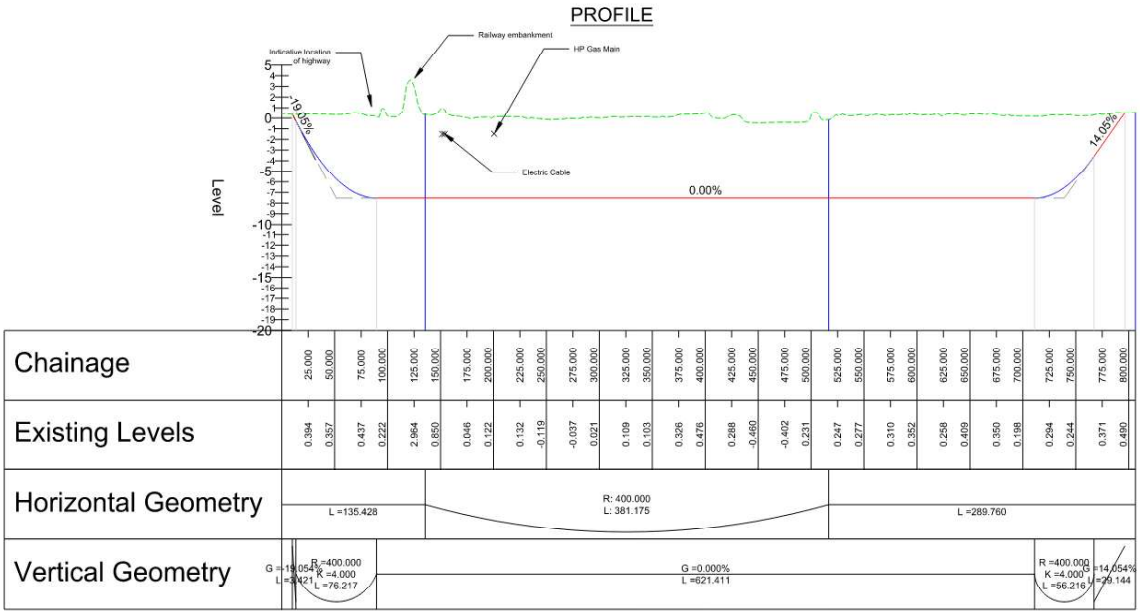

Figure 7: Curved HDD crossing profile in Section D

3.5 Stakeholder Consultation

This appraisal is based on consultation with the following key stakeholders at the time of production of the first version of this report. Consultation will be progressed with these and other stakeholders in detailed design stage. It was agreed with National Grid that engagement with Natural Resources Wales (NRW) would be deferred until the Environmental Impact Assessment phase, which will occur when the final route selection is made.

3.5.1 Welsh Heritage & Ffestiniog Highland Railway

NGET met with representatives from Welsh Heritage & Ffestiniog Highland Railway on 11th May, 2023 to discuss the project and identify preferred crossing locations. The clear preference was to cross somewhere south of the existing platform at Pen-y-Mount Station (where the track splits into two) and north of the high-pressure gas main crossing. For reference, this closely aligns with the location proposed by options C2 and C4.

‘Open Cut’ construction approach was discussed for this crossing. The stakeholder stated that they will likely self ‘assure’ the proposed design or appoint a local design house to do so when the detail cross sections and ‘make-up’ drawings become available. In this way, there will be no need for a BAPA or anything equivalent to what is being completed with Network Rail. For re-laying the track, the Welsh Heritage & Ffestiniog Highland Railway will provide supervisory support or a specialist to oversee the works.

In terms of a construction window, they identified that January to Easter weekend (no year preference, 2026, or 2027) is preferable so that the track can be re-opened for passengers. Compensation based on typical income would be required if not re-opened by this date.

3.5.2 Ysgol Eifionydd, Secondary School, Gwynedd County Council

The secondary school field crossing at the west end of Section C can be completed without issue as long as a good portion of the field is fenced off to achieve this. There was no preference on the crossing location of the A487. Preferred construction window would be during the summer holidays.

3.5.3 The Playground, Porthmadog Community Council

Due to space restrictions within the Project Area, the proposed cables will need to cross the A487 roundabout. Adjacent to this roundabout there is a playground that will need to be relocated during the proposed works. The preference from the local council is for this playground to be relocated to the northwest, adjacent to the highway boundary, if space allows.

3.5.4 Is-adran Rheoli'r Rhwydwaith - Network Management Division, Trafnidiaeth - Transport

Consultation with the highway authority was undertaken on 12th May, 2023. The roundabout crossing and the A487 crossings within Section C and D were discussed. The clear preference from the highway authority was to minimize disruption as much as possible by using trenchless methods where suitable. National Grid explained the constraints around the roundabout and that this section would likely be open cut construction. The highway authority noted the requirements for approaching these crossings and provided embargo dates for 2023.

4. Section A – Wern CSEC to A498

4.1 Overview & Baseline Condition

Within Section A the underground circuits are to be routed from Wern Cable Sealing end compound (CSEC) through a relatively open flat area of arable land that contains several drainage ditches and hedgerows. Section A ends at the interface with the A498 Highway.

As part of the Works, a new permanent access route is required to Wern CSEC from the A498 Highway. This access route is to be constructed at the same time as the new cables and was an important consideration when assessing the route.

Major assets and infrastructure in this section for consideration include the Wern CSEC, potable water mains, surface water ditches which a number of these are classified as NRW Main Rivers, existing 400kV and 132kV cables, and overhead power lines (OHL).

Three options were identified for investigation as shown in Figure 8 below. They include a route that stays south of the existing watercourse [Nant-yr Afon-oer] running from west to east, following the alignment of the existing cables (Option A1); a route that stays north of the existing watercourse and would be constructed under the OHL route (Option A2); and a route that deviates farther north (Option A3).

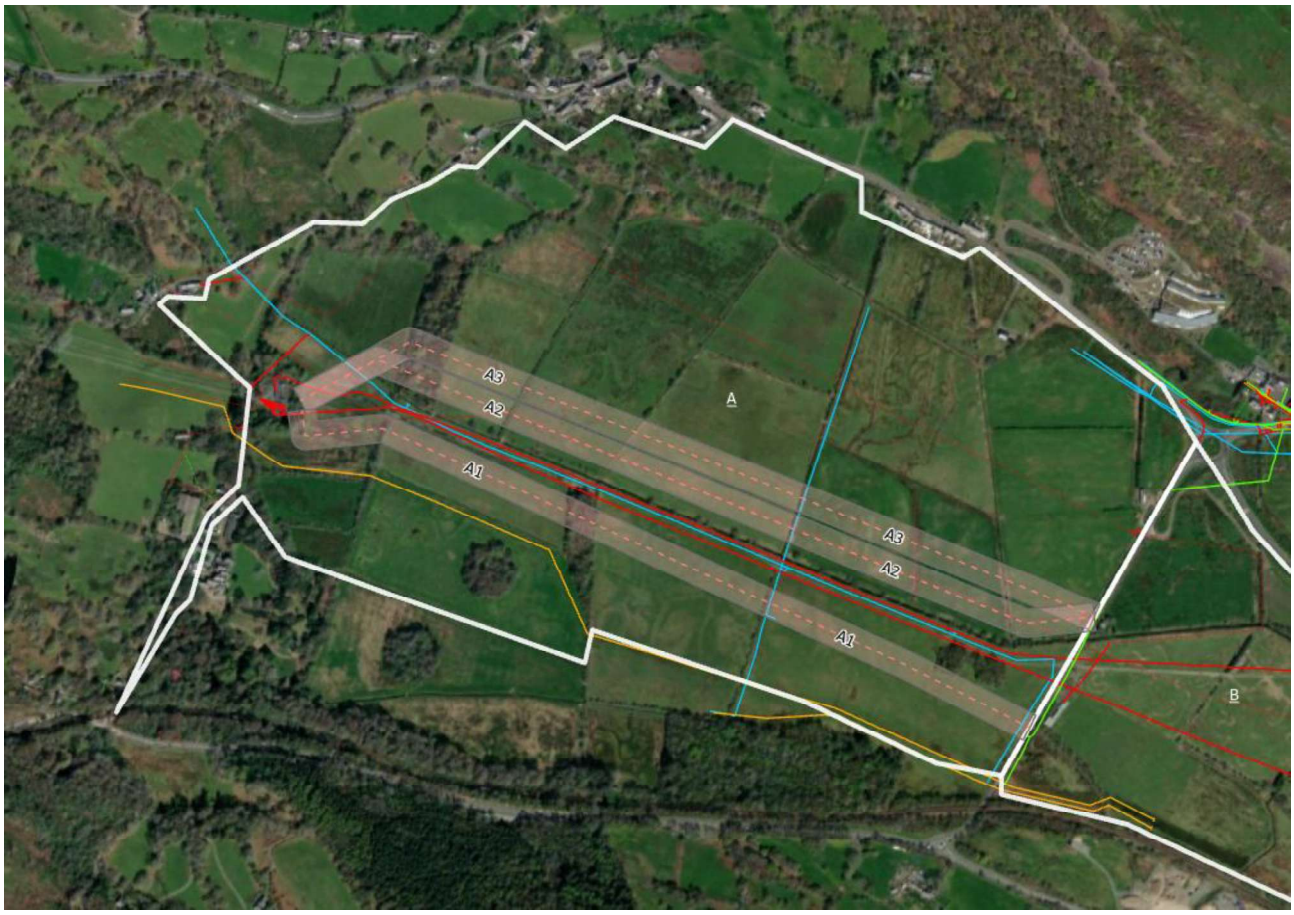

Figure 8: Overview of Section A on GIS model

4.2 Analysis

Criteria	Commentary
Technical Assessment Considerations • Technical complexity • Construction delivery • Project delivery ~~• Carbon~~ ~~• Suitability of Technology~~ ~~• Network Capacity~~ ~~• Network Efficiency / Benefits~~	Option A1 is the shortest route option considered within this section, at a length of approximately 1.17km. The route is located to the south of the ditch that runs centrally from east to west within this section. It is worth noting that the potential length of this route may be reduced if navigation around the tree is considered. The route has a total of 6 crossings, the least of all options in Section A, and is therefore considered to be the least complex from both a technical design and construction standpoint. The crossings include 2 small watercourses (at field boundaries) which are classed as NRW Main Rivers, 2 watermain crossings, and 1 existing 132kV cable route crossing. Staying to the south of Nant yr Afon-oer is advantageous as it stays away from the OHL route which is located north of the existing ditch. It is expected that this route can maintain a safe distance from the gas main, with no crossings proposed. The construction area is open farmland and therefore open-cut construction has been proposed. Trenchless options were not considered within Section A. This section is located on the same side as an existing track that runs over the existing 132kV and 400kV cables. This side is also noted by National Grid in the Works Information as the preferred access road alignment from A498. Constructing the cable route on this side would likely be less disruptive to the landowners as construction and decommissioning works can occur within the same construction swathe. Option A2 is slightly longer than Option A1, at a length of approximately 1.23km. The route is located to the north of Nant yr Afon-oer that runs centrally from east to west within this section, running parallel and in close proximity to the OHL route for approximately 900m. The route has a total of 12 crossings, including 8 field boundary watercourses, 2 watermain crossings, 1 existing 400kV route crossing, and 1 Public Right of Way (PROW). This route is considered the most technically complex due to the number of crossings and proximity along the entire length to the OHL route. Option A3 is the longest route considered, at a length of approximately 1.24km. The route is located to the north of Nant yr Afon-oer that runs centrally from east to west within this section. It also runs north of the OHL route to avoid being in close proximity. The route has a total of 13 crossings, including 9 field boundary watercourses, 2 watermain crossings, 1 existing 400kV route crossing, and 1 Public Right of Way (PROW). As this route deviates from the alignment of the OHL route, it would be less technically complex than Option A2. It is worth noting that both Options A2 and A3 cross the Nant yr Afon-oer Main River and two additional small watercourse which are also classed as Main Rivers Option A2 and A3are located on the opposite side to the existing 132kV and 400kV cables and would likely introduce additional complexity in terms of access arrangements throughout construction and decommissioning.
Environmental Assessment Considerations • Landscape / Visual Amenity • Ecology • Historic Environment ~~• Local Air Quality~~ ~~• Noise & Vibration~~ ~~• Soils & Geology~~ • Water	Option A1 crosses two hedgerows and two areas where existing trees are present. It may be possible to make minor adjustments to the route to limit tree removal, however, it is anticipated that approximately up to 50m of the route length will have existing trees that will need to be removed within the construction swathe. Option A2 crosses six hedgerows and an approximate 65m section of the route length will have existing trees that will need to be removed within the construction swathe. Option A3 crosses 7 hedgerows and an approximate 60m section of the route length will have existing trees that will need to be removed within the construction swathe. All three options A1, A2 and A3, highlight potential impacts on wildlife habitat due to the removal of trees within the construction swath. No construction is required in SSSI, SAC, or Priority Habitat areas. Noise & Vibration, Local Air Quality, and Soils & Geology criteria are also considered to be neutral for this Section as the differences between each option are minimal and any residual adverse effects during construction would likely be very minor using standard mitigation measures. Whilst parts of the route options in Section A fall within the Registered Historic Parks and Gardens area, no route options cross the Garden/Kitchen Garden area. Most of the listed buildings are located outside the Work Area. There are only few Grade II listed buildings outside the perimeter of Section A that is approximately 140m to 280m away from the Wern CSEC site. All options within Section A do not cross any conservation areas or ancient woodlands, and any adverse effect during construction assets or their setting would be very minor. The entire Work Area is within the extents of the historic landscape area, showing no differentiation between all route options. There are no scheduled monuments within the project area as well. The entire Work Area is within the extents of the Flood Zone 3, showing no differentiation between all route options. Option A1 has up to 3 existing watercourses crossings at field

Criteria	Commentary
	boundaries along the route, 2 of which are classed as NRW Main Rivers. Option A2 has up to 8 existing watercourses at field boundaries along the route and Option A3 has up to up to 9 existing watercourses, which includes crossing the Nant yr Afon-oer Main River once and two others NRW Main Rivers. Any watercourse intersection will need to be reinstated following construction as necessary.
Socio-Economic Assessment Considerations • Economic Activity • Traffic Congestion • Transport Corridors • ~~Aviation~~ • ~~Defence~~	As most of the land that the routes crosses are mainly agricultural land, construction activities for the proposed options in Section A have the potential to disrupt agricultural activities, affecting the livelihood of landowners. Options A2 and A3 intersect with a Public Right of Way, and construction activities may possibly introduce disturbance to leisure activities. It is essential to assess the extent of this disruption and its impact on the affected parties. Option A1 stands out as it would disrupt the least number of landowners and, importantly, be entering discussions with only 3 landowners who already have National Grid assets within their land. Whereas construction on the north side of the ditch for Options A2 and A3 would likely be more disruptive to the landowners because construction and decommissioning works would occur on separate plots. 5 landowners would need to be engaged for Options A2 and A3, as opposed to only 3 for Option A1. The route of Option A3 deviates farther from the plot boundary than Option A1 and A2 and would likely be more disruptive to the respective landowners. The route would also result in less useable area for the landowner after construction is complete. In terms of land acquisition, none of the options in Section A would require permanent acquisition of land except for Wern CSEC site. This means that, the land will be returned to the owner for their continued use after decommissioning and construction. However, during construction, temporary acquisition of land is necessary to build the cable corridor and install cables. This temporary utilisation of land for construction has implication for landowners and their ability to utilise their land for agriculture, and the compensation for this will be key considerations in landowner discussion and the overall project assessment. Note that the route has no open cut work within the highway, apart from at the A498 Highway crossing, which would be required with every option. There are no railway crossings to consider in Section A. None of the routes in Section A are crossing any highway, so there is no impact in traffic congestion and transport corridors.
Cost Assessment Considerations • Capital Cost • ~~Lifetime Cost~~	High level capital cost estimates for this section indicate that Option A1 is advantageous due to the reduced number of crossings and improved access. Options A2 and A3 are relatively similar with Option A2 having slightly less ditch crossings than Option A3, hence the estimated cost suggests to ranked second and third respectively.
Health & Safety Assessment Considerations • Design Risk • Construction Risk • Operation & Maintenance • Demolition & Decommissioning	Option A1 is considered to be the preferred option from a health and safety perspective due to the reduced number of service crossings and the fact that it is located farther from the OHL route which would need to be considered for Options A2 and A3. Although this option is closer to the existing 400kV and 132kV routes, these assets are underground, and the risk can be controlled by ensuring construction occurs a safe distance to the south. This is made possible by the fact that Section A1 is primarily open farmland and there is some flexibility with the proposed cable alignment and construction swathe. Option A2 is considered to be the least preferred option in terms of Health and Safety due to proximity to the OHL route across the majority of the route. This option does, however, maintain a larger offset from the existing gas main and underground HV cable routes. From an operations and decommissioning standpoint, installing the new cables away from the existing route will result in more complex access arrangements. Option A3 is preferred to Option A2 from a Health and Safety standpoint as the alignment maintains an offset from the OHL route along the Section length. However, it still requires crossing the OHL line and 400kV lines after leaving Wern CSEC. Similar to Option A2, from an operations and decommissioning standpoint, installing the new cables away from the existing route will result in more complex access arrangements.

4.3 Ranking & Conclusion

Assessment Criteria	Technical	Environmental	Socio-Economic	Cost	Health & Safety	Overall
Option A1	Rank 1	Rank 1	Rank 1	Rank 1	Rank 1	Rank 1
Option A2	Rank 3	Rank 2	Rank 2	Rank 2	Rank 3	Rank 3
Option A3	Rank 2	Rank 3	Rank 3	Rank 3	Rank 2	Rank 2

Option A1 is the preferred route within Section A1, ranking highest for all criteria. Option A2 has been ranked lower primarily due to the proximity with the OHL along the route, which resulted in adverse effects on most of the scoring criteria. Option A3 deviates quite far from the land boundary which started to increase cable length and introduce socio-economic concerns.

5. Section B – A498 to Trunk Road Island

5.1 Overview & Baseline Condition

Within Section B the underground circuits are to be routed from A498 Highway through a relatively open flat area of arable land that contains several drainage ditches and hedgerows, and Nant yr Afon-oer. The A487 Highway runs along the north of Section B which ends at the interface with the A487 Porthmadog Roundabout and along the High Street in Porthmadog.

Within the Primary area, there was no potential route that would avoid plots that requires further engagement with landowners. Major assets and infrastructure in this section for consideration include a high-pressure gas, potable water, surface water ditches, existing HV and LV cables, telecoms, and OHL.

Three options were identified in this area. Option B1 aligns with the end of Options A2 and A3, while B2 and B3 align with the end of Option A1. Option B1 runs along the northern plots while Options B2 and B3 take different routes along the southern plots. All the three options join about halfway into Section B as they enter the approach to the roundabout section. At the eastern end of this section, the cables will be restricted to a corridor that has the highway and high-pressure gas main to the north and the existing 400kV cables to the south. Within the Primary Area, the roundabout was seen as the only viable crossing point between Section B and Section C due to the town of Porthmadog to the south. In addition to this, it should be acknowledged that there may be temporary traffic disruption, and it will be imperative to develop suitable traffic management measures.



Figure 9: Overview of Section B on GIS model

5.2 Analysis

Criteria (See Table 2)	Commentary
Technical Assessment Considerations • Technical complexity • Construction delivery • Project delivery ~~• Carbon~~ ~~• Suitability of Technology~~ ~~• Network Capacity~~ ~~• Network Efficiency / Benefits~~	Option B1 is approximately 1.41km long and would intersect with options A2 and A3 at the A498 highway. Before converging with Options B2 and B3, this option follows the southern edge of the northern plots before crossing the existing 400kV cable route. Option B1 also crosses an OHL route and multiple watercourses at field boundaries. Before converging with the other options, this route is constricted by a field boundary and the highway to the north, which would require a narrower construction swathe to what is shown in the typical section described in Section 3.4. Option B1 crosses the existing 400kV line twice as opposed to only once for the other options. Since it is located farther from the existing cable route, it would likely introduce additional complexity in terms of access arrangements throughout construction and decommissioning. Option B1 is not located close to an existing track and would require new access arrangements. Options B2 and B3 are 1.45km and 1.35km, both crossing Nant yr Afon-oer respectively. These routes are the same, apart from the first section of the route, where B3 crosses the A498 highway and existing 132kV line at an angle. This option would provide more flexibility with the highway crossing location and would allow the construction swathe to avoid the golf driving range. B2 utilizes the golf driving range land for a short period before turning and heading straight north. Options B2 and B3 follow the route of the 400kV cables relatively closely as well as the route of an existing access track. Constructing the cable route on this side would likely be less disruptive to the landowners as construction and decommissioning works can occur within the same construction swathe.
Environmental Assessment Considerations • Landscape / Visual Amenity • Ecology • Historic Environment ~~• Local Air Quality~~ ~~• Noise & Vibration~~ ~~• Soils & Geology~~ • Water	Option B1 crosses five hedgerows and approximately 75m of the route length will have existing trees that will need to be removed within the construction swathe, and Options B2 and B3 both cross seven hedgerows and would require about 50m of the route length with existing trees to be removed within the construction swathe, and All three options B1, B2 and B3, highlight potential impacts on wildlife habitat due to the removal of trees within the construction swath. No construction is required in SSSI, SAC, or Priority Habitat areas. Noise & Vibration, Local Air Quality, and Soils & Geology criteria are also considered to be neutral for this Section as the differences between each option are minimal and any residual adverse effects during construction would likely be very minor using standard mitigation measures. Most of the listed buildings are located outside the Work Area. There are three Grade II LBs in Section B that is approximately 50m to 90m away from the route options, which is considered to be sufficiently far away from the proposed route. All options within Section B do not cross any conservation areas, listed buildings, or ancient woodlands, and any adverse effect during construction assets or their setting would be very minor. The entire Work Area is within the extents of the historic landscape area, showing no differentiation between all route options. There are no scheduled monuments within the project area as well. The entire Work Area is within the extents of the Flood Zone 3, showing no differentiation between all route options. There are up to 6 existing watercourses along Option B1 at field boundaries along the route, two of which are classified as NRW Main River. There are up to 5 existing watercourses along B2 & B3 at field boundaries along the route including two NRW Main River. The watercourse, Nant yr Afon-oer, is crossed with the existing 400kV lines with a substantial cable bridge. Various trenchless options have been considered for the large existing watercourse crossing with the proposed cables as noted in Appendix A. Additionally, any watercourse intersection will need to be reinstated following construction as necessary.
Socio-Economic Assessment Considerations • Economic Activity • Traffic Congestion • Transport Corridors ~~• Aviation~~ ~~• Defence~~	All of the route option in Section B primarily involve crossing agricultural land, with some overlap into an urban area near the A487 roundabout, mainly affecting agricultural activity. Construction within the northern plots of Options B1 would likely be more disruptive to the landowners than Options B2 and B3 because construction and decommissioning works would occur on separate plots. Option B1 crosses 17 plots, with 14 landowners that have positive relationship with National Grid and the other 3 would require further engagement. This is one more than Options B2 and B3 and would require engagement with landowners who have not previously had National Grid assets within their land boundary. It is important to note that none of the options in Section B involve permanent land acquisition. Instead, construction activities necessitate temporary land acquisition for building a cable corridor and installing cables. Subsequently, most land will be returned to the landowners for their continued use. During construction, landowners will potentially experience a temporary loss of access, and discussion will revolve around fair compensation for this period.

Criteria (See Table 2)	Commentary
	Both Option B2 and B3 might be crossing parts of the Madog Quads Trekking route, potential impact to the local tourism activity. All routes cross a stone circle feature used by the local community and a playground in close vicinity to the roundabout, construction activities along these routes may have the potential to disrupt leisure activities. Facilities would need to be reinstated after works are complete. Options B3 would provide more flexibility with the highway crossing location and would allow the construction swathe to avoid the golf driving range. Option B2 utilizes the golf driving range land for a short period before turning and heading straight north. All options are required to cross a Public Right of Way, National Cycle Route 8, the A498 on the western side and the roundabout on the eastern side. Construction activities around these transport corridors and traffic management measures may disrupt the local area, particularly due to its proximity to an urban area, potentially affecting the traffic congestion, unless trenchless methods are considered. Careful management of these disruptions will be essential to minimize inconvenience to residents and businesses.
Cost Assessment Considerations • Capital Cost • ~~Lifetime Cost~~	High level capital cost estimates for this section indicate that Option B3 is advantageous due to the shortest overall cable length and fewer crossings. Option B1 is ranked second with shorter HDD length while Option B2 is ranked last with the longest cable length.
Health & Safety Assessment Considerations • Design Risk • Construction Risk • Operation & Maintenance • Demolition & Decommissioning	Option B1 is considered to be slightly less preferable from a health and safety perspective due to the additional crossing of the live 400kV cables.

5.3 Comparative Ranking & Conclusion

Assessment Criteria	Technical	Environmental	Socio-Economic	Cost	Health & Safety	Overall
Option B1	Rank 3	Rank 3	Rank 3	Rank 2	Rank 3	Rank 3
Option B2	Rank 2	Rank 2	Rank 2	Rank 3	Rank 2	Rank 2
Option B3	Rank 1	Rank 1	Rank 1	Rank 1	Rank 1	Rank 1

Option B3 is the preferred route within Section B, ranking highest for all criteria. Option B1 ranked lower primarily due to being in a separate plot to the existing cables, which resulted in adverse effects on most of the scoring criteria. Furthermore, Option B1 crossed the existing 400kV line twice and did not align with the preferred Option from Section A. Finally, while Option B2 is extremely similar to Option B3, it ranked lower due to the impact on the driving range however it is noted that it provided greater flexibility at the A498 highway crossing.

6. Section C – Trunk Road Island to Heritage Railway

6.1 Overview & Baseline Condition

Within Section C the underground circuits are to be routed from Porthmadog Roundabout to Section D, which begins at Clwb Chwaraeon Madog and Porthmadog FC grounds. This route requires crossing the Heritage Railway and the A487 Highway. Major assets and infrastructure within this section include a high pressure gas main, surface water ditches, existing 400kV and 132kV cables, telecom routes, and overhead power lines. Most of the landowners within Section C have positive relationship with National Grid. However, it is crucial to emphasise the importance of engaging with the Heritage Railway for the relevant crossing.

Four options were identified for Section C. Option C1 routes south of the existing 400kV cables before heading north. Option C1 crosses the Heritage Railway farther to the north than the other options before continuing in a north-western direction to avoid the Clwb Chwaraeon Madog grounds. Option C2 follows the highway alignment and crosses the Highway at the earliest opportunity. It crosses the Heritage Rail slightly further south than Option C1 before entering the Clwb Chwaraeon Madog grounds. Option C3 follows the existing 400kV route closely to the south of the highway. It crosses the Heritage Rail before then turning north and crossing the highway. It then follows the eastern edge of Section 4. Finally, Option C4 is similar to Option C2 but crosses the highway at a point farther to the east.

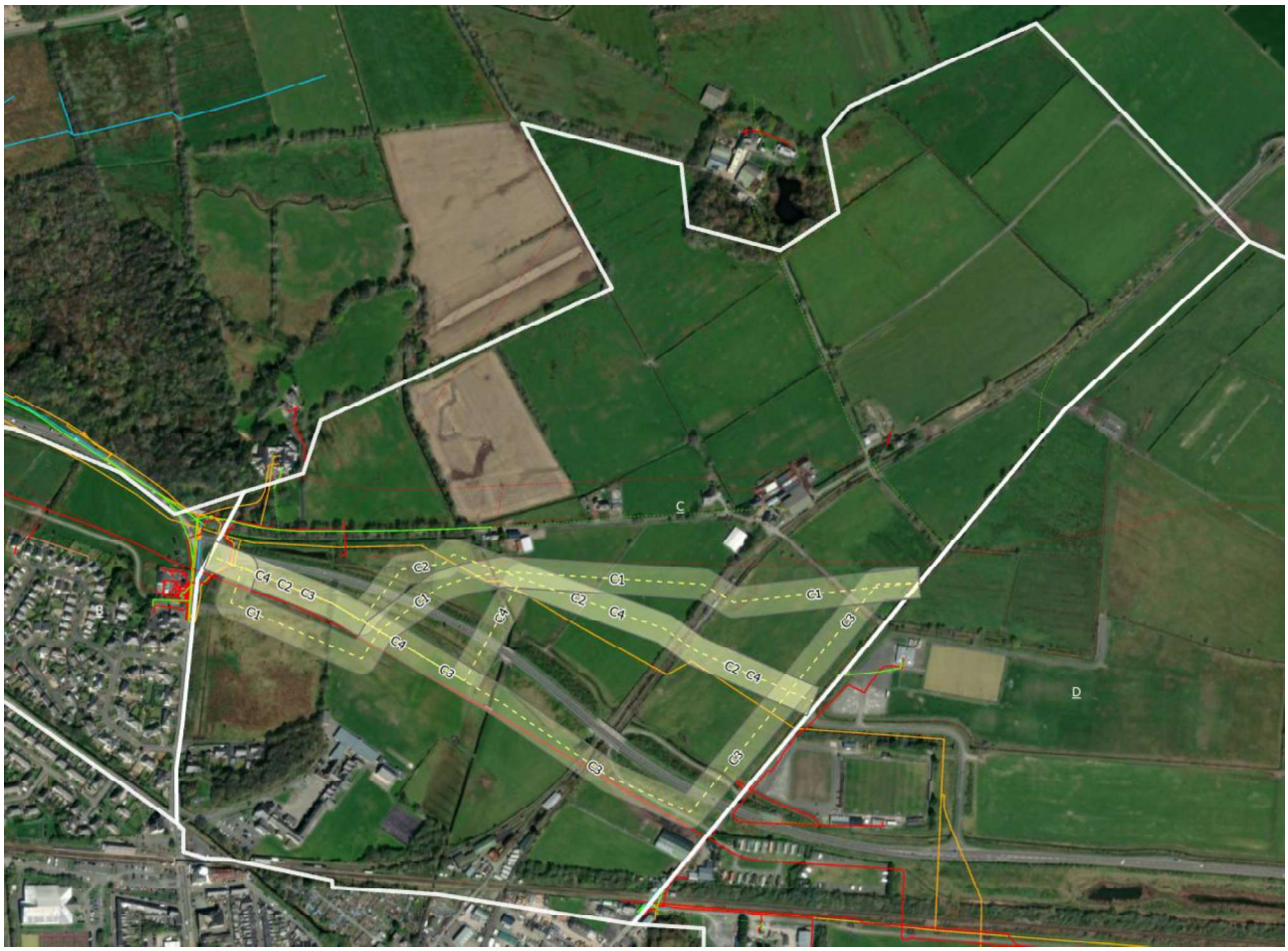

Figure 10: Overview of Section C on GIS model

6.2 Analysis

Criteria	Commentary
Technical Assessment Considerations • Technical complexity • Construction delivery • Project delivery • Carbon ~~• Suitability of Technology~~ ~~• Network Capacity~~ ~~• Network Efficiency / Benefits~~	Option C3 is the longest route option considered, at 1.17km and Option C2 is the shortest at 0.89km. Options C1 and C4 are 1.07km and 0.95km, respectively. Each route considers a trenchless method of construction under the A487 highway crossing, which is discussed further in Appendix A of this report. This analysis concluded that the optimum method of construction is HDD as it is more favourable in terms of the alignment and sustainability aspect. Option C4 is the preferred crossing location as it crosses at a location where there is more room for placement of the entry and exit pits. It is noted that Option C1 shows a slight meandering of the route to the south before crossing the A487. Upon review of the typical construction swathe and space constraints, this route offers additional flexibility to construction and eliminates a tight bend in the cables before crossing the highway. Option C3 follows the existing 400kV route for as long as possible before crossing the highway to the north. However, this route does not cross the heritage rail at the preferred location and also crosses the highway at a location where there is less room for the construction of the HDDs. In addition to the above technically complex crossings, the cables would also be nearer the existing 400kV route, and therefore this option is the least preferable. Options C1, C2, and C4 are closer to the high-pressure gas main and overhead power lines along the route, however, it is expected that these risks can be managed by maintaining a safe working distance from these assets. Of these three options, Option C4 provides the best crossing angle of the high-pressure gas main. At the heritage railway, it is expected that open cut construction will be accepted by the Heritage Railway as indicated in Section 3.5. It is also noted that their preferred crossing location would be the location shown in Option C2 and C4. Option C1 crosses slightly farther north than C2 and C4, however, this was noted as less preferable by Heritage Railway due to the fact that one of the track splits into two, which would require more extensive reinstatement. At the eastern interface, it should be noted that following the existing 400kV lines into Section D was not considered feasible as it runs through a Caravan Park before crossing the Network Rail line to the south. This route was discounted prior to this analysis as it did not offer sufficient room for construction of the typical cross section and the HDDs that would be required under the railway.
Environmental Assessment Considerations • Landscape / Visual Amenity • Ecology • Historic Environment ~~• Local Air Quality~~ ~~• Noise & Vibration~~ ~~• Soils & Geology~~ • Water	Of all the Options, Option C4 has the least impact on hedgerow boundaries and trees along the route. It is expected that six hedgerows would need to be removed and replaced and only approximately 20m of the route length will have existing trees that will need to be removed within the construction swathe. Options C2 and C1 have similar outcomes, while Option C3 is ranked as the most disruptive, likely requiring removal of additional vegetation on the verges of the highway. Any tree or hedgerow boundary removals within the construction swathe highlight potential impacts on wildlife habitat. Additionally, any watercourse intersection will need to be reinstated following construction as necessary. No construction is required in SSSI, SAC, or Priority Habitat areas. Noise & Vibration, Local Air Quality, and Soils & Geology criteria are also considered to be neutral for this Section as the differences between each option are minimal and any residual adverse effects during construction would likely be very minor using standard mitigation measures. There is a Grade II listed building in Section C located about 260m away to the nearest route option, which is considered to be sufficiently away from the proposed route. All options within Section C do not cross any conservation areas, listed buildings, or ancient woodlands, and any adverse effect during construction assets or their setting would be very minor. The entire Work Area is within the extents of the historic landscape area, showing no differentiation between all route options. There are no scheduled monuments within the project area as well. The entire Work Area is within the extents of the Flood Zone 3 and all of the options cross the NRW Main River once, showing no differentiation between all route options. In terms of watercourse crossings, all of the options cross the one unnamed ditch and a NRW Main River, and Option C3 crosses an extra unnamed ditch. Various trenchless options have been considered for the NRW Main River crossing with the proposed cables as noted in Appendix A that would need to be reinstated after works are complete. Any residual adverse effects during construction would likely be very minor using standard pollution control and other mitigation measures.
Socio-Economic Assessment Considerations • Economic Activity	Most of the lands that the route options crosses are mainly agricultural land, hence construction for the proposed options in Section C have the potential to disrupt agricultural and economical activities and the livelihood of landowners. Options C2, C3, and C4 each cross 9 different plots, while Option C1 crosses 10 in total. The primary disruption lies in agricultural activity, which is

Criteria	Commentary
• Traffic Congestion • Transport Corridors • ~~Aviation~~ • ~~Defence~~	the predominant land use here. There are multiple landowners involved in these areas including the heritage railway. Note that none of the options in Section C require permanent land acquisition. Instead, construction requirements involve the temporary acquisition of land for building a cable corridor and installing cables. Subsequently, most of the land will be returned to the landowners for their continued use. During construction, landowners will experience a temporary loss of access, which leads to discussions about fair compensation for this period. All options are required to cross the eastern side of the A487 roundabout, the school playing field right after the roundabout and Snowdon Street. Option C1 and C3 crosses the access road to a local farm after crossing the Heritage Railway, and C3 would have an extra highway crossing near the southern side. Construction activities may disrupt these areas, particularly due to its proximity to an urban and local business area, potentially affecting the school, economic and leisure activities, unless trenchless methods are considered. Careful management of these disruptions will be essential to minimize inconvenience to residents and businesses. It is worth noting that Option C3, which follows the existing 400kV route, would likely be the least disruptive to landowner operations, as it is maintained along the field boundaries for the entire length. Additionally, trenchless construction methods are proposed for the highway crossing, assuming negligible traffic congestion and impact on highway operations. Options C2 and C4, while crossing the heritage railway at the preferred location by external stakeholders, would have the least impact on this transport corridor. The crossing of the local road into Section D was considered to be equal for the two proposed crossing locations and of negligible effect on this scoring.
Cost Assessment Considerations • Capital Cost • ~~Lifetime Cost~~	High level review of capital costs indicates that Option C2 and C4 are preferable due to it being two of the shortest routes and causing the least disruption to landscape/ecology. Whilst Option C3 has the longest cable route length, Option C1 is most costly among all the options due to having higher number of service crossings along the route. The capital cost rate for service crossing was suggest being higher than standard agricultural trenching.
Health & Safety Assessment Considerations • Design Risk • Construction Risk • Operation & Maintenance • Demolition & Decommissioning	Option C3 is considered to be slightly less preferable from a health and safety perspective due to the proximity to the live 400kV cables at the proposed heritage railway and highway crossing. Of the rest of the options, Option C4 is ranked highest as it provides the most room for crossing the highway and crosses the gas main perpendicularly. Option C1 provides additional room before crossing the highway and improves the angle of the highway crossing and is therefore ranked higher than Option C2.

6.3 Comparative Ranking & Conclusion

Assessment Criteria	Technical	Environmental	Socio-Economic	Cost	Health & Safety	Overall
Option C1	Rank 3	Rank 3	Rank 3	Rank 3	Rank 2	Rank 3
Option C2	Rank 2	Rank 2	Rank 2	Rank 1	Rank 3	Rank 2
Option C3	Option discarded.					
Option C4	Rank 1	Rank 1	Rank 1	Rank 2	Rank 1	Rank 1

Option C4 is the preferred route within Section C4. However, upon review of the typical construction swathe and space constraints between the highway and 400kV live cables, it is decided to use the western portion of Option C1 (where the alignment meanders south) to achieve an improved alignment of cables in the approach to the trenchless crossing under the highway. It is also noted that while Option C4 only appears to connect with Options D9, D4, and D8, the route can deviate within the final land parcel to connect with the other options to the north if they are found to be preferable. Option C3 was discarded from the available options primarily due to the heritage rail crossing location and constraints associated with completing works

adjacent to the existing 400kV line. Options C1 and C2 ranked lower primarily due to the less advantageous crossing location of the highway.

7. Section D – Heritage Railway to East of Afon Glaslyn

7.1 Overview & Baseline Condition

Within Section D the underground circuits are to be routed from Snowdon Street (beginning at either Clwb Chwaraeon Madog or Porthmadog FC grounds) to Section E, east of Afon Glaslyn. This route requires crossing the A487 Highway, the Cambrian Railway Line, and several environmental constraints such as the SSSI, SAC and Priority Habitat. Major assets and infrastructure within this section include a high-pressure gas main, surface water ditches, existing 400kV and 132kV cables.

Crossing the highway, railway, utilities, and SSSI is considered to be the most complex portion of the route. Options that were discarded early in the process and not reviewed as part of this appraisal included:

- Open cut highway and railway crossings: Not permitted by Network Rail and strongly opposed by the highway authority.
- Cable bridge across Afon Glaslyn: Would require extensive works within the SSSI and riverbanks, less financially viable given the size of structure that would be required. The cable bridge should be designed in a way that avoids any adverse effects on flood risk.
- Use of existing bridge structures to cross Afon Glaslyn: Not considered due to the age of existing assets, number of cables being constructed, and complexity of construction.

All route options in Section D therefore considered trenchless construction for crossing these major assets and environmental constraints, with open cut construction being used for the other sections of the route. The trenchless options are summarized in the analysis section below and reviewed in detail in Appendix A. The wide construction swathe of approximately 110m to 150m (as noted in Section 3.4) had an impact on the viability of some of the route options.

Nine options in Section D were considered in this appraisal. Options D1, D2, D3, D5, D6 and D7 align with the end of Options C1 and C3, starting north of Clwb Chwaraeon Madog and continuing around the sports ground. At the approach to the highway and SSSI, these options split into various routes crossing the SSSI, primary habitat, railway, and highway. Option D2 is first to deviate south and cross the highway and railway perpendicularly, taking a longer route through the SSSI. Option D3 follows a similar course to Option D2 but farther to the east. Option D1, D5, D6 and D7 continue furthest east before Options D1 and D7 meander south and cross the SSSI. Option D6 simply maintains a southeast trajectory, crossing the highway and railway at an acute angle before reaching Section E. Finally, Option D5 stays north of the highway and reaches Section E at the quarry, outside of the Primary Work Area.

Options D4, D8 and D9 align with the end of Options C2 and C4, starting from the south of Clwb Chwaraeon Madog and routing around Porthmadog FC ground. Option D4 stays north of the highway running from west to east until it combines with Option D2. Option D8 considers and option where the cable routes would be constructed under the A487 highway, deviating towards northeast right before crossing the Afon Glaslyn river and meeting Section E at the quarry outside of the Primary Area. Option D9 runs towards the south, crosses at the highway and railway as soon as possible, before being constructed in the SSSI for the remainder of the route.

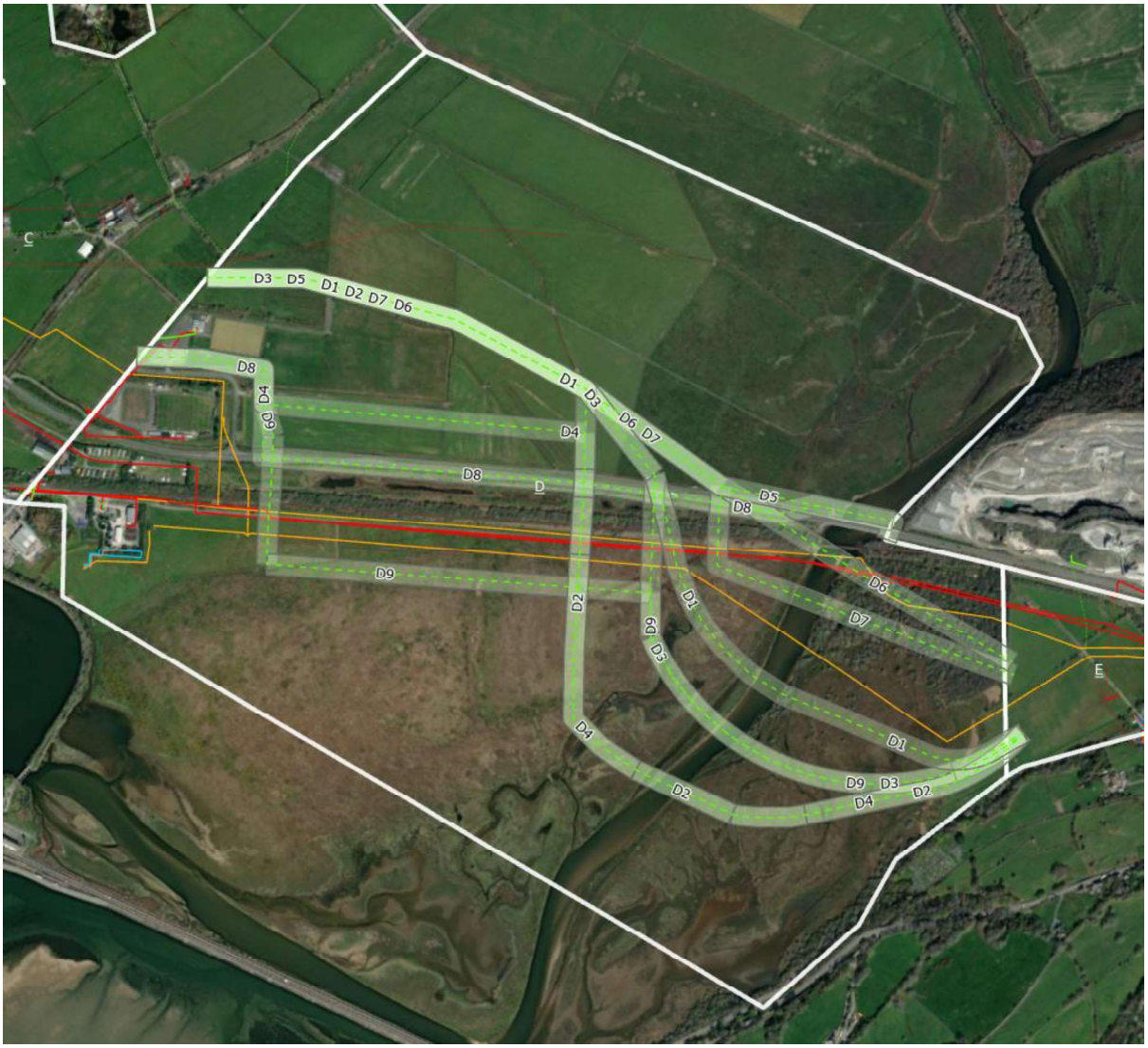

Figure 11: Overview of Section D on GIS model

7.2 Analysis

Criteria	Commentary
Technical Assessment Considerations • Technical complexity • Construction delivery • Project delivery • Carbon ~~• Suitability of Technology~~ ~~• Network Capacity~~ ~~• Network Efficiency / Benefits~~	Option D1 is 2.09km long and Option D1 crosses the highway, railway, gas main, and existing 400kV line at a 75° angle before continuing across the Afon Glaslyn to Section E. This route crosses under the high-pressure gas main and then maintains a 25m offset from the major utility throughout the HDD section. The HDD would need to bend towards Section E after passing under the railway with a radius of 400m or more. This is the preferred alignment noted by the trenchless options report in Appendix A, if this section is completed in a single drive. The HDD length is approximately 1km long, which is achievable with a single cable drum with joint bays on either side. Minimal work is required in the SSSI area, and it would be limited to the eastern perimeter where the HDD would end.

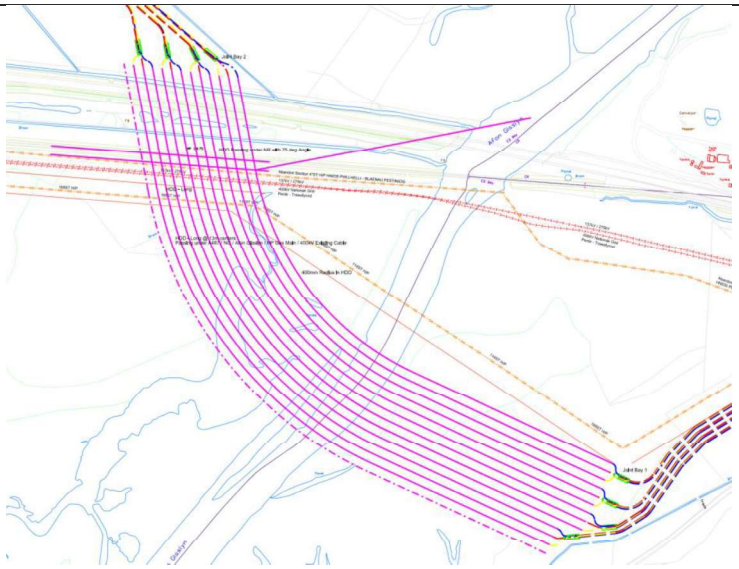

Figure 12: HDD Alignment for Option D1

Options D2 and D4 are the longest route options considered, at 2.45km and 2.53km long, respectively. These routes would cross the highway, railway, gas main, and existing 400kV line at a 90° angle and require some open cut construction in the SSSI before a second HDD is completed across the Afon Glaslyn. This option is feasible but is seen as technically more complex than Option D1 due to the additional construction works required in the SSSI. In terms of the technical assessment, the construction and project delivery would be more complex. Option D4 connects with Option C2 and C4 at a pinchpoint between the football club and the sports club, requiring a reduction in the construction swathe. Since Option D2 is slightly shorter and can maintain the typical cross section, it is preferred above Option D4.

Option D3 is 2.23km long and is very similar Option D1, except that this route would cross the highway, railway, gas main, and existing 400kV line at a 90° angle, instead of at 75°. Crossing the major constraints in a single HDD of approximately 1.4km (as shown by the blue cables in Figure 13 below) was considered to be more complex than options D1, D2, and D4. In addition, the maximum cable length offered by Iljin, the preferred supplier, is 1050m. To make this alignment work with the preferred supplier, this crossing would need to occur in two separate drives, one shorter drive under the highway and railway and then a second drive under the remaining SSSI and Afon Glaslyn. The Figure below demonstrates the requirement for a works area within the SSSI. As mentioned for Option D2, this is considered less preferable from a technical standpoint. Option D9 is similar to Option D3 except that the first HDD alignment occurs farther east, which requires a larger portion of open cut excavation within the SSSI.

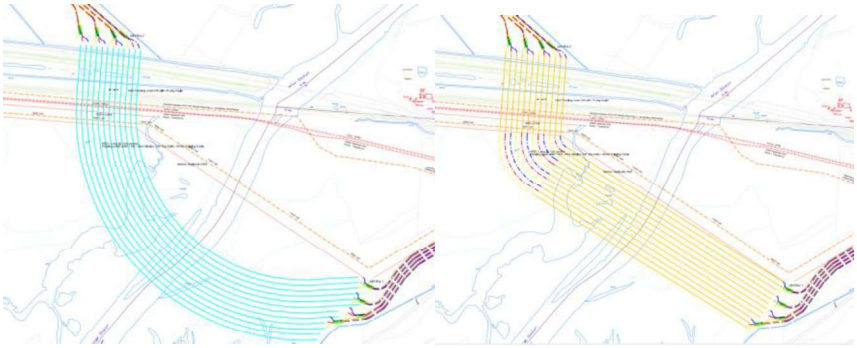

Figure 13: HDD Alignments for Option D3

Option D5 considers an HDD crossing of the river Glaslyn to the north of the highway, meeting Section E outside of the primary work area. Upon review of the spacing requirements for HDD crossings and the proximity of the Quarry, highway, and railway, this option was discarded.

Option D6 is considered the shortest route that meets Section E. While this is advantageous in terms of cable length, this option was discarded due to feedback from Network Rail that crossings at an acute angle are not acceptable.

Option D7 considers crossing the railway at a 90° angle with and HDD, having a small section of open cut to realign the cables, and then using another HDD to cross under the Afon Glaslyn. This option is similar to option D3 except that the alignment stays north of the high pressure gas

Criteria	Commentary
	main. This option is complex and high risk as the cables would need to re-surface between the live 400kV cables and high-pressure gas main. It was therefore discarded from the analysis. Option D8 considered a potential route of following the highway. This option was discarded due to multiple technical issues including cable installation swathe, stakeholder feedback, and inadequate space for the river and railway crossings.
Environmental Assessment Considerations • Landscape / Visual Amenity • Ecology • Historic Environment • ~~Local Air Quality~~ • ~~Noise & Vibration~~ • ~~Soils & Geology~~ • Water	Although all the routes cross the SSSI, SAC, and Priority Habitat areas. All routes require a combination of both open-cut and trenchless construction in these restricted areas. Option D1 offers the preferred option with the least amount of construction work within the SSSI, and that work would be restricted to the eastern edge, where the long HDD would terminate. To the north of the highway, it is anticipated that all options can be adjusted slightly during the design to avoid Priority Habitat area to the north of A487 highway. Options D4, D8 and D9 have no impact on hedgerow boundaries along the route whilst Options D1, D2, D3, D5, D6 and D7 all require two hedgerows to be removed and replaced. Any tree or hedgerow removals within the construction swathe highlight potential impacts on wildlife habitat. Noise & Vibration, Local Air Quality, and Soils & Geology criteria are also considered to be negligible for this Section as the differences between each option are minimal. All Options within Section D do not cross any conservation areas, listed buildings, or ancient woodlands, and any adverse effect during construction assets or their setting would be very minor. The entire Work Area is within the extents of the historic landscape area, showing no differentiation between all route options. There are no scheduled monuments within the project area as well. In terms of watercourse crossings (apart from the Afon Glaslyn), all routes appear to cross at least 7 unnamed watercourses/ditches that would need to be reinstated after works are complete. The entire Work Area is within the extents of the Flood Zone 3, showing no differentiation between all route options.
Socio-Economic Assessment Considerations • Economic Activity • Traffic Congestion • Transport Corridors • ~~Aviation~~ • ~~Defence~~	In Section D, the predominant land use is agricultural, with most of the land falling into this category. All options cross between 4 to 7 different plots. It is essential to underline that none of the options in Section D necessitate the permanent acquisition of land. Instead, construction requirements involve the temporary acquisition of land for constructing a cable corridor and installing cables. Afterward, the land will mostly be returned to the landowners for their continued use. During the construction phase, landowners may experience a temporary disruption in access, prompting discussions on fair compensation for this interim period. It is important to note that Options D8, D4, and D9 could be more disruptive to the sports club and football club due to the connection point with Section C, potentially affecting their leisure or economic activity. Among these options, D8 is the most disruptive as it requires extensive open-cut work along the A487 highway, leading to heavy traffic congestion and affecting the transport corridor. Consequently, this option was discarded. Trenchless construction methods are proposed for the highway and railway crossing in all other options, which is expected to result in negligible traffic congestion and minimal impact on highway operations. Option D1 is the most preferred because it involves no major temporary works and construction access requirements within the SSSI area to the south of the railway and west of the Afon Glaslyn.
Cost Assessment Considerations • Capital Cost • ~~Lifetime Cost~~	High level review of capital costs indicates that of all the options, Option D3, D4 and D9 are the least favourable as they are significantly costly due to the longest HDD lengths crossing the SSSI Area. Similarly, Option D6 and D7 have slightly reduced capital cost due to fewer crossings and relatively shorter HDD length. Whilst Option D5 and D8 both have the shortest cable route length and the lowest estimated capital cost, both options were discarded due to multiple technical issues. As a result, Option D1 and D2 are preferable due to them being the only possible options with least HDD lengths and crossings. Option D1 is considered to be the most preferable as it has the lowest estimated capital cost in this analysis.
Health & Safety Assessment Considerations • Design Risk • Construction Risk • Operation & Maintenance • Demolition & Decommissioning	Option D1 is considered to be the most preferable as it would require the least amount of temporary works within the SSSI area. In addition, it stays north of the pinch point between the sports club and football club and therefore the typical cross section can be maintained. The other options are ranked according to the amount of work required within the SSSI.

7.3 Comparative Ranking & Conclusion

Assessment Criteria	Technical	Environmental	Socio-Economic	Cost	Health & Safety	Overall
Option D1	Rank 1	Rank 1	Rank 1	Rank 1	Rank 1	Rank 1
Option D2	Rank 3	Rank 3	Rank 3	Rank 2	Rank 3	Rank 3
Option D3	Rank 2	Rank 2	Rank 2	Rank 3	Rank 2	Rank 2
Option D4	Rank 4	Rank 4	Rank 4	Rank 5	Rank 4	Rank 4
Option D5	Option Discarded					
Option D6	Option Discarded					
Option D7	Option Discarded					
Option D8	Option Discarded					
Option D9	Rank 5	Rank 5	Rank 5	Rank 4	Rank 5	Rank 5

Option D1 ranks first since only 1 HDD is required and work within the SSSI area would be limited. The other available options rank lower due to the requirement for two separate HDDs and open cut construction within the SSSI. Finally, Options D4 and D9 rank lower as they connect with Section C at a pinch point.

8. Section E – East of Afon Glaslyn to Minffordd CSEC

8.1 Overview & Baseline Condition

Within Section E the underground circuits are to be routed from the east of Afon Glaslyn to Minffordd CSEC through a relatively smaller open flat area of arable land that contains a few drainage ditches and hedgerows. Major assets and infrastructure in this section for consideration include the Minffordd CSEC, surface water ditches, existing HV and LV cables and telecoms.

Four options were considered as shown in Figure 14 below. After crossing the woodlands in the SAC and SSSI region, Option E1 aligns with the end of Options D1, D2, D3, D4 and D9 at the southmost of Section E. Similarly, Option E3 aligns with the end of Option D7 and Option E4 aligns with the end of Option D6. In contrast, Option E2 starts from the Afon Glaslyn and aligns with the end of Option D5 and D8, running from west to east between the A487 highway and the quarry. It meanders south after reaching the quarry entrance and crosses perpendicular to the highway and railway until it arrives the Minffordd CSEC.



Figure 14: Overview of Section E on GIS model

8.2 Comparative Ranking & Conclusion

As the previous section of this report discarded Options D5 to D8, the only available option for consideration is Option E1. Due to the size of this area and the connection with Snowdonia VIP tunnel project, no further analysis was conducted.

9. Conclusion

Option A1, Option B3, Option C4, Option D1, and Option E1 have been selected as the preferred option for each section, as shown in Table 3 below.

Table 3: Summary of Options Ranking

Section	Option #								
	1	2	3	4	5	6	7	8	9
A	Rank 1	Rank 3	Rank 2						
B	Rank 3	Rank 2	Rank 1						
C	Rank 3	Rank 2	Discarded	Rank 1					
D	Rank 1	Rank 3	Rank 2	Rank 4	Discarded	Discarded	Discarded	Discarded	Rank 5
E	Rank 1	Discarded	Discarded	Discarded					

Option A1 is the preferred route within Section A1, ranking highest for all criteria. It is the shortest route considered within this section and had the least asset/constraint crossings, and maintains a safe distance from the gas main. Staying to the south of the existing ditch, this route offers an advantage over the other options as it stays away from an OHL route. It is also possible to make adjustment to the route to limit tree removal. From a socio-economic perspective, Option A1 maintains a similar alignment to the existing 400kV line which will be less disruptive to landowners as construction and decommissioning works can occur within the same construction swathe. Option A2 ranked lower primarily due to the proximity with the OHL along the route, which resulted in adverse effects on most of the scoring criteria. Option A3 deviates quite far from the land boundary which started to increase cable length and introduce socio-economic concerns. It is important to note that all options in Section A share common attributes in terms of the environmental assessment, no impact on conservation areas, listed buildings, or ancient woodlands, and expected minor construction effects on assets and their setting. Additionally, construction in SSSI, SAC, or Priority Habitat areas is not required, and criteria related to Noise & Vibration, Local Air Quality, and Soils & Geology are considered neutral, with any residual adverse effects during construction anticipated to be minimal with standard mitigation measures.

Option B3 is the preferred route within Section B. This option would provide more flexibility with the A498 highway crossing location and would allow the construction swathe to avoid an existing golf driving range. Option B3 follows the route of the 400kV cables relatively closely as well as the route of an existing access track. Constructing the cable route on this alignment would likely be less disruptive to the landowners as construction and decommissioning works can occur within the same construction swathe. Option B1 ranks lower primarily due to being in a separate plot to the existing cables, which resulted in adverse effects on most of the scoring criteria. Furthermore, Option B1 crossed the existing 400kV line twice and did not align with the preferred Option from Section A. Finally, while Option B2 is extremely similar to Option B3, it ranked lower due to the impact on the driving range and reduced flexibility at the A498 highway crossing. In Section B, all options share common attributes in terms of the environmental assessment. There is no impact on conservation areas, listed buildings, or ancient woodlands. Minor construction effects are expected on assets and their settings, and no construction is required in SSSI, SAC, or Priority Habitat areas. Noise & Vibration, Local Air Quality, and Soils & Geology criteria are considered neutral, with any residual adverse effects during construction anticipated to be minimal and manageable through standard mitigation measures.

Option C4 is the preferred route within Section C4 primarily due to the highway crossing location being preferable in the technical and environmental assessment. It is also noted that while Option C4 only appears to connect with Options D9, D4, and D8, the route can deviate within the final land parcel to connect with Option D1. Option C3 was discarded from the available options primarily due to the heritage rail crossing location and constraints associated with completing works adjacent to the existing 400kV line. Options C1 and C2 ranked lower primarily due to the less advantageous crossing location of the highway. Whilst Option

C4 has less impact on hedgerow boundaries and trees, and less disruption to landscape/ecology due to reduced length, it is important to note that all options in Section C have no impact on conservation areas, listed buildings, or ancient woodlands. Construction effects on assets are minor, and none require work in SSSI, SAC, or Priority Habitat areas. Criteria related to Noise & Vibration, Local Air Quality, and Soils & Geology are neutral, with expected minimal adverse effects during construction, manageable through standard mitigation measures.

Option D1 ranks first in Section D since only 1 HDD is required and work within the SSSI/SAC/Priority Habitat area would be limited to the eastern perimeter where the HDD terminates and involves no major temporary works and construction access requirements within the SSSI area to the south of the railway and the west of Afon Glaslyn. The other available options rank lower due to the requirement for two separate HDDs and open cut construction within the SSSI. Finally, Options D4 and D9 rank lower as they connect with Section C at a pinch point. Options D5 to D8 have been discarded following further technical review and feedback from stakeholders, which indicated that they were not feasible. In Section D, it is noteworthy again that there is no impact on listed buildings or ancient woodlands. The criteria related to Noise and Vibration, as well as Local Air Quality, are manageable through standard mitigation measures. Additionally, Soils and Geology do not influence the selection of the route, affirming the feasibility of the chosen path. The analysis for Option D resulted in Option E1 being chosen by default within Section E.

It is worth noting that the routes included in this Option Appraisal Report are preliminary to inform options appraisal. It is recommended that minor adjustments will be made to the route during preliminary design to avoid hazards, reduce risk, and limit impact of the proposed works. Following this Options Appraisal Report, engagement will continue with relevant stakeholders and landowners. A proposed design will be put forward for the preferred route that can be taken forward to the consenting stage.

Appendix A

Trenchless Options Report

ARUP

Technical Note

Project title	Glaslyn Cable Uprating
Job number	295280-00
File reference	GLAS-ARUP-DS-XX-FN-X-0001
cc	
Prepared by	Tom Moore / Juan Pablo Villagra
Date	29 May 2024
Subject	A487 Highway Crossings Options Appraisal

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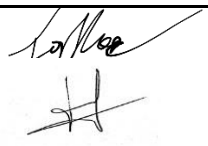
Signature			

ARUP

Job number	295280
Date	29 May 2024

1. Introduction

This technical note aims to summarise how the A487 highway crossing options have been selected as part of the Glaslyn Cable Uprating project.

2. Glaslyn Cable Uprating

National Grid are undertaking upgrades to the Pentir – Trawsfynydd 4ZC route to allow for future offshore wind power generation connection to the National Grid. The works have been split into the following 5 projects:

- Uprate existing National Grid 400kV Glaslyn Cables
- Replace 132kV SPEN Glaslyn Cables with 400kV
- 4ZC Pentir – Traws OHL Uprating
- New Bryncir Grid Supply Point
- Pentir & Trawsfynydd Cross Site Cables & Minor Substation works

In the vicinity of Porthmadog, the Glaslyn Cables Uprating and replacement of the 132kV SPEN (Scottish Power Energy Network) Cables will interface with the Welsh Government Strategic Highway Network, in the form of the A487 Porthmadog Bypass.

The works comprise of the installation of a new 400kV circuit to replace the existing National Grid 400kV cable installed in the 1960s, and the installation of a new 400kV circuit to replace the existing SPEN 132kV cables running from Trawsfynydd to Four Cross. Four Cross will be served from a new Substation to be built at Bryncir. These works also interface with the Eryri Visual Impact Provision (EVIP) project at Garth / Minffordd where a new tunnel and headhouse are being constructed.

Both existing cable systems run from Garth Cable Sealing End Compound (CSEC) to Wern CSEC as buried cables. Both circuits pass through a SSSI flood plain area adjacent to the Afon Glaslyn and then run alongside the Network Rail Cambrian Railway towards Porthmadog. The cables then split with the 400kV cable running to the north of Porthmadog crossing the High Street just north of the North Wales Fire and Rescue Station and SPEN substation.

The requirements for the new circuits were assessed by National Grid in 2012 and buried cables were selected as the preferred solution to replace the existing cable system.

Murphy Power Networks Limited (MPNL) have been appointed by National Grid to develop a new cable solution to replace the existing circuits whilst the existing circuits remain operational until switchover. MPNL appointed Arup to support the development of the cable design solution.

Part of that scope was to develop a new cable route corridor, optimising the route whilst minimising the impact on the environment and ecology, third party assets and the existing cable corridors.

An option appraisal report (GLAS-ARUP-DS-ZZ-RP-X-0004) was produced to show the various cable route options considered and assess the impact of the scheme to make a recommendation for a preferred route.

Figure 1 below shows the recommended cable corridor along with some of the environmental constraints and utility constraints shown.

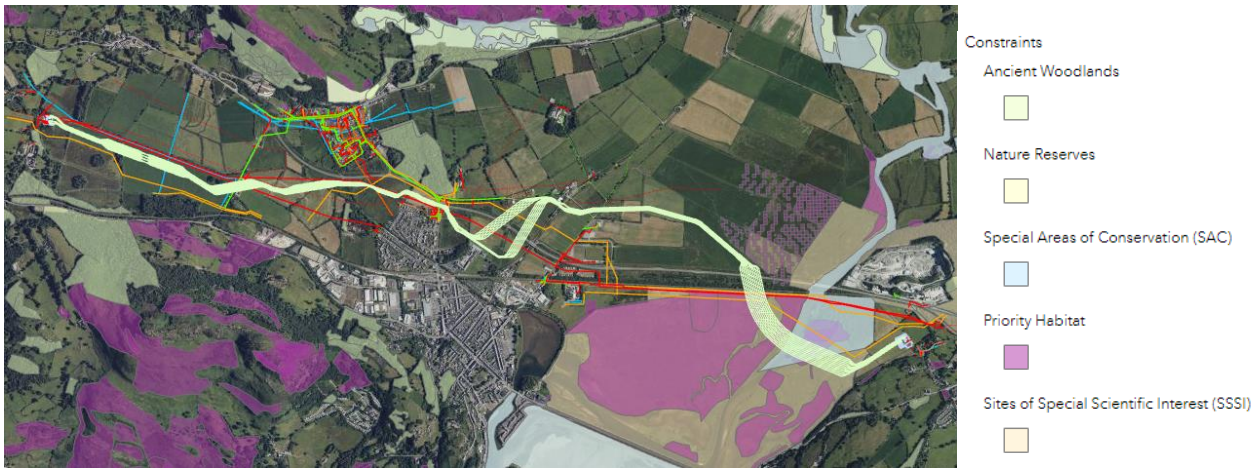


Figure 1 - Glaslyn Cable corridor.

The proposed cable corridor crosses the A487 in two locations, in horizontal directional drills (HDDs) to minimise the impact on the highway. There is also a pinch point where the cables cross the A487 / High Street roundabout which is proposed to be an open cut solution. More details for each of these crossings are provided in this report.

It is highlighted that, as part of the option selection process, consideration was given to routing the cable corridor to the south of the A487, following the line of the existing 400kV cable and thus avoiding the two crossings of the highway. This option was evaluated and determined to be unsuitable due to the number of constraints.

In this scenario the corridor would follow the line of the existing 400kV cable. Given that the existing cables are operational, the new cables have to be constructed offline from the existing live cable. The new cable corridor width in an open cut arrangement is approx. 25-30m and, given the space constraints at certain locations, this would constrain the amount of works that could be undertaken while the cables are live.

As the route progresses east, the existing corridor routes between the A487 Porthmadog Bypass and the Network Rail Cambrian Railway, through a caravan park before the cable turns south, to pass under the railway into the Afon Glaslyn flood plain marshes which are a SSSI. Routing the new cable corridor along this alignment would require the demolition of a farm building and the closure of the caravan park as the new corridor would take up the entire width and length of the park. The cable would then either have to route between the A487 Porthmadog Bypass and the railway, thus clashing with the SUDs drainage and ponds adjacent to the bypass or pass under the railway into the SSSI flood plain marshes. Crossing under the railway would require an undertrack crossing compliant with Network Rail standards. With the limited space afforded between the A487 and the railway, drilling under the railway was deemed not achievable due to the lack of space needed for the HDD worksite on the north side of the railway and the need to construct a further worksite within the SSSI site, south of the railway. An open cut crossing of the railway was also considered but the same issue applies to the worksites and the additional need for a blockade of the railway to construct the open cut crossing.

Given these constraints, this option was not taken forward and alternative options crossing the A487 were developed as described in the following sections.

3. A487 Highway Crossing Locations

The project area has been split into a total of 5 sections in line with the Options Appraisal Report (GLAS-ARUP-DS-ZZ-RP-X-0004), from Section A in the vicinity of the Wern CSEC through to Section E in the vicinity of the proposed Minffordd CSEC. Figure 2 below shows the location of these sections:

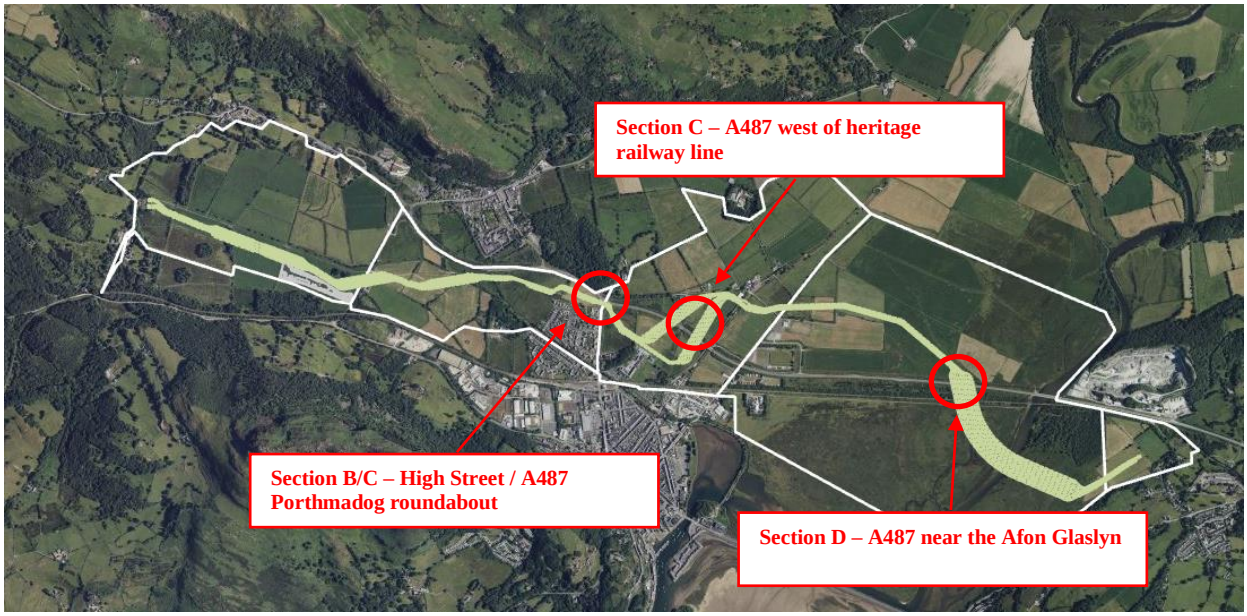


Figure 2: Overview of Glaslyn Cable Uprating project including sections

The new cable corridor intersects the A487 highway at 3 locations:

- Section B / C – High Street / A487 Porthmadog roundabout.
- Section C – A487 west of the heritage railway line.
- Section D – A487 near the Afon Glaslyn.

4. Appraisal Methodology

Multiple options have been appraised in a qualitative manner for each crossing as described below. It should be noted that, while the options largely align with the options described in the Options Appraisal Report, options in the vicinity of the A487 roundabout have been expanded in this note for completeness.

Where multiple route options cross the A487 highway in an identical manner, these have been grouped together for the purposes of this technical note. Please refer to the Options Appraisal Report for a more detailed assessment of the distinction between these routes and the corresponding benefits and drawbacks.

This note does not detail the relative benefits and drawbacks of HDDs with respect to other trenchless techniques. For a detailed assessment of these, please refer to the Trenchless Optioneering Report (GLAS-ARUP-DS-ZZ-RP-X-0005). Where trenchless techniques are referenced, these are assumed to be HDD throughout this note.

5. Route Options Description and High-level Appraisal

5.1 Section B / C – A487 near the Porthmadog roundabout

Routing of the new 400kV cables requires the cable corridor to pass Porthmadog. Options to take the cables through the centre of the town, or to the south, were discounted on the grounds of no clear corridor options without significant interface with existing buildings / properties. National Grid will not accept tunnel solutions under buildings unless no other options are available. Options to the north of the town were considered feasible due to the open land and possibility of routing around the built-up areas. Several options were assessed to route the corridor across the High Street / A487 roundabout, and the key options are detailed below.

5.1.1 Description of Options

The following options have been considered to achieve a crossing from the west of Porthmadog through to the east:

- **Option 1A A487 Roundabout - Open Cut Trench:** the cable route approaches Porthmadog towards the north and crosses the Porthmadog roundabout with an open cut trench, turning southeast to run almost parallel to the A487 highway.
- **Option 1B A487 Roundabout – HDD**: the cable route approaches Porthmadog in a similar manner to Option 1A, but the crossing of the Porthmadog roundabout is achieved by use of HDD. The HDD would end southeast of the roundabout, on the south side of the A487 highway.
- **Option 2 Woodland Route**: approaches Porthmadog towards the north and avoids crossing the Porthmadog roundabout by crossing the A487 highway at a high skew angle to the west of the roundabout, by use of HDD. The HDD would then pass under an environmentally sensitive ancient woodland and a residential building. The crossing would end to the east of the ancient woodland.
- **Option 3 Porthmadog Town Route – HDD**: crosses the town of Porthmadog from east to west by use of HDD with an alignment which is south of the Porthmadog roundabout, thereby avoiding crossing the A487 highway. This HDD alignment would require the drill to pass under a large residential area on the outskirts of Porthmadog.

Indicative figures for each option have been included in the following sections to aid appraisal of these.

5.1.2 Option 1A – A487 Roundabout - Open Cut Trench

This option takes the cable corridor route over the High Street / A 487 roundabout junction in an open cut trench solution. It is located between the existing 400kV cables immediately to the south, with the SPEN substation beyond that, and the high-pressure gas main to the north, with the river and ancient woodland beyond that. These constraints create a narrow pinch point to pass the new cables through. The cable design has been adapted to allow the cables to be built into the central island of the roundabout, so that the construction can be phased to both sides of the roundabout and a suitable traffic management scheme can be developed, thus keeping a traffic managed solution for all arms of the roundabout at all times.

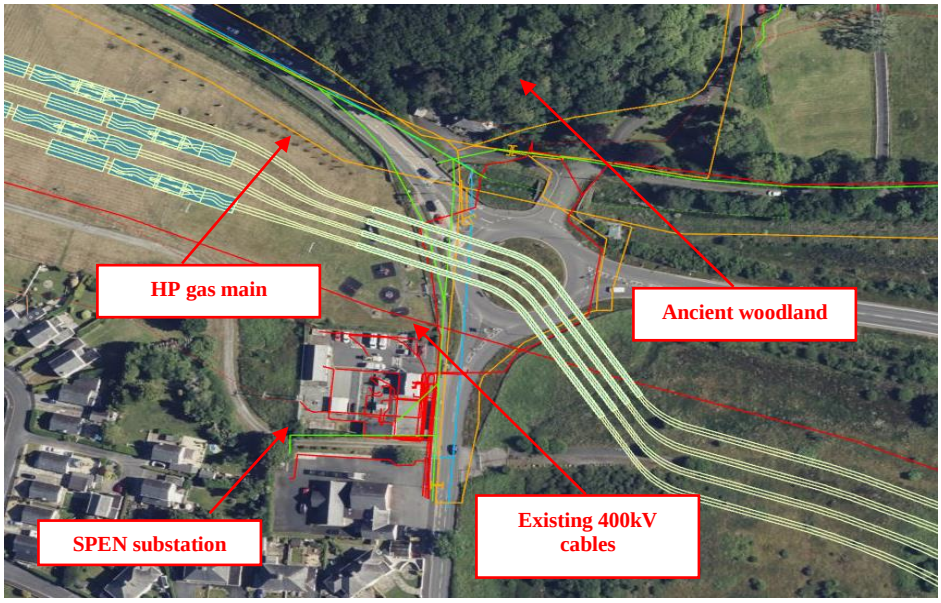


Figure 3: Indicative layout of cables for Option 1A

Benefits	Challenges
Uses an established and safe construction technique to achieve the crossing. Does not impact the high-pressure gas main to the north of the roundabout; works can be progressed beyond its exclusion zone. Minimises risk in terms of impacting the structural integrity of nearby properties and infrastructure. In particular, it does not impact the local substation which is immediately to the south of the roundabout. Does not impact the environmentally sensitive ancient woodland immediately to the north of A487. Can be constructed whilst the existing 400kV cable remains operational. Overall permanent environmental impact likely to be negligible. Offers more flexibility with respect to other options in terms of	Requires open excavation of the A487 roundabout and subsequent reinstatement. Requires works in the vicinity of numerous services. Requirement to carefully protect these assets. In particular requires near crossing of SPEN assets. Requires temporary diversion of ditch southeast of the roundabout during construction. Requires traffic management during open cut excavation and install operation, which will be disruptive to the local area. Will result in temporary disruption to local community in terms of noise. This solution will require the temporary removal of the adjacent playground whilst the works are progressing. Requirement for a supported trench solution and likely requirement for dewatering scheme to control groundwater

Benefits	Challenges
reducing impacts to the nearby stone circle and options for relocating the playground have been proposed. Expected to be less costly solution. Allows for a suitable traffic management regime to be instigated to keep all traffic movements between A487 and High Street during the construction phase. Health and safety aspects can be managed by a competent contractor.	entering excavation.

5.1.3 Option 1B – A487 Roundabout – HDD

The alignment of the cable corridor is the same as option 1A but a HDD solution is considered to pass the cables under the roundabout, thus minimising the traffic disruption during the construction phase. To ensure the HDDs can be constructed, the cable spacing has to be increased to allow each drill to be built without clashing with the adjacent drill. The additional depth of each cable also generates additional heat in the cables when operating so this also requires the cables to be spaced apart to keep the cables within the normal operating temperature range. The additional space required to construct the HDD for each cable makes this solution very challenging in terms of clashes with the existing 400kV cables and the high-pressure gas main.

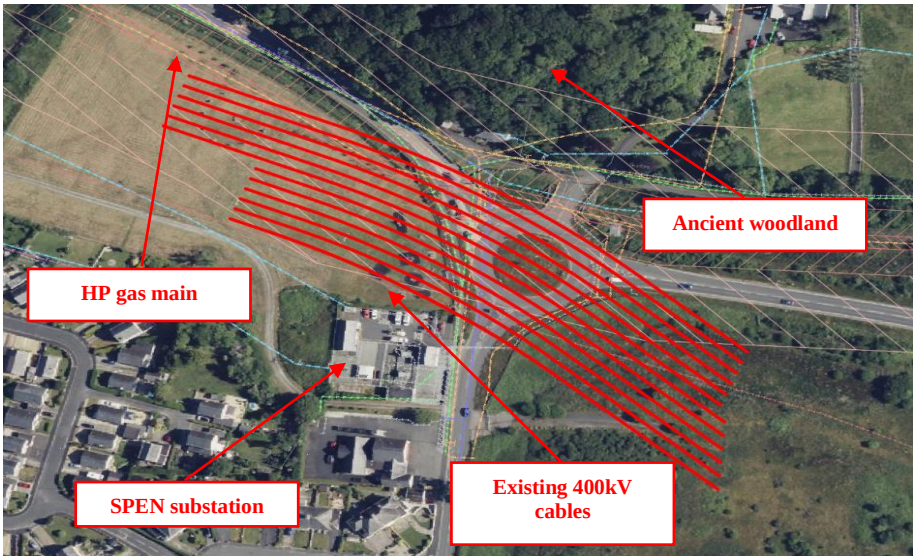


Figure 4: Indicative layout of cables for Option 1B

Benefits	Challenges
Crosses existing services at depth thus simplifying the protection of these. Does not require temporary traffic management hence avoiding the risk of disruption to the local community and associated congestion. Avoids temporary diversion of the ditch to the southeast of the	Clashes with existing 400kV operational cable at launch / exit areas. Require significant temporary works / possible diversion of existing cable to be feasible. Complex curve likely to be required to achieve this HDD alignment which may be a construction challenge.

Benefits	Challenges
roundabout during construction. Overall permanent environmental impact likely to be negligible. Crosses the under existing playground minimising disruption in this area.	Launch/exit areas significantly constrained due to the presence of overhead lines and the high-pressure gas main to the north of the roundabout. Alignment of northern HDD's would pass under the existing high-pressure gas main, requiring mitigation measures to protect the asset. Requires long HDD drive (~240m) which could in turn result in greater spacing, thus increasing the construction corridor and requiring going under nearby properties and/or infrastructure such as the substation, with the associated structural risk. Requires settlement monitoring of roundabout. Introduces risk of frac-out and settlement. May require the removal of the stone circle. Will result in temporary disruption to local community in terms of noise. Costly solution, but less than other HDD alternatives.

5.1.4 Option 2 – Woodland Route

This option considered an HDD solution to the north of the A487 roundabout. The long HDD solution would start to the east of the recreation ground and pass under the environmentally sensitive ancient woodland areas to the north of the A487. The HDD would also have to pass under the Bodawen nursing home building. Whilst this solution is technically viable, National Grid will not accept tunnel solutions that pass below third-party buildings or solutions under / through environmentally sensitive sites if alternative options are available.

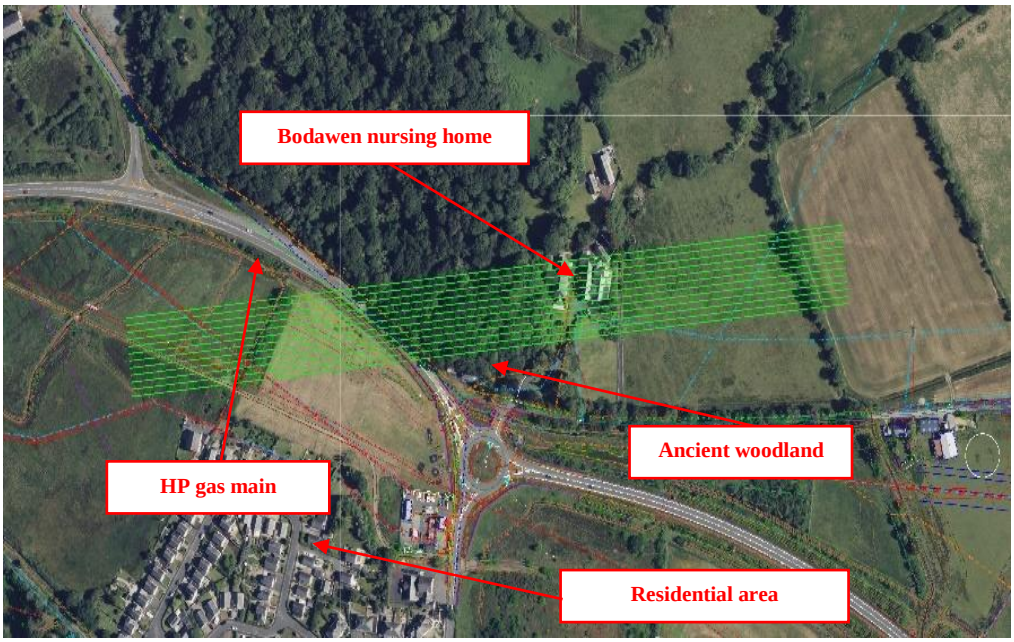


Figure 5: Indicative layout of cables installed for Option 2

Benefits	Challenges
Avoids construction in the roundabout area entirely. Avoids the requirement of an additional highway crossing in Section C. May cross existing services at depth thus simplifying the protection of these. Does not require temporary traffic management hence avoiding the risk of disruption to the local community and associated congestion. Avoids temporary diversion of the ditch to the southeast of the roundabout during construction. No direct impact to stone circle and playground.	Is likely to require going under the care home, with the associated structural risk. Routing under a third-party property is not acceptable to National Grid. Goes under the ancient woodland which is an environmentally sensitive area. Could result in overall increase in cable route length, with implications on the electrical design. Launch/exit areas significantly constrained due to the presence of overhead lines and the high-pressure gas main to the north of the roundabout, as well as the existing 400kV line. Crosses gas mains on five occasions at an acute angle, which is not likely to be acceptable to the gas service provider. Requires long HDD drive (~650m) which could in turn result in greater spacing, thus increasing the construction corridor. Introduces risk of frac-out and settlement. Will result in temporary disruption to local community in terms of noise. Requires settlement monitoring of A487.

5.1.5 Option 3 – Porthmadog Town Route - HDD

This option considers a HDD solution to the south of the A487 roundabout. The HDD would have to pass under the residential areas of Maes Gerddi / Meadow Drive. Whilst technically this would be possible, National Grid will not accept a route under third-party properties when alternative options are available.

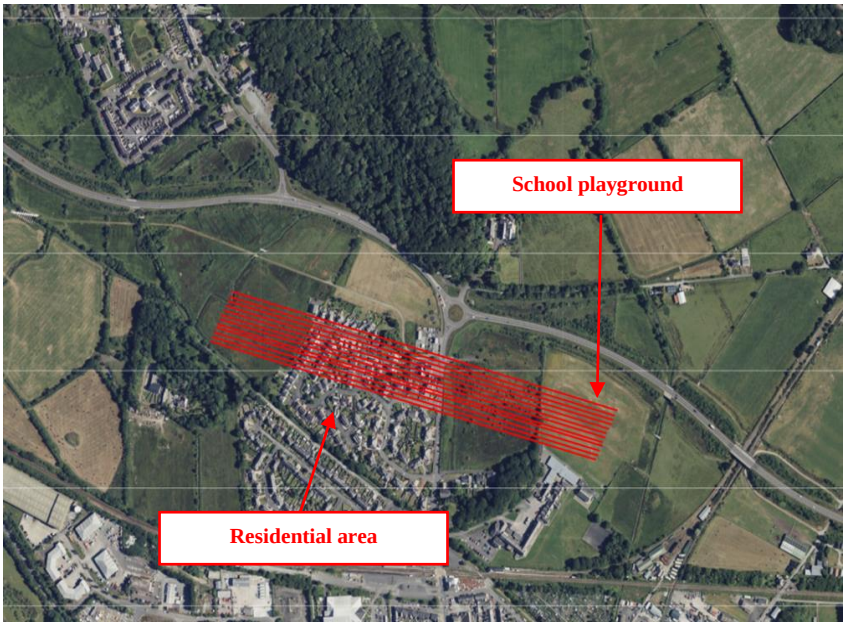


Figure 6: Indicative layout of cables for Option 3

Benefits	Challenges
Avoids construction in the roundabout area entirely. May cross existing services at depth thus simplifying the protection of these. Does not require temporary traffic management hence avoiding the risk of disruption to the local community and associated congestion. Avoids temporary diversion of the ditch to the southeast of the roundabout during construction. No direct impact to stone circle and playground.	Will require going under a significant number of properties, with the associated structural risk. Routing under third-party properties is not acceptable to National Grid, if alternative options are available. Launch/exit areas significantly constrained due to the presence of overhead lines, high-pressure gas main and combined sewer to the east of Porthmadog. Requires long HDD drive (> 700m) which could in turn result in greater spacing, thus increasing the construction corridor. Introduces risk of frac-out and settlement. Impacts the playground of the local school at the eastern end. Will result in temporary disruption to local community in terms of noise. Expected to be most costly solution. Health and safety risks for general public.

5.2 Section C - A487 west of heritage railway

5.2.1 Description of the Options

The following options have been considered with respect to the crossing of the A487 highway west of the heritage railway line, as informed by the preferred option for A487 roundabout crossing, which results in the cable route approaching the area towards the southeast of the Porthmadog roundabout.

All of the proposed options require crossing the A487 highway towards the north. Alternatives which do not cross the highway in this area are not considered feasible due to the reasons outlined in Section 2.

All of the options considered below make use of HDD to achieve the highway crossing towards the north.

- **Option C1** routes south of the existing 400kV cables before heading north by crossing the A487 highway, immediately north of the school building. It then crosses fields and a ditch and crosses the Heritage Railway further to the north than the other options before continuing in a north-western direction to avoid the Clwb Chwaraeon Madog grounds.
- **Option C2** follows the highway alignment and crosses the highway at the earliest opportunity, slightly further to the west than Option C1. It then crosses fields and the ditch at approximately the same location as Option C1; however, it crosses the Heritage Rail further south than Option C1 (south of the station building) before entering the Clwb Chwaraeon Madog grounds. For the purposes of the highway crossing, C1 and C2 are considered comparable.
- **Option C3** follows the existing 400kV route closely to the south of the highway. It crosses the Heritage Rail before then turning north and crossing the highway. It then follows the eastern edge of Section D.
- **Option C4** is similar to Option C2 but crosses the A487 highway at a point further to the east, just west of the existing bridge structure.

Indicative figures for each option have been included in the following sections to aid appraisal of these.

5.2.2 Options C1/ C2

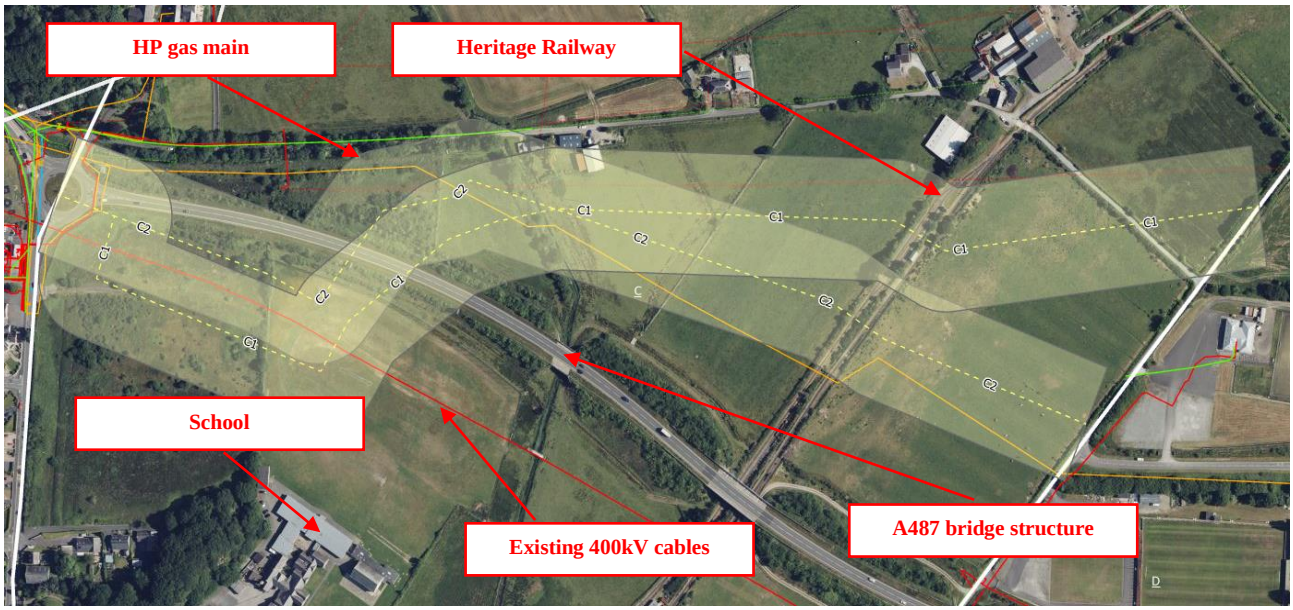


Figure 7: Indicative layout of cables for Options C1 and C2

Benefits	Challenges
Shortest route options. Acceptable highway crossing angle (closer to perpendicular). Does not cross any conservation areas, listed buildings, or ancient woodlands. No construction is required in SSSI, SAC, or Priority Habitat areas. HDD avoids direct impact on A487 highway and the need for temporary traffic management measures and potential congestion. C2 is expected to be the least costly solution of all options.	C1 a challenging solution due to the large number of service crossings. C2 is comparable. Requires HDD drive to achieve the A487 highway crossing and introduces the risk of frac-out and settlement. Requires settlement monitoring of live carriageway pre, during and post HDD installation. Proximity to gas main and overhead power lines; however, risks can be managed. Proximity to existing 400kV underground cables which will introduce constraints to the HDD profiles and/or HDD compounds. C1 expected to be the costliest option of all options due to number of service crossings. Disruption to agricultural activity, C1 affects a large number of landowners of all options, but C2 is comparable. C2 crosses an existing woodland just north of the A487 highway. Both Options C1 and C2 cross the high-pressure gas main at an angle.

5.2.3 Option C3

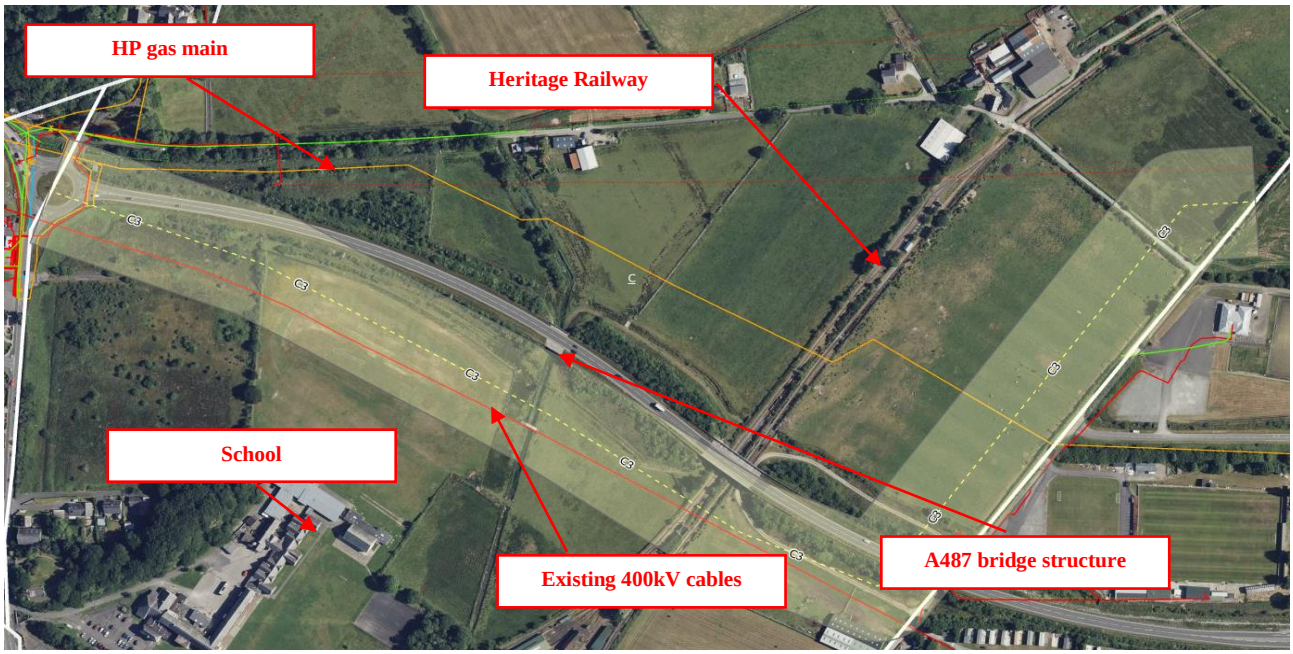


Figure 8: Indicative layout of cables for Option C3

Benefits	Challenges
Does not any cross any conservation areas, listed buildings, or ancient woodlands. No construction is required in SSSI, SAC, or Priority Habitat areas. Likely least disruptive to agricultural activity as it runs along existing boundaries. HDD avoids direct impact on A487 highway and the need for temporary traffic management measures and potential congestion. Offers good crossing angle of high-pressure gas main.	Longest route option. Requires HDD drive to achieve the A487 highway crossing and introducing the risk of frac-out and settlement. Requires settlement monitoring of live carriageway pre, during and post HDD installation. Does not provide sufficient spacing to develop the HDD to achieve the highway crossing. Crosses the heritage railway line at a constrained location south of the A487 highway, between the highway and existing buildings. Requires completion of works adjacent to existing (live) 400kV cable. Most disruptive in terms of requirements for removal of vegetation as it crosses several vegetated boundaries in open cut. Disruption to agricultural activity; however, likely to be less disruptive as it runs adjacent to existing boundaries. Least preferable option in terms of health and safety due to proximity of existing 400kV line.

5.2.4 Option C4

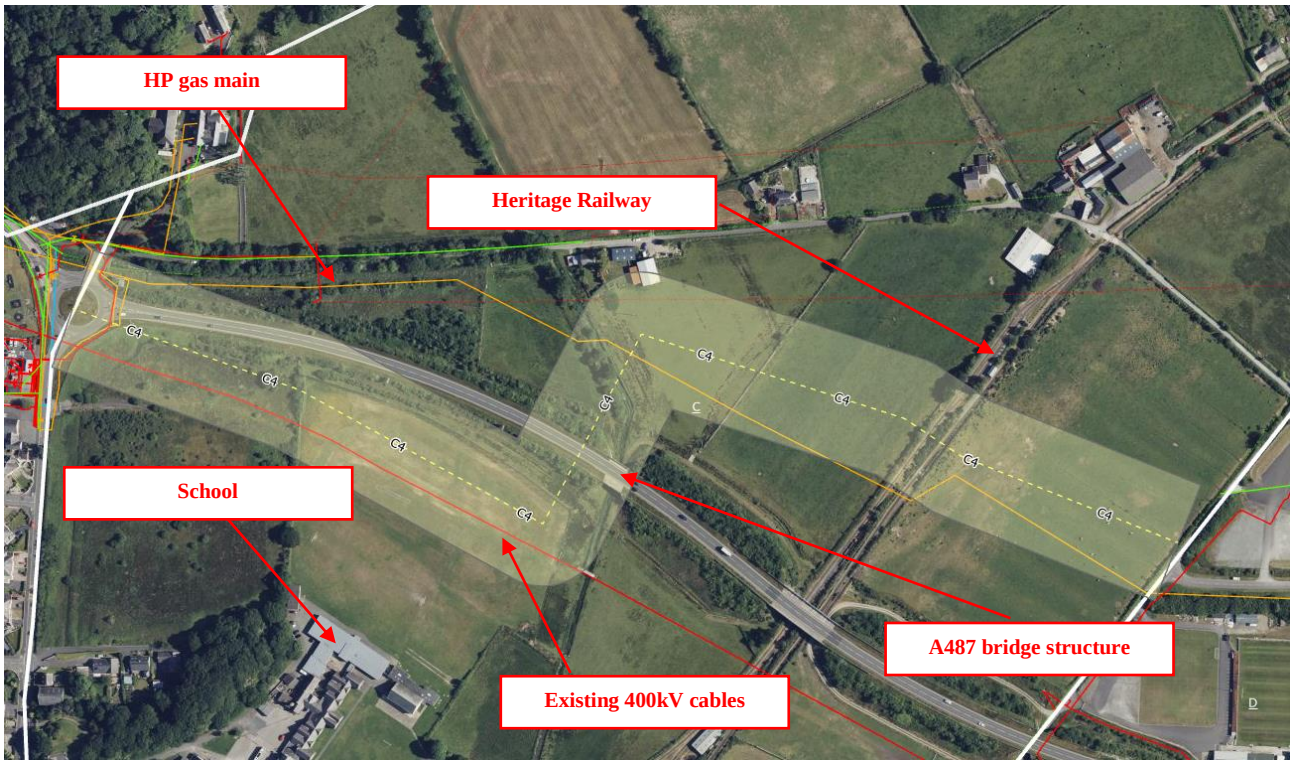


Figure 9: Indicative layout of cables for Option C4

Benefits	Challenges
Second shortest route overall. Crosses the heritage railway at the preferred location by Heritage Railway. Less significant impact on the heritage railway line (avoids impacting the train station). Offers good crossing angle of high-pressure gas main. Provides more space and flexibility in terms of setting up the launch/exit areas of the HDD. Least impact on hedgerow boundaries and trees. Does not cross any conservation areas, listed buildings, or ancient woodlands. No construction is required in SSSI, SAC, or Priority Habitat areas. HDD avoids direct impact on A487 highway and the need for temporary traffic management measures and potential congestion.	Requires HDD drive to achieve the A487 highway crossing and introducing the risk of frac-out and settlement. Requires settlement monitoring of live carriageway pre, during and post HDD installation. Proximity to gas main and overhead power lines; however, risks can be managed. Crosses a ditch to the northern side of the HDD. Northern side is also closer to existing buildings than other options. Disruption to agricultural activity. Preferred solution in terms of health and safety due to greater flexibility to implement the HDD.

5.3 Section D – A487 near the Afon Glaslyn

5.3.1 Description of Options

The following options were considered for the crossing of the A487 highway to the west of the Afon Glaslyn, as informed by the preferred option in Section C, which results in the cable route approaching the area from the north. The options are also informed by the requirement to reach the Minffordd area towards the southeast of the Afon Glaslyn, and immediately west of Garth CSEC.

All route options use HDD to cross the highway with open cut construction being used for the other sections of the route.

- **Option D1** starts north of Clwb Chwaraeon Madog and continues around the sports ground. It then continues further east before it turns south to cross the A487 highway, the railway line and the SSSI and the Afon Glaslyn in one long curved HDD drive.
- **Option D2** also starts north of Clwb Chwaraeon Madog and continues around the sports ground; however, it deviates south further west than Option D1 and crosses the highway and railway perpendicularly, taking a longer route through the SSSI. **Option D4** starts south of Clwb Chwaraeon Madog until it combines with Option D2. These options require an additional HDD drive to cross the Afon Glaslyn. For the purposes of the highway crossing, D2 and D4 are considered comparable.
- **Option D3** is similar Option D1 in that it crosses the A487 highway at approximately the same location, but it does this in a perpendicular manner, thus requiring 2 HDD drives and additional construction works within the environmentally sensitive area.
- **Option D9** starts south of Clwb Chwaraeon Madog, crossing the highway and railway further to the west than all other options, before being constructed in the SSSI for the remainder of the route.

The following options were considered as part of the original long list to achieve the A487 highway crossing in Section D and have been discounted due to technical constraints; these are not considered further in this appraisal note:

- Option D5 also starts north of Clwb Chwaraeon Madog and continues around the sports ground; however, it stays north of the highway for the entirety of the section and is not considered further in terms of the crossing of the highway.
- As with Options D1, D2, D3, D5, Option D6 starts north of Clwb Chwaraeon Madog and continues around the sports ground. It then continues further southeast, crossing the highway and the railway line at an acute angle. This option is not considered further due to indication from Network Rail that it would not be approved.
- Option D7 is similar to Option D6 but crosses the highway and the railway line in a perpendicular manner. This option is considered too technically complex due to the need to provide 2 HDD crossings: one for the highway and railway line (in the near vicinity of the high-pressure gas main and existing 132 and 400kV cables) and another one for the Afon Gaslyn. It has not been considered further.
- Option D8 starts south of Clwb Chwaraeon Madog and runs along the A487 highway through Section D. This option is considered too technically complex and likely to impact the A487 highway negatively in terms of works undertaken and associated traffic management and potential congestion and is not considered further.

5.3.2 Options D1

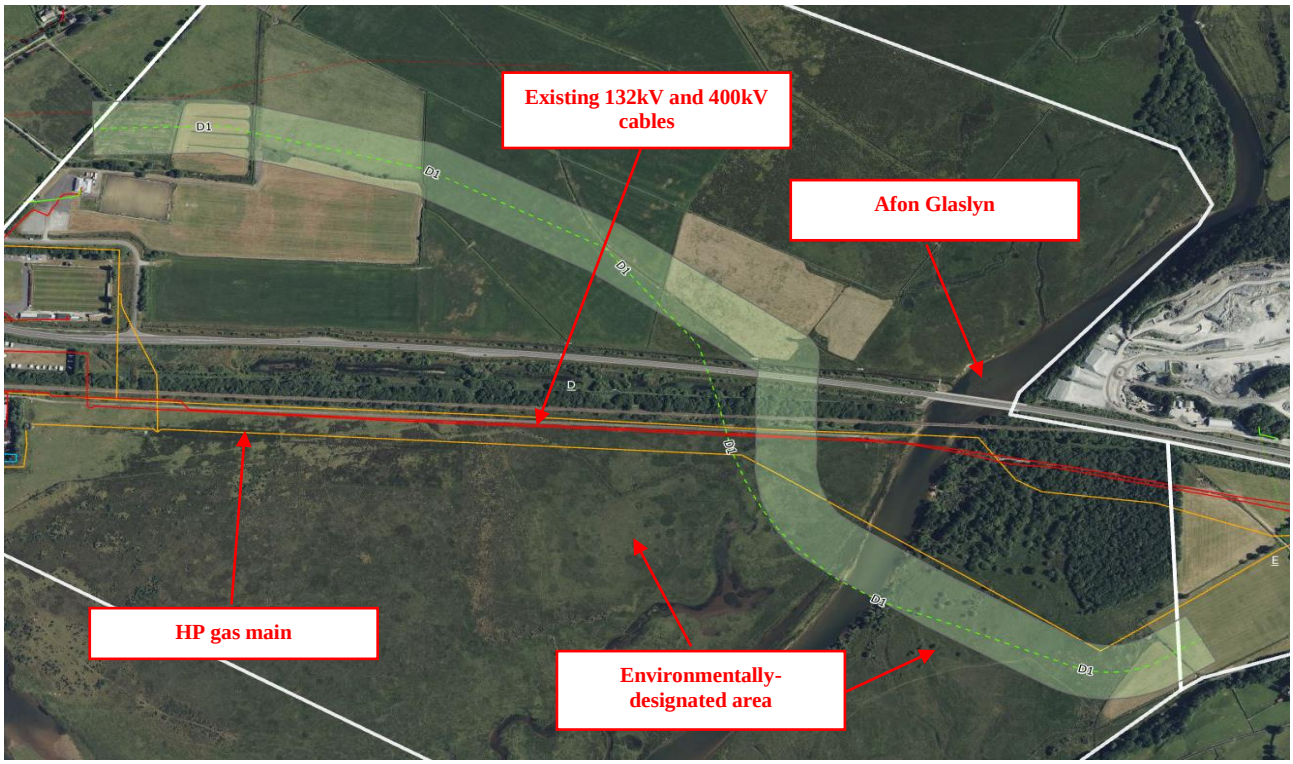


Figure 10: Indicative layout of cables for Option D1

Benefits	Challenges
Technically preferred route in the Trenchless Optioneering Report. Has the potential to be completed with a single cable drum, with joint bays at either side of the crossing. Crosses the highway, railway line and gas main at 75°, but this is considered manageable from a design and construction point of view and is generally acceptable to approving organisations. Does not any cross any conservation areas, listed buildings, or ancient woodlands. HDD avoids direct impact on A487 highway and the need for temporary traffic management measures and potential congestion. Does not require construction works at surface within the SSSI. Expected to have the lowest overall cost. Is the preferred option in terms of health and safety due to the need for less temporary works.	Requires long and curved HDD drive to achieve the A487 highway which is technically challenging. Introduces risk of frac-out under A487 highway and in environmentally sensitive area. Introduces risk of settlement of carriageway and railway line. Requires settlement monitoring of pre, during and post HDD installation. Impacts the SSSI, SAC and Priority Habitat areas, but surface works and associated impacts are minimised by use of a single HDD drive. Disruption to agricultural activity.

5.3.3 Options D2 / D4

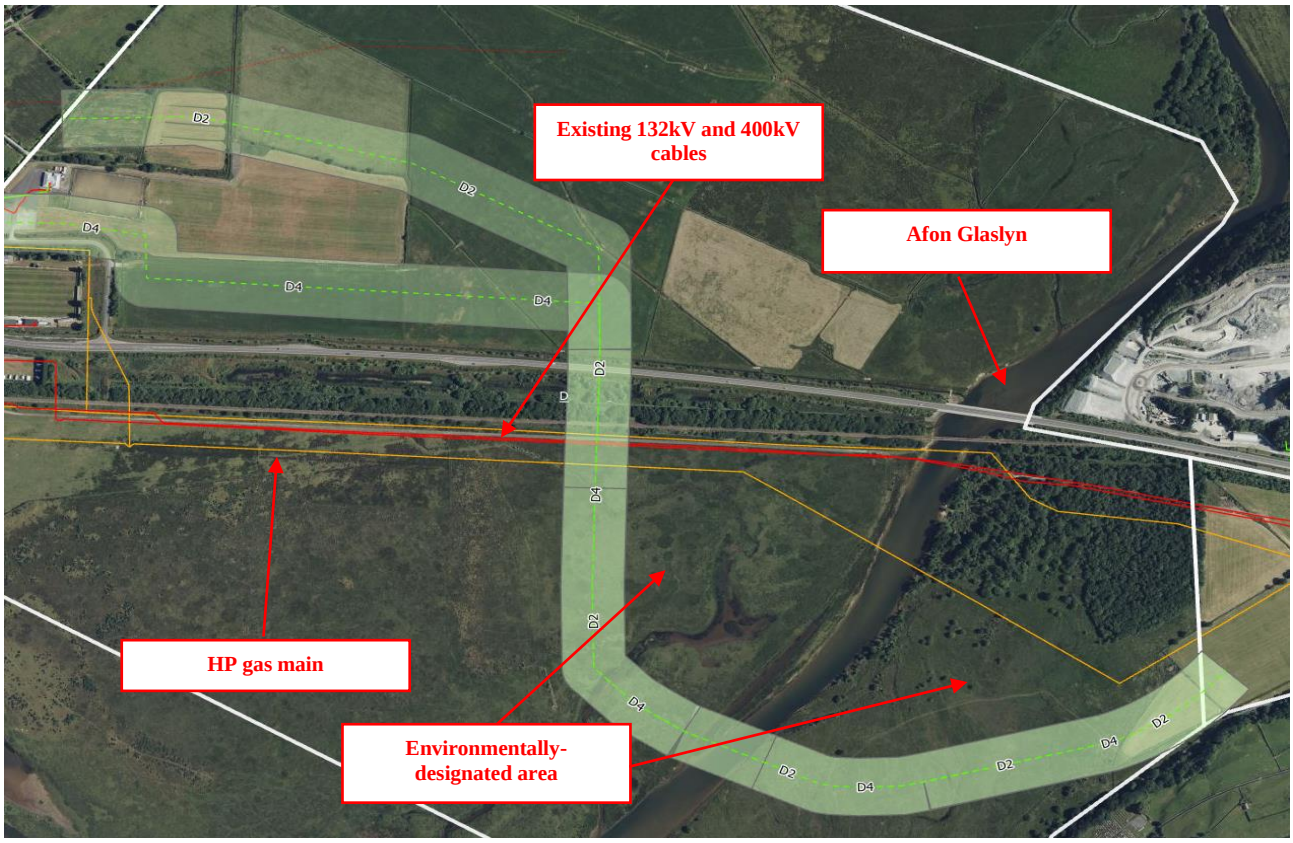


Figure 11: Indicative layout of cables for Options D2 and D4

Benefits	Challenges
These options cross the highway, railway line and gas main in a perpendicular manner, minimising impacts on these. This is considered to be technically advantageous. Does not any cross any conservation areas, listed buildings, or ancient woodlands. HDD avoids direct impact on A487 highway and the need for temporary traffic management measures and potential congestion.	Longest route options considered. Introduces risk of frac-out under A487 highway and in environmentally sensitive area. Introduces risk of settlement of carriageway and railway line. Requires settlement monitoring of pre, during and post HDD installation. Impacts the SSSI, SAC and Priority Habitat areas. Surface works and associated impacts are somewhat minimised by use of HDD, but both options would require additional open cut works within the SSSI as 2 HDD drives are required. Disruption to agricultural activity. Football club acts as a pinch point for the construction of D4.

5.3.4 Option D3

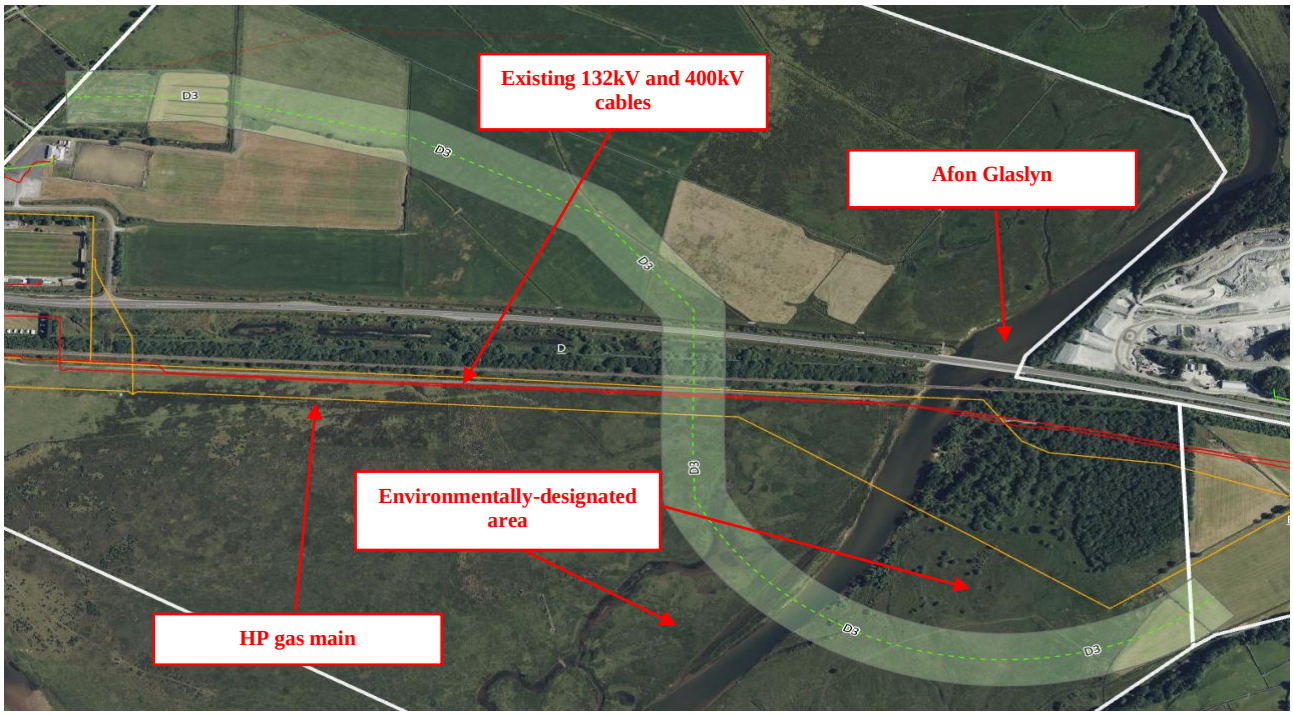


Figure 12: Indicative layout of cables for Option D3

Benefits	Challenges
Somewhat overall reduced route length with respect to Options D2 and D4. Crosses the highway, railway line and gas main in a perpendicular manner, minimising impacts on these. This is considered to be technically advantageous. Does not any cross any conservation areas, listed buildings, or ancient woodlands. HDD avoids direct impact on A487 highway and the need for temporary traffic management measures and potential congestion.	Introduces risk of frac-out under A487 highway and in environmentally sensitive area. Introduces risk of settlement of carriageway and railway line. Requires settlement monitoring of pre, during and post HDD installation. Impacts the SSSI, SAC and Priority Habitat areas. Surface works and associated impacts are somewhat minimised by use of HDD, but it would require additional open cut works within the SSSI as 2 HDD drives are required. Disruption to agricultural activity.

5.3.5 Options D9

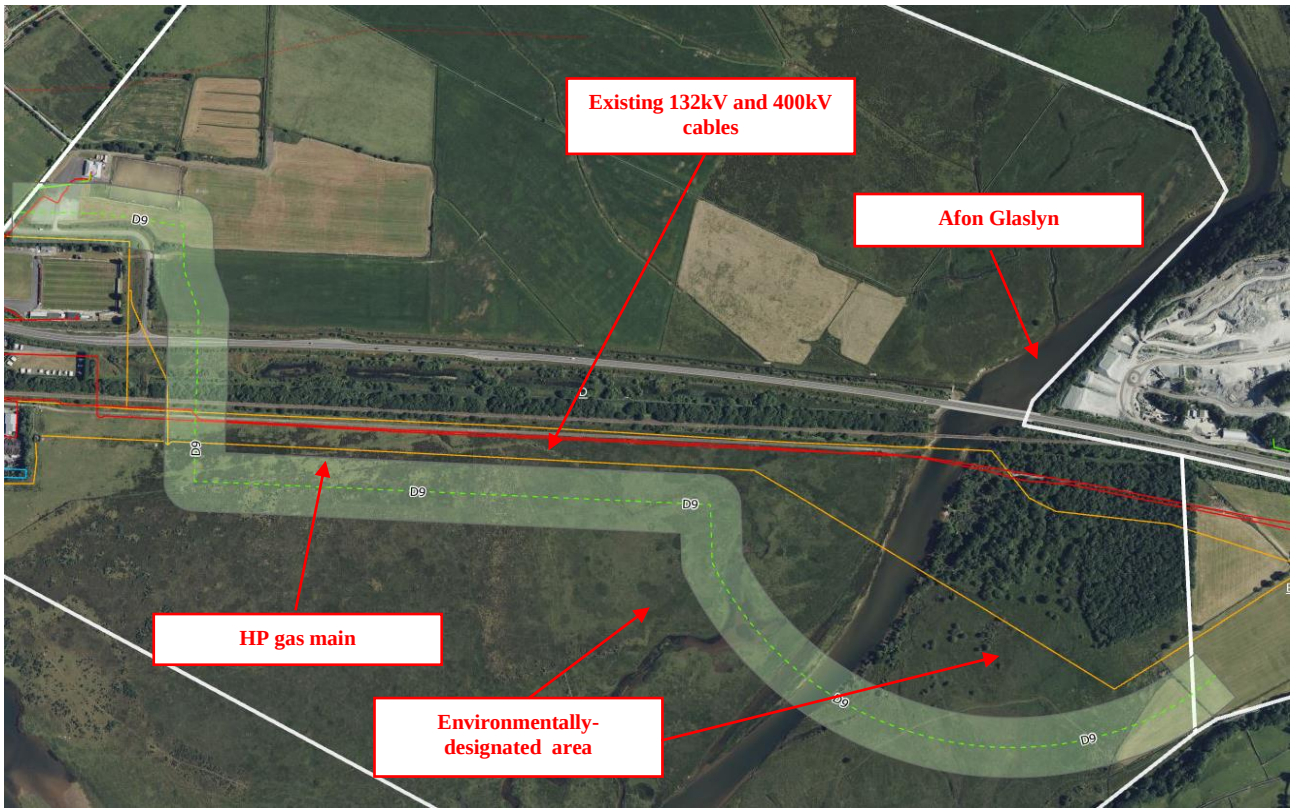


Figure 13: Indicative layout of cables for Options D2 and D4

Benefits	Challenges
Crosses the highway, railway line and gas main in a perpendicular manner, minimising impacts on these. This is considered to be technically advantageous. Does not any cross any conservation areas, listed buildings, or ancient woodlands. Lower impact on boundary hedgerows. HDD avoids direct impact on A487 highway and the need for temporary traffic management measures and potential congestion.	Introduces risk of frac-out under A487 highway and in environmentally sensitive area. Introduces risk of settlement of carriageway and railway line. Requires settlement monitoring of pre, during and post HDD installation. Would require more extensive open cut trench works in the SSSI, SAC and Priority Habitat areas as the route runs parallel to the A487 highway and the railway line. Disruption to agricultural activity. More disruption likely to sports club and football club. Highest cost option. Option D9 is the least preferred option in terms of health and safety due to the need for significant temporary works along the route.

6. Appraisal Summary

6.1 General

Based on the qualitative appraisals included in Section 5, an appraisal for each section and option has been divided into the following 5 categories:

- Technical assessment.
- Environmental assessment.
- Socio-Economic assessment.
- Cost assessment.
- Health and Safety assessment.

Each option has been classified with the following symbols for each category:

- "+" where the assessment of the option shows it has a clear benefit or is relatively advantageous when compared to the other options.
- "≈" where the assessment of the option shows it has a neutral benefit/challenge or is not the most advantageous or the least advantageous when compared to the other options.
- "-" where the assessment of the option shows it has a clear challenge or is the least advantageous when compared to the other options.

6.2 Section B / C – A487 near the Porthmadog roundabout

Table 1: Section B / C – A487 near the Porthmadog roundabout - Appraisal Summary

Criteria	Option 1A	Option 1B	Option 2	Option 3
Technical Assessment	+	-	-	-
Environmental Assessment	≈	≈	-	≈
Socio-Economic Assessment	≈	+	-	-
Cost Assessment	+	≈	-	-
Health & Safety Assessment	+	≈	-	-

Option 1A is the preferred option to cross over the A487 roundabout. Whilst technical challenging with an open cut solution requiring traffic management, it is the only option that can be constructed without significant protective measures to the HP gas main and existing 400kV cable and also does not require drilling under third party properties, thus making it the preferred solution to National Grid.

6.3 Section C – A487 west of the heritage railway line

Table 2: Section C – A487 west of the heritage railway line - Appraisal Summary

Criteria	Option C1 / C2	Option C3	Option C4
Technical Assessment	≈	-	+
Environmental Assessment	≈	-	+
Socio-Economic Assessment	≈	≈	≈
Cost Assessment	≈ (Option C1 likely most costly, Option C2 likely least costly)	≈	≈
Health & Safety Assessment	≈	-	+

Option C4 is the preferred solution, when considering all the criteria. All of the options considered HDD under the A487 Highway embankment, so to a certain extent from a highways perspective, they are all neutral in terms of the highway interface. However, Option C4 provided the best location to minimise the impact on the highway by routeing the HDD so that it can pass under the other constraints, HP gas main, water course in the same drill. It also allows space to allow the HDDs to be located to avoid any highway structures.

6.4 Section D – A487 near the Afon Glaslyn

Table 3: Section D – A487 near the Afon Glaslyn - Appraisal Summary

Criteria	Option D1	Options D2 / D4	Option D3	Option D9
Technical Assessment	+	≈	≈	-
Environmental Assessment	+	≈	≈	-
Socio-Economic Assessment	≈	≈	≈	≈
Cost Assessment	+	≈	≈	-
Health & Safety Assessment	+	≈	≈	-

Option D1 is the preferred solution, combining one HDD to cross under the A487 Porthmadog Bypass, the NR railway, Afon Glaslyn and flood plain in one drive. All other options would require an additional work site in the SSSI flood plain area.

7. Concluding Remarks

The appraisal summarised in this report, and a visual inspection of Table 1, Table 2 and Table 3, indicate the following are the preferred options to achieve each of the crossings of the A487 highway:

- Section B / C – A487 near the Porthmadog roundabout: **Option 1A** – open cut trench through Porthmadog roundabout.
- Section C – A487 west of the heritage railway line: **Option C4 –** HDD crossing of the A487 highway immediately west of the heritage railway line.
- Section D – A487 near the Afon Glaslyn: **Option D1** – HDD crossing of the A487 highway west of the Afon Glaslyn, also crossing the railway line and the Afon Glaslyn in a single drive.

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ARUP

Technical Note

Project title	Glaslyn Cable Uprating
Job number	295280-00
File reference	GLAS-ARUP-DS-XX-FN-X-0008
cc	
Prepared by	Graham Tivey
Date	28 February 2025
Subject	Minffordd CSEC Options Appraisal

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ARUP

Job number	295280
Date	28 February 2025

1. Introduction

This technical note aims to summarise the possible options available for the interface between the Glaslyn cable uprating cable and the Eryri Visual Impact Provision (EVIP) cable at Minffordd. It will also explain what options were considered and how the design was developed at the earlier stages of the project.

2. Glaslyn Cable Uprating

To enable power generated by a proposed offshore wind farm to reach the rest of the transition network, upgrades will be required to the Pentir – Trawsfynydd 4ZC route to increase circuit capacity.

The overall investment comprises of the five following projects:

- Uprate existing National Grid 400 kV Glaslyn Cables
- Replace 132 kV SPEN Glaslyn Cables with 400kV
- 4ZC Pentir – Trawsfynydd OHL Uprating
- New Bryncir Grid Supply Point
- Pentir & Trawsfynydd Cross site cables and minor substation works

Glaslyn Cable Uprating comprises:

- Uprate existing National Grid 400 kV Glaslyn Cables
    - This involves replacing the existing 400kV oil filled cables circuit from Wern CSEC at tower 4ZC044 to Garth CSEC at tower 4ZC037 with new400kV XLPE cables
- Replace 132 kV SPEN Glaslyn Cables with 400kV
    - This involves replacing the 2 circuits at 132kV from Wern CSEC at tower 4ZC044 to Garth CSEC at Tower 4ZC037

The layout of the new cable corridor is shown below in Figure 1.

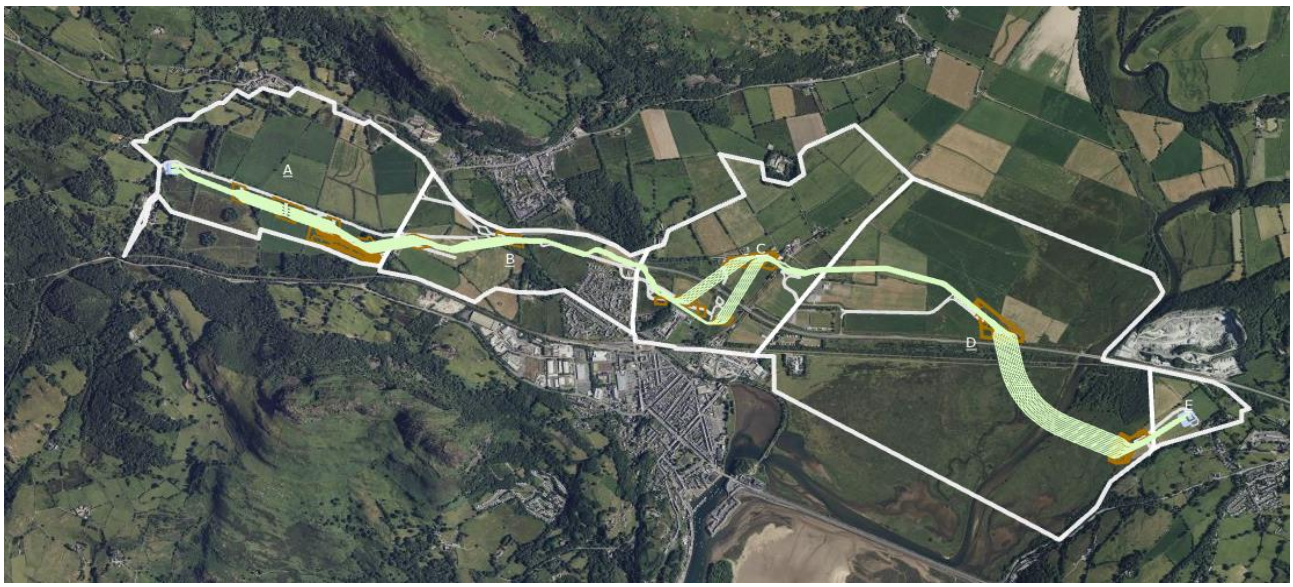

Figure 1: Overview of Glaslyn Cable Uprating project including sections

Wern CSEC is at the western end of the scheme in Section A, Garth CSEC is at the Eastern End of the scheme in Section E.

A further part of the 4ZC improvement works is the Eryri Visual Impact Provision [EVIP], which will replace the OHL section of the line from tower 4ZC027 to 4ZC037 with a new tunnel with the circuit housed within it.

Given that the Glaslyn cables terminate at Tower 4ZC037, this means that the Glaslyn cables and the EVIP project abut each other thus creating a project interface.

Due to space requirements, it is not possible for the EVIP tunnel to terminate at the Garth CSEC, so the tunnel extends beyond it to terminate at a new headhouse at Minffordd.

Figure 2 below shows the locations of the existing Garth CSEC and Garth headhouse.

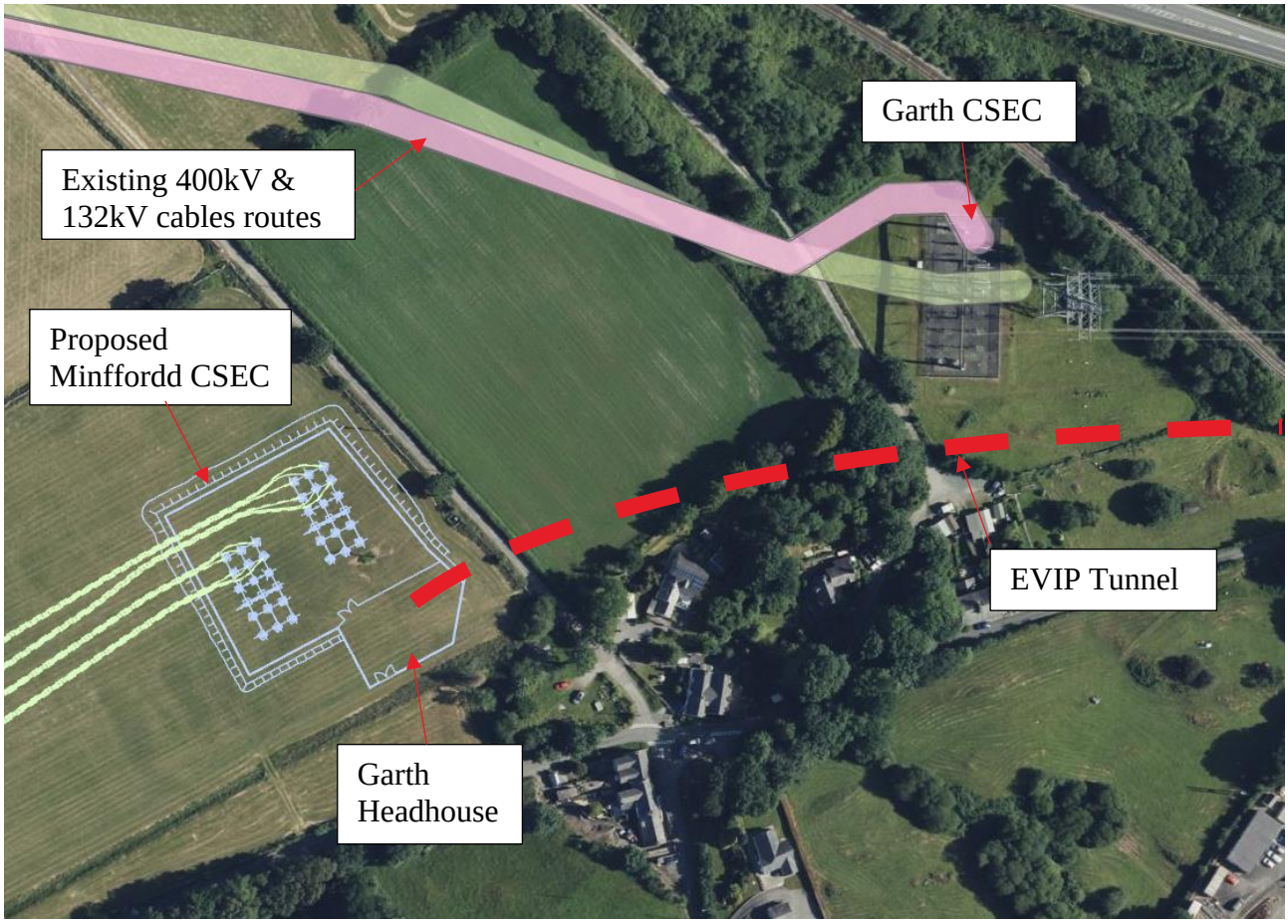

Figure 2 Garth & Minffordd

Part of the Glaslyn Cable Uprating scope included the design and development of a new CSEC at Minffordd to link the Glaslyn Cable scheme to the EVIP scheme.

3. Minffordd CSEC

The detailed scope for the Glaslyn Cable Uprating is detailed in the following document:

NGET PROJECT SPECIFIC SCOPE – HV CABLE- GLASLYN CABLE UPRATING – 15 June 2022 – Version1.0

This document formed the basis of the work scope for the development of the HV cable route study carried out.

For the Minffordd CSEC the following is stated:

There will be a new operational compound and the Client will apply for the permission under a TCPA and will secure the necessary permissions and secure the land agreements. The location of the new operational CSEC will be built of/on land that was formerly agricultural land built up by imported stone used as part of a construction compound for the NG VIP Snowdonia Tunnel Scheme. Refer to Appendix F

During the development and design phase of these works the raised compound will be in place and being used for the VIP Snowdonia Tunnel Main works. During the construction phase of these works (Stage two) it can be assumed the compound will be removed back to a level of 1.5m AOD by others to enable the Contractor to take over the proposed project area and build to engineering compaction specifications and improve the area to meet both short and long-term settlement performance requirements.

The Contractor shall design the newly created CSE referred to as Minffordd to meet the requirements of the CDS.

There will be key electrical interactions between the newly created CSE referred to as Minffordd and the existing Garth CSEC and gantry located approx. 400m to the east. These interactions are as follows:

Key Interaction 1

During part of the Stage 2 works, the electrical supply will be connected between the newly created CSE referred to as Minffordd and the existing CSEC by the erection of temporary overhead lines with a terminal tower and downlead connection to the new 400kV circuits. This concept is shown indicatively in Figure 3.

Key Interaction 2

The permanent connection between the Glaslyn cables and the cables installed by the VIP Snowdonia Tunnel scheme will be made in the new Minffordd CSEC. The Contractor will be responsible for the design of the electrical connection during Stage One and the Client will facilitate informed consultations with all parties to ensure that cable manufacturing and technology interfaces can be best managed considering interfaces and possible differences between manufacturing and installation warranty. This concept is shown indicatively in Figure 4.

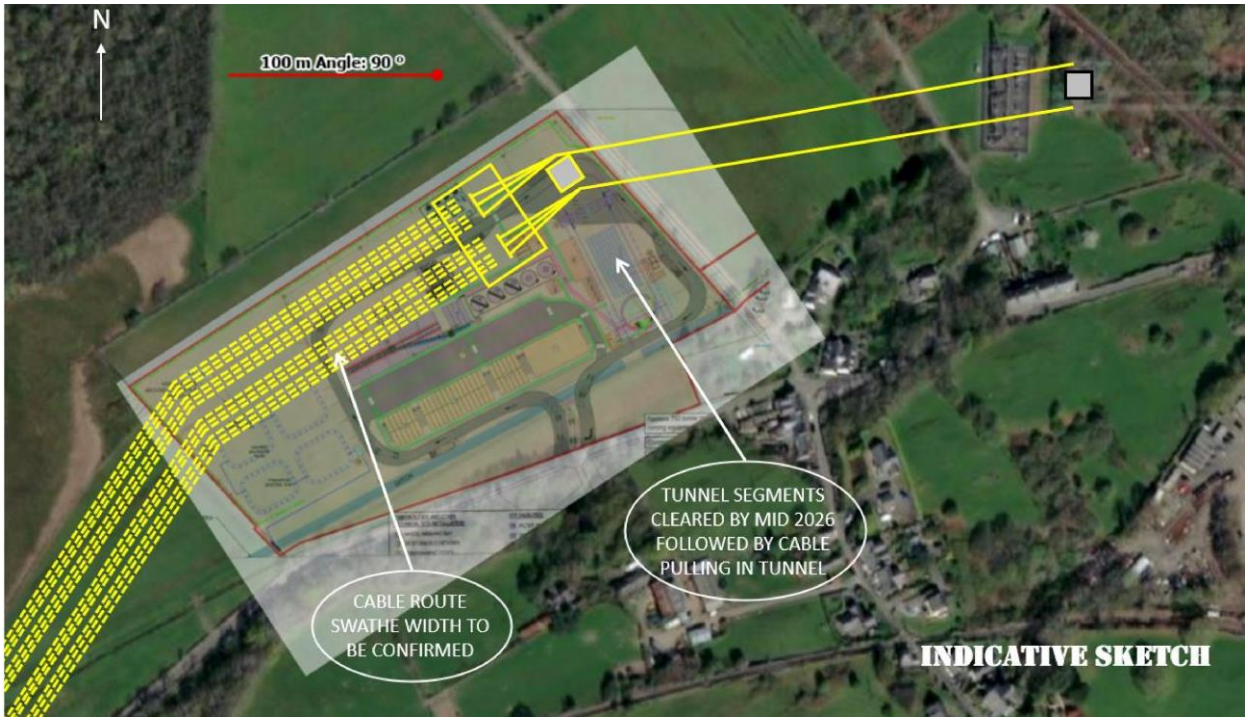

Figure 3 - Appendix F Minffordd temporary connection to tower 4ZC037

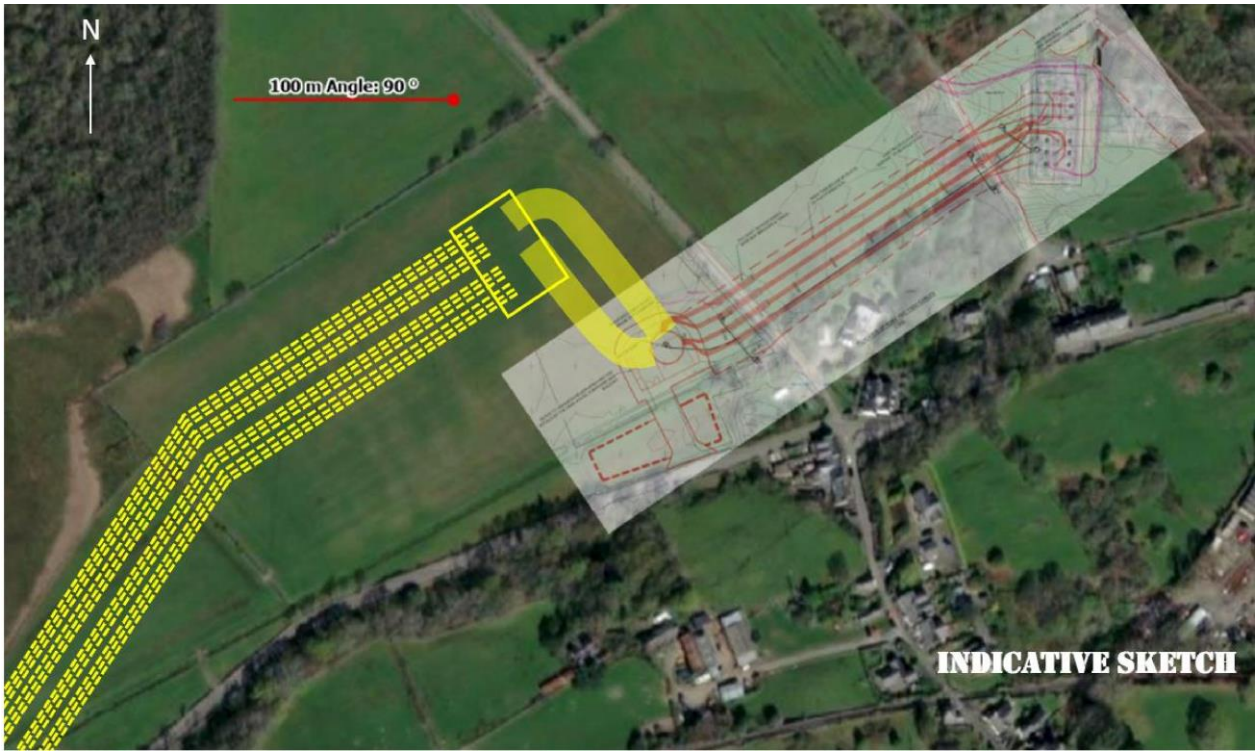

Figure 4 - Appendix G - Minffordd connection to SVIP tunnel

As stated in the original works information, the Minffordd CSEC, was to have two key interfaces. The first with the original overhead line at Garth CSEC via an extension to the OHL from 4ZC037 to a new temporary tower (4ZC037T) which would be a terminal tower allowing the OHL to drop down on to a new temporary gantry and Minffordd CSEC to allow a connection between the Glaslyn cable and Trawsfynydd utilising the existing OHL and bypassing the SVIP tunnel works.

The second stage was to connect Minffordd CSEC to the EVIP cables coming from the Garth headhouse with a new connection at Minffordd CSEC.

This phased approach for Minffordd had an impact on what options were considered when developing the design solution appropriate for this location, particularly given the fact that Key Interaction 1 was instructed to be removed from the works information during project development.

4. Appraisal methodology

A total of 3no. options for the interface between the Glaslyn cable uprating cable and the EVIP cable at Minffordd are appraised in qualitative manner in this note. The key criteria include:

- Technical assessment.
- Environmental assessment.
- Socio-Economic assessment.
- Cost assessment.
- Health and Safety assessment.

It is highlighted that the environmental assessment includes considerations in terms of visual and landscape impacts, as well as impacts on the historic environment. There are historic assets in the area and Minffordd is located in the Aberglaslyn Historic Landscape and Area 5 of the Slate Landscape of Northwest Wales World Heritage Site (WHS), known as “Ffestiniog: its Slate Mines and Quarries, ‘city of slates’ and Railway to Porthmadog. Archaeology is not considered as a differentiator between options because the site of the interface between the cables has been part of the EVIP working area with high levels of ground disturbance and compaction and all options are likely to be subject to a watching brief and potentially a geophysical survey. The environmental assessment includes the commentary included in the “Minffordd CSEC Discussion Paper v2.0 10.10.24” prepared by the Consents Officer.

In terms of the cost assessment, high-level costs have been provided by the Contractor (MPNL) to enable this assessment; a further breakdown can be provided upon request.

5. Minffordd CSEC Options Description and High-level Appraisal

5.1 Option 1: AIS Cable Sealing End Compound

5.1.1 Description

AIS stands for air insulated switchgear. This is typically the most common form of switchgear used where space is not the key driver in the selection of switchgear type. As the name suggests AIS uses the air to insulate the switch gear so typically this solution is normally situated outside to allow for the air flow around the equipment. Electrical safety clearance as details in NGET-TS 2.01 table 4 relate to the minimum safety clearances to be maintained in AIS installations.

A study of the 4ZC route from Pentir to Trawsfynydd highlighted that the existing HV equipment at both substations and the existing CSEC at Wern and Garth were all air insulated switchgear (AIS). Therefore, the use of AIS at Minffordd would be consistent with the rest of the network for an operational standpoint.

The adjacent Garth CSEC is an AIS system. At Garth the OHL from tower 4ZC037 drops down to a gantry where the conductors then drop on to post insulators before transferring to cables sealing ends via busbars as shown in Figure 5 below.



Figure 5 Garth CSEC

It was also noted that the new CSEC being proposed by the EVIP project for Garth and Cilfor are also AIS systems. Given the key interfaces detailed in the original scoping document, and the need for a temporary tower and gantry, an AIS system at Minffordd would not only be operationally consistent but would also allow for the different key interfaces required of it.

In addition to the Cable Sealing End, the compound will also house additional HV plant required for protection and maintenance operations.

- **Earth Switches** are provided which allow the cables to be isolated when maintenance is required.
- **Surge Arrestors** are provided to offer protection to the cable section from surges in power which can occur of OHL conductors from atmospheric and switching over voltages.
- **Busbars** link the CSE's to each other and allow for sections to be removed to create points of isolation.
- **Circuit Breakers** can also be provided to minimize overcurrent. In this instance they are not required.

5.1.2 Appraisal

The table below lists the assessment carried out in relation to an AIS CSEC.

Benefits	Challenges
Technical assessment	
Consistent with the HV Equipment at both Pentir and Trawsfynydd substations. Consistent with AIS system used at Garth and Wern CSEC. Consistent with the EVIP project use of AIS at Cilfor and Garth Works for both key interactions. Allowed for the switch between the key interfaces as defined in the works information. Will allow connection to EVIP tunnel cables immediate adjacent to headhouse site therefore removing the need to build new cables to existing Garth CSEC site. Allows for earth switches to be installed into the network which can be used to isolate the sections of cables between the EVIP system and Glaslyn cables for maintenance.	AIS system needs great clearances between the assets thereby can require a great land take than other systems.
Environmental assessment	
The new AIS CSEC at Minffordd will allow the key interfaces to be complied with in the works information. Can be located adjacent to the Garth Headhouse site to make one site rather than two separate sites	While landscape and visual impacts are likely to be similar for all options during construction, following construction this option would involve a more prominent CSEC infrastructure and ancillary development. Overall the AIS CSEC will require a larger footprint than some other solutions. Impacts on the historic environment are likely to be similar for all options during construction. Following construction, this option is likely to have an impact on the Aberglaslyn Historic Landscape, however, would be viewed in context of existing OHL infrastructure and alongside the A road (A497) and Garth Quarry.

Benefits	Challenges
	The site is approx. 160 metres north of the rail line and approx. 250 metres northwest of the Minffordd Station which are part of the WHS. The rail line is at a higher level than the site, therefore would be visible from the WHS. Owing to changes in land levels the site is not visible from the station. No material difference in impacts on Grade II listed Building at Rhos House Minffordd owing to its setting, in a small group of trees and intervening development. Generally impacts for a new CSEC at Minffordd will have to be considered at planning alongside the changes required to the EVIP planning application for the Garth Headhouse site, which may be more challenging than for Option 2.
Socio-Economic assessment	
Allows the Minffordd CSEC site to be directly adjacent to the Garth Headhouse site thus removing the need to retain the Garth CSEC which can be removed and restored with natural planting.	Will result in a larger site for assessment in planning and resubmission of EVIP planning, which may be more challenging than for Option 2.
Cost assessment	
Expected to be less costly solution. High-level cost estimated as £3 million.	
Health and safety assessment	
Same earthing system can be used for both the CSEC and the headhouse. One site, so only need for one combined access to site for Headhouse and CSEC.	Clearance to comply with NGET TS standards and maintenance requirements will be built into the design of the layout of the CSEC. Perimeter fencing will be used to prevent unauthorised access in the CSEC.

5.2 Option 2: Cable to Cable Solution

5.2.1 Description

To enable a seamless connection between the Glaslyn cables and the EVIP cables, a cable-to-cable connection was considered. The major benefit of a cable-to-cable solution is the reduced space required for such a connection as the CSEC is not required. A cable-to-cable connection can be jointed in a joint bay which can be buried thus whilst this requires space to achieve this, the visual implications of a buried joint bay over any CSEC alternative are significant.

It should be noted that a cable-to-cable solution would only be practical for key interaction 2 when the Glaslyn cables are connected to the EVIP cables. For key interaction 1 where the cables are to be connected to the OHL, a CSEC is required.

For a cable-to-cable solution to work, the joint between the cables must be type registered and approved for use by National Grid. Type approval of cables and joints is the responsibility of the cable manufacturers who submit their products for testing in order to gain approval. Given the number of different cable manufacturers, and the variance in each cable design, a universal type-registered joint for a 400kV solution is not currently available as manufacturers presently only develop joints that can be used to connect their own cables together.

To enable a cable-to-cable joint at Minffordd would therefore mean that the cable used by the EVIP project and the cables used by the Glaslyn project would need to be made by the same manufacturer in order for this to be possible.

In this instance, as EVIP are already under construction on site, orders for the EVIP cable have already been placed and NKT is confirmed as the cable supplier for the EVIP scheme. For a cable-to-cable solution to work NKT would also need to provide the cable for the Glaslyn scheme. Alternatively, type registration would need to be sought jointly by the Glaslyn and EVIP cable manufacturers for the 400kV joint, which may not be commercially advantageous.

5.2.2 Appraisal

Benefits	Challenges
Technical assessment	
Would allow for minimal assets at Minffordd to joint the cables together. No CSE Compound would be required, hence minimal changes to the current EVIP planning application. Would simplify the cable-to-cable connection by using the same cable type on the different projects. Will allow connection to EVIP tunnel cables immediate adjacent to headhouse site therefore removing the need to build new cables to existing Garth CSEC site.	Would require protection measure required by EVIP scheme to be moved to Wern CSEC, as the Minffordd CSEC would no longer exist. Would require re-assessment of Glaslyn cable design to suit different cable manufacture specification. Would not work for Key Interface Stage 1 for the OHL solution which would still require a temporary CSEC* (*: This requirement has been removed by client instruction)
Environmental assessment	
Minimises the land footprint at Minffordd to essentially the same as the EVIP scheme, thus less environmental impact.	While landscape and visual impacts are likely to be similar for all options during construction, following construction this option is

Benefits	Challenges
Minimal impact on visual impact as joints can be buried.	likely to have the least visual impact as it would be primarily be below ground. However additional equipment which would have been at Minffordd would need to be moved to Wern CSEC so this would result in greater impacts at Wern increasing the overall size. Impacts on the historic environment are likely to be similar for all options during construction. Following construction, this option would have no material effects on setting of historic assets – historic landscape, WHS or Listed Buildings. Key Interface 1 for the OHL would still need to be addressed. i.e. a temporary CSEC would still be required *. (*: This requirement has been removed by client instruction) Generally impacts for a new cable-to-cable solution at Minffordd will have to be considered at planning alongside any changes required to the EVIP planning application for the Garth Headhouse site; however, these considerations are likely to be more readily accepted for this option.
Socio-Economic assessment	
Smaller site, essentially the headhouse site only so minimal change to existing planning approvals required to implement.	Additional equipment which would have been at Minffordd would need to be moved to Wern CSEC so greater impacts at Wern increasing the overall size.
Cost assessment	
Less HV Equipment / compounds so should be in principle a less expensive solution subject to aligning cables manufacture for both schemes (see challenges).	Glaslyn contractor contacted NKT to request a cost to supply cable to Glaslyn scheme. NKT price increased by order of magnitude of additional £12million to supply cables over and above the current supplier, so significant cost implication to adopt this option.
Health and safety assessment	
Cables jointed underground so no clearance issues and no separate compound required.	Additional equipment needed at Wern CSEC, with an increase of associated risks at this site.

5.3 Option 3: GIS/GIB Solution

5.3.1 Description

GIS stands for Gas Insulated Switchgear. This varies from an AIS solution by encasing the switchgear in protective shield structures containing gas, typically SF_6 [Sulphur hexafluoride]. This is a synthetic, odourless gas which it highly stable, non-toxic, non-flammable and electronegative. The gas is used to surround the switchgear to insulate the live equipment. It should be noted that current NG Policy requires GIS system to be SF_6 free where alternative products are available.

GIS has some advantage over AIS but also some disadvantages so it needs careful consideration when it is used.

The largest benefit of GIS system over an AIS system is that a GIS system can be smaller than an identical AIS system. Being enclosed, the GIS system is less vulnerable to air conditions and pollutants.

Typically, most GIS system are enclosed within a building to offer a more controlled environment in which to operate. This also has the added benefit of enclosing the HV equipment thus reducing aesthetic concerns particularly in built up areas. Given the location of Minffordd CSEC and its proximity to the coast, an outdoor GIS solution is unlikely due to ongoing maintenance due to salt content of the air.

The associated building needed to enclose the GIS system would likely be large, circa 10m high apex roof box type structure. It is highly likely that a crane would need to be installed inside the building to aid the installation and maintenance of the GIS system. The overall footprint of the building is therefore similar to the AIS CSEC footprint so in term of land take / planning, is deemed to be similar to that of an AIS CSEC.

GIS equipment is more expensive than AIS equipment to install and operation and maintenance considerations should be taken into account. The enclosed building will also have a greater capital cost alongside the running and maintenance costs of the building services. A standalone GIS solution may not be cost effective if all other assets are AIS systems for example.

Part of a GIS solution is the Gas insulated busbar (GIB).

As described in Section 4.1, a review of the HV equipment on the 4ZC route determined that all of the existing equipment was AIS in its nature, including the CSEC being built as part of the EVIP project. Whilst a GIS solution at Minffordd CSEC could be smaller than the AIS solution, it still would not be as favourable, in terms of land take as the cable-to-cable solution described in Section 4.2. Being a standalone GIS CSEC would also create additional operational and maintenance requirements unique to this site.

5.3.2 Appraisal

Benefits	Challenges
Technical assessment	
Smaller overall footprint than AIS solution. Could works for both key interactions. Allowed for the switch between the key interfaces as defined in the works information. Will allow connection to EVIP tunnel cables immediate adjacent to headhouse site therefore removing the need to build new cables to existing Garth CSEC site.	Whilst standard NG equipment, a GIS solution would require different maintenance regime to the AIS system on the rest of the route. Would require an enclosure to house the GIS plant adjacent to headhouse structure. Additional measure to house the inert gas and its handling during operations.

Benefits	Challenges
Allows for earth switches to be installed into the network which can be used to isolate the sections of cables between the EVIP system and Glaslyn cables for maintenance.	Lead times on GIS is currently +24 months with some TR suppliers at point of order placement.
Environmental assessment	
Smaller overall footprint than AIS solution. Visual impact of a new structure as opposed to an AIS CSEC.	While landscape and visual impacts are likely to be similar for all options during construction, following construction this option would involve a prominent GIS building, infrastructure and ancillary development. Impacts on the historic environment are likely to be similar for all options during construction. Following construction, this option is likely to have an impact on the Aberglaslyn Historic Landscape, and a building would be a more substantial feature in the landscape than Option 1. However, it would also be viewed in context of existing OHL infrastructure and alongside the A road (A497) and Garth Quarry. This option would have more of a visual impact on the outstanding universal value of the Slate Landscape of Northwest WHS due to that option including a building with an apex/roof box type structure. No material difference in impacts on Grade II listed Building at Rhos House Minffordd owing to its setting, in a small group of trees and intervening development. Potential for gas emissions if a failure occurs. Generally impacts for a new GIS building at Minffordd will have to be considered at planning alongside the changes required to the EVIP planning application for the Garth Headhouse site, which may be more challenging than for Option 2.
Socio-Economic assessment	
Allows the Minffordd CSEC site to be directly adjacent to the Garth Headhouse site thus removing the need to retain the Garth CSEC which can be removed and restored with natural planting.	Will result in a larger site (than EVIP site at present) for assessment in planning and resubmission of EVIP planning, which may be more challenging than for Option 2.
Cost assessment	
	Will be more expense for initial construction than AIS solution. Operation and maintenance for a standalone GIS site will be greater than AIS equivalent. Estimated cost of a standalone GIS solution is approx. £9 million.
Health and safety assessment	
Same earthing system can be used for both the CSEC and the headhouse. One site, so only need for one combined access to site for Headhouse and CSEC.	Clearance to comply with NGET TS standards and maintenance requirements will be built into the design of the layout of the CSEC. Perimeter fencing will be used to prevent unauthorised access in the CSEC.

Benefits	Challenges
	Additional O & M requirements for standalone GIS solution.

5.4 Design Change at Minfford CSEC

During the Stage 1 design development for Glaslyn cables, interface meetings with the EVIP team were organised and information shared. During the initial interface meeting, the 'Key Interface' strategy was discussed with a view to understanding where the Minffordd CSEC and temporary tower could be sited within the EVIP Garth Headhouse construction site, as required in the original works information.

It became apparent that 'Key Interface 1'connecting Glaslyn cables to the existing OHL was required to bypass the EVIP project should it be delayed. However, if the EVIP project was delayed then it was unlikely that the land required to construct Minffordd CSEC and the temporary tower within the confines of the EVIP worksite would be available this making it impossible to construct Minffordd whilst EVIP was still under construction.

An instruction was issued by NG to disregard Key Interface 1 and remove the temporary tower from the scope of the Stage 1 works. This instruction allowed the Minffordd CSEC to be located adjacent to the Garth Headhouse in one compound area as the need to align to a temporary OHL tower had been removed.

6. Appraisal Summary

6.1 General

For each one of the key criteria described in Section 4, and based on the assessment described in the same section, each option has been classified with the following symbols for each criteria:

- "+" where the assessment of the option shows it has a clear benefit or is relatively advantageous when compared to the other option.
- "≈" where the assessment of the option shows it has a neutral benefit/challenge or is not the most advantageous or the least advantageous when compared to the other option.
- "-" where the assessment of the option shows it has a clear challenge or is the least advantageous when compared to the other option.

It should be noted that, depending on the specific assessment, not all symbols have been used if the relative differences between the options are not considered to be significant.

6.2 Appraisal Summary

Table 1: Minffordd CSEC Options - Appraisal Summary

Criteria	Option 1 (AIS)	Option 2 (Cable to Cable)	Option 3 (GIS)
Technical Assessment	≈	≈	-
Environmental Assessment	≈	+	≈
Socio-Economic Assessment	≈	+	≈
Cost Assessment	+	-	-
Health & Safety Assessment	≈	+	≈

All options are achievable and have positive and negative considerations.

The technical assessment shows that all the options have positive and negative features which overall show that no one solution from a technical viewpoint has a benefit over the other options. We do however note that whilst the implications of additional plant at Wern CSEC is a consideration for Option 2, a full assessment of these implications has not been carried out. Option 3 was ruled slightly less advantageous due to its unique nature of the HV equipment in relation to the rest of the 4ZC route.

The environmental assessment shows that Option 2, the cable-to-cable solution has a clear advantage over the other options. The removal of the CSE compound has a clear benefit in terms of land take and environmental impact as well as to the planning applications for both Glaslyn and EVIP. Options 1 and 3 are comparable in terms of environmental impacts, with Option 1 being slightly preferrable, both of which can

be provided with landscaping mitigations. Impacts of Option 3 could be further mitigated by consideration of details regarding structure, colour, façade treatment, etc.

The socio – economic assessment also shows Option 2 as the preferred solution for similar reasons to the environmental assessment. The removal of the CSE compound will reduce the disruption to the local community during the construction phase and will also reduce the operational requirements at the site.

The cost assessment is probably the biggest determining factor in regard the most favourable option. Option 2 whilst favourable on a number of criteria caries a significant cost imbalance over Option 1. The need to use the same cable supplier for both projects allow the supplier to charge less competitive rates than other manufacturers which makes this option very expensive to consider.

The health and safety assessment shows that with the reduced footprint and reduction in HV plant that Option 2 requires, it also shows a benefit over the other options.

7. Concluding Remarks

The appraisal summarised in this report, and a visual inspection of Table 1, shows that Option 2 (Cable to cable) solution would be the most favourable solution on a number of criteria if cost effective. However, the cost mark-up quoted to the Glaslyn contractor makes this option too costly to take forward for further development.

Option 1 (AIS) is the next best solution giving a more realistic cost for the scheme whilst enabling the cable connection to be achieved. The need to construct a CSE compound is the difference between option 1 & 2.

Option 3 (GIS) is similar to Option 1 but whilst being slightly smaller in overall size has a number of technical issues and cost issues that make this less favourable as an overall solution.

The preferred option is still therefore Option 1 (AIS Cable Sealing End Compound) taking all the assessment criteria into account.

4.4.A Glaslyn Cables Works – Landscape Assessment Tables

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1. Landscape Assessment Tables

1.1.1 This Appendix provides details of the predicted impacts on landscape designations and landscape character in the Study Area for the Glaslyn Cables Works. The following tables should be read in conjunction with the baseline description and value judgements which are found in the Environmental Statement (ES) **Volume 4: Glaslyn Cables, Chapter 4 Landscape and Visual Amenity** and the supporting figures.

1.1.2 The proposed Glaslyn Cables works at operation are scoped out of the assessment as summarised in the ES **Volume : Glaslyn Cables, Chapter 4 Landscape and Visual Amenity**.

1.2 Gwynedd Landscape Character Areas (LCA)

Table 1-1: LCA 9 Porthmadog

Descriptor	
Baseline Description	All elements of the proposed works (Glaslyn cables route corridor, Wern CSEC and Minffordd CSEC and THH) and the majority of the study area are in this LCA. The LCA forms the transition from the estuary coastline and the upland areas of the Eryri National Park. The landform of the LCA is a mosaic of landscape types including the elevated scrub and grassland of Moel-Y-Gest, the ephemeral wetland grazing marsh of the estuary, and the broad flat pastoral valley. Vegetation is limited around the estuary and on higher ground. There are larger blocks of woodland to the west of the LCA away from the estuary areas and around the rising valley sides. The presence of the surrounding hills to the south and north creates a sense of enclosure and frames long expansive views along the valley floor, which provide a positive scenic quality. The limited access to the valley floor contributes to the rural characteristics and strong perception of tranquillity. Urban areas in the wider LCA, including Porthmadog, Tremadog and Penrhyndeudraeth, and the major highways such as the A487, A497 and A498 influence and reduce the perception of wildness. Valuable landscape elements include the wet grassland and salt marsh around the estuary and the small-scale fields along the valley floor. The area around Porthmadog is a gateway to the Eryri National Park with

Descriptor			
	an important listed view along the bypass. The Cob at Porthmadog has associations with renowned Welsh artists who have been inspired by the natural beauty.		
Value:	Although not a designated landscape, the area is within, and contributes to, the setting of the National Park. The LCA has strong scenic value, landscape elements of conservation interest, and strong cultural associations and is assessed as having a high value.		
Susceptibility:	Whilst large parts of the LCA are rural in character, there are also large areas of urban influence and infrastructure present making the landscape tolerant to a small to medium degree of change and assessed to have a medium susceptibility.		
Sensitivity:	High		
Description of change		**Magnitude of Effect**	**Significance of Effect**
Construction:			
***Glaslyn Cables*:** Construction operations would represent an incongruous activity within this LCA. Direct impacts during construction would result from vegetation clearance and the excavation and soil disturbance from HDD and open trenching of the cable corridor route although these would be highly localised and limited in geographical extent. The presence of construction activity including storage of materials, tall machinery, temporary scaffolding structures and site facilities would lead to direct landscape effects. Construction would introduce additional movement and activity into the landscape, leading to a slight reduction in tranquillity that would be localised, temporary and reversible. Construction operations would result in a partial deterioration to landscape characteristics, over a small geographical extent that would be temporary and reversible.		Medium	Moderate adverse (significant)
***Wern CSEC*:** Direct impacts during construction would result from a very small change in land use from agricultural land as the CSEC footprint is extended. The presence of construction activity including storage of materials, tall machinery and movement of plant would result in a slight alteration to the character which would be limited in extent due to the relative containment provided by landform, tall hedgerows and woodland. The duration of works would be short term and reversible and of a localised geographical scale with a slight deterioration to landscape characteristics.		Low	Minor adverse (not significant)

Descriptor		
Minffordd CSEC and THH: Activity would represent a partially incongruous activity within this LCA although its proximity to the existing CSEC and the EVIP works would lessen the impact. Direct impacts during construction would result from a small change in land use from agricultural land. The presence of construction activity including storage of materials, tall machinery and movement of plant would result in a slight alteration to the character which would be limited in extent due to the relative containment provided by landform, tall hedgerows and woodland. The duration of works would be short term and reversible and of a localised geographical scale with a slight alteration in landscape characteristics.	Low	Minor adverse (not significant)
Operation Year 1 (winter):		
***Wern CSEC*:** The proposed works would locally extend the influence of electrical infrastructure related development within the landscape through the operation of the CSEC. The proposed works would be characteristic with the existing CSEC, resulting in a very slight deterioration to the existing landscape resource.	Very low	Negligible adverse (not significant)
Minffordd CSEC and THH: The proposed works would locally extend the influence of electrical infrastructure related development within the landscape through the operation of the enlarged CSEC, resulting in a very slight deterioration to the existing landscape resource.	Very low	Negligible adverse (not significant)
Operation Year 15 (summer):		
***Wern CSEC*:** As operation year 1.	Very low	Negligible adverse (not significant)
Minffordd CSEC and THH: As operation year 1.	Very low	Negligible adverse (not significant)

1.3 Assessment of the setting of the Eryri National Park.

1.3.1 Seascape Character Area (SCA) and LCAs as defined in the Eryri (Snowdonia) National Park Supplementary Planning Guidance 7 – Landscape and Seascapes of Eryri (Ref 1.1) consider the setting of the National Park. These are shown in ES **Volume 4, Figure 4.4.2: National Landscape and National Seascape Character Areas**. The majority of the SCA overlaps with the Gwynedd LCA and the Eryri (Snowdonia) National Park LCA. The SCA will be assessed as they form part of the setting of the National Park, but their impact and significance of effect should not be double counted.

Table 1-2: SCA 20 Porthmadog and Glaslyn Estuary

Descriptor	
Baseline Description	The eastern and central part of the Glaslyn cables route corridor is in this SCA. The Minffordd CSEC is in the adjacent SCA 21 to the east. The landscape of the SCA is open and large scale. The surrounding hills and mountains of the Eryri National Park provide containment to the landscape and contribute to the sense of scale and intimacy of the flat valley floor. The SCA is primarily ephemeral wetland and grazing marsh that is dominated by the changing patterns and movement of watercourses. Whilst this is a historically engineered landscape, it is now an important conservation interest as a nature reserve. Settlement is scarce in the SCA with the exception of the settlement of Porthmadog which offers expansive views of strong scenic quality toward the Eryri National Park. Recreation access is very limited within the landscape creating perceptual qualities of remoteness and tranquillity despite the proximity to the large settlements. The Welsh Heritage Railway passes through the SCA offering access and provides associations to the historic character of the landscape. The Cob at Porthmadog also has associations with renowned Welsh artists who have been inspired by the natural beauty. Detracting elements are limited to the urban influence of settlements and the A487.
Value:	Whilst not in the boundary of the Eryri National Park, the area is in and contributes to its setting. The LCA has strong scenic value, landscape elements of conservation interest, and strong cultural associations and is assessed as having a high value.
Susceptibility:	Whilst the SCA is predominantly rural in character, there are also large areas of urban influence and infrastructure present making the landscape able to tolerate a small to medium degree of change and it is assessed to have a medium susceptibility.
Sensitivity:	High

Descriptor		
Description of change	**Magnitude of Effect**	**Significance of Effect**
Construction:		
***Glaslyn Cables*:** Activity would represent an incongruous activity in this SCA. Direct impacts during construction would result from vegetation clearance and the excavation and soil disturbance from HDD and open trenching of the cable corridor route although these would be localised and limited in geographical extent. The presence of construction activity including storage of materials, tall machinery, temporary scaffolding structures and site facilities would lead to some direct landscape effects. Construction would also introduce additional movement and activity into the landscape with haul vehicles. Impacts would result in a partial alteration to the landscape that would be localised, temporary and reversible.	Medium	Moderate adverse (significant)
***Wern CSEC*:** Direct impacts during construction would result from a very small change in land use from agricultural land as the CSEC footprint is extended. The presence of construction activity including storage of materials, tall machinery and movement of plant would result in a slight alteration to the character which would be limited in extent due to the relative containment provided by landform, tall hedgerows and woodland. The duration of works would be short term and reversible and of a localised geographical scale with a slight alteration in landscape characteristics.	Low	Minor adverse (not significant)
Minffordd CSEC and THH: Direct impacts during construction would result from a very small change in land use from agricultural land as the CSEC footprint is constructed. The presence of construction activity including storage of materials, tall machinery and movement of plant would result in a slight alteration to the character which would be limited in extent due to the relative containment provided by landform, tall hedgerows and woodland. The duration of works would be short term and reversible and of a localised geographical scale with a slight alteration in landscape characteristics.	Low	Minor adverse (not significant)
Operation Year 1 (winter):		
***Wern CSEC*:** The proposed works would locally extend the influence of electrical infrastructure in the landscape through the operation of the enlarged CSEC. The proposed works would be characteristic of the existing CSEC, resulting in a very slight deterioration to the existing landscape resource.	Very low	Negligible adverse (not significant)

Descriptor		
Minffordd CSEC and THH: The proposed works would locally extend the influence of electrical infrastructure related development in the landscape through the additional elements at the operational CSEC. This would lead to a very slight deterioration to the existing landscape resource.	Very low	Negligible adverse (not significant)
Operation Year 15 (summer):		
Wern CSEC**:** As operation year 1.	Very low	Negligible adverse (not significant)
Minffordd CSEC and THH: As operation year 1.	Very low	Negligible adverse (not significant)

Table 1-3: SCA 21 Dwyryd Estuary and Morfa Harlech and LCA 10 Morfa Harlech

Descriptor			
Baseline Description	The eastern part of the Glaslyn cables route corridor and the Minffordd CSEC and THH are in this SCA. The terrain of this SCA is low-lying and in most part comprises the Glaslyn estuary. Landcover is limited to grazing marsh and sand dunes with tree cover limited to woodland blocks at Morfa Harlech and along inland valley sides near Penrhyndeudraeth. Settlement is scarce in the area with the exception of the settlements of Penrhyndeudraeth and Harlech. Recreation access is very limited in the landscape with large parts being inaccessible and thereby creating perceptual qualities of wildness, remoteness and tranquillity. Views toward the coast are limited but views inland offer scenic quality framed by the surrounding hills.		
Value:	Whilst the SCA is not in the Eryri National Park, it contributes to its setting. The SCA has very good scenic value and landscape elements of conservation interest. There is limited recreational access in the SCA and it is assessed as having a high value.		
Susceptibility:	Whilst the LCA and SCA predominantly are rural and coastal in character, there are also large areas of urban influence and infrastructure are present making the landscape able to tolerate a small to medium degree of change and is assessed to have a medium susceptibility.		
Sensitivity:	High		
Description of change		**Magnitude of Effect**	**Significance of Effect**
Construction:			
***Glaslyn Cables*:** The proposed works would represent an incongruous activity within this SCA. Direct impacts during construction would result from vegetation clearance and the excavation and soil disturbance from HDD and open trenching of the cable corridor route although these would be localised and limited in geographical extent. The presence of construction activity including storage of materials, tall machinery, temporary scaffolding structures and site facilities would lead to direct landscape impacts. Construction would also introduce additional movement and activity into the landscape with haul vehicles and construction personnel. Impacts would result in a partial alteration to the landscape that would be localised, temporary and reversible for the duration of the works.		Low	Minor adverse (not significant)
***Wern CSEC*:** Based upon the distance and size of the construction works, there would be no change to the aesthetic and perceptual aspects of the landscape receptor.		None	Neutral

Descriptor		
Minffordd CSEC and THH: There would be a very limited loss or change to landscape elements within this SCA due in part to the existing works site for the EVIP works. The construction work would lead to a very slight alteration to tranquillity from construction activity including storage of materials, tall machinery and movement of plant. This would result in a slight alteration to the character which would be limited in extent due to the relative containment provided by landform, tall hedgerows and woodland. The proposed works would have some similar characteristics to the EVIP works. The duration of works would be short term and reversible and of a localised scale with a slight alteration in landscape characteristics.	Low	Minor adverse (not significant)
Operation Year 1 (winter):		
Wern CSEC**:** As construction.	None	Neutral
Minffordd CSEC and THH: The proposed works would locally extend the influence of electrical infrastructure related development within the landscape through the addition of the operational CSEC. This would lead to a very slight deterioration to the existing landscape resource.	Very low	Negligible adverse (not significant)
Operation Year 15 (summer):		
Wern CSEC**:** As construction.	None	Neutral
Minffordd CSEC and THH: As operation year 1.	Very low	Negligible adverse (not significant)

Table 1-4: SCA 19 Criccieth to Mochhras

Descriptor			
Baseline Description	The proposed works are in a small proportion of the northern section of the SCA and would be in the setting and views out from the summit of Moel-y-Gest which is at the inland boundary of this SCA. The landscape of the SCA is predominantly coastal with a sweeping shallow bay before inland elements including farmland, woodland, and coastal heath at Moel-y-Gest offering expansive seaward views across the seascape. Landform for much of the SCA frames an intimate coastal landscape and it is only from elevated perspectives that inland views to the Eryri National Park are available. The coastal settlements of Criccieth and Morfa Bychan provide a strong perceptual influence on the inland interface of the SCA. Recreational access in the SCA is good particularly along the coast and on the open land at Moel-y-Gest. The long expansive beaches offer some tranquillity and wildness, but this is more seasonal due to tourism. The foothills and summits at Moel-y-Gest offer tranquillity and remoteness but are heavily influenced by the urban influences of the inland valley floor when viewed from above.		
Value:	Whilst the SCA is not in the Eryri National Park, it contributes to its setting and is assessed as having a high value.		
Susceptibility:	Whilst the SCA is predominantly rural and coastal in character, there are also large areas of urban influence and infrastructure present making the landscape tolerate of a small to medium degree of change and is assessed to have a medium susceptibility.		
Sensitivity:	Medium		
Description of change		**Magnitude of Effect**	**Significance of Effect**
Construction:			
***Glaslyn Cables*:** There would be no loss or change to landscape elements in this SCA as the main construction works are not within it. The presence of construction activity including, vegetation clearance, excavation and soil disturbance from HDD and open trenching, storage of materials, tall machinery, temporary scaffolding structures and site facilities would result in in-direct impacts to the SCA, resulting in a small loss of tranquillity and scenic quality that would be of very limited geographical extent. Construction would be localised, temporary and reversible.		Low	Minor adverse (not significant)

Descriptor		
***Wern CSEC*:** There would be no loss or change to landscape elements within this LCA as the proposed works are not proposed in it. Based upon the distance and size of the proposed works, there would be a very slight alteration to the aesthetic and perceptual aspects of the landscape receptor.	Very low	Negligible adverse (not significant)
Minffordd CSEC and THH: No impact as a result of distance	None	Neutral
Operation Year 1 (winter):		
***Wern CSEC*:** Based upon the distance and size of the proposed works in an extremely large panorama, there would be no change to the aesthetic and perceptual aspects of the landscape receptor.	Very low	Negligible adverse (not significant)
Minffordd CSEC and THH: No impact as a result of distance	None	Neutral
Operation Year 15 (summer):		
***Wern CSEC*:** As operation Year 1.	Very low	Negligible adverse (not significant)
Minffordd CSEC and THH: As operation Year 1.	None	Neutral

Table 1-5: LCA 04 Moel Hebog Uplands

Descriptor			
Baseline Description	The proposed works are outside and to the south of this LCA. This LCA is on the westerly mountains of the Eryri National Park, bound by the A4085 to the east and the A487 to the west. The steep upland landform is rugged with intervening U-shaped valleys. Landcover is predominantly large areas of rough grazing land to the higher areas and smaller scale grass pasture fields on lower ground. Settlement and infrastructure are extremely limited due to the terrain, and where present are on the lower valley areas, creating a perception of remoteness. Recreational footpaths are limited although the area is open access land. Views in and out offer scenic quality. The views out are expansive looking across the plateau toward the Llyn Peninsula and coast and will include detracting elements of urban infrastructure.		
Value:	This is a designated landscape at the western edge of the Eryri National Park. Considering the setting, landscape elements, recreational access, expansive scenic quality and perception of tranquillity and remoteness, it is assessed as having a very high value.		
Susceptibility:	This is a rural landscape. The elevated views out from this LCA are expansive and electrical infrastructure, highways and urban elements are present in views. The perceptual setting is tolerant of a degree of change and is assessed to have a medium susceptibility.		
Sensitivity:	High		
Description of change		**Magnitude of Impact**	**Significance of Effect**
Construction:			
***Glaslyn Cables*:** There would be no direct loss or change to landscape elements in this LCA as the proposed works are not proposed in it. The elevated terrain of this LCA potentially increases the geographical extent, however the large size of the LCA, its intervening mountainous landform and the proposed size and scale of construction operations would result in highly localised indirect impacts to the foothills to the southernmost area of Craig-y-Gesail to Mynydd Gorllwyn. Effects will be short term, temporary and reversible. Based on the distance and expansive panorama containing other urban elements, the construction work would lead to a slight alteration to the perceptual qualities of tranquillity.		Low	Minor adverse (not significant)

Descriptor		
***Wern CSEC*:** There would be no direct loss or change to landscape elements in this LCA as the construction works are not proposed in it. Based on the distance and size of construction works located within an extremely large panorama, there would be a very slight alteration to the aesthetic and perceptual aspects of the landscape receptor.	Very low	Negligible adverse (not significant)
***Minffordd CSEC and THH*:** No impact as a result of distance	None	Neutral
Operation Year 1 (winter):		
***Wern CSEC*:** As construction.	Very low	Negligible adverse (not significant)
Minffordd CSEC and THH: No impact as a result of distance	None	Neutral
Operation Year 15 (summer):		
***Wern CSEC*:** As operation Year 1.	Very low	Negligible adverse (not significant)
Minffordd CSEC and THH: As operation Year 1.	None	Neutral

Bibliography

Ref 1.1 – Eryri (Snowdonia) National Park (2014). *Supplementary Planning Guidance: Landscapes and Seascapes of Eryri July 2014.* Available at: https://snowdonia.gov.wales/wp-content/uploads/2022/03/Supplementary-Planning-Guidance-7-%E2%80%93-Landscape-and-Seascapes-of-Eryri.pdf. Accessed October 2024.

4.4.B Glaslyn Cables Works - Visual Amenity Assessment Tables

nationalgrid

1. Visual Amenity Assessment Tables

1.1.1 This Appendix provides details of the predicted impacts on visual amenity receptors, focused on the identified representative viewpoints within the Glaslyn Cables Works Study Area. The following tables should be read in conjunction with the Environmental Statement (ES) **Volume 4: Glaslyn Cables, Chapter 4 Landscape and Visual Amenity** and supporting figures.

1.1.2 The proposed Glaslyn Cables works at Operation are scoped out of the assessment as summarised in the ES **Volume 4: Glaslyn Cables, Chapter 4 Landscape and Visual Amenity**.

Table 1-1: Viewpoint 1: PRoW Dolbenmaen No 107, Ty' n-y-berllan

Descriptor					
Grid Reference	254574 340481	**Approximate elevation**	23 m AOD	**Receptor type**	Residential, recreational
Baseline Description	An open, rural view across the broad, flat valley floor from the foothills near Penmorfa typical of those using the PRoW and local residents. From a slightly elevated viewpoint, the terrain immediately falls down from fore to middle ground. Individual trees and blocks of woodland in the foreground partially filter the view beyond. Medium sized fields bound by hedgerows with individual hedgerow trees stretch across the flat valley basin in the middle ground. The middle ground is framed by the rising foothills of Moel-y-Gest to the south and the Eryri National Park to the north. In the distance, the settlements of Porthmadog and Tremadog are set amongst a wooded horizon. The rising hills and mountains of Eryri National Park can be seen in the far distance during periods of good visibility. A line of receding wooden telegraph poles are the only detracting element in an otherwise rural view.				
Value:	Views are typical of the area within the setting of the Eryri National Park. They are generally pleasing and well composed with a few detracting elements in the background and therefore the value of the view is assessed to be high.				
Susceptibility:	Views from residential properties are generally considered to be of primary importance resulting in high susceptibility. Views for receptors who are engaged in outdoor recreation, including use of public rights of				

Descriptor			
	way, whose attention or interest is likely to be focused on the landscape and on particular views resulting in high susceptibility.		
Sensitivity:	High		
Magnitude and Significance of Effect			
Description of change		**Magnitude of Effect**	**Significance of Effect**
Construction:			
***Glaslyn Cables*:** Construction activity along parts of the Glaslyn cables route would be visible occupying part of the midground of the view. Views of construction activity would include excavation of soil, tall plant including HDD machinery and temporary structures, and the presence of temporary storage compounds and works buildings. Construction is assessed to result in a low impact, over a medium geographical extent, low number of viewers, short-term and reversible.		Low	Minor adverse (not significant)
***Wern CSEC*:** Construction activities would only be intermittently visible as a small-scale addition within a largely unchanged panorama. Visibility of construction activity would be limited to tall plant above the tree line and only for the duration of the construction phase. Views would be more apparent during winter when vegetation is not in leaf, but the proposed works would remain barely perceptible and heavily screened by the woodland belts along the road. Construction is assessed to result in a very low impact, over a medium geographical extent, very low number of viewers, short-term and reversible.		Very low	Minor adverse (not significant)
Minffordd CSEC and THH: The proposed works would not be discernible from this receptor.		None	Neutral
Operation Year 1 (winter):			
***Wern CSEC*:** The operational CSEC would be barely visible within the wider view. As with construction, views would be more apparent during winter, but the structures associated with the CSEC would be barely perceptible resulting in a very low impact, over a medium geographical extent, low number of viewers and long-term.		Very low	Negligible adverse (not significant)
Minffordd CSEC and THH: As Construction		None	Neutral

Descriptor		
Operation Year 15 (summer):		
***Wern CSEC*:** As operation Year 1.	Very low	Negligible adverse (not significant)
***Minffordd CSEC and THH*:** As construction.	None	Neutral

Table 1-2: Viewpoint 2: Garth Road, Porthmadog.

Descriptor					
Grid Reference	256842 338275	**Approximate elevation**	16 m AOD	**Receptor type**	Residential
Baseline Description	An elevated viewpoint looking across the urban maritime edge of Porthmadog to the rural flat valley floor of the Glaslyn estuary in the middle ground with the hills of the Eryri National Park rising up in the distance. Residential dwellings are largely oriented to provide views across the estuary. The Ffestiniog Railway line is visible heading east along the Cob. Beyond this, the terrain is flat and open, encompassing grazing marsh with limited vegetation to the east, and small-scale fields with hedgerows to the north. Into the distance, hedgerows and tree blocks form a wooded horizon with Garth quarry as a noticeable element.				
Value:	Elevated view that is pleasing and well composed within the setting of the Eryri National Park with limited detracting elements and therefore the value of the view is assessed to be high.				
Susceptibility:	Views from residential properties are generally considered to be of primary importance resulting in high susceptibility.				
Sensitivity:	High				
Magnitude and Significance of Effect					
Description of change				**Magnitude of Effect**	**Significance of Effect**
Construction:					
Glaslyn Cables: Construction activity along parts of the central and eastern end of the Glaslyn cables route would be visible from a distance occupying part of the mid to background of the view. Views to the western end would not be visible due to intervening landform and vegetation. The main focus of visible construction activity would be excavation of soil, tall plant including HDD machinery and temporary structures, and the presence of temporary storage compounds and works buildings. Construction is assessed to result in a low impact, over a medium geographical extent, low number of viewers, short-term and reversible.				Low	Minor adverse (not significant)

Descriptor		
***Wern CSEC*:** The proposed works would not be discernible from this receptor.	None	Neutral
Minffordd CSEC and THH: Construction activities would only be visible as a small-scale addition within a largely unchanged panorama due in part to the EVIP works. Visibility of construction activity would be barely perceptible and limited as a result of intervening vegetation and viewed at a long distance. Construction is assessed to result in a very low impact, over a medium geographical extent, low number of viewers, short-term and reversible.	Very low	Minor adverse (not significant)
Operation Year 1 (winter):		
Wern CSEC: The proposed works would not be discernible from this receptor.	None	Neutral
Minffordd CSEC and THH: The operation CSEC would be barely discernible and viewed at a long distance as part of a wider panoramic view resulting in a very low impact, over a medium geographical extent, low number of viewers and long-term.	Very low	Minor adverse (not significant)
Operation Year 15 (summer):		
Wern CSEC: As operation Year 1.	None	Neutral
Minffordd CSEC and THH: As operation Year 1.	Very low	Minor adverse (not significant)

Table 1-3: Viewpoint 3 PRoW Porthmadog No 31, Moel-y-Gest.

Descriptor					
Grid Reference	255871 338760	**Approximate elevation**	129 m AOD	**Receptor type**	Recreational
Baseline Description	An elevated view from the footslopes on the eastern edge of Moel-y-Gest representative of those using the PRoW and common land around Moel-y-Gest. The settlements of Porthmadog and Tremadog dominate the foreground from this elevated perspective with a mixture of residential dwellings and commercial properties in the view. Highway infrastructure across the middle ground defines the settlement edge. Beyond this, the terrain is flat and open, encompassing grazing marsh with limited vegetation to the east, and small-scale fields with hedgerows to the north. Larger blocks of woodland are present to the north around the footslopes. Garth quarry is a noticeable element just above the wooded horizon. The hills and mountains of the Eryri National Park rise up in the distance with expansive views across the range of summits during periods of good visibility.				
Value:	Elevated view that is pleasing and well composed within the setting of the Eryri National Park with limited detracting elements with a few detracting elements and therefore the value of the view is assessed to be high.				
Susceptibility:	Views for receptors who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focused on the landscape and on particular views resulting in high susceptibility.				
Sensitivity:	High				
Magnitude and Significance of Effect					
Description of change				**Magnitude of Effect**	**Significance of Effect**
Construction:					
Glaslyn Cables: Construction activity along parts of the eastern end and central section of the Glaslyn cables route would be visible from above and from a distance occupying part of the middle ground view. Views to the western end would not be visible due to intervening landform and vegetation. The main focus of visible construction activity would be excavation of soil, tall				Low	Minor adverse (not significant)

Descriptor		
plant including HDD machinery and temporary structures, and the presence of temporary storage compounds and works buildings. The movement of construction workers might add to the perception of development in the vicinity. The works would be highly localised and temporary. Construction is assessed to result in a low impact, over a small geographical extent, low number of viewers, short-term and reversible.		
Wern CSEC: The proposed works would not be discernible from this receptor.	None	Neutral
Minffordd CSEC and THH: Construction activities would only be intermittently visible as a small-scale addition within a largely unchanged panorama due in part to the EVIP works. Visibility of construction would be limited to tall plant but would be set against the mountainous background and only for the duration of the construction phase, which in this context would be short and reversible. Views of the proposed works would remain a barely perceptible change in the panorama. Construction is assessed to result in a very low impact, over a medium geographical extent, low number of viewers, short-term and reversible.	Very low	Minor adverse (not significant)
Operation Year 1 (winter):		
Wern CSEC: The proposed works would not be discernible from this receptor.	None	Neutral
Minffordd CSEC and THH: The operational CSEC would not be discernible from this receptor resulting in no impact.	None	Neutral
Operation Year 15 (summer):		
Wern CSEC: As operation Year 1.	None	Neutral
Minffordd CSEC and THH: As operation Year 1.	None	Neutral

Table 1-4: Viewpoint 4: Moel-y-Gest Trig point.

Descriptor					
Grid Reference	255537 338856	**Approximate elevation**	262 m AOD	**Receptor type**	Recreational
Baseline Description	An elevated view from the summit Trig point of Moel-y-Gest representative of those using the PRoW and common land around Moel-y-Gest. The terrain falls down from the scarp edge in the immediate foreground. The valley floor dominates the middle ground. The view is largely rural to the west with only a small number of scattered farms and individual properties surrounded by woodland blocks. This includes the existing Wern CSEC and the overhead line pylons heading westward. Small fields divided by hedgerows with occasional hedgerow trees dominate the central middle ground with the settlement of Penmorfa set withing the wooded backdrop around the hill footslopes. The settlement edge of Tremadog along with the Ysbyty Alltwen Hospital building are an urban element to the east of the middle ground. Beyond this, large woodland blocks form a wooded horizon before the terrain rises up steeply to the lower hills and mountains of the Eryri National Park.				
Value:	Elevated views across the settlement edge and are not specifically recognised (albeit within the setting of the Eryri National Park). View is pleasing and well composed with a few detracting elements and therefore the value of the view is assessed to be high.				
Susceptibility:	Views for receptors who are engaged in outdoor recreation, including use of PRoW, whose attention or interest is likely to be focused on the landscape and on particular views are considered to be of high importance indicating a very high susceptibility.				
Sensitivity:	High				
Magnitude and Significance of Effect					
Description of change				**Magnitude of Effect**	**Significance of Effect**
Construction:					
Glaslyn Cables: Construction activity along parts of the western end and central section of the Glaslyn cables route would be visible from above and from a distance occupying part of the middle ground view. Views to the eastern end would not be visible due to intervening landform				Low	Minor adverse (not significant)

Descriptor		
and vegetation. The main focus of visible construction activity would be excavation of soil, tall plant including HDD machinery and temporary structures, and the presence of temporary storage compounds and works buildings. Construction is assessed to result in a low impact, over a medium geographical extent, low number of viewers, short-term and reversible.		
***Wern CSEC*:** Visibility of construction activity would be barely perceptible and limited as a result of intervening vegetation and viewed at a long distance. Construction is assessed to result in a very low impact, over a medium geographical extent, low number of viewers, short-term and reversible.	Very low	Minor adverse (not significant)
Minffordd CSEC and THH: The proposed works would not be discernible from this receptor.	None	Neutral
Operation Year 1 (winter):		
Wern CSEC: The operation CSEC would be barely discernible and viewed at a long distance as part of a wider panoramic view resulting in a very low impact, over a medium geographical extent, low number of viewers and long-term.	Very low	Minor adverse (not significant)
Minffordd CSEC and THH: The proposed works would not be discernible from this receptor.	None	Neutral
Operation Year 15 (summer):		
Wern CSEC: As operation Year 1.	Very low	Minor adverse (not significant)
Minffordd CSEC and THH: As operation Year 1.	None	Neutral

Table 1-5: Viewpoint 5: PRoW Porthmadog No 6.

Descriptor					
Grid Reference	255974 340036	**Approximate elevation**	3 m AOD	**Receptor type**	Residential; recreational
Baseline Description	An ordinary (albeit within the setting of the Eryri National Park) enclosed rural view across the valley floor set against the rising Moel-y-Gest mountain in the background. Hedgerows and a small woodland block enclose the field foreshortening the view and screening the middle distance beyond. The footslopes of Moel-y-Gest rise up in the background of the view. There are no detracting elements present in this typical rural view.				
Value:	Views from these receptors are typical of the area (albeit within the setting of the Eryri National Park) and not specifically recognised. They are generally pleasing and well composed with the setting of the Eryri National Park Moel-y-Gest in the background. View is well composed but common place with a few detracting elements and therefore the value of the view is assessed to be medium.				
Susceptibility:	Views from residential properties are generally considered to be of primary importance resulting in high susceptibility. Views for receptors who are engaged in outdoor recreation, including use of PRoWs, whose attention or interest is likely to be focused on the landscape and on particular views resulting in high susceptibility.				
Sensitivity:	High				
Magnitude and Significance of Effect					
Description of change				**Magnitude of Effect**	**Significance of Effect**
Construction:					
Glaslyn Cables: Construction activities would only be intermittently visible as a small-scale addition within a largely unchanged panorama. Visibility of construction would be limited to tall plant in the background above the tree line and only for the duration of the construction phase, which in this context would be short and reversible. Views would be more apparent during winter when vegetation is not in leaf, but the proposed works would remain barely perceptible and heavily screened by the woodland belt to either side of the intervening A487 highway. Construction is assessed to result in a very low impact, over a medium geographical extent, low number of viewers, short-term and reversible.				Very low	Minor adverse (not significant)

Descriptor		
Wern CSEC: The proposed works would not be discernible from this receptor.	None	Neutral
Minffordd CSEC and THH: The proposed works would not be discernible from this receptor.	None	Neutral
Operation Year 1 (winter):		
Wern CSEC: As construction.	None	Neutral
Minffordd CSEC and THH: As construction.	None	Neutral
Operation Year 15 (summer):		
Wern CSEC: As construction.	None	Neutral
Minffordd CSEC and THH: As construction.	None	Neutral

Table 1-6: Viewpoint 6: Wales Coast Path – The Cob (western end), Porthmadog (including Ffestiniog Railway users).

Descriptor					
Grid Reference	257258 338404	**Approximate elevation**	3 m AOD	**Receptor type**	Recreational; residential, recreational places of interest
Baseline Description	This is an expansive view to the northeast across the Glaslyn estuary marshland and nature reserve. Tall intermittent hedgerow vegetation in the immediate foreground partially screens views from the Cob and Welsh Coast Path. Flat marshland with areas of ephemeral water stretches from fore to middle ground. A linear tree belt alongside the railway line and highway form a wooded horizon screening longer distance views into the valley. The terrain rises up to either side of the valley floor. Hills and mountains within the Eryri National Park rise up in the far distance with an extensive mountain range panorama visible in periods of very good visibility.				
Value:	A relatively open view dominated by the expansive marshland in the foreground and framed by the mountain ranges of the Eryri National Park in the background setting. Location of Wales Coast Path and tourist destination of the Ffestiniog railway referenced in prominent Welsh artworks (Ref 1.1). Porthmadog cob is considered by Natural Resources Wales to be a Key viewpoint – Visible setting SNP16 (2) therefore the value of the view is assessed to be very high.				
Susceptibility:	Views for receptors who are engaged in outdoor recreation, including use of public rights of way and users of the Ffestiniog Railway resulting in high susceptibility.				
Sensitivity:	High				
Magnitude and Significance of Effect					
Description of change				**Magnitude of Effect**	**Significance of Effect**
Construction:					
Glaslyn Cables: Construction activity along parts of the eastern end of the Glaslyn cables route would be visible in the central background of the view. Views to the central section and western end would not be visible due to intervening landform, buildings and vegetation. Construction activities would be barely noticeable in the view, partially mitigated by distance. Construction is				Low	Minor adverse (not significant)

Descriptor		
assessed to result in a low impact, over a medium geographical extent, low number of viewers, short-term and reversible.		
Wern CSEC: The proposed works would not be discernible from this receptor.	None	Neutral
Minffordd CSEC and THH: The proposed works would not be discernible from this receptor.	None	Neutral
Operation Year 1 (winter):		
Wern CSEC: As construction.	None	Neutral
Minffordd CSEC and THH: As construction.	None	Neutral
Operation Year 15 (summer):		
Wern CSEC: As construction.	None	Neutral
Minffordd CSEC and THH: As construction.	None	Neutral

Table 1-7: Viewpoint 7: Eastbound layby on Porthmadog bypass and sports playing fields.

Descriptor					
Grid Reference	257912 339191	**Approximate elevation**	2 m AOD	**Receptor type**	Recreational, transport
Baseline Description	A typical peri-urban view looking north from the Porthmadog bypass. An open view across the flat valley floor comprising fields bound by low hedgerows with occasional hedgerow trees. Sports equipment including rugby and football posts are present across the middle ground of the view. Floodlights and a line of wooden telegraph poles are detracting elements. The terrain rises up steeply with the rocky footslopes of the Cambrian mountains partially foreshortening views of longer distance hill and mountain summits within the Eryri National Park.				
Value:	Foreground views from these receptors are typical of the area (albeit within the setting of the Eryri National Park). They are generally pleasing and well composed rural scenes. The background of the view comprises the gateway setting of the Eryri National Park. There are a few detracting elements in the background, however the Porthmadog bypass layby is considered by Natural Resources Wales to be a Key viewpoint – Visible setting SNP35 (Ref 1.2) and therefore the value of the view is considered to be very high.				
Susceptibility:	Road users and those involved in active team sports are typically not focussed on appreciation of the view resulting in low susceptibility.				
Sensitivity:	Medium				
Magnitude and Significance of Effect					
Description of change				**Magnitude of Effect**	**Significance of Effect**
Construction:					
Glaslyn Cables: Construction activity along the central section of the Glaslyn cables route would be visible in the fore and middle ground of the view. Views to the eastern and western end would not be visible due to intervening landform, buildings and vegetation. Construction would be visible across the majority of the view, partially mitigated by the temporary and short-term nature of the proposed works but forming an incongruous element. Construction is assessed to result in a				Medium	Minor adverse (not significant)

Descriptor		
medium impact, over a medium geographical extent, low number of viewers, short-term and reversible.		
Wern CSEC: The proposed works would not be discernible from this receptor.	None	Neutral
Minffordd CSEC and THH: The proposed works would not be discernible from this receptor.	None	Neutral
Operation Year 1 (winter):		
Wern CSEC: As construction	None	Neutral
Minffordd CSEC and THH: As construction	None	Neutral
Operation Year 15 (summer):		
Wern CSEC: As construction	None	Neutral
Minffordd CSEC and THH: As construction	None	Neutral

Table 1-8: Viewpoint 8: PRoW Porthmadog No 11 and Welsh Highland Heritage Railway.

Descriptor					
Grid Reference	257859 339887	**Approximate elevation**	2 m AOD	**Receptor type**	Recreational, Recreational places of interest
Baseline Description	A flat rural view across the valley floor foreshortened by intervening hedgerows with longer distance views of the rising terrain of the Eryri National Park. A flat, open field stretches from the fore to middle ground. A hedgerow with occasional hedgerow trees foreshortens and partially screens views of the fields beyond. The terrain rises up in the far distance with a series of low hill and mountain summits within the Eryri National Park that are visible in periods of good visibility.				
Value:	Views from these receptors are typical of the area (albeit within the setting of the Eryri National Park) and not specifically recognised. They are generally pleasing and well composed with the setting of the Eryri National Park in the background. Sequential views along the Welsh Highland Heritage Railway route from within the study area are the gateway to the Eryri National Park from lowland urban settlements. There are few detracting elements in the background and therefore the value of the view is considered to be high.				
Susceptibility:	Views for receptors who are engaged in outdoor recreation, including use of public rights of way, are typically focussed on enjoyment of the view resulting in high susceptibility.				
Sensitivity:	High				
Magnitude and Significance of Effect					
Description of change				**Magnitude of Effect**	**Significance of Effect**
Construction: ***Glaslyn Cables:*** Construction activities would be intermittently visible as a small-scale addition within a largely unchanged panorama. Visibility of construction would be limited to tall plant in the middle ground above the intervening hedgerows and tree line and only for the duration of the construction phase, which in this context would be short and reversible. Because of the direction of view, tall plant and structures would break the skyline. Work at ground level would be barely perceptible and when visible would focus on tall plant including HDD machinery and temporary structures, and the presence of temporary storage compounds and works buildings. Views for				Low	Minor adverse (Not significant)

Descriptor		
users of the Welsh Highland Heritage Railway would be transient and viewed obliquely and would be most apparent upon approaching the urban edge of Porthmadog. These receptor views would be highly localised and temporary in nature. Views would be more apparent during winter when vegetation is not in leaf, but overall, the proposed works would remain an unobtrusive change in the composition of the view. Construction is assessed to result in a low impact, over a medium geographical extent, low number of viewers, short-term and reversible.		
Wern CSEC: The proposed works would not be discernible from this receptor.	None	Neutral
Minffordd CSEC and THH: The proposed works would not be discernible from this receptor.	None	Neutral
Operation Year 1 (winter):		
Wern CSEC: As construction.	None	Neutral
Minffordd CSEC and THH: As construction.	None	Neutral
Operation Year 15 (summer):		
Wern CSEC: As construction.	None	Neutral
Minffordd CSEC and THH: As construction.	None	Neutral

Table 1-9: Viewpoint 9: Wales Coast Path – The Cob (eastern end), Porthmadog (including Ffestiniog Railway users).

Descriptor					
Grid Reference	258379 337889	**Approximate elevation**	2 m AOD	**Receptor type**	Recreational, Recreational places of interest
Baseline Description	This is an expansive view to the north across the Glaslyn estuary marshland and nature reserve. Tall intermittent hedgerow vegetation in the immediate foreground partially screens views from the Cob and Welsh Coast Path. Flat marshland with areas of ephemeral water stretches from fore to middle ground. A linear tree belt alongside the railway line and highway form a wooded horizon screening longer distance views into the valley. The terrain rises up to either side of the valley floor. Hills and mountains within the Eryri National Park rise up in the far distance with an extensive mountain range panorama visible in periods of very good visibility.				
Value:	A relatively open view dominated by the expansive marshland in the foreground and framed by the mountain ranges of the Eryri National Park in the background setting and therefore the value of the view is assessed to be high.				
Susceptibility:	Views for receptors who are engaged in outdoor recreation, including use of public rights of way, are typically focussed on enjoyment of the view resulting in high susceptibility.				
Sensitivity:	High				
Magnitude and Significance of Effect					
Description of change				**Magnitude of Effect**	**Significance of Effect**
Construction:					
Glaslyn Cables: Construction activity along parts of the eastern end of the Glaslyn cables route would be barely perceptible in the central background of the view. Views to the central section and western end would not be visible due to intervening landform, buildings and vegetation. Construction activities would be noticeable in the view, partially mitigated by distance. Construction is assessed to result in a very low impact, over a medium geographical extent, low number of viewers, short-term and reversible.				Very low	Minor adverse (not significant)

Descriptor		
Wern CSEC: The proposed works would not be discernible from this receptor.	None	Neutral
Minffordd CSEC and THH: Construction activities would only be intermittently visible as a small-scale addition within a largely unchanged panorama due in part to the EVIP works. Visibility of construction would be limited to tall plant but would be set against the mountainous background and only for the duration of the construction phase, which in this context would be short and reversible. Views of the proposed works would remain a barely perceptible change in the panorama. Construction is assessed to result in a very low impact, over a medium geographical extent, low number of viewers, short-term and reversible.	Very low	Minor adverse (not significant)
Operation Year 1 (winter):		
Wern CSEC: As construction.	None	Neutral
Minffordd CSEC and THH: The operational CSEC would not be discernible from this receptor resulting in no impact.	None	Neutral
Operation Year 15 (summer):		
Wern CSEC: As construction.	None	Neutral
Minffordd CSEC and THH: As Operation Year 1.	None	Neutral

Table 1-10: Viewpoint 10: Sustrans Route 8, Tan-y-Glannau, Minffordd.

Descriptor					
Grid Reference	259211 338539	**Approximate elevation**	2 m AOD	**Receptor type**	Residential, recreational
Baseline Description	An open rural view across the valley floor set against the rising hill and mountain summits of the Eryri National Park. Open rural fields stretch from the fore to middle ground. Low metal stock fencing and wooden posts divide the fields in the foreground from the wider areas of marshland. A large block of woodland forms a wooded horizon with the settlement of Porthmadog set amongst it to the southwest. Beyond this the terrain rises up in the far distance with a scarp slope and a series of low hill and mountain summits including Moel-y-Gest within the Eryri National Park that are visible in periods of good visibility. The overhead line pylons originating from the Wern CSEC break the skyline in far distance and are perceptible in periods of exceptional visibility. The ongoing EVIP works site is a prominent detracting element in local views.				
Value:	Views from these receptors are typical of the area (albeit within the setting of the Eryri National Park) and not specifically recognised. They are generally pleasing and well composed with the setting of the Eryri National Park in the background. There are a few detracting elements in the fore and background including the ongoing EVIP works site, the quarry at Garth and the settlement of Porthmadog, and therefore the value of the view is considered to be medium.				
Susceptibility:	Views from residential properties are generally considered to be of primary importance resulting in high susceptibility. Views for receptors who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focused on the landscape and on particular views resulting in high susceptibility.				
Sensitivity:	High				
Magnitude and Significance of Effect					
Description of change				**Magnitude of Effect**	**Significance of Effect**
Construction:					

Descriptor		
Glaslyn Cables: Construction activity along the eastern end of the Glaslyn cables route would be visible in the fore and middle ground of the view. Views to the central section and western end would not be visible due to intervening landform, buildings and vegetation. Construction would be noticeable within the view, partially mitigated by the temporary and short-term nature of the proposed works, and also the existing works for EVIP, forming an incongruous element. The works would be highly localised and temporary. Construction is assessed to result in a medium impact, over a small geographical extent, low number of viewers, short-term and reversible.	Medium	Moderate adverse (significant)
Wern CSEC: The proposed works would not be discernible from this receptor.	None	Neutral
Minffordd CSEC and THH: Construction activities would be visible as a small-scale addition within a largely unchanged panorama that contains the existing EVIP site. Visibility of construction activity would be visible in the foreground to the right of the view. Construction is assessed to result in a very low impact, over a medium geographical extent, low number of viewers, short-term and reversible.	Very low	Minor adverse (not significant)
Operation Year 1 (winter):		
Wern CSEC: As construction	None	Neutral
Minffordd CSEC and THH: The operational CSEC and tunnel head house would be visible as a small-scale addition to the wider view. The structures would be visible to the right of the view resulting in a very low impact, over a small geographical extent, low number of viewers and long-term.	Very low	Minor adverse (not significant)
Operation Year 15 (summer):		
Wern CSEC: As construction	None	Neutral
Minffordd CSEC and THH: As operation year 1.	Very low	Minor adverse (not significant)

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4.4.C Glaslyn Cables Outline Landscape and Ecological Management Plan

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Executive Summary

i. The purpose of this Outline Landscape and Ecological Management Plan (LEMP) is to provide a framework for delivering the landscape and ecological mitigation strategy and the successful establishment and future management of the proposed landscape and ecology works associated with the proposed works for the Glaslyn Cables site.

ii. It sets out the short and long-term measures and practices that will be implemented by National Grid to establish, monitor and manage landscape and ecology mitigation and enhancement measures. It also provides a mechanism for the delivery of landscape and ecological measures to avoid, reduce or compensate for any potential environmental effects identified in the Environmental Statement.

iii. It should be noted that as this is an outline document, which will be fully developed as the proposed works progresses into detailed design and prior to the commencement of works. National Grid will maintain a regular dialogue with statutory bodies and relevant stakeholders during this period.

1. Introduction

1.1 Overview

1.1.1 National Grid Electricity Transmission (plc) (NGET) are seeking powers to construct, operate and maintain the Pentir to Trawsfynydd Reinforcement Project (the 'Project'). Planning applications are being made both in terms of the Town and Country Planning Act 1990 (as amended) ('TCPA') (Ref 1.1), and Section 37 of the Electricity Act 1989 ('the Electricity Act') (Ref 1.2).

1.1.2 NGET owns, builds and maintains the electricity transmission network in England and Wales. Under the Electricity Act 1989, NGET holds a transmission license under which it is required to develop and maintain an efficient, coordinated, and economic electricity transmission system.

1.1.3 This would be achieved by reinforcing the overhead lines, cables and substations on the existing circuits between Pentir and Trawsfynydd.

1.1.4 NGET is also required, under Section 38 of the Electricity Act, to comply with the provisions of Schedule 9 of the Electricity Act. Schedule 9 requires licence holders, in the formulation of proposals to transmit electricity, to:

> *Schedule 9(1)(a) '…have regard to the desirability of preserving natural beauty, of conserving flora, fauna and geological or physiographical features of special interest and of protecting sites, buildings and objects of architectural, historic or archaeological interest;' and*
>
> *Schedule 9(1)(b) '…do what [it] reasonably can to mitigate any effect which the proposals would have on the natural beauty of the countryside or on any such flora, fauna, features, sites, buildings or objects'.*

1.2 Glaslyn Cables Works

1.2.1 The Glaslyn works include the installation of replacement 400 kilovolts (kV) cables, the Minffordd cable sealing end compound (CSEC) and Tunnel Head House (THH), and the extension of the Wern CSEC, as well as the decommissioning of the existing 132 kV and 400 kV cable circuits including the Garth CSEC.

1.2.2 The Glaslyn works site covers an area approximately 106.4 hectares (ha). The land within the Glaslyn works site comprises access roads, turning areas, construction compounds and laydown areas required for the construction and operation of the works.

1.2.3 The proposed works are described in more detail in the Environmental Statement (ES) **Volume 4, Chapter 2 Glaslyn Cable Works**.

1.3 Purpose of the Outline Landscape and Ecological Management Plan

1.3.1 This Outline Landscape and Ecological Management Plan (LEMP) focuses on works at Glaslyn . It forms part of an application for consents to construct, operate and maintain the Project with all applications supported by an Environmental Statement (ES). These consents include planning permission under the Town and Country Planning Act, and consent under the provisions of Section 37 of the Electricity Act. This document provides a framework for delivering the landscape and ecological mitigation strategy and the successful establishment and future management of proposed landscape and ecology works associated with the Project. It sets out the short and long-term measures and practices that will be implemented by NGET to establish, monitor, and manage landscape and ecology mitigation and enhancement measures. It also provides a mechanism for the delivery of landscape and ecological measures to avoid, reduce or compensate for environmental effects identified in the ES.

1.3.2 This LEMP will be updated by NGET into a full LEMP.

1.3.3 This document outlines the establishment, management and monitoring of habitats and landscape features that are referenced in the ES, **Volume 4, Chapter 4: Landscape and Visual Amenity** and **Volume 4, Chapter 5: Ecology and Nature Conservation**. **Volume 8, Appendix 4.5.K: Arboricultural Impact Assessment** also provides further information.

1.4 Structure of the LEMP

1.4.1 The structure of the LEMP is set out in **Table 3-1** below. The outline contents of the LEMP has been discussed with the relevant planning authorities and stakeholders.

Table 1-1 Structure of the LEMP

Chapter	Content
Chapter 1: Introduction	This chapter sets out the purpose of the LEMP and how it is structured. It references relevant application documents which accompany the LEMP. It also describes the features of the proposed works.
Chapter 2: Landscape and Ecology Baseline	This chapter sets out the baseline landscape and ecology features which have informed the mitigation commitments. It also makes reference to any existing features that will be protected as part of the proposed works.
Chapter 3: Construction Mitigation	This chapter sets out the pre-construction ecological monitoring required and specific

	ecological mitigation requirements and associated licensing requirements.
Chapter 4: Landscape and Ecological Reinstatement	This chapter sets out the reinstatement required following construction.
Chapter 5: Long-term Landscape and Ecological Proposals	This chapter sets out the proposed outline landscape and ecological interventions, their functions and rationale. It also identifies species mixes and the phasing of the landscape proposals.
Chapter 6: Maintenance and Management Aims, Prescriptions and Objectives	This chapter sets out the maintenance and management prescriptions of the various ecological and landscape interventions. It also identifies the management periods.
Chapter 7: Monitoring	This chapter outlines the monitoring requirements pre and post construction and the requirement for adaptive management.

1.5 Objectives of the LEMP

1.5.1 The overarching objectives of the LEMP are to:

- integrate the proposed works into its landscape setting and avoid or minimise adverse landscape, biodiversity, heritage and visual effects as far as practicable;
- promote the conservation, protection and improvement of the physical, natural and historic environment within the proposed works and its setting;
- diversify ecological value of existing habitats, for example through restoration and enhancement of riparian ditches and creation of diverse habitats; and
- guide the design and management of landscape and biodiversity components that respond to and enhance the character of the landscape, local distinctiveness and sense of place.

1.6 Responsibilities

1.6.1 NGET will establish the appropriate roles and responsibilities for site staff as set out in Outline Construction Environmental Management Plan. An Environmental Clerk of Works (EnvCoW) will be responsible for ensuring construction environmental mitigation measures are correctly implemented, monitored and maintained. In addition, an Ecological Clerk of Works (ECoW) will be appointed. The scope of the ECoW will be advised by the ecologist and landscape architect based on relevant environmental commitments, the findings of the pre-commencement walkovers, protected species licensing requirements and with reference to the relevant proposed works programmes.

1.6.2 Relevant site staff would receive toolbox talks (summary training by environmental and ecology staff on site on specific issues over which they need to be aware) as necessary from the ECoW on the relevant ecological risks present, legal requirements, and the working requirements necessary to comply with legislation, and the final approved landscape and biodiversity management and enhancement measures. Toolbox talks would be repeated as necessary over the duration of the works.

1.6.3 The contractor appointed by NGET to construct the proposed works will be responsible for establishing, managing and monitoring the implementation and establishment of landscape and ecological mitigation within the establishment aftercare period. NGET will inspect and report on the success of establishment during this period.

1.6.4 All long-term monitoring and management requirements are specified in this document and will be carried out by NGET and/or a contractor appointed by NGET.

2. Landscape and Ecology Baseline

2.1 Landscape Designations Overview

2.1.1 The Glaslyn works site is not covered by any statutory landscape designations. The boundary to the Eryri National Park, however, is approximately 300 metres (m) east of the Glaslyn works site at its closest point. The Eryri National Park covers 823 square miles with 1,497 miles of routes to explore and is Wales' largest National Park.

2.1.2 There are non-statutory landscape designations covering the Glaslyn works site and Study Area. These include Special Landscape Areas (SLA), Historic Landscapes, and Registered Historic Parks and Gardens. These are detailed in ES **Volume 4, Chapter 4 Landscape and Visual Amenity**.

2.2 Landscape Baseline

2.2.1 The following is a summary of the Landscape baseline, which is provided in detail in **ES Volume 4, Chapter 4: Landscape and Visual Amenity**. A 3 kilometres (km) radius of the Glaslyn works site was deemed appropriate for assessment (hereafter referred to as 'the Study Area').

2.2.2 The landform of the Study Area varies from a low-lying estuary hinterland at approximately 0 – 10 m above ordnance datum (AOD) to the contrasting steeply rising uplands of the Llŷn peninsula, and the mountains of Snowdonia, which reach approximately 1,085 m AOD.

2.2.3 The landform of the Glaslyn works site is largely flat and low-lying with the two CSECs lying at either end and the route corridor passing through the broad, flat valley floor of the Glaslyn Estuary at approximately 0 – 10 m AOD.

2.2.4 The Glaslyn estuary is a dominant and dynamic hydrological feature within the Study Area.

2.2.5 Settlement within the Study Area comprises the town of Porthmadog and villages generally in lower lying areas and villages and caravan sites along the coast. On higher land, settlements are limited to scattered farms and individual properties.

2.2.6 The Glaslyn works site is between the settlements of Penmorfa in the west and Minffordd in the east. The Wern CSEC is south-west of isolated dwellings and to the south of Penmorfa. The route corridor passes to the south of the larger settlements of Tremadog, and to the north of Porthmadog. The Minffordd CSEC site is north-west of Minffordd and to the west of Penrhyndeudraeth. The Garth CSEC is west of Penrhyndeudraeth and to the south of the A487.

2.2.7 The landscape of the Glaslyn works site is largely rural comprising a mixture of open grazing marsh and contained wetland pasture in small rectilinear field patterns divided by low hedgerows. Linear woodland belts are present on the steeply rising upland areas. This includes small woodland blocks around both existing CSECs at Wern and

Garth. On higher ground there is limited tree cover, with largely open areas of grassland and low scrub on mountain summits and ridges with boundaries marked by stone walls.

2.2.8 There are numerous public rights of way (PRoWs) in the Study Area linking settlements and providing recreational routes. The Study Area includes some common land and open access land in Eryri National Park, but none are in the Glaslyn works site.

2.2.9 There are six PRoWs in the Glaslyn works site. Porthmadog No 10 and No 11 pass through the Glaslyn works site to the north-east of Porthmadog. Porthmadog No 37 connects into Porthmadog No 10. Porthmadog No 6 and No 8 pass through the Glaslyn works site to the north-west of Porthmadog. PRoW Dolbenmaen No. 107 lies to the west of the Wern CSEC. The nearest PRoW to the existing Minffordd CSEC is Penrhyndeudraeth No 34 which is approximately 240 m to the east.

2.2.10 The Wales Coast Path passes through the southern part of the Study Area approximately 250 m from the route corridor at its closest point. National Cycle Route (NCR) Route 8 Lôn Las Cymru, NCR Route 8 runs in sections down the whole length of Wales and passes through the Glaslyn works site near Porthmadog.

2.2.11 The Glaslyn cables, proposed Minffordd CSEC, and the Wern CSEC sites lie within the National Character Area (NLCA) 05 Tremadoc Bay (Ref 2.1) and exhibit some of the key characteristics of the NLCA as set out below:

- *"a lowland coastal region of exceptional interest and scenic beauty".*
- The NLCA *"forms the land between the sea and the mountains".*
- *"Hemmed in by steeply rising uplands of both Llŷn and Snowdonia".*
- Areas of *"Lowland pastoral and hill sheep grazing"* to the west where there is a *"more extensive lowland hinterland".*
- *"The fantasy Italianate village of Portmerion"* is a significant tourist destination near Minffordd.

2.2.12 A small part of the outer extents of the Study Area lies within NLCA 06 Snowdonia (Ref 2.2). The NLCA is a *"sublime, picturesque, iconic visual and sensory landscape of great drama".* The rural upland areas include *"numerous high ridges and peaks offer wider ranging panoramas across much of north-west Wales".* Equally, the *"directly fronting open sea"* location provide *"an iconic and contrasting image".*

2.2.13 A small part of the outer extents of the Study Area lies within National Seascape Character Area (NSCA) 14 Tremadog Bay and Dwyryd Estuary (Ref 2.3). The NSCA is a *"relatively enclosed MCA with views of the Llŷn AONB (now referred to as National Landscape) to the north and the Gwynedd coastline (including the rising mountains of Snowdonia National Park) to the east".* As a *"sweeping, shallow bay with wide sandy beaches"* recreational activities and tourism are important.

2.2.14 At the Unitary authority level, the Glaslyn works site and Study Area covers the Landscape Character Area (LCA) LCA 9 Porthmadog. A smaller part of the eastern extents of the Study Area lies within LCA 10 Central Llyn. Both LCAs are defined in the Gwynedd Landscape Strategy Update 2012 (Ref 2.4).

2.2.15 Seascape Character Area (SCA) and LCA as defined in the Snowdonia National Park Supplementary Planning Guidance 7 – Landscape and Seascapes of Eryri (Ref 2.5) consider the setting of the National Park.

2.2.16 The Glaslyn cables, Wern CSEC and the majority of the Study Area is incorporated into SCA 20 Porthmadog and Glaslyn Estuary.

2.2.17 A smaller part of the Glaslyn cables, Minffordd CSEC and eastern extents of the Study Area lies within LCA 10 Morfa Harlech and SCA 21 Dwyryd Estuary and Morfa Harlech.

2.2.18 Part of the south-western extents of the Study Area is in SCA 19 Criccieth to Mochhras.

2.2.19 Part of the Study Area to the north of the Wern CSEC and area adjacent to the Glaslyn works site is in LCA 04 Moel Hebog Uplands.

2.2.20 A small part of the Study Area to the north-east of the proposed Minffordd CSEC and area adjacent to the Glaslyn works site is in LCA 08 Vale of Ffestiniog.

2.2.21 A very small part of the Study Area to the east of the proposed Minffordd CSEC and adjacent Glaslyn works site is in LCA 12 Ardudwy Coastal Hinterland.

2.2.22 No part of the Glaslyn cables, the Wern CSEC or Minffordd CSEC are in the boundary of the Eryri National Park.

2.3 Arboriculture Baseline

2.3.1 Semi-natural broadleaved woodland of medium biodiversity importance is present within the Glaslyn works site. An area of wet woodland which is present in the Glaslyn works site and is a component of the Glaslyn Site of Special Scientific Interest (SSSI).

2.3.2 810 trees are located in the Glaslyn works Study Area. Eighteen of which were identified as being significant (ancient or veteran trees) and of those, 13 are in the Glaslyn works site.

2.3.3 Please refer to **Volume 8, Appendix 4.5.K: Arboricultural Impact Assessment** for further information.

2.4 Ecology Baseline

2.4.1 There are six international statutory sites for nature conservation (i.e. Special Areas of Conservation (SAC), Special Protection Areas (SPAs) and Ramsar sites) in the 10 km Study Area and two further SACs designated for bats within 30 km of the Glaslyn works site.

2.4.2 Twenty-two other statutory designated sites for nature conservation (SSSIs, National Nature Reserves (NNRs) and Local Nature Reserve (LNR)) are present in the 5 km Study Area. The Morfa Harlech SSSI is within the Glaslyn works site and Study Area.

2.4.3 There are 41 non-statutory sites designated for nature conservation (Wildlife Site (WS) and County Wildlife Site (cWS)) within the 2 km Study Area. Two of these (Ty'n-y-berllan and Coed Bryn-twr/Wern) are in the Glaslyn works site.

2.4.4 For further information on the ecological baseline of the Glaslyn works site, including habitats and notable and protected species, please refer to ES **Volume 4 Chapter 5 Ecology and Nature Conservation**.

3. Construction Mitigation

3.1 Approach to Mitigation

3.1.1 The proposed works has been designed, as far as possible, following the mitigation hierarchy in order to, in the first instance, avoid or reduce impacts and effects through the process of design development, and by embedding measures into the design of the proposed works. Where avoidance is not possible, the next steps of minimisation, rehabilitation/restoration and ultimately offsetting, have been followed (where relevant and appropriate).

3.1.2 Mitigation measures typically fall into one of three categories: embedded measures; control and management measures; and additional mitigation measures. All mitigation measures for the proposed works will be captured within the full LEMP and full Construction Environmental Management Plan (CEMP). Control and management measures will also be captured within the full LEMP and full CEMP.

3.2 Impact Avoidance

3.2.1 Avoidance of features of landscape and ecological value has been a primary consideration throughout the development of the proposed works, including the design and selection of alternatives. The proposed works has been designed to avoid the temporary or permanent loss of notable habitats, as far as is practicable.

3.2.2 ES **Volume 4, Chapter 3: Assessment of Alternatives** details the main alternatives considered in relation to the Glaslyn Cables works.

3.3 Impact Mitigation

3.3.1 Mitigation measures will be implemented, as relevant and appropriate, prior to and during the construction phase of the proposed works, the purpose being to minimize the impact of works on landscape and biodiversity features and to achieve legislative compliance.

3.3.2 Standard environmental best practice and mitigation will be implemented to ensure construction and operation of the proposed works complies with legislation relating to protected species. It will also ensure the proposed works does not compromise the local conservation status of ecological receptors present within or in the vicinity of the Study Area.

3.3.3 Commitments embedded within the proposed works design that will contribute to the avoidance of and/ or reduction of potential effects on landscape and visual amenity, biodiversity, and trees will be included within the full LEMP and full CEMP.

3.4 Protected Species Licenses

3.4.1 Any protected species licenses that are expected to be required for the proposed works will be detailed in the full LEMP. The associated control measures and mitigation measures will be detailed in the full LEMP.

3.5 Tree Works

3.5.1 The proposed works has been designed to minimise the removal of mature trees.

3.5.2 Where works in close proximity to retained trees cannot be practicably avoided, these works will be undertaken in accordance with an Arboricultural Method Statement and final Tree Protection Plan. All works will be undertaken in accordance with the current best practice, which is defined in:

- British Standard (BS) 5837: 2012 Trees in relation to design, demolition and construction – Recommendations;
- National Joint Utilities Group (NJUG) Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees; and
- BS 3998: 2010 Tree works – Recommendations (British Standards Institution, 2010).

3.5.3 All necessary protective fencing would be installed prior to the commencement of any construction works. This would be set out in an Arboricultural Method Statement, the full CEMP and a final Tree Protection Plan to be prepared pre-construction.

3.5.4 If part of a group of trees is to be removed, the final extent of tree loss will be determined on site by an arboriculturist who will assess the stability and suitability of retained trees.

4. Landscape and Ecological Reinstatement

4.1.1 The following habitats are likely to be temporarily lost by the proposed works and reinstated within three years:

- 0.09ha of Broadleaved woodland -plantation
- 0.62ha of scrub – dense/continuous
- 0.03ha of scrub-scattered
- 0.06ha of Acid grassland – semi-improved
- 4.52ha of Neutral grassland -semi-improved
- 10.01ha of improved grassland
- 11.68ha of Marsh/marshy grassland
- 12.37ha of poor semi-improved grassland
- 0.05ha of other tall herb and fern -ruderal
- 4.35ha of arable
- 1.34ha of amenity grassland
- 0.15ha of marginal and inundation-marginal vegetation
- 0.05 km of intact hedge -native species-rich
- 0.04 km standing water
- 0.6 km running water
- 0.18 km running water -mesotrophic
- 25 Individual Trees

4.1.2 The full LEMP will set out in full the reinstatement process for any habitat that is to be replaced. This will detail the habitat to be lost, the process to reinstate the habitat and identify any further management plans, control measures or mitigation measures that are to be undertaken.

5. Long-term Landscape and Ecological Proposals

5.1 Landscape and Ecological Strategy and Proposals

5.1.1 Good design has been a key consideration from the outset of the Project. The Environmental Impact Assessment (EIA) has informed the iterative design process, guided by design principles developed specifically to address the opportunities and constraints presented by the Project. These principles have been developed in response to policy requirements, published landscape character assessment guidance and fieldwork analysis.

5.1.2 Design mitigation has been embedded in the proposed works to minimise effects on the environment, including landscape character, visual amenity, biodiversity, and heritage assets. These design mitigation measures and design proposals will be detailed in the full LEMP. Any measures and proposals, such as habitat creation, will require design, management, and monitoring, and will be detailed in the full LEMP.

5.2 Phasing of Landscape Proposals

5.2.1 Where planting areas do not conflict with construction compounds and activities, consideration will be given to advanced planting being undertaken in available areas in the first available planting season prior to construction commencing. These areas will be developed in detail as part of the full LEMP subject to contractor discussions.

5.3 Habitat Enhancement and Creation Proposals

5.3.1 Areas of habitat creation and enhancement are proposed to provide habitat compensation in efforts to work towards achieving a net benefit, these are shown on the Landscape Plan. Areas of habitat compensation are present throughout the proposed works area, targeted in areas to sustain green infrastructure or wildlife corridors and maintain habitat connectivity. These areas may be subject to change based on landowner commitment to habitat management and monitoring. **Table 5-1** below presents the proposed areas of habitat creation and enhancement which are to be delivered.

Table 5-1 Habitats created or enhanced as part of NBB and GI

Phase 1 habitat description	Created/ enhanced	Area (ha) created/enhanced post works
A2.1 - Scrub - dense/continuous	Created	0.3
B4 - Improved grassland	Created	0.19
B6 - Poor semi-improved grassland	Created	0.03
A1.1.2 - Broadleaved woodland - plantation	Created	0.06
B5 - Marsh/marshy grassland	Created	0.06
SuDS	Created	0.02
B2 -Neutral Grassland	Enhanced	0.32
Linear Features		**Area (km) created/enhanced Post Works**
J2.1.1 - Intact hedge - native species-rich	Created	0.23
Point Features		**Number count created**
Individual Trees	Created	100

5.3.2 To compensate for the remaining shortfall of habitat loss, off-site delivery through a third-party provider will support compensation efforts for the following habitats:

- 1.6 ha of Glaslyn SSSI
- 1.6 ha of Coastal Flood Plain Grazing Marsh
- 0.49 km of species-rich hedgerow
- 119 individual trees

6. Maintenance and Management Aims, Prescriptions, and Objectives

6.1 Introduction

6.1.1 This section introduces how existing and proposed habitats will be protected or implemented during construction, maintained, and managed in the long term for the lifetime of the proposed works.

6.1.2 As the detailed design progresses, further details will be provided, particularly in relation to plant species selection, specification of seed mixes, management prescriptions and timescales, and site-specific mitigation and enhancement elements.

6.1.3 Implementation and monitoring works will be supervised by the ECoW.

6.2 Management Periods

6.2.1 Any planting associated with the proposed works will be maintained for a period of time that will be determined in the full LEMP. The full LEMP will detail all mitigation measures associated with habitats and protected or notable species and the timeframe that they will be maintained for. This will likely be a five-year aftercare period for all reinstatement and mitigation planting for the proposed works.

6.3 Existing Retained Trees and Shrubs

6.3.1 During construction any retained hedgerows, woodland and trees will be protected in accordance with an Arboricultural Method Statement and Tree Protection Plan. The measures to be employed will likely include the use of clearly defined stand-offs (secured with temporary protective fencing), managing the structure and integrity of the retained vegetation and the soil upon which it relies, and undertaking any pruning outside of the bird breeding season.

6.3.2 Any retained trees will be periodically inspected by an arboriculturist during construction to ensure that the tree protection measures detailed in an Arboricultural Method Statement and Tree Protection Plans are adhered to. Where sensitive operations are required within Root Protection Areas (RPA) of any retained trees, works will be undertaken under the supervision of an arboriculturist to ensure that agreed methodologies are fully implemented, to record any root pruning and to recommend further arboricultural remedial works where required. All works requiring arboricultural supervision will be detailed within an Arboricultural Method Statement.

6.3.3 Any retained trees will likely require periodic inspection to assess their structural condition and safety. Occasional removal of dead wood or other remedial works to address significant defects may be required in areas of frequent access and will be the responsibility of the tree owner.

6.3.4 During the construction and operation of the proposed works, all staff operating on site are to be made aware of the need to look out for obvious signs of tree defects and to report them to the Site Manager who will seek further advice as necessary.

6.4 Other Habitat Proposals

6.4.1 As the identification of required habitat maintenance and management proposals for proposed works is ongoing, the full LEMP will detail all final proposals for existing and proposed habitats.

7. Monitoring

7.1 Pre and Post Construction Monitoring and Reporting

7.1.1 Monitoring and reporting is required in order to determine that the functions documented within the full LEMP are being achieved and to determine whether any remedial management action may be required.

7.1.2 A post-construction monitoring programme and reporting procedures will be formalised, agreed with the relevant planning authority and included within the full LEMP.

7.1.3 Post-construction monitoring and reporting programmes will be established for some habitats and species following completion of construction works, where agreed with the relevant planning authority.

7.1.4 Results from the post-construction monitoring will feed into the management plan and, if required, management may be amended accordingly.

7.2 Reinstatement of habitats

7.2.1 A monitoring protocol to determine successful restoration of any habitat will be agreed with the local planning authority. This will be based on a combination of survey data for the existing pre-construction habitat, and any relevant guidance. This will be detailed within the full LEMP.

7.3 Adaptive Management Monitoring

7.3.1 The adoption of an adaptive management programme for the landscape planting is proposed to achieve optimum levels of plant growth and growing conditions and ultimately provide greater confidence that effective screening will be achieved by the tree planted areas. It will also allow flexibility to adapt to future climate changes and trends with regard to species selection and maintenance requirements. Monitoring will be undertaken throughout the implementation and maintenance and management periods to ascertain progress of tree growth to inform the subsequent steps to be taken as part of the adaptive management programme.

7.3.2 The full LEMP will define the adaptive management programme in agreement with the relevant planning authority. New activities or adaptions to the management and maintenance regime will respond to the results of monitoring and changes as a result of climate change. It will comprise a landscape aftercare supervision structure that specifically addresses the quality and annual growth of different planting areas, with monitoring against agreed objectives. It will provide mechanisms to target specific measures to improve any areas where planting is not establishing satisfactorily. These measures could include, replacement of failed trees and shrubs with different species if repeated failure of species is occurring and other remediation measures to improve growth including but not limited to watering, targeted weeding and soil analysis.

7.4 Non-Compliance Procedure

7.4.1 The ECoW will be responsible for undertaking the inspections during and post construction to check compliance with the LEMP. All incidents and non-conformance with the LEMP, will be reported and investigated, with the necessary procedures identified in the LEMP.

7.5 Change Process

7.5.1 The LEMP will identify the process to amend aspects of the LEMP once it has been approved, if required. Changes would not alter any underlying commitments, mitigation or methodologies, which would be set out in the LEMP. An example may be where a preconstruction survey identifies that a measure already committed to is no longer required in the full LEMP. This change process will be fully set out in the full LEMP in discussion with stakeholders.

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4.5.A Ecology Report: Glaslyn Habitat Surveys

nationalgrid

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1. Introduction

1.1 Introduction

1.1.1 This document has been prepared by AECOM on behalf of National Grid Electricity Transmission plc (NGET) who seek to construct and operate the Pentir to Trawsfynydd Reinforcement Project (the 'Project').

1.1.2 This document concerns the section of the Project relating to Glaslyn Cables (the proposed works) and is a Technical Appendix to the Environmental Statement (ES) **Volume 4, Chapter 5: Ecology and Nature Conservation** being submitted as part of the Environmental Impact Assessment (EIA) which accompanies the consent applications for the Project.

1.2 Description of the Proposed Works

1.2.1 The proposed works are in the administrative boundary of Gwynedd Council, North West Wales, between the existing Wern Cable Sealing End Compound (CSEC) (SH 543401) and existing Garth CSEC cable sealing end compound (SH 59592 38765), Porthmadog (the 'Glaslyn works site').

1.2.2 The proposed works comprise:

- Extending the existing CSEC at Wern, including a new access road to the east.
- Decommissioning and removal of Garth CSEC.
- Construction of a new CSEC and Tunnel Head House at Minffordd.
- Replacement and upgrading of approximately 6 km of cables between Wern CSEC and Minffordd CSEC.
- Removal of redundant cables in selected locations (with the remainder left *in situ* where constraints, such as ecological, preclude their removal).
- Temporary construction compounds, construction areas and permanent and temporary accesses that are required to install and maintain the infrastructure listed above.

1.2.3 The new cables will be installed through a combination of open cut and non-open cut techniques. The proposed non-open cut technique will be Horizontal Directional Drill (HDD).

1.2.4 A description of the proposed works is provided in **ES Volume 4, Chapter 2: Glaslyn Cable Works.** The location of the Glaslyn works site is shown in ES **Volume 4, Figure 4.2.1.**

1.3 Introduction to the Habitats Report

1.3.1 This report provides baseline information on habitats that could potentially be affected by the proposed works, apart from hedgerows, which are described in **Volume 8, Appendix 4.5.B: Hedgerow Report.**

1.3.2 Baseline information was obtained through desk-based assessments and the following field surveys during 2023 and 2024:

- Extended Phase 1 Habitat survey.
- National Vegetation Classification (NVC) survey.

1.3.3 This report details the baseline information collated for habitats present in the study area (defined in paragraph 1.3.5 and shown on **Figure 4.5.A.1** and identifies relevant legislation and planning policy relating to plants and habitats, which are outlined in **Section 2** of this report.

Objectives

1.3.4 The objectives of the surveys and report are to:

- Review existing ecological data to identify any sites designated for nature conservation (international, national or local) in the study area (Appendix A: **Figure 4.5.A.2** and **Figure 4.5.A.3**).
- Identify the presence of Habitats of Priority Importance (HoPI) in the study area (**Appendix A: Figure 4.5.A.4**).
- Identify and categorise habitats present in the survey area (see definition I in **Table 1.1**).
- Carry out a high-level appraisal of the potential for habitats recorded to support protected or notable species of fauna and flora in the survey area.
- Provide maps showing habitat types and their location in the survey area (**Appendix A: Figure 4.5.A.1**).
- Provide baseline information about the presence and distribution of any important NVC communities in the survey area and evaluate their status.
- Use this information to determine whether notable habitat and plants could be affected by the proposed works (see paragraph 3.1.5).
- Inform the mitigation requirements for the proposed works to prevent or reduce any negative impacts on habitats present.
- Inform the landscape assessment, Green Infrastructure Strategy and Net Benefits for Biodiversity (NBB) proposals **Volume 8, Appendix 4.5.L: Net Benefit for Biodiversity and Green Infrastructure Statement**.

Study Area and Survey Areas

1.3.5 The Study Area discussed in this report is defined as the boundary of the Glaslyn works site and a 2 kilometre (km) buffer. This area was used for the desk-based assessment to collate existing ecological records relating to sites designated for nature conservation, notable plants and invasive non-native species (INNS). A larger study area for statutory designated sites is applied and discussed within the ES **Volume 4, Chapter 5: Ecology and Nature Conservation**, where applicable. This report presents only the records of notable plant species within the Glaslyn works site, along with a 50 metre (m) buffer, as identified through professional judgment for their potential to be most affected by the proposed works.

1.3.6 Table **1-1** details where each survey type was carried out. The Survey Area locations were determined using professional judgement of the likely extent of impacts on plants and habitats.

Table 1-1 – Survey Area

Survey Type	Survey Area	Justification for the Survey Area
Extended Phase 1 Habitat survey. Invasive Non-Native Plant Species (INNPS) were also recorded where observed.	The Glaslyn works site and to a maximum of 50 m where viewable or access was permitted.	The Glaslyn works site, plus a 50 m buffer is an appropriate survey area. Habitats that are likely to be impacted by the proposed works are in the Glaslyn works site. In relation to the potential for protected or notable species, the 50 m buffer covers, for example, the 30 m distance at which direct effects to badger could occur and acknowledges that badger setts present beyond this distance are unlikely to be impacted by the proposed works, e.g. through construction disturbance.
Botanical and NVC survey	Appropriate locations in the Glaslyn works site.	The Glaslyn works site is an appropriate survey area. Habitats that are likely to be impacted by the proposed works are in the Glaslyn works site.

2. Legislation

2.1 Introduction

2.1.1 This section lists the legislation, planning policy framework and guidance that is relevant to plants and habitats.

2.1.2 More detailed information can be found in **Volume 8, Appendices: Appendix 1.1.A: Legislation, Policy and Guidance**.

2.2 Legislation

2.2.1 The following legislation is relevant to Ecology and Nature Conservation:

- Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ('Habitats Directive') (Ref. 2.1).
- The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref. 2.2).
- The Countryside and Rights of Way Act 2000 (Ref. 2.3).
- The Hedgerows Regulations 1997 (Ref. 2.4).
- Wildlife and Countryside Act 1981 (WCA) (as amended) (Ref. 2.5).
- The Environment Act (2021) (Ref. 2.6).
- The Natural Environment and Rural Communities Act 2006 (NERC) (Ref. 2.7).
- The Environment (Wales) Act 2016 (Ref. 2.8).
- Regulation (EU) 1143/2014 on the prevention and management of the introduction and spread of invasive alien species (Ref. 2.9).
- The Invasive Alien Species (Enforcement and Permitting) Order 2019 (as amended) (Ref. 2.10).

2.3 Planning Policy

2.3.1 The following planning policy is relevant to Ecology and Nature Conservation:

- Planning Policy Wales – Edition 12 (2024) (Ref. 2.11).
- Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026 (Ref. 2.12).
- Anglesey and Gwynedd Joint Local Development Plan Review Report (Ref. 2.13).

2.4 Guidance

2.4.1 The following guidance is relevant to Ecology and Nature Conservation:

- The International Union for Conservation of Nature Red List of Threatened Species 2025 (Ref. 2.14).

- UK Biodiversity Framework (Joint Nature Conservation Committee (JNCC)) on behalf of the Four Countries' Biodiversity Group (2024) (Ref. 2.15).
- Natur Gwynedd Biodiversity Action Plan (BAP) (Ref. 2.16).
- The Vascular Plant Red Data List for Wales (Ref. 2.17).
- The Vascular Plant Red Data List for Great Britain (Ref. 2.18).

3. Methodology

3.1 Desk Study

Designated Sites

3.1.1 The desk study incorporates a review of all international and national statutory designated sites for nature conservation in the study area.

3.1.2 It also includes a review of non-statutory designated Wildlife Sites (WS) and Candidate WS (cWS). WS are of substantial local nature conservation value and in some cases the quality of habitat may be equal to that found on a Site of Special Scientific Interest (SSSI) but may not meet the national criteria for selection as a SSSI, which receive statutory protection. Although cWS have not yet been designated, they are included in this report, as they are being considered for designation and may become so in the lifetime of the proposed works.

Existing Records

3.1.3 Ecological data for the study area were gathered from the following sources:

- JNCC website (Ref. 3.1) for site information and designation details of Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar Sites.
- Natural Resources Wales (NRW) website (Ref. 3.2) for information on statutory designated sites of nature conservation interest such as SSSI and to confirm reasons for designation.
- DataMapWales website (Ref. 3.3) to identify the location of Habitats of Principal Importance (HoPI) and Ancient Woodland.
- Woodland Trust Ancient Tree Inventory (Ref. 3.4) for records of Veteran and Ancient trees.
- Natur Gwynedd Biodiversity Action Plan website (Ref. 2.16) for biodiversity action plan habitats and species.
- Aerial photography (Google Earth).
- Cofnod, the local environmental records centre for North Wales.

3.1.4 Protected and notable habitats and species record data (including INNS) have been provided by Cofnod, the local environmental record centre. Data is refreshed on a six-monthly basis; the date of the latest refresh provided is November 2024. Only records in the last ten years (2014-2024) are included in the baseline.

3.1.5 Protected and notable habitats and species data include those listed under Schedules 1, 5 and 8 of the Wildlife and Countryside Act 1981 (as amended) (Ref. 2.5), Schedules 2 and 4 of The Conservation of Habitat and Species Regulations 2017 (as amended) (Ref. 2.2) and Habitats and Species of Principal Importance listed under Section 7 of the Environment (Wales) Act 2016 (Ref. 2.8). INNS are species listed under Schedule 9

of the Wildlife and Countryside Act 1981 (as amended) (Ref. 2.5) and as species of European Union (EU) concern listed in the EU Invasive Alien Species Regulation 2014 (Ref. 2.9).

Existing Report Reviews

3.1.6 The following published ecology reports covering the Study Area were reviewed for relevant information on habitats and plants:

- National Grid (2012). Glaslyn Estuary Network Reinforcement Initial Route Selection Report. National Grid (Ref. 3.5).
- National Grid (2014). North Wales Connection Project. Porthmadog and Glaslyn Estuary Cabling Reinforcement. Phase 1 Habitat Survey and Protected Species Survey – Factual Report (Ref. 3.6).
- AECOM (2016). Snowdonia Visual Impact Provision Project. Preliminary Ecological Appraisal. National Grid (Ref. 3.7).
- Jacobs (2017). North Wales Connection. Wider Works - Glaslyn Botanical Survey Report. National Grid (Ref. 3.8).
- National Grid (2020). Visual Impact Provision, Snowdonia Project. Environmental Appraisal Volume1. National Grid (Ref. 3.9).

3.1.7 Historic data collected by AECOM from 2016 to 2018, including botanical and NVC survey results, as well as unpublished reports prepared in 2018-19 (relating to the National Grid North Wales Connection Project that was paused in 2019), were also reviewed for relevant information.

National Vegetation Classification

3.1.8 To inform the NVC survey process, a desk-top scoping exercise was undertaken, comprising a review of aerial photography, habitat and target notes (TN) recorded during the Extended Phase 1 Habitat survey conducted in 2023 and previous botanical surveys completed by AECOM in 2018-19 in support of the National Grid North Wales Connection Project that was paused in 2019. Records received from Cofnod concerning notable plant species in the study area were also reviewed.

3.1.9 From this desk-top scoping exercise, areas of potential botanical interest were identified for more detailed vegetation survey in 2024.

3.2 Field Surveys

Phase 1 Habitat Survey

3.2.1 Phase 1 Habitat survey is a standard method of environmental audit and involves categorising different habitat types and habitat features in the survey area and recording these using standard Phase 1 Habitat survey codes as described in the Handbook for Phase 1 Habitat Survey: A technique for environmental audit (Ref. 3.10). The approach applied accords with the Guidelines for Preliminary Ecological Appraisal published by the Chartered Institute of Ecology and Environmental Management (CIEEM) (Ref. 3.11).

3.2.2 The Phase 1 Habitat survey was undertaken between May and August 2023, supplemented and refreshed during 2024 to take account of adjustments to the Glaslyn works site.

National Vegetation Classification Survey

3.2.3 The NVC system provides a standardised method for classifying and mapping semi-natural habitats and ensures that surveys are carried out to a consistent level of detail and accuracy. NVC surveys are undertaken in accordance with the methodology outlined in the NVC Users' Handbook (Ref. 3.12).

3.2.4 The NVC survey focussed on areas in which the proposed works have the potential to cause direct or indirect impacts to habitats which are also recorded as statutory or non-statutory sites, or are areas identified from the Phase 1 Habitat survey as being particularly species rich.

3.2.5 Surveys were conducted by suitably experienced botanical surveyors on 06 and 07 June 2024. The month of June is within the optimal period for marshy grassland NVC surveys.

3.2.6 Habitats were subject to an initial walkover to identify homogeneous stands of vegetation. From each homogenous stand, five samples were taken to determine the frequency of species present using a 2 by 2 m quadrat.

3.2.7 The presence and percentage cover for every plant species was recorded in each quadrat. In the NVC this is estimated using the Domin Scale by which a score is attributed to different ranges of abundance, as summarised in Table **3-1.**

Table 3-1 - Domin Scale

Cover/Abundance	Domin Score
91-100%	10
76-90%	9
51-75%	8
34-50%	7
26-33%	6
11-25%	5
4-10%	4
<4% (many individuals)	3
<4% (several individuals)	2
<4% (few individuals)	1

3.2.8 For each quadrat, results were tabulated to provide figures for cover expressed as a Domin value, range and frequency of occurrence across the five quadrats. The range is given by the Domin score of any one plant found in any of the survey squares. For example, if creeping buttercup (*Ranunculus repens*) is found in two quadrats out of the

five sampled, and the Domin score in these quadrats was 6 and 7, this means that the abundance range is 6 to 7.

3.2.9 Frequency of species presence was then established. Frequency is used to describe how often a species is encountered in different stands or samples of a vegetation type, irrespective of species cover in each stand or sample. It is summarised in floristic tables using the Roman numerals I-V and referred to in descriptions of vegetation types using the terms listed in Table **3-2.**

Table 3-2 – Vegetation Frequency Class

Frequency Class	Range of Frequency Class	Terms used to Describe Frequency Class
I	1-20% (i.e. 1 stand in 5)	Scarce
II	21-40%	Occasional
III	41-60%	Frequent
IV	61-80%	Constant
V	81-100%	Constant

3.2.10 Species that were absent from the quadrats but present in the same stand of vegetation were recorded with a '+'. This information is not used in analysis but can be useful for allocating species-poor or heterogeneous samples.

3.2.11 Botanical nomenclature follows that of Stace (2019) (Ref. 3.13) for vascular plants and Atherton et al. (2010) (Ref. 3.14) for bryophytes. The names of the NVC plant communities follow Rodwell (1991) (Refs. 3.15 – 3.19).

NVC Data Analysis

3.2.12 Data gathered from the field surveys were analysed and NVC communities were attributed using surveyor experience and matching sample field data against published NVC floristic tables; stands were classified to sub-community level where possible. The computer programme MAVIS (Ref. 3.20) was used to analyse the sample field data. MAVIS mathematically compares the sample data with the constancy profiles for all NVC plant communities and sub-communities and produces a list of similarity coefficients which is ranked in order of the best fit.

Further Botanical Surveys

3.2.13 Where NVC surveys could not be completed at the time of survey as initially planned due to lack of safe access, a detailed plant list was completed instead, from multiple locations along the field boundary fence using binoculars. The relative abundance of each species was recorded using the DAFOR scale. The DAFOR scale is used for semi-quantitative sampling, to provide a rapid estimate of the relative abundance of species in an area based on the categories in Table **3-3.**

Table 3-3 – DAFOR Scale

Abundance	Range of Abundant Class
Dominant	50-100%
Abundant	30-50%
Frequent	15-30%
Occasional	5-15%
Rare	<5%

3.2.14 Locally and Very can precede the DAFOR categories to further describe abundance in terms of fine scale patterns or extreme ends of the percentage cover range, respectively. For example, if sheep's fescue (*Festuca ovina* agg.) was abundant in one area of a homogenous stand, but occasional elsewhere, it could be described as Occasional to Locally Abundant. Or if sheep's fescue was present at approximately 1% cover in the stand, it could be described Very Rare, to denote that it was present at the extreme end of rarity.

Evaluation

3.2.15 The intrinsic values of the identified habitats in the survey area and conservation importance of these habitats were evaluated with reference to HoPI identified in Section 7 of the Environment Wales Act (2016) (Ref. 2.8). Individual species were evaluated against the species listed in Schedule 8 of WCA 1981 (Ref. 2.5), Schedule 5 of The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref. 2.2), Section 7 of the Environment Wales Act (2016) (Ref. 2.8), and the Vascular Plant Red Data List for Wales (Ref. 2.17). The importance of habitats and species were also evaluated with reference to the Natur Gwynedd BAP (Ref. 2.16).

3.3 Assumptions and Limitations

Desk Study

3.3.1 The aim of a desk study is to characterise the baseline context of a proposed development and provide valuable background information that would not be captured by surveys alone. Information obtained during a desk study is dependent upon people and organisations having made and submitted records for the area of interest; a lack of records for habitats or species does not mean that the habitats or species do not occur in a study area. Likewise, the presence of records for habitats and species does not automatically mean that these still occur or are relevant in the context of proposed works.

3.3.2 The detail and accuracy of the desk study records rely on those provided to Cofnod from a variety of sources. The results of the updated desk study undertaken in November 2024 have been reviewed for the baseline assessment.

Phase 1 Habitat Survey

3.3.3 The Phase 1 Habitat surveys were conducted in the recommended survey period as stated in the Handbook for Phase 1 Habitat Survey (Ref. 3.10). There were, however, access restrictions to parts of the Glaslyn works site.

3.3.4 The area to the south of the A487 Porthmadog Bypass in Glaslyn SSSI is prone to regular inundation and there are patches of floating vegetation and flooded ditches that are hazardous to cross. Large parts of this area could not be safely surveyed, and the Phase 1 Habitat survey was completed mostly from boundaries and edge habitats.

3.3.5 Other parts of the Glaslyn works site also contain areas of dense and impenetrable vegetation, which restricted access to some parts during the Phase 1 Habitat survey.

3.3.6 Despite access restrictions, it was still possible to record the habitat types present and these constraints did not present a significant limitation to the survey.

National Vegetation Classification

3.3.7 The NVC survey was carried out in June 2024 when most of the grassland and mire plant species were flowering. There were, however, access restrictions. One field held livestock, and survey was avoided for health and safety reasons. Instead, a detailed species list was compiled based on plants that could be accurately observed from multiple locations along the field boundary fence using binoculars.

3.3.8 If the proposed works area is amended in future, the NVC assessment should be reviewed and revised as appropriate. Ecosystems are dynamic and constantly changing and species distribution and abundance in the survey area may shift. In accordance with current guidance, the existing survey data has a shelf life of 18 months from the date of survey; the NVC survey data should therefore not be relied on beyond December 2025. After this date, updated surveys are likely to be required, and advice sought from an appropriately experienced ecologist to determine survey scope and methods.

3.3.9 Although some plant species may have been undetected during the NVC survey, particularly if they were only present in late summer, this has not impacted the habitat assessments in this report. This is because June is the optimal time to survey marshy grassland, as most expected species would have germinated or be in flower, while the vegetation has not yet grown tall enough to obscure smaller plants.

4. Results

4.1 Desk Study Results

Important Ecological Features (Designated Sites)

4.1.1 The results of the desk study are shown in the following figures in **Appendix A**:

- **Figure 4.5.A.1 -** Phase 1 Habitat Survey
- **Figure 4.5.A.2** – Relevant Statutory Designated Sites for Habitats within 2 km.
- **Figure 4.5.A.3** – Relevant Non-Statutory Designated Sites for Habitats within 2 km.
- **Figure 4.5.A.4** – HoPI and Ancient Woodland within 2 km.
- **Figure 4.5.A.5** – Notable Plants and Fungi and INNS within 50 m.
- **Figure 4.5.A.6 -** Botanical Survey Locations

4.1.2 Table **4-1** summarises the international and national nature conservation designations in the study area.

Table 4-1 – Statutory Designated Sites for Nature Conservation in the 2 km Study Area

Designated Site	Reason for Designation	Location of Designated Site
Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC	Annex I habitats that are a primary reason for selection of this site are: • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles. • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*). **Priority feature*. Annex I habitats present that are not a primary reason for selection of this site but as a qualifying feature are: • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. • Northern Atlantic wet heaths with *Erica tetralix.* • European dry heaths. • *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature*. • Bog woodland **Priority feature*. The Annex II species that is a primary reason for selection of this site is lesser horseshoe bat (*Rhinolophus hipposideros*). This large composite site includes most of the known maternity roosts in Meirionnydd and some hibernacula and comprises the centre of distribution for lesser horseshoe bats in Wales. The sheltered river valleys provide excellent tree cover and numerous suitable maternity roosts.	In the Glaslyn works site (eastern end at Garth)
Pen Llŷn a'r Sarnau/ Lleyn Peninsula and the Sarnau SAC	Annex I habitats that are a primary reason for selection of this site are: • Sandbanks which are slightly covered by sea water all the time. • Estuaries. • Coastal lagoons **Priority feature* • Large shallow inlets and bays. • Reefs. Annex I habitats present that are not a primary reason for selection of this site but as a qualifying feature are: • Mudflats and sandflats not covered by seawater at low tide. • *Salicornia* and other annuals colonizing mud and sand.	0.54 km south

Designated Site	Reason for Designation	Location of Designated Site
	• Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*). • Submerged or partially submerged sea caves. Annex II species present as a qualifying feature, but not a primary reason for site selection are: • Bottlenose dolphin (*Tursiops truncates*). • Otter (*Lutra lutra*). • Grey seal (*Halichoerus grypus*).	
Glaslyn SSSI	The Afon Glaslyn is important as an oligotrophic low altitude, low gradient river, supporting the nationally rare floating water plantain (*Luronium natans)*. The muddy river margins support another national rarity, the Welsh mudwort (*Limosella australis*) and the wetland habitats adjoining the river support the only known population of the boreal relict snail (*Vertigo lilljeborgi*) in East Gwynedd. The floodplain grassland comprises marshy, neutral and acid grassland and brackish to freshwater transitional marsh communities. There is considerable floristic variation in the rush-dominated marshy grassland with species-rich areas characterised by the presence of the uncommon whorled caraway (*Carum verticillatum*) and globeflower (*Trollius europaeus*). Orchids include greater butterfly-orchid (*Platanthera chlorantha*), lesser butterfly-orchid (*Platanthera bifolia*), early marsh-orchid (*Dactylorhiza incarnata*) and northern marsh-orchid (*Dactylorhiza purpurella*). The site citation also refers to the presence of the very restricted Welsh marsh orchid (*Dactylorhiza majalis* ssp *cambrensis*). However, as a consequence of taxonomic research, this species is now grouped within *Dactylorhiza purpurella.* The coastal grazing marsh here supports the nationally scarce sharp rush (*Juncus acutus*) and other uncommon plants including needle spike-rush (*Eleocharis acicularis*), small water-pepper (*Persicaria minor*) and brackish water-crowfoot (*Ranunculus baudotii*). In places, this transitional vegetation gives way to sea rush saltmarsh and slender spike-rush (*Eleocharis uniglumis*) saltmarsh. This site also supports dwarf spike-rush (*Eleocharis parvula*) saltmarsh which occurs on the muddy edges of creeks, pools and the banks of the Afon Glaslyn close to Porthmadog. The site supports one of the most extensive areas of alluvial wet woodland in Wales and is a good example of alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*), yellow pimpernel	In the Glaslyn works site (eastern end at Garth)

Designated Site	Reason for Designation	Location of Designated Site
	(*Lysimachia nemorum*) woodland. Wet woodland of this type is of European importance with mature alder coppice dominating the canopy with some grey willow (*Salix cinerea*) and scattered ash. Areas of oak woodland with sessile oak (*Quercus petraea*) accompanied by *Betula* sp. (usually *Betula pubescens*) occur on the drier rocky ridges. The sessile oak woodland of southern Snowdonia form one of the most important areas for woodland conservation in Europe. This type of Atlantic woodland is often described as 'temperate rainforest' due to the prevailing damp humid climate and associated abundance of ferns, lichens and the luxuriant growth of mosses and liverworts. The site supports two separate nursery roosts of lesser horseshoe bats. The combination of woodland and grazed pastures in the Glaslyn valley provides a rich source of invertebrate prey throughout the year. Brown long-eared bats (*Plecotus auritus*), Daubenton's bats (*Myotis daubentonii*) and pipistrelle bats (*Pipistrellus* sp.) have also been recorded roosting at the site. The Glaslyn floodplain also supports a breeding bird assemblage of lowland damp grassland, and the marshes attracts overwintering wildfowl and waders as well as a variety of birds on passage including wintering whooper swans (*Cygnus cygnus*) which use some of the fields for feeding and the river and Cob for roosting. Otter and water vole (*Arvicola amphibius*) also occur, and Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta trutta*) use the river as a migration route to access their spawning grounds higher up the catchment.	
Ysbyty Bron y Garth SSSI	This site is of special interest for its population of breeding lesser horseshoe bats which make use of a detached building, part of a former hospital, to give birth and raise their young between spring and autumn. An area beyond the building consists of agricultural land with scrub, hedgerows and deciduous trees which provide important feeding and commuting habitat.	In the Glaslyn works site (eastern end at Garth)
Coed Tremadog SSSI and National Nature Reserve (NNR)	Coed Tremadog is selected for its biological interest as an example of Woodsage/Oak/Birch (*Teucrium scorodonia/Quercus/Betula*) woodland type and for its vascular plant species richness. The woodland is of entomological interest for its dipteran fauna and is the only extensive example of a cliff/scree woodland in the sub-region.	0.37 km north-east and 0.38 km north-east

Designated Site	Reason for Designation	Location of Designated Site
Morfa Harlech SSSI and NNR	This site lies in the boundary of Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC and is of both geomorphological and biological interest. The marine biological interest comprises the exposed sandy shore of Morfa Harlech beach and the Glaslyn and Dwyryd estuary. The hard cliffs of the Portmeirion peninsula and Ynys Giftan support maritime lichen communities. The sand dunes at Morfa Harlech are one of the largest moderately calcareous systems in Britain. The mobile dune communities and the humid dune slack communities (in seasonally wet hollows) are of European importance supporting nationally scarce flora. Morfa Harlech is a nationally important site for Aculeata (wasps and bees) and is of regional importance for breeding waders. During September to March nationally important numbers of pintail (*Anas acuta*) feed and roost on the extensive areas of mud and saltmarsh in the Glaslyn/Dwyryd estuary. The sand lizard (*Lacerta agilis*) has been introduced into two areas of sand dune at Morfa Harlech. Glaslyn/Dwyryd estuary is an important breeding and feeding habitat for otter and the ditches associated with embankments and adjacent farmland provide suitable bankside habitat for the water vole.	0.54 km south and 0.83 km south-east
Tiroedd a Glannau Rhwng Cricieth ac Afon Glaslyn SSSI	This site is of special interest for its geological, botanical and marine biological features. The features of special scientific interest include: • A range of sand dune habitats and associated communities. • A range of wetland habitats and associated communities. including: - Marshy grassland. - Reedswamp. - Wet woodland. • Four Nationally Scarce species of flowering plant and fern: - Sharp rush (*Juncus acutus*). - Variegated horsetail (*Equisetum variegatum*). - Lanceolate spleenwort (*Asplenium obovatum* ssp. *lanceolatum*). - Dune fescue (*Vulpia fasciculata*). • Marine habitats and communities.	0.80 km south-west

Designated Site	Reason for Designation	Location of Designated Site
	• A nationally important type of cave community characterised by a velvety coating of the red seaweed known as *Rhodothamniella floridula.* • Nationally important honeycomb worm reef community. • Diverse seagrass beds. • Diverse shallow rockpools with encrusting coralline seaweed and the coral weed (*Corallina officinalis).* • Community zonation patterns characteristic of sandy shores with a moderate degree of exposure to waves and tidal streams. • Important geological exposure of glacial sediments at Morannedd.	
Parc Y Borth Local Nature Reserve (LNR)	Parc y Borth LNR contains both oak woodland and wildflower meadows.	1.30 km south-west
Pen y Banc LNR	Pen y Banc LNR includes coastal rocks, secluded sandy coves and mixed woodland. The estuary supports a number of birds during the winter, including curlew (*Numenius arquata*), redshank (*Tringa totanus*) and black-necked grebe (*Podiceps nigricollis*). Large flocks of sandwich terns (*Sterna sandvicensis*) can be seen in summer. Flora around the site includes coastal heath species.	1.31 km south
Afon Ddu SSSI	The Afon Ddu is of special interest for its population of the freshwater pearl mussel (*Margaritifera margaritifera*) which is one of the few remaining breeding populations of this species in Wales. The freshwater pearl mussel is dependent on the local salmonid populations' sea trout spawn in the river and native brown trout (*Salmo trutta fario*) are abundant. Otter and water vole have been recorded in the Afon Ddu catchment. There are areas of botanically interesting mire and wet heath adjacent to parts of the river and around Llyn Du which are also important in providing a protective buffer to the river channel and the mussels therein.	1.65 km north-east

4.1.3 Table **4-2** summarises the non-statutory designated sites in the study area and the reason for their designation.

Table 4-2 – Non-statutory Designated Sites for Nature Conservation in the 2 km Study Area

Non-statutory Designated Site	Reason for Designation	Location of Designated Site
Ty'n-y-berllan cWS	Broadleaved woodland and neutral grassland.	In Glaslyn works site (western end at Wern)
Coed Bryn-twr/ Wern cWS	Broadleaved woodland, acid grassland and standing water.	In Glaslyn works site (western end at Wern)
Coed y Chwarel WS	Broadleaved woodland.	0.01 km south-west
Nursery Wood cWS	Broadleaved woodland and semi-improved neutral grassland.	0.01 km north
Coed yr Eglwys cWS	Broadleaved woodland and neutral grassland.	0.03 km north-west
Coed y Cefn cWS	Coniferous woodland.	0.06 km south-east
Gwernddwyryd WS	Acid grassland, broadleaved woodland and marshy grassland. Lowland acid grassland, valley mire with bog or acid fen vegetation.	0.14 km west
Glegyrog cWS	Broadleaved woodland.	0.15 km west
Penamser cWS	Scattered trees, bracken and acid grassland.	0.15 km south-east
Geirth Mawr cWS	Broadleaved woodland and neutral grassland.	0.26 km west
Coed Allt-wen cWS	Broadleaved woodland.	0.27 km north-east
Coed y Garth cWS	Broadleaved woodland.	0.31 km south-west
Abergafren WS	Semi-improved neutral grassland and broadleaved woodland. Upland oakwood, lowland acid grassland.	0.34 km south-east
Coed Tu hwnt I'r Bwlch cWS	Broadleaved woodland.	0.42 km south-west
Bronygarth Hospital WS	Marshy grassland and broadleaved woodland. Lowland bog, upland oakwood, wet woodland, lowland acid grassland, rush pasture.	0.45 km east
Moel-y-Gest cWS	Acid grassland, dry dwarf shrub heath, bracken and broadleaved woodland or scrub.	0.51 km south

Non-statutory Designated Site	Reason for Designation	Location of Designated Site
Cae Canol cWS	Marshy grassland, neutral grassland and acid grassland.	0.58 km north-west
Cae Canol WS	Marshy grassland, neutral grassland and acid grassland.	0.64 km south-east
Coed Tan-yr-allt cWS	Broadleaved woodland.	0.72 km north
Pen-y-bryn WS	Semi-improved neutral grassland and marshy grassland. Swamp, rush pasture and lowland mixed deciduous woodland.	0.73 km east
Portmeirion Woodlands cWS	Broadleaved woodland.	0.78 km south
Borthwen cWS	Broadleaved woodland.	0.80 km south-east
Garth cWS	Broadleaved woodland and neutral grassland.	0.84 km south
Hafod Cae Maen cWS	Semi-improved neutral grassland.	0.88 km south
Pentrefelin cWS	Semi-improved neutral grassland.	1.09 km west
Bron-y-foel cWS	Acid grassland, dry dwarf shrub heath and broadleaved woodland.	1.12 km south-east
Coedydd Cae-merched cWS	Broadleaved woodland.	1.28 km north-east
Parc y Borth WS	Lowland mixed deciduous woodland.	1.30 km south-west
Garreg Wen cWS	Broadleaved woodland, acid grassland and neutral grassland.	1.46 km south-west
Coed Garreg-goch cWS	Broadleaved woodland.	1.65 km south-west
Borth y Gest cWS	Acid grassland and marshy grassland.	1.66 km south-west
Glan Morfa Bach (West) cWS	Neutral grassland and marshy grassland.	1.70 km south
Pen-y-Bwlch WS	Marshy grassland, wet woodland and rush pasture.	1.71 km north-east
Glan Cedron cWS	Acid grassland, neutral grassland, marshy grassland and coniferous woodland.	1.75 km north-west
Afon Cedron cWS	Acid grassland.	1.76 km north-west

Non-statutory Designated Site	Reason for Designation	Location of Designated Site
Bryn Neuadd WS	Acid grassland, wet heath and acid grassland mosaic and marshy grassland. Bog, heathland, rush and rhos pasture, wet woodland.	1.81 km north-west
Glan-y-morfa-mawr pools cWS	Standing water.	1.90 km south
Traeth Mawr Woodland cWS	Broadleaved woodland and standing water.	1.91 km north-east
Gwaith Powdwr cWS	Dry dwarf shrub heath and bracken.	1.93 km east
Carreg Wen cWS	Dune grassland and broadleaved woodland.	1.94 km south-west
Hir Ynys bog cWS	Marshy grassland.	1.97 km north-east

Wildlife Trust Sites

4.1.4 Cofnod records two North Wales Wildlife Trust (NWWT) sites in the study area.

4.1.5 Traeth Glaslyn NWWT Reserve is in the Glaslyn works site and encompasses a mosaic of habitats, providing a good example of seral succession from brackish open water, through mudflats, marshes and wet grassland to damp alder carr. Traeth Glaslyn NWWT Reserve is statutorily protected in that it is wholly within Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC and Glaslyn SSSI.

4.1.6 Gwaith Powdwr NWWT is 1.91 km east of the Glaslyn works site. It is a former industrial site now composed of woodland and heathland, with lesser horseshoe bats present in old structures and tunnels. Small discrete areas inside the boundary of Gwaith Powdwr NWWT are statutorily protected in they are included within Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC.

Habitats

Ancient Woodland

4.1.7 There are 80 sites of Ancient Semi Natural Woodland, 38 sites of Restored Ancient Woodland, seven Plantations on Ancient Woodland sites and one site of Ancient Woodland of unknown category in the study area.

4.1.8 The Glaslyn works site contains five areas of ancient woodland. Two are at the western end near Wern CSEC and include an existing road running north from the A497 to Wern CSEC. This road will be used temporarily, without modification, until a separate main haul road is constructed elsewhere within the Glaslyn works site to support the main works. No vegetation removal or management is required along this road, and these ancient woodland sites will not be directly affected by the proposed works. A third in this area lies along the A497 in a visibility splay area for the above road heading north from the A497. Minor tree trimming is required within this ancient woodland at the junction with the A497 to maintain the existing visibility splay, however this is currently being

maintained as part of the highway maintenance required for the A497 and continuation of this by the council highways team will be sufficient for the visibility splay. One area is in the centre of the Glaslyn works site, where no works are proposed, and existing cables will be retained *in situ*. This area of ancient woodland will also not be directly affected by the proposed works. One lies to the north of the A487-High Street roundabout. No vegetation removal or management is required, and this ancient woodland site will not be directly affected by the proposed works.

Ancient or Veteran Trees

4.1.9 A review of the Woodland Trust, Ancient Tree Inventory (Ref. 3.4) does not indicate any ancient, or veteran trees in the study area; the closest is a veteran tree 0.25 km south of the Glaslyn works site and comprises an ornamental tree in Wern Manor.

4.1.10 However, the arboricultural survey (**Volume 8, Appendix 4.5.K: Arboricultural Baseline Assessment)** identified 18 trees in the Study Area with characteristics that qualify them as ancient or veteran.

Important Ecological Features (Habitats of Principal Importance)

4.1.11 Data supplied by Cofnod and Datamap Wales (Ref. 3.3) identified the following HoPI in the study area.

Table 4-3 – Important Ecological Features (HoPI) in the Study Area

Feature	Environment (Wales) Act 2016 Priority Habitat	Gwynedd BAP	Location of IEF	In or Out of Proposed Works Area
Coastal and floodplain grazing marsh	✓		In Glaslyn works site	**IN**
Lowland fen and reedbed (lowland wetland)	✓	✓	In Glaslyn works site (above HDD section only)	OUT
Coastal saltmarsh	✓		In Glaslyn works site	**IN**
Lowland dry acid grassland	✓	✓	In Glaslyn works site	**IN**
Purple moor grass and rush pasture	✓	✓	In Glaslyn works site (above HDD section only)	OUT
Traditional Orchards (Relict)	✓		0.04 km east	OUT
Lowland heathland	✓	✓	0.16 km north-east	OUT
Lowland meadows	✓	✓	0.72 km south	OUT

Maritime cliffs and slopes	✓	✓	1.53 km south	OUT
Blanket bog	✓	✓	1.90 km north	OUT
Raised bog	✓	✓	1.90 km north	OUT

4.1.12 Further HoPI present in the Glaslyn works site, but not currently identified by Cofnod or on the Datamap Wales website (Ref. 3.3) are:

- Hedgerows.
- Rivers.
- Standing water or ponds.
- Deciduous woodland.
- Wet woodland.

Protected and Notable Plant Species

4.1.13 The desk study returned records of five protected or notable plant species in the 2 km study area (including historical records >10 years old) comprising bluebell (*Hyacinthoides non-scripta*), dwarf spike-rush (*Eleocharis parvula*), Welsh mudwort (*Limosella australis*), lesser butterfly-orchid (*Platanthera bifolia*) and Welsh marsh-orchid (*Dactylorhiza purpurella* subsp. *cambrensis*). It is noted that as a consequence of taxonomic research, *Dactylorhiza purpurella* subsp. *cambrensis* is now grouped within *Dactylorhiza purpurella*.

4.1.14 Five further species of special botanical interest associated with the Glaslyn works site and specifically the Glaslyn SSSI citation were returned from the desk study and comprise: early marsh-orchid (*Dactylorhiza incarnata*), northern marsh-orchid (*Dactylorhiza purpurella*), slender spike-rush (*Eleocharis uniglumis*), small water-pepper (*Persicaria minor*) and whorled caraway (*Trocardis verticillate*).

4.1.15 Plants of special botanical interest are those listed within the Glaslyn SSSI citation and as Locally Rare or Locally Scarce in the Merionethshire Rare Plant Register 2014 (Ref 4.4) or Caernarvonshire Rare Plant Register 2008 (out of print).

4.1.16 Records of fungi were also requested from Cofnod. None listed in Section 7 of the Environment (Wales) Act 2016 (Ref. 2.8) were recorded in 50 m of the Glaslyn works site, although several species of waxcap were recorded in a cemetery 25 m to the south and in woodland 25 m to the north. A Species Action Plan for waxcaps is included in the Natur Gwynedd BAP (Ref. 2.16).

Invasive Non-Native Species (INNS)

4.1.17 Cofnod identified the following INNS listed on Schedule 9 of the WCA 1981 (Ref. 2.5) in the study area:

- Canadian waterweed (*Elodea canadensis*).
- Japanese knotweed (*Reynoutria japonica*).
- Japanese rose (*Rosa rugosa*).
- Giant rhubarb (*Gunnera tinctoria*).

- Himalayan balsam (*Impatiens glandulifera*).
- Montbretia (*Crocosmia* x *crocosmiiflora*).
- New Zealand pigmyweed (*Crassula helmsii*).
- Pontic rhododendron (*Rhododendron ponticum*).
- Variegated yellow archangel (*Lamiastrum galeobdolon* ssp. *argentatum*).
- Butterfly-bush (*Buddleja davidii*)[1].

4.2 Phase 1 Habitat Survey Results

Habitat Overview in the Survey Area

4.2.1 The Glaslyn works site contains a variety of habitats typical of rural pastoral farmland, largely characterised by improved and marshy grasslands grazed by cattle and sheep.

4.2.2 Field boundaries are formed by fences, hedgerows, dry stone walls and one cloddiau (dry stone outers with compacted earth, or earth and rubble cores).

4.2.3 Semi-natural vegetation includes grassland types such as semi-improved and marshy grassland. Scrub is mostly scattered and fragmented.

4.2.4 Extensive tree cover is generally uncommon, although there is a significant area of wet woodland (alder carr) at the eastern end of the Glaslyn works site in the Glaslyn SSSI and Meirionnydd Oakwoods and Bat Sites SAC.

4.2.5 Watercourses and drains are present throughout the Glaslyn works site. All ponds have been constructed recently in support of the A487 Porthmadog Bypass, between the highway and parallel railway line. These ponds are generally very shallow and densely vegetated. In the wider survey area, an ornamental garden pond, quarry drainage pond and hospital grounds pond were also recorded. Glaslyn SSSI, at the eastern end of the Glaslyn works site, encompasses a diverse array of semi-natural habitats making it important for floodplain grassland, riverine habitat, and its vascular plant and breeding bird assemblage and broadleaved woodland, particularly alluvial wet woodland.

4.2.6 The habitats recorded during the Phase 1 Habitat survey are provided on **Figure 4.5.A.1 Phase 1 Habitat Survey** in **Appendix A**.

General Habitat Descriptions

Broadleaved Semi-natural Woodland

4.2.7 Although semi-natural broadleaved woodland (including ancient woodland), is in the Glaslyn works site, woodland of this type is largely confined to three main locations.

4.2.8 At the western end, approximately 400 m east of the Wern CSEC, is a rectangular block of semi-natural broadleaved woodland. This woodland comprises even-aged mature trees, some likely originally planted in the nineteenth century but now regenerating naturally. Species include beech (*Fagus sylvatica*), silver birch (*Betula pendula*), sycamore (*Acer pseudoplatanus*) and mature hawthorn (*Crataegus monogyna*).

[1] Historical records >10 years old.

Sycamore and birch are naturally regenerating, and bramble (*Rubus fruticosus* agg.) is also frequent. The ground flora includes tufted hair grass (*Deschampsia cespitosa*), red campion (*Silene dioica*) and bluebell.

4.2.9 Towards the centre of the Glaslyn works site is an area of semi-natural broadleaved woodland also recorded as ancient woodland. Species include pedunculate oak (*Quercus robur*), beech, sycamore, willow (*Salix* sp.). The ground flora is dominated by nettle (*Urtica dioica*) and Himalayan balsam.

4.2.10 At the eastern end of the Glaslyn works site, an area of alluvial wet woodland is present in the Glaslyn SSSI and Meirionnydd Oakwoods and Bat Sites SAC. This woodland comprises an alder (*Alnus glutinosa*) canopy with grey willow (*Salix cinerea*) and scattered ash (*Fraxinus excelsior*). Sessile oak (*Quercus petraea*), hazel (*Corylus avellana*) and downy birch (*Betula pubescens*) also occur in the canopy with scattered young ash and rowan (*Sorbus aucuparia*) and western gorse scrub (*Ulex gallii*) in the shrub layer. Bramble is also common in the woodland.

4.2.11 Further pockets of semi-natural broadleaved woodland are close to the Glaslyn works site, including an area of ancient woodland that abuts the western boundary at the Wern CSEC.

Broadleaved Plantation Woodland

4.2.12 Young broadleaved plantation woodland is present throughout the Glaslyn works site, formed by highway planting along the recently constructed A487 Porthmadog Bypass. Species include hazel, alder, blackthorn (*Prunus spinosa*), oak, willow, rowan and sycamore.

Coniferous Plantation Woodland

4.2.13 Two small areas of coniferous plantation woodland are in the Glaslyn work site; one at the edge of a formal garden at Wern Manor and another as a narrow shelterbelt in the site's centre. The shelterbelt consists of European larch (*Larix decidua*) and Lawson cypress (*Chamaecyparis lawsoniana*).

Mixed Semi-Natural Woodland

4.2.14 A single area of mixed semi-natural woodland borders an access road to Wern Manor from the A497, adjacent to the Glaslyn works site.

Mixed Plantation Woodland

4.2.15 Mixed plantation woodland surrounds the Wern CSEC and includes species such as Leyland cypress (*Cupressus* × *leylandii*), ornamental fir, sycamore, willow, ash, and beech.

Dense or Continuous Scrub

4.2.16 Dense stands of hawthorn, gorse (*Ulex* sp.) and bramble are present in various locations throughout the Glaslyn works site, including along roadside verges and railway lines.

Scattered Scrub

4.2.17 Scattered scrub is present throughout the Glaslyn works site; mainly comprising willow and gorse.

Broadleaved Parkland or Scattered Trees

4.2.18 Scattered trees are present throughout the Glaslyn works site, often aligning field margins and roadside verges. Frequently recorded species include sessile oak, pedunculate oak and sycamore. Scattered trees are also present adjacent to watercourses; a line of scattered trees runs along Y Cyt and Nant yr Afon-oer to the west of the Glaslyn works site.

Grassland and Marsh

Improved Grassland

4.2.19 This habitat is common throughout the Glaslyn works site. Swards comprise a limited range of species typical of heavily grazed pastures such as perennial rye-grass (*Lolium perenne*), crested dog's-tail (*Cynosurus cristatus*) and Yorkshire-fog (*Holcus lanatus*) with commonly occurring herbaceous species including white clover (*Trifolium repens*), greater plantain (*Plantago major*), daisy (*Bellis perennis*), broad-leaved dock (*Rumex obtusifolius*), common sorrel (*Rumex acetosa*), creeping buttercup and dandelion (*Taraxacum officinale* agg.).

Neutral Grassland Semi-improved

4.2.20 Semi-improved neutral grassland is relatively uncommon in the Glaslyn works site. To the east of the A4971, a small ungrazed field is dominated by rough unmanaged grassland containing false oat grass (*Arrhenatherum elatius),* Yorkshire fog, red fescue (*Festuca rubra)* and tormentil (*Potentilla erecta*). The taller grasses grade into a more floristically diverse vegetation where common sorrel, lesser trefoil (*Trifolium dubium*), meadow vetchling (*Lathyrus pratensis*), ribwort plantain (*Plantago lanceolata*) common vetch (*Vicia sativa*), common ragwort (*Jacobaea vulgaris*), sweet vernal grass (*Anthoxanthum odoratum*) and common knapweed (*Centaurea nigra*) were recorded.

4.2.21 A field affiliated with Clwb Chwaraeon Madog (sports club) has likewise been subjected to less agricultural improvement and provides increased botanical diversity over nearby improved fields.

Marshy Grassland

4.2.22 Marshy grassland is a common habitat type throughout the Glaslyn works site. Typically, this habitat is classified by communities with greater than 25% cover of rush species which include jointed rush (*Juncus articulatus*), soft-rush (*Juncus effusus*) and sharp-flowered rush (*Juncus acutiflorus*). Other species characteristic of this habitat include meadowsweet (*Filipendula ulmaria*), marsh thistle (*Cirsium palustre*), tufted hair-grass, creeping buttercup, marsh foxtail (*Alopecurus geniculatus*), floating sweet-grass (*Glyceria fluitans*) and great willowherb (*Epilobium hirsutum*).

4.2.23 The largest areas of marshy grassland with most botanical interest and diversity are at the eastern end of the Glaslyn works site near the Afon Glaslyn. The species composition here includes a hybrid swarm of jointed rush and sharp-flowered rush (*Juncus* × *surrejanus*), soft-rush, cuckooflower (*Cardamine pratensis*), lesser spearwort (*Ranunculus flammula*), ragged robin (*Silene flos-cuculi*), marsh pennywort (*Hydrocotyle vulgaris*), meadowsweet, marsh marigold (*Caltha palustris*), marsh bedstraw (*Galium palustre*) and greater birds-foot trefoil (*Lotus pedunculatus*). Whorled caraway, as well as early marsh-orchid (*Dactylorhiza incarnata* ssp. *incarnata*) and the

hybrid between heath spotted-orchid and early marsh-orchid (*Dactylorhiza* × *carnea*) are also recorded in the Glaslyn SSSI.

4.2.24 It has been observed throughout the duration of the ecological surveys (from 2016-2018 and 2023-24) that the extent of marshy grassland throughout the Glaslyn works site has varied between years and has been influenced by land use and management.

Acid Grassland

4.2.25 A small strip of acid grassland HoPI was recorded in the Glaslyn works site by Cofnod, within Glaslyn SSSI. The Phase 1 Habitat survey confirms the species composition in this specific location aligns with marshy grassland habitat; acid grassland is not present within the Glaslyn works site.

Poor Semi-improved Grassland

4.2.26 The characteristics of this habitat are like those found in semi-improved neutral grassland although the diversity of herbaceous species is much more restricted. This habitat is common throughout the Glaslyn works site and is largely characterised by pasture with a slightly greater diversity of species than the improved grasslands, as well as unmanaged highway verges.

Open Water

Standing Water

4.2.27 There are six water bodies within 50 m of the Glaslyn works site. **See Volume 8, Appendix 4.5.I: Great Crested Newt Report** for additional information. Five have been recently constructed in support of the A487 Porthmadog Bypass, between the highway and parallel railway line. These ponds are generally very shallow and densely vegetated. Plant species that were frequently recorded included common reed (*Phragmites australis*), common reedmace (*Typha latifolia*) fool's water-cress (*Apium nodiflorum*), floating sweet-grass and pondweeds (*Potamogeton* sp.). A sixth mitigation pond is present to the east of the A487- A4971 roundabout vegetated with common reedmace.

Running Water

4.2.28 Running water is present in the form of rivers and drainage ditches, of which the latter are numerous throughout the Glaslyn works site. See **Volume 8, Appendix 4.5.H: Riparian Mammal Report** for additional information. Some of these drainage ditches are intermittent and have flowing water periods during the winter but are often dry during the summer months. Ditches with more stable water levels often support extensive stand of common reed.

4.2.29 The larger watercourses in the Glaslyn works site are the Nant yr Afon-oer and Y Cyt and the Afon Glaslyn. The former varies considerably along its length but, is generally a moderately choked field drain approximately 2-2.5 m wide, dominated by dense stands of common reed interspersed with fool's-water-cress, floating sweet-grass, pondweed and water starwort (*Callitriche stagnalis*). Bankside vegetation is dominated by stands of Himalayan balsam, stinging nettle, docks (*Rumex* sp.), and the occasional stands of common reedmace and great willowherb. The Nant yr Afon-oer and Y Cyt flows west to east and eventually emerges into the Afon Glaslyn.

4.2.30 The Afon Glaslyn is known to support the nationally rare floating water-plantain (*Luronium natans*), which is typically associated with this type of river in Wales. No records of floating water-plantain were provided by Cofnod in the study area, and none were recorded during field surveys; the water in the survey area is too brackish to support the species. The cattle-grazed muddy margins of the Afon Glaslyn support another national rarity, the Welsh mudwort . No signs of Welsh mudwort were found at the time of survey; its closest location is understood to be close to the Cob (a historic causeway built across the Afon Glaslyn) and outside of the Glaslyn works site.

Other Tall Herb and Fern – Tall Ruderal

4.2.31 Discrete patches of tall ruderal vegetation are scattered in the Glaslyn works site in neglected edge habitats. Frequently recorded species are rosebay willowherb (*Chamerion angustifolium*), cow parsley (*Anthriscus sylvestris*) and hogweed (*Heracleum sphondylium*).

Swamp

4.2.32 At the eastern end of the Glaslyn works site, in Glaslyn SSSI, marshy grassland grades into areas of swamp. This area was inaccessible for surveying in 2023/24 due to flooding. However, vegetation recorded during previous surveys in 2016-2018 identified extensive stands of sea club rush (*Bolboschoenus maritimus*), grey club-rush (*Schoenoplectus tabernaemontani*), water horsetail (*Equisetum fluviatile*) and reed canary-grass (*Phalaris arundinacea*). This area is in the Glaslyn works site but outside of any area in which surface works are proposed. Cables are being installed using HDD at this location at approximately 13 m below the ground surface. *Marginal and Inundation – Marginal Vegetation*

4.2.33 Marginal vegetation associated with running water is in the Glaslyn works site, where narrow strips of emergent floating sweet grass (*Glyceria fluitans*), reed canary grass (*Phalaris arundinacea*) and common reed (*Phragmites australis*) were recorded.

Marginal and Inundation – Inundation Vegetation

4.2.34 Inundation vegetation is found along the sandy river banks and small islands of the Afon Glaslyn. Although these areas were inaccessible at the time of survey, the vegetation communities are expected to be unstable due to periodic tidal flows and flooding. This area is in the Glaslyn works site but outside of any area in which surface works are proposed. Cables are being installed using HDD at this location at approximately 13 m below the ground surface.

Dense or Continuous Saltmarsh

4.2.35 At the eastern end of the Glaslyn works site, in Glaslyn SSSI, the marshy grassland is influenced by seawater leakage through the Cob which maintains saltmarsh and brackish conditions over lower marsh areas. This area was inaccessible for surveying in 2023/24 due to flooding. However, vegetation recorded during previous surveys in 2016-2018 identified vegetation dominated by sea rush (*Juncus maritimus*) and slender spike-rush (*Eleocharis uniglumis*) saltmarsh. This area is outside of the Glaslyn works site but inside the survey area.

Miscellaneous

Cultivated Disturbed Land – Arable

4.2.36 Arable land includes cropland, freshly ploughed land and recently reseeded grassland, such as rye clover leys. There are several fields in the centre of the Glaslyn works site that in previous years formed part of a golfing range and then latterly a bike track. These fields have been recently reseeded with perennial rye grass and are being managed for silage.

Cultivated Disturbed Land - Amenity Grassland

4.2.37 Amenity grasslands are intensively managed and regularly mown grasslands such as lawns, playing fields and parks. Amenity grassland is present at several locations in the Glaslyn works site: at a public playing field immediately to the west of the High Street and south of the A487, in the Clwb Chwaraeon Madog and the Ysgol Eifionydd playing field. Typical species included perennial rye-grass, Yorkshire fog and annual meadow-grass (*Poa annua*) with herbs such as daisy, white clover, red clover, dandelion, common mouse-ear (*Cerastium fontanum*) and ribwort plantain (*Plantago lanceolata*).

Ephemeral or Short Perennial

4.2.38 Small, localised patches of ephemeral or short perennial vegetation are recorded within the Glaslyn works site, associated with road and track edges and human habitation

Introduced Shrub

4.2.39 Occasional introduced shrubs typically found along garden edges are present within the Glaslyn works site.

Native Species-rich Hedge

4.2.40 Where the structural species making up the 30 m section of hedgerow include at least five (or at least four in northern and eastern England, upland Wales and Scotland) woody species that are either native somewhere in the UK, or which are archaeophytes, the hedgerow is defined as species-rich (Ref. 4.1). Frequently recorded woody species include hawthorn, blackthorn, willow species, hazel, holly (*Ilex aquifolium*) and rose species (*Rosa* sp.). Following detailed hedgerows surveys, four hedgerows in the Glaslyn works site were classified as species rich, and two of those as 'Important' under the Hedgerow Regulations 1997 (Ref. 2.4). **See Volume 8, Appendix 4.5.B: Hedgerow Report.**

Species-poor Hedge

4.2.41 This classification of hedgerow is defined as those with less than five woody species native to the UK within a 30 m length (or at least four in northern and eastern England, upland Wales and Scotland) (Ref. 4.1). Following detailed hedgerows surveys, three hedgerows in the Glaslyn works site were classified as species-poor. **See Volume 8, Appendix 4.5.B: Hedgerow Report.**

Other Miscellaneous Habitats

4.2.42 The Phase 1 Habitat survey also records other miscellaneous habitats such as 'built-up areas' (e.g. caravan parks and buildings), 'bare ground' and linear habitats such as walls and dry ditches. Whilst these habitats do not contribute to the ecological value of

an area they have been included, where present, for completeness as part of the Phase 1 Habitat survey.

Invasive Non-Native Species

4.2.43 INNS are found frequently in the Glaslyn works site, with Himalayan balsam being especially widespread along the watercourses and drainage ditches. Other species present include Japanese knotweed, montbretia, and American skunk-cabbage (*Lysichiton americanus*). Nuttall's waterweed (*Elodea nuttallii*) was recorded in several drainage watercourses, including the Nant yr Afon-oer, while New Zealand pigmyweed is present in the Afon Glaslyn floodplain, on the eastern side of the river. See **Appendix A: Figure 4.5.A.5: Notable Plants and Fungi and INNS.**

4.3 Habitat Area

4.3.1 A summary of the approximate area or length of each habitat in the Glaslyn works site and the survey area is shown in **Table 4.4.** The percentage contribution of each of the area habitats in the Glaslyn works site and in the survey area is also provided. The linear habitats have been excluded from the percentage contribution calculations.

Table 4-4 – Summary of Habitat Area within the Survey Area

Habitat Type	Phase 1 Habitat Survey Code	Area (ha)/Length (km) (Site Limits)	% Contribution to Site Limits (area only)	Area (ha)/Length (km) (Survey Area Limits)	% Contribution to Survey Area (Area Only)
Broadleaved Semi-natural Woodland	A1.1.1	3.39 ha	3.38	21.94 ha	9.53
Broadleaved Plantation Woodland	A1.1.2	1.11 ha	1.11	3.02 ha	1.31
Coniferous Plantation Woodland	A1.2.2	0.04 ha	0.04	0.08 ha	0.04
Mixed Semi-natural Woodland	A1.3.1	0.03 ha	0.03	0.37 ha	0.16
Mixed Plantation Woodland	A1.3.2	0.52 ha	0.51	0.66 ha	0.28
Dense or Continuous Scrub	A2.1	2.15 ha	2.15	6.93 ha	3.01
Scattered Scrub	A2.2	0.22 ha and 0.42 km	0.22	1.22 ha and 0.56 km	0.53

Habitat Type	Phase 1 Habitat Survey Code	Area (ha)/Length (km) (Site Limits)	% Contribution to Site Limits (area only)	Area (ha)/Length (km) (Survey Area Limits)	% Contribution to Survey Area (Area Only)
Broadleaved Parkland or Scattered Trees	A3.1	1.95 km	0.00	5.2 km 0.72 ha	0.31
Neutral Grassland Semi-improved	B2	6.17 ha	6.16	15.61 ha	6.78
Improved Grassland	B4	19.64 ha	19.57	41.51 ha	18.02
Marshy Grassland	B5	25.66 ha	25.58	49.08 ha	21.31
Poor Semi-improved Grassland	B6	14.56 ha	14.52	25.06 ha	10.88
Other Tall Herb and Fern – Tall Ruderal	C3.1	0.65 ha	0.64	1.32 ha	0.57
Swamp	F1	1.90 ha	1.89	2.62 ha	1.14
Marginal and Inundation – Marginal Vegetation	F2.1	0.32 ha	0.32	0.68 ha	0.30
Marginal and Inundation – Inundation Vegetation	F2.2	0.33 ha	0.33	0.64 ha	0.28
Standing Water	G1	0.06 ha and 0.08 km	0.06	0.16 ha and 0.08 km	0.07
Running Water	G2	1.99 ha and 3.14 km	1.98	5.47 ha and 11.13 km	2.38
Dense or Continuous Saltmarsh	H2.6	0.00 ha	0.00	0.09 ha	0.04
Cultivated Disturbed Land - Arable	J1.1	7.14 ha	7.12	12.17 ha	5.29

Habitat Type	Phase 1 Habitat Survey Code	Area (ha)/Length (km) (Site Limits)	% Contribution to Site Limits (area only)	Area (ha)/Length (km) (Survey Area Limits)	% Contribution to Survey Area (Area Only)
Cultivated Disturbed Land - Amenity Grassland	J1.2	4.43 ha	4.41	10.88 ha	4.72
Ephemeral or Short Perennial	J1.3	0.23 ha	0.23	0.38 ha	0.17
Introduced Shrub	J1.4	0.00 ha	0.00	0.05 ha	0.02
Intact Hedge Native Species-rich	J2.1.1	0.22 km	0.00	0.37 km	N/A
Intact Hedge Species-poor	J2.1.2	0.00 km	0.00	0. 2 km	N/A
Defunct Hedge Species-poor	J2.2.2	0.48 km	0.00	1.1 km	N/A
Hedge and Trees Species-poor	J2.3.2	0.00 km	0.00	0.16 km	N/A
Other Linear Habitats (including fence, wall, dry ditch, earth bank)	J2.4; J2.5; J2.6; J2.8;	3.41 km	N/A	6.589 km	N/A
Other Area Habitats (including caravan sites, buildings, bare ground, hardstanding)	J3.4; J3.6; J4; J5	9.78 ha	9.75	29.65 ha	12.87
The total area used for the percentage contribution calculations was 100.31 ha for the proposed works area and 230.33 ha for the survey area.[2]					

[2] Habitat areas are DRAFT as Glaslyn works site is due to be realigned.

4.4 National Vegetation Classification and Further Botanical Survey Results

Desk Based Assessment

4.4.1 The desk-based assessment identified two areas (Area A and Area B) in which the proposed works have the potential to cause direct impacts to habitats which are also recorded as statutory or non-statutory sites or are particularly species-rich. See **Appendix A: Figure 4.5.A.6 Botanical Survey Locations**.

4.4.2 Area A is in Glaslyn SSSI where construction of an HDD working area is proposed. Cofnod records it as also both coastal and floodplain grazing marsh HoPI and saltmarsh HoPI.

4.4.3 Area B is 130 m west of Glaslyn SSSI where construction of another HDD working area is planned. This area is also recorded as coastal and floodplain grazing marsh HoPI, and the Phase 1 Habitat survey identified it as an area of potential species diversity.

4.4.4 Coastal and floodplain grazing marsh HoPI is present throughout the Glaslyn works site. It is not a habitat type but rather a landscape type which supports a variety of habitats; the defining features are hydrological and topographical rather than botanical. Grazing marsh is defined as periodically inundated pasture or meadow, typically with ditches or rills containing standing brackish or fresh water. Almost all areas are grazed, and some are cut for hay or silage (Ref. 4.2 and Ref. 4.3).

Summary of the NVC Field Survey

4.4.5 An NVC field survey of Area A was conducted in June 2024 and the location of each quadrat is recorded in **Table 4.5**.

Table 4-5 - Central Location of Each Quadrat

Area	Quadrat Number	Central OS NGR
A	1	SH 5902938541
A	2	SH 5904738557
A	3	SH 5906238561
A	4	SH 5908638574
A	5	SH 5911038589

4.4.6 Analysis of the NVC survey data confirmed the NVC plant community M23 *Juncus effusus/acutiflorus-Galium palustre rush* pasture present in Area A.

4.4.7 The quadrat locations are shown in **Appendix A: Figure 4.5.A.6.** Photographs are presented in **Appendix B** and the floristic tables summarising the quadrat survey data are provided in **Appendix C**.

Description: M23 *Juncus effusus/acutiflorus-Galium palustre Rush Pasture* (Area A)

4.4.8 Recorded as Marshy Grassland in the Phase 1 Habitat survey, the NVC survey confirmed Area A as M23 *Juncus effusus/acutiflorus-Galium palustre* grassland. The sampled plant community was on flat ground, regularly grazed by cattle and known to be periodically inundated. The vegetation had a mean sward height of 42 centimetres (cm) at the time of survey, with no bare ground present. Poaching from cattle, although present, was minimal in the surveyed area. The mean species per quadrat was 25, with a range of 22 to 28 species per quadrat.

4.4.9 The plant community supported nine constant species which were recorded in every quadrat: soft-rush, jointed rush or sharp-flowered rush, sweet vernal grass, red fescue, ribwort plantain, greater bird's-foot trefoil, meadow buttercup (*Ranunculus acris),* marsh bedstraw and ragged robin. Soft-rush, greater bird's-foot trefoil and marsh bedstraw are constants for M23 *Juncus effusus/acutiflorus-Galium palustre* rush pasture. The prevalence of jointed rush or sharp-flowered rush makes the surveyed area a good fit for the *Juncus acutiflorus* sub-community.

4.4.10 Whorled caraway was present in three out of five quadrats. Although not present in any surveyed quadrats, a single early marsh-orchid was recorded approximately 60 m to the north of the HDD area, outside the Glaslyn site boundary.

4.4.11 Dwarf spike-rush, Welsh mudwort, lesser butterfly orchid, northern (or Welsh) marsh-orchid, slender spike-rush and small water pepper were not recorded during the NVC survey.

Evaluation: M23 *Juncus effusus/acutiflorus-Galium palustre* Rush Pasture (Area A)

4.4.12 The results of the NVC survey confirm Area A as coastal and floodplain grazing marsh HoPI due to its species composition, periodic inundation and regular grazing by cattle. The species recorded do not align with saltmarsh communities and this part of the Glaslyn SSSI (Area A) does not align with saltmarsh HoPI.

Summary of the Further Botanical Survey

4.4.13 An NVC survey was scheduled for Area B in June 2024; however, cattle restricted access to the full field, making it unsafe to conduct a detailed survey. As an alternative, a comprehensive plant list was compiled from observations made from multiple locations along the field edges using binoculars. The relative abundance of each species was recorded using the DAFOR scale.

4.4.14 The Further Botanical Survey identified the NVC plant community M 23 *Juncus effusus/acutiflorus-Galium palustre* rush pasture present in Area B:

4.4.15 See **Figure 4.5.A.6 Botanical Survey Locations** in **Appendix A** for further information**.** Photographs are presented in **Appendix B** and the floristic tables summarising the quadrat survey data are provided in **Appendix C**.

Description M23 *Juncus effusus/acutiflorus-Galium palustre* Rush Pasture (Area B)

4.4.16 The species recorded and distribution were similar to those recorded in Area A, although whorled caraway was not recorded, and the proportions of grass to rush

species was somewhat greater. This is likely due to Area B being drier than Area A. Nevertheless, an analysis confirms this area as likewise comprising *Juncus effusus/acutiflorus-Galium palustre* rush pasture.

4.4.17 Dwarf spike-rush, Welsh mudwort, lesser butterfly orchid, early marsh orchid, northern (or Welsh) marsh-orchid, slender spike-rush and small water pepper were likewise not recorded during the survey.

Evaluation: M23 *Juncus effusus/acutiflorus-Galium palustre* Rush Pasture (Area B)

4.4.18 The results of the further botanical survey confirm Area B as coastal and floodplain grazing marsh HoPI due to its species composition, periodic inundation and regular grazing by cattle.

5. Conclusion

5.1 Phase 1 Habitat Survey

5.1.1 The survey area encompasses a variety of habitats typical of rural pastoral farmland. The dominant habitat types are improved, poor semi-improved and marshy grassland, comprising 50.21% of the survey area and 59.67% of the Glaslyn works site. Semi-natural woodland is relatively limited in the survey area and primarily concentrated at the western end of the Glaslyn works site and at the eastern end in the Glaslyn SSSI and Meirionnydd Oakwoods and Bat Sites SAC. Aquatic habitats present in the Glaslyn works site comprise ponds, drains, Nant-yr-Afon-oer, Y Cyt and the Afon Glaslyn.

5.1.2 Habitats in the Glaslyn works site would be temporarily lost or disturbed, and small extents would be permanently lost, to facilitate construction and operation of proposed works. However, most habitats would be fully re-instated to their former habitat type on completion of the construction works so there would be limited long-term effects apart from sections of hedgerow and trees within the required easement of the new cables. At the Wern CSEC and adjoining haul road, and at discrete locations where above ground infrastructure is required (link boxes, joint bays), habitat would be permanently lost and fragmented. However, areas of new habitat would be created as part of the landscape mitigation and NBB which could lead to an overall increase in habitat diversity over time as described in the **Volume 8, Appendix 4.5.L: Net Benefit for Biodiversity and Green Infrastructure Statement**.

5.1.3 Statutory and non-statutory designated sites have been identified in the study area. Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC and Glaslyn SSSI and Ty'n-y -berllan cLWS are in the Glaslyn works site. Ysbyty Bron y Garth SSSI is also in the Glaslyn works site but is outside an area in which any works are proposed. Designs have been revised to avoid as far as is possible direct and indirect impacts to statutory and non-statutory designated sites, including extensive usage of HDD drilling techniques to work below such habitats. However, to facilitate the proposed works a small extent of M23 *Juncus effusus/acutiflorus-Galium palustre* grassland habitat in Glaslyn SSSI will be directly impacted by the proposed works. Within Meirionnydd Oakwoods and Bat Sites SAC, all redundant cabling will be left in situ; small areas of scrub in the SAC will be removed to facilitate works to existing link boxes. Localised small-scale works at approximately 500 m intervals will also be required in the SSSI, to make safe existing cables which will be retained *in situ.* Habitat disturbance will be minimised and temporary. Indirect impacts to statutory and non-statutory sites, for example from construction dust, will be mitigated by standard environmental protection measures, which will be outlined in the Construction and Environmental Management Plan (CEMP) (**Volume 8, Appendix 4.2.A: Outline Construction and Environmental Management Plan**). This will include suitable measures to suppress dust, reduce site runoff and reduce spillage risk and water pollution risk.

5.2 National Vegetation Classification/Further Botanical Survey

5.2.1 The NVC survey and Further Botanical survey confirmed that the NVC plant community M23 *Juncus effusus/acutiflorus-Galium palustre* is present in the proposed works area in Area A (Glaslyn SSSI) and in Area B.

5.2.2 This NVC community also qualifies as coastal and floodplain grazing marsh HoPI.

5.3 Potential Impacts and Constraints

5.3.1 Potential effects on habitats and plants from the proposed works and the mitigation measures proposed, are provided in **Pentir to Trawsfynydd Reinforcement Project Environmental Statement (ES) Volume 4 Glaslyn Cables Chapter 5: Ecology and Nature Conservation.**

5.4 Monitoring

5.4.1 Following completion of the proposed works and mitigation, the Glaslyn works will be monitored for the re-establishment of habitats, where recoverable, and the establishment of new compensatory habitat(s). The composition of the colonising plant species will be identified along with the need for any additional management measures, such as removal of pernicious weeds or encroaching scrub that may be detrimental to the habitats. Details of monitoring and management proposals to be implemented following completion of the proposed works is included in **Volume 8, Appendix 4.4.C: Landscape and Ecological Management Plan (LEMP).**

5.5 Enhancement

5.5.1 Recommendations for NBB are in **Volume 8, Appendix 4.5.L: Net Benefit for Biodiversity Assessment and Green Infrastructure Statement.**

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Appendix A – Figures

Figure 4.5.A.1 – Phase 1 Habitat Survey.

Figure 4.5.A.2 – Relevant Statutory Designated Sites for Habitats.

Figure 4.5.A.3 – Relevant Non-statutory Designated Sites for Habitats.

Figure 4.5.A.4 – HoPI and Ancient Woodland.

Figure 4.5.A.5 – Notable Plants and Fungi and INNS.

Figure 4.5.A.6 – Botanical Survey Locations.

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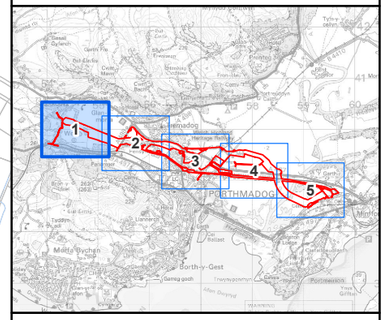
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 50m Buffer of Glaslyn Works Site Boundary

Phase 1 Habitat Feature

- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered tree
- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- G2 - Running water
- G2.2 - Running water - mesotrophic
- J2.1.1 - Intact hedge - native species-rich
- J2.1.2 - Intact hedge - species-poor
- J2.2.2 - Defunct hedge - species-poor
- J2.4 - Fence
- A1.1.1 - Broadleaved woodland - semi-natural
- A1.2.2 - Coniferous woodland - plantation
- A1.3.1 - Mixed woodland - semi-natural
- A1.3.2 - Mixed woodland - plantation
- A2.1 - Scrub - dense/continuous
- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- B4 - Improved grassland
- B5 - Marsh/marshy grassland
- B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- F2.1 - Marginal and inundation - marginal vegetation
- G2 - Running water
- J1.1 - Cultivated/disturbed land - arable
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.4 - Introduced shrub
- J3.6 - Buildings
- J4 - Bare ground
- J5 - Other habitat
- Hardstanding

Rev	Date	Description	GIS	Chk	App
A	04/09/2025	Environmental Statement	CA	RR	NL

nationalgrid

Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.1
PHASE 1 HABITAT SURVEY

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Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:4,000	A3	1 OF 5	A

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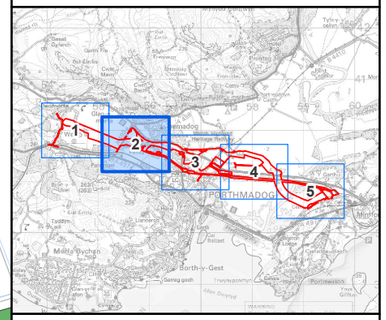
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 50m Buffer of Glaslyn Works Site Boundary

Phase 1 Habitat Feature

- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered tree
- A3.1 - Broadleaved parkland/scattered trees
- G2 - Running water
- G2.2 - Running water - mesotrophic
- J2.1.1 - Intact hedge - native species-rich
- J2.2.2 - Defunct hedge - species-poor
- J2.3.2 - Hedge with trees - species-poor
- J2.4 - Fence
- J2.5 - Wall
- J2.6 - Dry ditch
- A1.1.1 - Broadleaved woodland - semi-natural
- A1.1.2 - Broadleaved woodland - plantation
- A1.2.2 - Coniferous woodland - plantation
- A2.1 - Scrub - dense/continuous
- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- B4 - Improved grassland
- B5 - Marsh/marshy grassland
- B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- F2.1 - Marginal and inundation - marginal vegetation
- G2 - Running water
- J1.1 - Cultivated/disturbed land - arable
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.3 - Cultivated/disturbed land - ephemeral/ short perennial
- J1.4 - Introduced shrub
- J3.6 - Buildings
- J4 - Bare ground
- Hardstanding

Rev	Date	Description	GIS	Chk	App
A	04/09/2025	Environmental Statement	CA	RR	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.1
PHASE 1 HABITAT SURVEY

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Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:4,000	A3	2 OF 5	A

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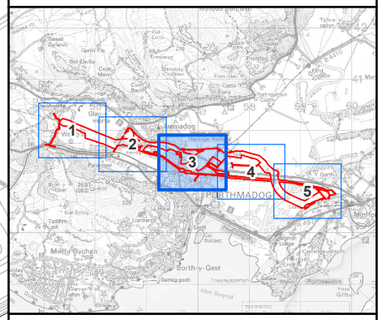
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 50m Buffer of Glaslyn Works Site Boundary

Phase 1 Habitat Feature

- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered tree
- A3.2 - Coniferous parkland/scattered trees
- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- G1 - Standing water
- G2 - Running water
- J2.1.1 - Intact hedge - native species-rich
- J2.1.2 - Intact hedge - species-poor
- J2.2.2 - Defunct hedge - species-poor
- J2.4 - Fence
- J2.5 - Wall
- J2.6 - Dry ditch
- A1.1.1 - Broadleaved woodland - semi-natural
- A1.1.2 - Broadleaved woodland - plantation
- A1.3.1 - Mixed woodland - semi-natural
- A2.1 - Scrub - dense/continuous
- A2.2 - Scrub - scattered
- B2.2 - Neutral grassland - semi-improved
- B4 - Improved grassland
- B5 - Marsh/marshy grassland
- B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- F2.1 - Marginal and inundation - marginal vegetation
- F2.2 - Marginal and inundation - inundation vegetation
- G1 - Standing water
- G2 - Running water
- J1.1 - Cultivated/disturbed land - arable
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.3 - Cultivated/disturbed land - ephemeral/ short perennial
- J1.4 - Introduced shrub
- J3.6 - Buildings
- J4 - Bare ground
- Hardstanding

Rev	Date	Description	GIS	Chk	App
A	04/09/2025	Environmental Statement	CA	RR	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.1
PHASE 1 HABITAT SURVEY

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	04/09/2025	RR	04/09/2025	NL	04/09/2025

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FIGURE	1:4,000	A3	3 OF 5	A

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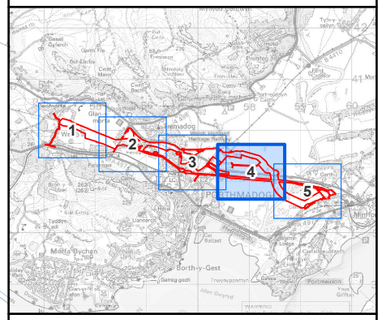
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 50m Buffer of Glaslyn Works Site Boundary

Phase 1 Habitat Feature

- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered tree
- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- G2 - Running water
- J2.2.2 - Defunct hedge - species-poor
- J2.4 - Fence
- J2.5 - Wall
- J2.6 - Dry ditch
- A1.1.1 - Broadleaved woodland - semi-natural
- A1.1.2 - Broadleaved woodland - plantation
- A2.1 - Scrub - dense/continuous
- A2.2 - Scrub - scattered
- B2.2 - Neutral grassland - semi-improved
- B4 - Improved grassland
- B5 - Marsh/marshy grassland
- B6 - Poor semi-improved grassland
- F1 - Swamp
- F2.2 - Marginal and inundation - inundation vegetation
- G1 - Standing water
- G2 - Running water
- J1.2 - Cultivated/disturbed land - amenity grassland
- J3.6 - Buildings
- Hardstanding

Rev	Date	Description	GIS	Chk	App
A	04/09/2025	Environmental Statement	CA	RR	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.1
PHASE 1 HABITAT SURVEY

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FIGURE	1:4,000	A3	4 OF 5	A

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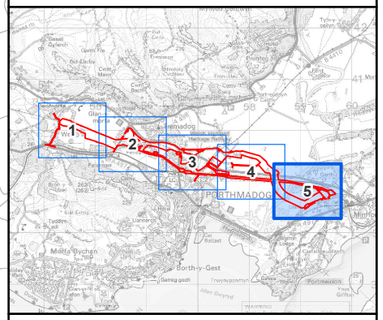

Legend

- Glaslyn Works Site Boundary
- 50m Buffer of Glaslyn Works Site Boundary

Phase 1 Habitat Feature

- A3.1 - Broadleaved parkland/scattered tree
- A3.1 - Broadleaved parkland/scattered trees
- G2 - Running water
- J2.1.1 - Intact hedge - native species-rich
- J2.3.2 - Hedge with trees - species-poor
- J2.4 - Fence
- J2.5 - Wall
- A1.1.1 - Broadleaved woodland - semi-natural
- A2.1 - Scrub - dense/continuous
- B2.2 - Neutral grassland - semi-improved
- B4 - Improved grassland
- B5 - Marsh/marshy grassland
- B6 - Poor semi-improved grassland
- F1 - Swamp
- F2.2 - Marginal and inundation - inundation vegetation
- G1 - Standing water
- G2 - Running water
- H2.6 - Saltmarsh - dense/continuous
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.3 - Cultivated/disturbed land - ephemeral/ short perennial
- J1.4 - Introduced shrub
- J3.6 - Buildings
- J4 - Bare ground
- Hardstanding

Rev	Date	Description	GIS	Chk	App
A	04/09/2025	Environmental Statement	CA	RR	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.1
PHASE 1 HABITAT SURVEY

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	04/09/2025	RR	04/09/2025	NL	04/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:4,000	A3	5 OF 5	A

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N

Afon Ddu SSSI

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Cwmystradllyn

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Penmorfa

Pwllgoleulas

Coed Tremadog NNR

Coed Tremadog SSSI

Pentrefelin

Tiroedd a Glannau Rhwng Cricieth ac Afon Glaslyn SSSI

Pen Llyn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC

Tiroedd a Glannau Rhwng Cricieth ac Afon Glaslyn SSSI

Pen Llyn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC

PORTHMADOG

Glaslyn SSSI

Parc y Borth LNR

Pen Llyn a'r Sarnau / Lleyn Peninsula and the Sarnau SAC

Morfa Harlech SSSI

0 0.5 1 1.5 2

Kilometres

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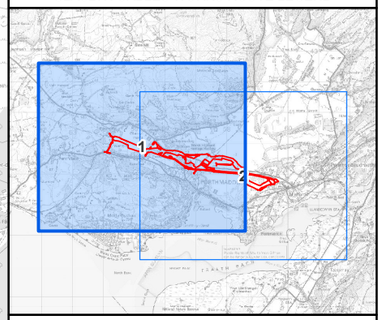

Legend

- Glaslyn Works Site Boundary
- 2km Buffer of Glaslyn Works Site Boundary

Relevant[1] Statutory Designated Sites for Habitats

- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- National Nature Reserve (NNR)
- Local Nature Reserve (LNR)

NOTES

1: Relevant designated sites are those designated for their habitats within 2km of the Glaslyn works site boundary.

Rev	Date	Description	GIS	Chk	App
A	03/09/2025	Environmental Statement	CA	RR	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.2 RELEVANT STATUTORY DESIGNATED SITES FOR HABITATS

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CA	03/09/2025	RR	03/09/2025	NL	03/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:20,000	A3	1 OF 2	A

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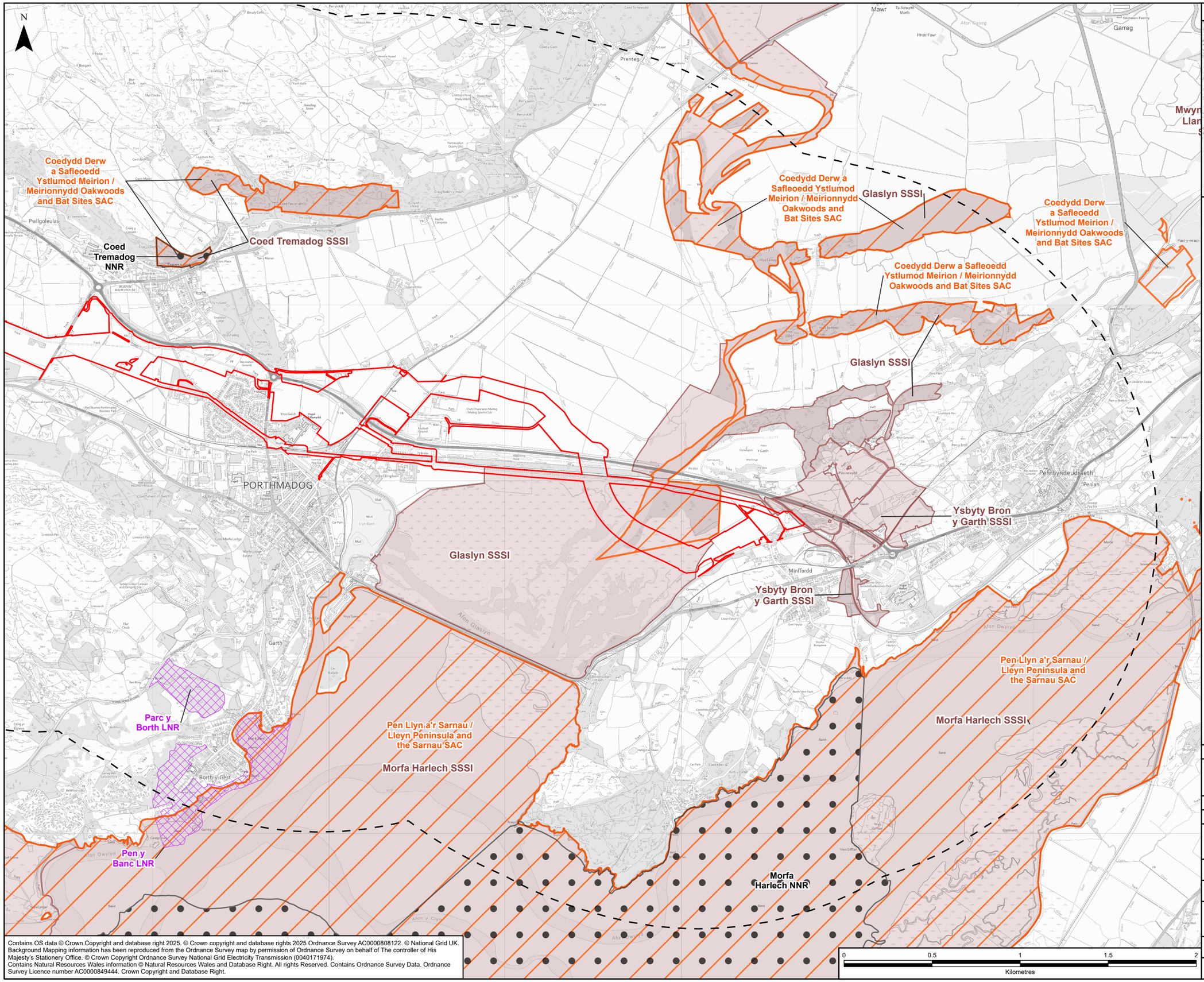

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 2km Buffer of Glaslyn Works Site Boundary

Relevant[1] Statutory Designated Sites for Habitats

- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)
- National Nature Reserve (NNR)
- Local Nature Reserve (LNR)

NOTES

1: Relevant designated sites are those designated for their habitats within 2km of the Glaslyn works site boundary.

Rev	Date	Description	GIS	Chk	App
A	03/09/2025	Environmental Statement	CA	RR	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

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GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.2
RELEVANT STATUTORY DESIGNATED SITES FOR HABITATS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	03/09/2025	RR	03/09/2025	NL	03/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:20,000	A3	2 OF 2	A

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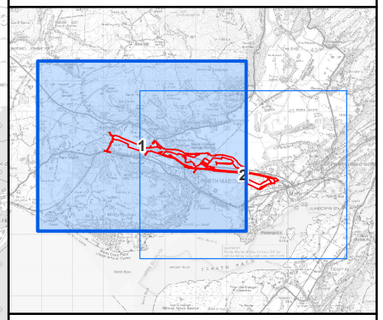
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 2km Buffer of Glaslyn Works Site Boundary

Relevant[1] Non-Statutory Designated Sites for Habitats

- Wildlife Site - Confirmed (WS)[2]
- Wildlife Site - Candidate (cWS)[2]
- North Wales Wildlife Trust Reserve (NWWT)[2]

NOTES

1. Relevant designated sites are those designated for their habitats within 2km of the Glaslyn works site boundary.
2. Wildlife Sites and NWWT Sites data supplied by Cofnod.

Rev	Date	Description	GIS	Chk	App
A	04/09/2025	Environmental Statement	CA	RR	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

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GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.3
RELEVANT NON-STATUTORY DESIGNATED SITES FOR HABITATS

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CA	04/09/2025	RR	04/09/2025	NL	04/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:20,000	A3	1 OF 2	A

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Wildlife Sites data supplied by Cofnod.

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N

Traeth Mawr woodland cWS
Coed Allt-wen cWS
Coed Tan-yr-allt cWS
Coed Tan-yr-allt cWS
Coed Tan-yr-allt cWS
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Hir Ynys bog cWS
Nursery Wood cWS
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Coed Bryn-twr Wern cWS
Penamser cWS
Pen-y-bryn WS
Pen-y-Bwlch WS
Bronygarth Hospital WS
Gwaith Powdwr NWWT
Gwaith Powdwr cWS
Moel-y-Gest cWS
Coed Tu hwnt i'r Bwlch cWS
Traeth Glaslyn NWWT
Abergafren WS
Garth cWS
Cae Canol WS
Bron-y-foel cWS
Borthwen cWS
Coed y Garth cWS
Borth y Gest cWS
Parc y Borth WS
Garreg Wen cWS
Coed Garreg-goch cWS
Hafod Cae Maen cWS
Carreg Wen cWS
Portmeirion Woodlands cWS

PORTHMADOG
Tremadog
Prenteg
Minffordd
Penrhyndeudraeth
Garreg
Afon Glaslyn
Afon Dwyryd
Afon y Glyn

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Wildlife Sites data supplied by Cofnod.

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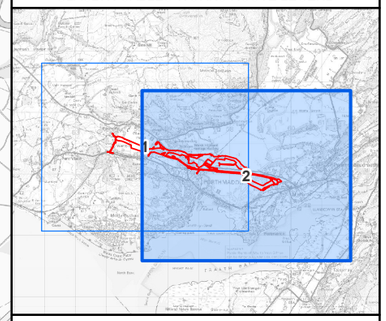
Kilometres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 2km Buffer of Glaslyn Works Site Boundary

Relevant[1] Non-Statutory Designated Sites for Habitats

- Wildlife Site - Confirmed (WS)[2]
- Wildlife Site - Candidate (cWS)[2]
- North Wales Wildlife Trust Reserve (NWWT)[2]

NOTES

1. Relevant designated sites are those designated for their habitats within 2km of the Glaslyn works site boundary.
2. Wildlife Sites and NWWT Sites data supplied by Cofnod.

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

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GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.3
RELEVANT NON-STATUTORY DESIGNATED SITES FOR HABITATS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	04/09/2025	RR	04/09/2025	NL	04/09/2025

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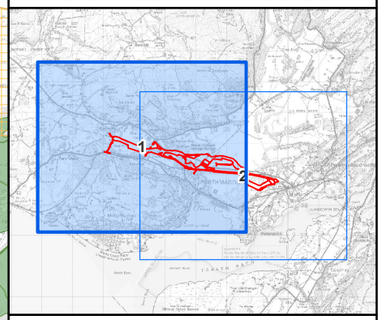
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 2km Buffer of Glaslyn Works Site Boundary

Arboricultural Survey May 2024

- Ancient Tree
- Veteran Tree

Habitats of Principal Importance (HoPI)[1]

- Ancient woodland
- Blanket bog
- Coastal and floodplain grazing marsh
- Lowland dry acid grassland
- Lowland fens and reedbeds
- Lowland heathland
- Maritime cliff and slopes
- Purple moor grass and rush pastures
- Raised bog
- Saltmarsh
- Traditional orchard

NOTES

1. Due to availability of Habitat of Principal Importance (HoPI) data from Data Map Wales, not all HoPI types are shown on the figure.

Rev	Date	Description	GIS	Chk	App
A	29/08/2025	Environmental Statement	CA	RR	NL

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Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.4
HABITATS OF PRINCIPAL IMPORTANCE
& ANCIENT WOODLAND

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CA	29/08/2025	RR	29/08/2025	NL	29/08/2025

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FIGURE	1:20,000	A3	1 OF 2	A

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Kilometres

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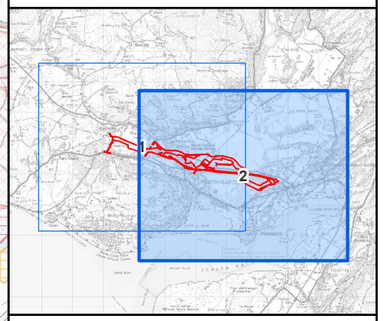

Legend

- Glaslyn Works Site Boundary
- 2km Buffer of Glaslyn Works Site Boundary

Arboricultural Survey May 2024

- Ancient Tree
- Veteran Tree

Habitats of Principal Importance (HoPI)[1]

- Ancient woodland
- Coastal and floodplain grazing marsh
- Lowland dry acid grassland
- Lowland fens and reedbeds
- Lowland heathland
- Lowland meadows
- Maritime cliff and slopes
- Purple moor grass and rush pastures
- Saltmarsh
- Traditional orchard

NOTES

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GLASLYN CABLES WORKS

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HABITATS OF PRINCIPAL IMPORTANCE
& ANCIENT WOODLAND

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Kilometres

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N

Penmorfa

Pwllgoleulas

Allt-wen

Cae-Crwn

Coed Tyn-llan

Coed yr Eglwys

Coed Bryn-tŵr

Coed y Wern

Coed Pen-amser

Coed y Chwarel

Coed y Cefn

Rhes Glanmorfa / Glanmorfa Terrace

Ty N-Llan

PW

El Dist Sta

Butlers Cottage Wern

Sluice

Overflow

Wern Lodge

Cwt Defaid

Bryn-Derwen Cottage

Cefn Cyfanedd

Penamser Farm

Afon Glaslyn

A487

A497

A498

Track

Drain

Path

FB

Iss

Sks

Spr

Ford

Collects

Spreads

59m

56m

41m

25m

26m

18m

14m

21m

5m

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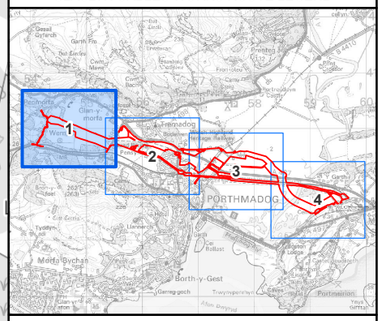
Metres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 50m Buffer of Glaslyn Works Site Boundary

Terrestrial INNS Features (2016 to 2018)[1&3]

- American skunk cabbage (*Lysichiton americanum*)
- American skunk cabbage (*Lysichiton americanum*)
- Himalayan balsam (*Impatiens glandulifera*)

Terrestrial INNS Features (2023 to 2024)[2&3]

- American skunk cabbage (*Lysichiton americanum*)
- Giant rhubarb (*Gunnera tinctoria*)
- Himalayan balsam (*Impatiens glandulifera*)
- Rhododendron (*Rhododendron ponticum*)
- American skunk cabbage (*Lysichiton americanum*)
- Himalayan balsam (*Impatiens glandulifera*)
- Rhododendron (*Rhododendron ponticum*)
- American skunk cabbage (*Lysichiton americanum*)
- Himalayan balsam (*Impatiens glandulifera*)
- Rhododendron (*Rhododendron ponticum*)

INNS Records from Data Search [5]

- American skunk-cabbage (*Lysichiton americanus*)
- Himalayan balsam (*Impatiens glandulifera*)

NOTES

1: The figure includes invasive non-native species (INNS) identified during field surveys from 2016 to 2018. The surveys covered the area for the works site boundary at the time they were undertaken, and may not cover the extent of the current works site boundary.
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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.5
NOTABLE PLANTS AND FUNGI
AND INVASIVE NON-NATIVE SPECIES

Creator:	Date:	Checker:	Date:	Approver:	Date:
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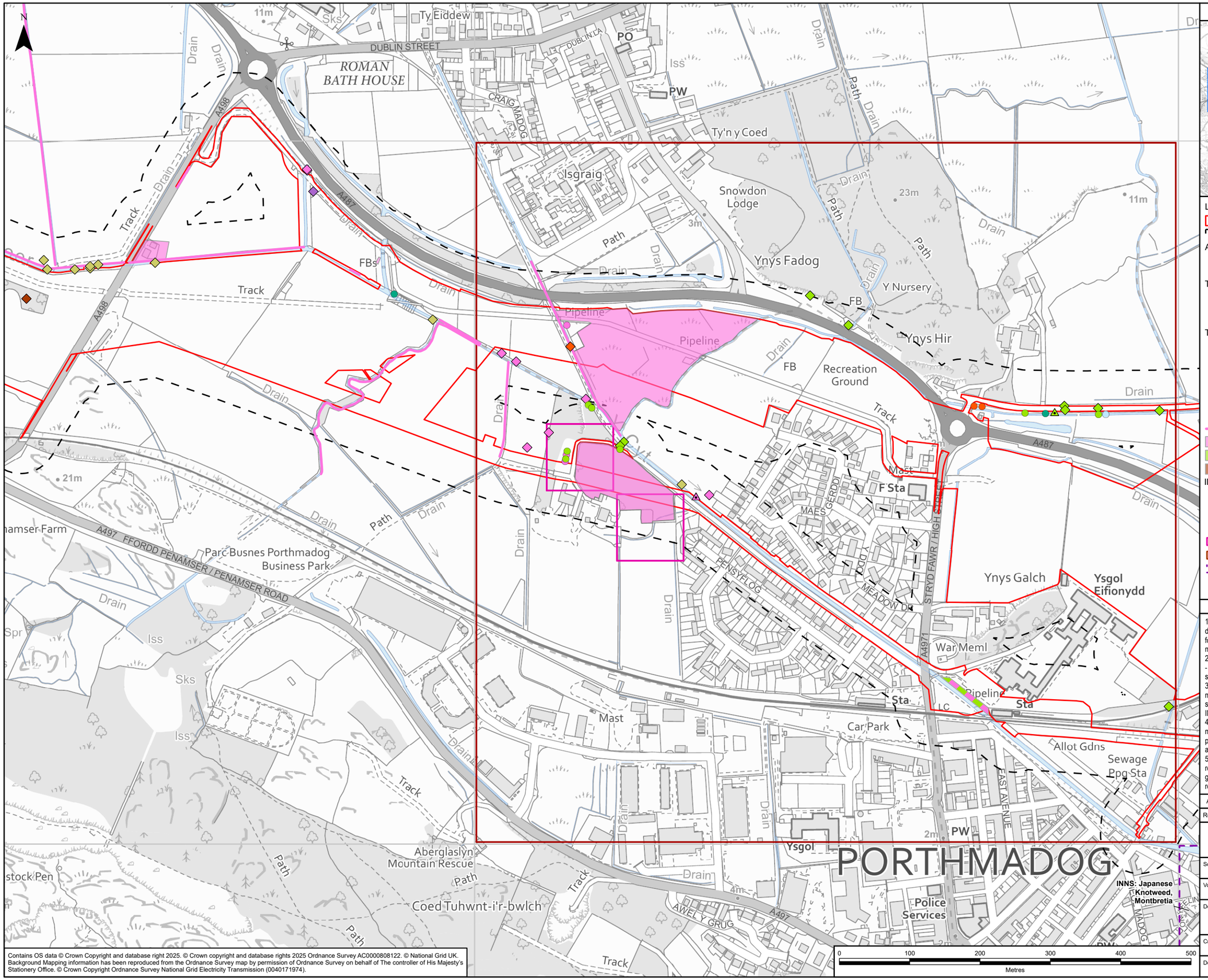

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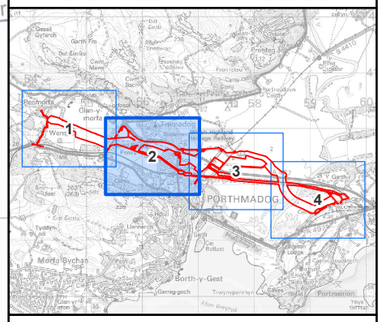

Legend

- Glaslyn Works Site Boundary
- 50m Buffer of Glaslyn Works Site Boundary

Aquatic INNS Features (2016 to 2018)[1&3]

- Nuttall's waterweed (*Elodea nuttallii*)
- Waterweeds (all species) (*Elodea spp.*)

Terrestrial INNS Features (2016 to 2018)[1&3]

- Himalayan balsam (*Impatiens glandulifera*)
- Japanese knotweed (*Reynoutria japonica*)
- Montbretia (*Crocosmia x crocosmiiflora*)

Terrestrial INNS Features (2023 to 2024)[2&3]

- American skunk cabbage (*Lysichiton americanum*)
- Buddleia (*Buddleja davidii*)
- Himalayan balsam (*Impatiens glandulifera*)
- Japanese knotweed (*Reynoutria japonica*)
- Montbretia (*Crocosmia x crocosmiiflora*)
- Rhododendron (*Rhododendron ponticum*)
- Himalayan balsam (*Impatiens glandulifera*)
- Himalayan balsam (*Impatiens glandulifera*)
- Japanese knotweed (*Reynoutria japonica*)
- Rhododendron (*Rhododendron ponticum*)

INNS Records from Data Search [5]

- American skunk-cabbage (*Lysichiton americanus*)
- Himalayan balsam (*Impatiens glandulifera*)
- Japanese knotweed (*Reynoutria japonica*)
- Himalayan balsam (*Impatiens glandulifera*)
- Rhododendron (*Rhododendron ponticum*)
- Multiple INNS Records

NOTES

1: The figure includes invasive non-native species (INNS) identified during field surveys from 2016 to 2018. The surveys covered the area for the works site boundary at the time they were undertaken, and may not cover the extent of the current works site boundary.
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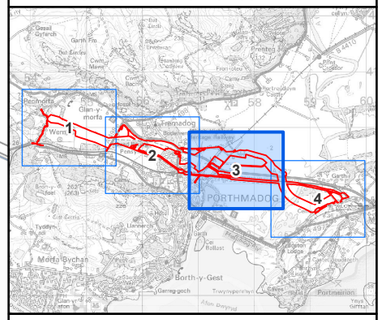

Legend

- Glaslyn Works Site Boundary
- 50m Buffer of Glaslyn Works Site Boundary

Aquatic INNS Features (2016 to 2018)[1&3]

- Waterweeds (all species) (*Elodea spp.*)

Terrestrial INNS Features (2016 to 2018)[1&3]

- Japanese knotweed (*Reynoutria japonica*)

Terrestrial INNS Features (2023 to 2024)[2&3]

- Buddleia (*Buddleja davidii*)
- Japanese knotweed (*Reynoutria japonica*)
- Montbretia (*Crocosmia x crocosmiiflora*)
- Japanese knotweed (*Reynoutria japonica*)

INNS Records from Data Search [5]

- Rhododendron (*Rhododendron ponticum*)
- Multiple INNS Records

Notable Plant Records from Data Search[5]

- Dwarf spike-rush (*Eleocharis parvula*)

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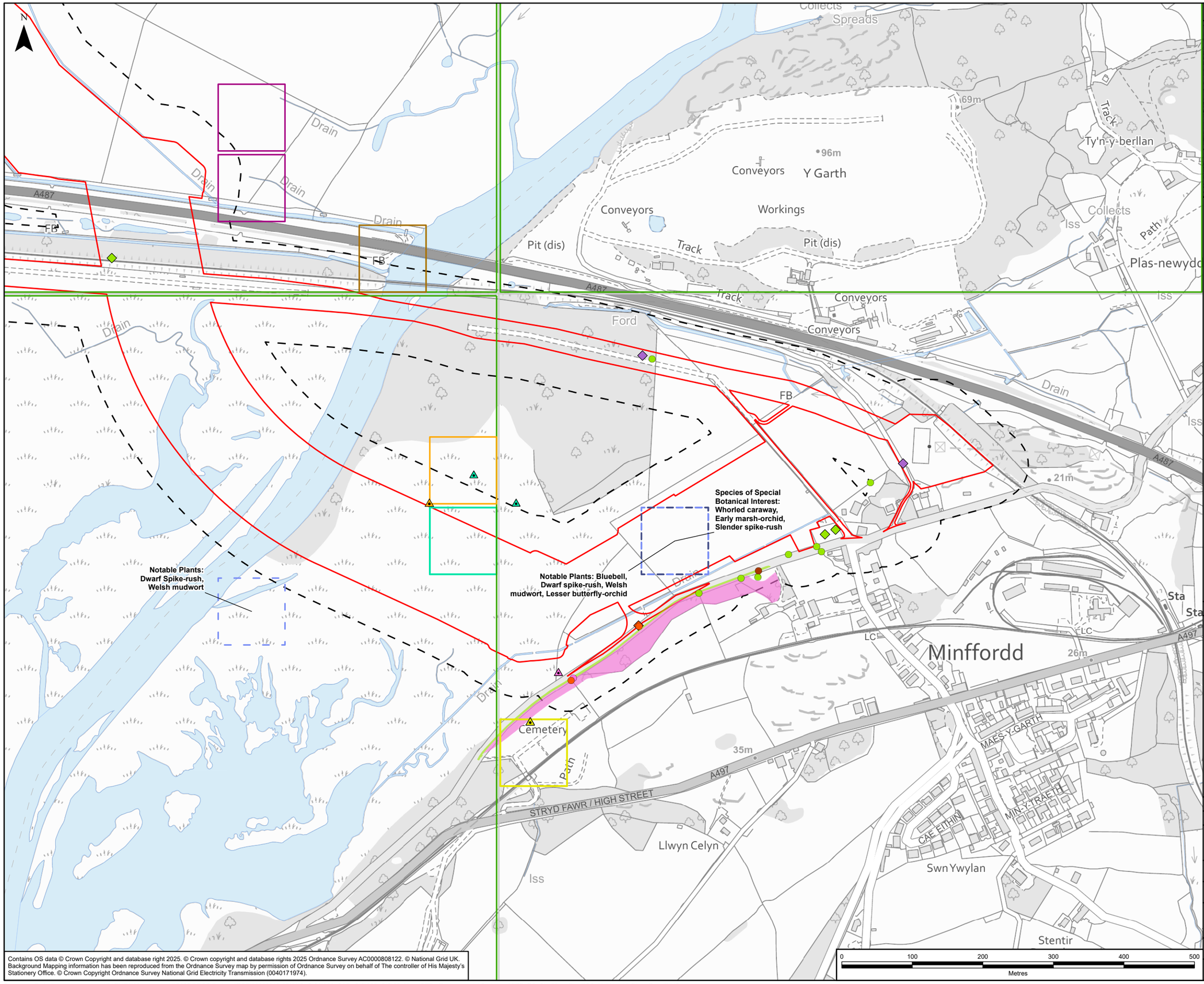

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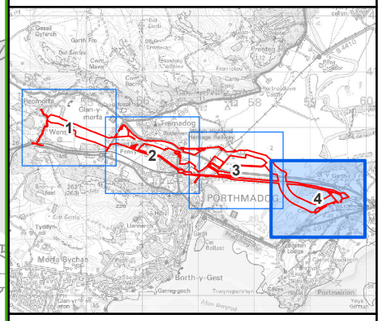

Legend

- Glaslyn Works Site Boundary
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Terrestrial INNS Features (2016 to 2018)[1&3]

- Himalayan balsam (*Impatiens glandulifera*)
- Japanese knotweed (*Reynoutria japonica*)
- Montbretia (*Crocosmia x crocosmiiflora*)
- Rhododendron (*Rhododendron ponticum*)
- Himalayan balsam (*Impatiens glandulifera*)
- Japanese knotweed (*Reynoutria japonica*)

Terrestrial INNS Features (2023 to 2024)[2&3]

- Buddleia (*Buddleja davidii*)
- Japanese knotweed (*Reynoutria japonica*)
- Montbretia (*Crocosmia x crocosmiiflora*)

INNS Records from Data Search [5]

- Himalayan balsam (*Impatiens glandulifera*)
- New Zealand pigmyweed (*Crassula helmsii*)
- New Zealand pigmyweed (*Crassula helmsii*)

Notable Plant Records from Data Search[5]

- Waxcap Mushroom (*Hygrocybe*)
- Dwarf spike-rush (*Eleocharis parvula*)
- Waxcap mushroom (*Hygrocybe*)
- Welsh mudwort (*Limosella australis*)
- Multiple Species Records of Notable Plants

Further Species of Special Botanical Interest from Data Search[5]

- Small water-pepper (*Persicaria minor*)
- Slender spike-rush (*Eleocharis uniglumis*)
- Small water-pepper (*Persicaria minor*)
- Multiple Species Records of Special Botanical Interest

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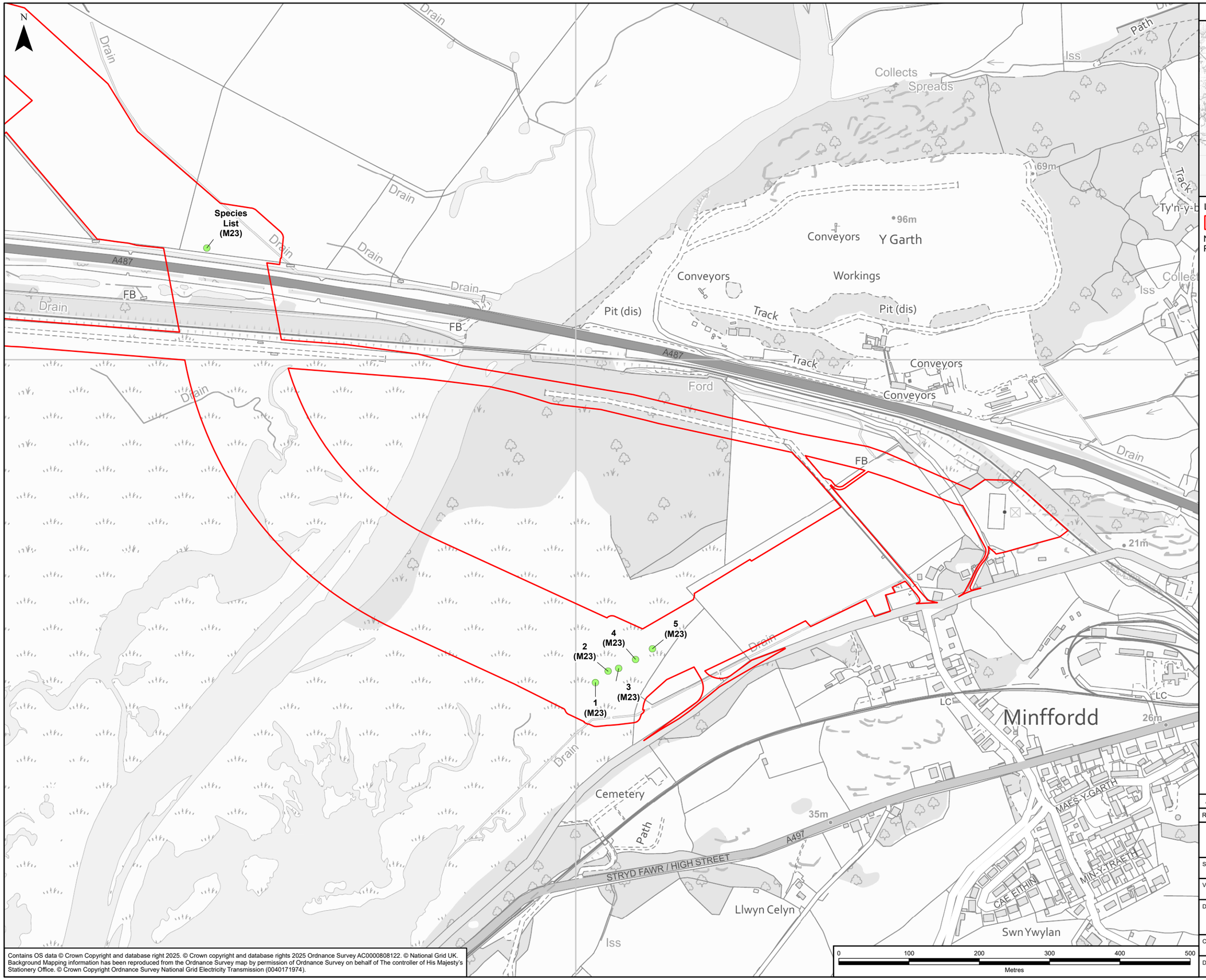
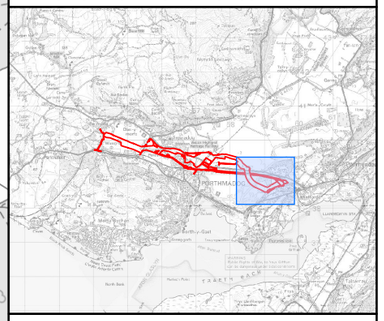


GLASLYN CABLES WORKS ROUTE LEGEND



Legend

Glaslyn Works Site Boundary

NVC Survey Results 2024 - Quadrat Locations and Plant Communities

Juncus effusus/acutiflorus-Galium palustre rush pasture (M23)

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Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.A.6
BOTANICAL SURVEY LOCATIONS

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CA	20/08/2025	RR	20/08/2025	NL	20/08/2025

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FIGURE	1:5,000	A3	1 OF 1	A

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Appendix B – Photos

Phase 1 Habitat Survey Photos



Plate 1: Mixed plantation woodland around Wern CSEC.



Plate 2: Species poor marshy grassland.



Plate 3: Nant yr Afon-oer.



Plate 4: Semi-natural broadleaved woodland.



Plate 5: Extensive Himalayan balsam along ditches.



Plate 6: Improved grassland.



Plate 7: Semi-improved neutral grassland (south-east of A487/A491 roundabout).



Plate 8: Highway drainage ditches.

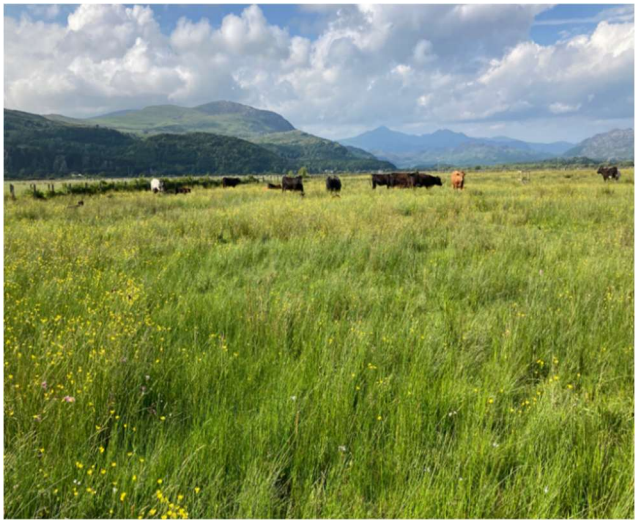




Plate 8: Species rich marshy grassland (Area B).



Plate 9: Mitigation or balancing ponds along the southern boundary of the A487 bypass.



Plate 10: Afon Glalsyn.



Plate 11: Wet woodland (SSSI & SAC).



Plate 12: Glaslyn SSSI west of Afon Glalsyn.



Plate 13: Glaslyn SSSI east of Afon Glaslyn (Area A).



Plate 13: *Scirpus lacustris* ssp. *tabernaemontani* is dominant in places (Glaslyn SSSI – historic photo (2018)).

Plate 14: The creeks have a mat of algae floating on the surface of the water (Glaslyn SSSI – historic photo (2018)).

NVC Survey Photos



Area A: Quadrat 1.



Area A: Quadrat 2.



Area A: Quadrat 3.



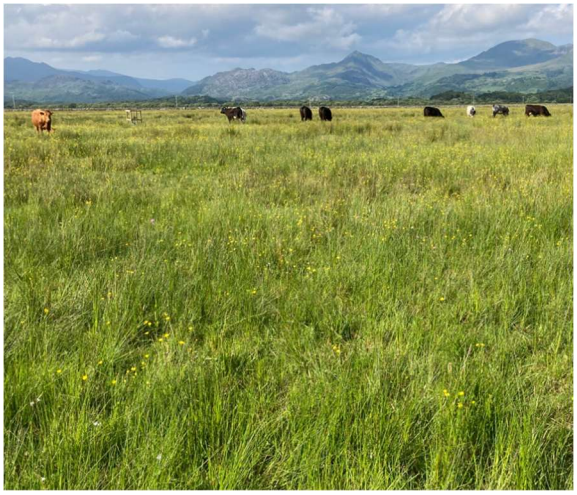
Area A: Quadrat 4.



Area A: Quadrat 5.



Area A: looking north.



Area B: photo from outside fence taken during NVC survey (cattle prevent access) in June 2024.



Area B: photo taken from outside fence during course of ornithological surveys in June 2023.

Appendix C – Floristic Tables

Area A: M23 *Juncus effusus/acutiflorus-Galium palustre* Rush Pasture Floristic Table

Common Name	Scientific Name	Q1	Q2	Q3	Q4	Q5	Frequency	Abundance
Sharp-flowered/jointed rush hybrid	*Juncus × surrejanus*	7	7	7	7	7	V	7
Soft-rush	*Juncus effusus*	7	7	7	7	7	V	7
Sweet vernal-grass	*Anthoxanthum odoratum*	3	4	3	4	4	V	3-4
Ragged robin	*Silene flos-cuculi*	4	4	3	3	4	V	3-4
Red fescue	*Festuca rubra*	4	4	4	4	3	V	3-4
Ribwort plantain	*Plantago lanceolata*	2	4	3	2	3	V	2-4
Meadow buttercup	*Ranunculus acris*	4	4	2	3	4	V	2-4
Marsh bedstraw	*Galium palustre*	4	3	3	2	1	V	1-4
Greater bird's-foot trefoil	*Lotus pedunculatus*	2	3	2	2	2	V	2-3
Yorkshire-fog	*Holcus lanatus*	-	3	3	3	4	IV	3-4
Carnation sedge	*Carex panicea*	4	2	-	3	2	IV	2-4
Lesser spearwort	*Ranunculus flammula*	2	3	3	4	-	IV	2-4
Rough meadow-grass	*Poa trivialis*	-	2	2	2	3	IV	2-3
Creeping buttercup	*Ranunculus repens*	-	3	2	2	3	IV	2-3
Common sorrel	*Rumex acetosa*	-	2	3	3	3	IV	2-3
Meadowsweet	*Filipendula ulmaria*	2	-	2	3	1	IV	1-3
Marsh horsetail	*Equisetum palustre*	2	2	1	1	-	IV	1-2
Devil's-bit scabious	*Succisa pratensis*	1	2	1	2	-	IV	1-2
Marsh pennywort	*Hydrocotyle vulgaris*	6	5	4	-	-	III	4-6
Crested dog's-tail	*Cynosurus cristatus*	-	3	-	4	4	III	3-4
Whorled caraway	*Carum verticillatum*	3	2	3	-	-	II	2-3
Silverweed	*Potentilla anserina*	-	-	3	2	2	III	2-3
Creeping bent	*Agrostis stolonifera*	-	-	3	3	2	III	2-3
Water mint	*Mentha aquatica*	2	2	2	-	-	III	2

Cuckooflower	*Cardamine pratensis*	-	1	-	2	2	III	1-2
Marsh ragwort	*Jacobaea aquatica*	-	-	1	1	2	III	1-2
Marsh cinquefoil	*Potentilla palustris*	-	1	-	2	2	III	1-2
Common spike-rush	*Eleocharis palustris*	4	-	2	-	-	II	2-4
Creeping-Jenny	*Lysimachia nummularia*	-	-	3	3	-	II	3
Pointed spear-moss	*Calliergonella cuspidata*	3	3	-	-	-	II	3
Marsh marigold	*Caltha palustris*	2	-	2	-	-	II	2
Marsh willowherb	*Epilobium palustre*	2	-	-	1	-	II	1-2
Red clover	*Trifolium pratense*	1	-	-	-	1	II	1
Field horsetail	*Equisetum arvense*	-	-	2	-	-	I	2
Cock's-foot	*Dactylis glomerata*	-	-	-	1	-	I	1
Hemlock water-dropwort	*Oenanthe crocata*	1	-	-	-	-	I	1
Tormentil	*Potentilla erecta*	-	-	-	1	-	I	1
Goat willow (sapling)	*Salix caprea*	-	1	-	-	-	I	1

Area B: M23 *Juncus effusus/acutiflorus-Galium palustre* Rush Pasture Floristic Table

Common Name	Scientific Name	DAFOR
Soft-rush	*Juncus effusus*	A
Sharp-flowered/jointed rush hybrid	*Juncus × surrejanus*	A
Meadow buttercup	*Ranunculus acris*	F
Sweet vernal-grass	*Anthoxanthum odoratum*	F
Ribwort plantain	*Plantago lanceolata*	O
Marsh bedstraw	*Galium palustre*	O
Lesser spearwort	*Ranunculus flammula*	O
Cuckooflower	*Cardamine pratensis*	O
Silverweed	*Potentilla anserina*	O
Rough meadow-grass	*Poa trivialis*	O
Common spike-rush	*Eleocharis palustris*	O
Marsh pennywort	*Hydrocotyle vulgaris*	O
Creeping buttercup	*Ranunculus repens*	O
Tufted forget-me-not	*Myosotis laxa*	O
Common sorrel	*Rumex acetosa*	O
Compact rush	*Juncus conglomeratus*	O
Greater bird's-foot trefoil	*Lotus pedunculatus*	R
Yorkshire-fog	*Holcus lanatus*	R
Curled dock	*Runex crispus*	R
Oval sedge	*Carex leporina*	R
Clustered dock	*Runex conglomeratus*	R
Carnation sedge	*Carex panicea*	R
Aster species	*Aster* sp.	R

4.5.B Ecology Report: Glaslyn Hedgerows

nationalgrid

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1. Introduction

1.1 General Background

1.1.1 This document has been prepared on behalf of National Grid Electricity Transmission plc (NGET) who seek to construct and operate the Pentir to Trawsfynydd Reinforcement Project (the 'Project').

1.1.2 This document concerns the section of the Project relating to Glaslyn Cables (the proposed works) and is a Technical Appendix to the Environmental Statement (ES) **Volume 4, Chapter 5: Ecology and Nature Conservation** being submitted as part of the Environmental Impact Assessment (EIA), which accompanies the applications for consent for the Project.

1.2 Description of the Proposed Works

1.2.1 The proposed works are in the administrative boundary of Gwynedd Council, North West Wales, between the existing Wern Cable Sealing End Compound (CSEC) (SH 543401) and existing Garth CSEC (SH 59592 38765), Porthmadog (the 'Glaslyn works site').

1.2.2 The proposed works comprise:

- Extending the existing CSEC at Wern, including a new access road to the east.
- Decommissioning and removal of Garth CSEC.
- Construction of a new CSEC and Tunnel Head House at Minffordd.
- Replacement and upgrading of approximately 6 km of cables between Wern CSEC and Minffordd CSEC.
- Removal of redundant cables in selected locations (with the remainder left *in situ* where constraints, such as ecological, preclude their removal).
- Temporary construction compounds, construction areas and permanent and temporary accesses that are required to install and maintain the infrastructure listed above.

1.2.3 The new cables will be installed through a combination of open cut and non-open cut techniques. The proposed non-open cut technique will be Horizontal Directional Drill (HDD).

1.2.4 A description of the proposed works is provided in **ES Volume 4, Chapter 2: Glaslyn Cable Works**. The location of the Glaslyn works site is shown on ES **Volume 4, Figure 4.2.1**.

1.3 Introduction to the Hedgerow Survey Report

1.3.1 This Hedgerow Survey Report has been prepared as an assessment of the relative importance, nature conservation value and species richness of the hedgerow resource associated with the Glaslyn works site plus a 50 metres (m) buffer. Hedgerows are a highly valued landscape feature that are characteristic of much of lowland Britain. They are important for landscape, archaeological, cultural and agricultural reasons, and are a significant wildlife habitat. Hedgerows provide an essential refuge for many woodland and farmland plants and animals, and act as wildlife corridors allowing movement and dispersal between other habitats (Ref 1.1).

1.3.2 This report identifies where ecologically and historically important hedgerows have been recorded in the Glaslyn works site plus a 50 m buffer, based on the Hedgerow Regulations Act 1997 (the 'Regulations') (Ref 1.2), through a combination of desk-based assessment and field surveys carried out during 2024.

1.3.3 This report also identifies relevant legislation and planning policy relating to hedgerows, which are outlined in **Section 2.**

1.4 Survey Area

1.4.1 All hedgerows in the Glaslyn works site plus a 50 m buffer (the 'Survey Area') were surveyed, as shown in **Appendix A: Figure 4.5.B.1.**

1.5 Objectives

1.5.1 The hedgerow surveys and report:

- Provide baseline information and assessment of hedgerows within the Survey Area, in accordance with the Regulations (Ref. 1.2), to determine if the hedgerows in the Survey Area are classified as ecologically 'Important'.
- Identify hedgerows that may not meet the criteria for importance, but which are of greater species diversity, in particular those that are species-rich.
- Provide the above information to inform the ES (to determine the extent of hedgerow habitat to be lost (temporarily or permanently) by the proposed works).
- Inform the landscape assessment regarding appropriate hedgerow and tree species to include in planting schemes.

1.6 Definition of a Hedgerow

1.6.1 The hedgerow survey followed the approach given in the Hedgerow Survey Handbook (Ref. 1.1) and used the broad definition of a hedgerow developed by the Hedgerow Action Plan Working Group. This defines a hedgerow as:

"any boundary line of trees or shrubs over 20 m long and less than 5 m wide at the base, provided that at one time the trees or shrubs were more or less continuous. It includes an earth bank or wall only where such a feature occurs in association with a line of trees or shrubs. This includes 'classic' shrubby hedgerows, lines of trees,

shrubby hedgerows with trees and very gappy hedgerows (where each shrubby section may be less than 20 m long, but the gaps are less than 20 m).”

1.6.2 Critical consideration is defining where an individual hedgerow starts and stops. To ensure that definable lengths of hedgerow are identified and surveyed consistently, individual hedgerows have been identified with reference to the Hedgerow Survey Handbook (Ref. 1.1):

- The point at which a hedgerow stops and there is a gap of more than 20 m to the next hedgerow (e.g. where the hedgerow ends in the middle of a field).
- The point at which the hedgerow links to a woodland, stands of scrub or a pond.

2. Relevant Legislation and Policy

2.1 Introduction

2.1.1 This section lists the legislation, planning policy framework and guidance that is relevant to plants and habitats.

2.1.2 More detailed information can be found in **Volume 8, Appendix 1.1.A: Legislation, Policy and Guidance**.

2.2 Hedgerows Regulations 1997

2.2.1 The Regulations (Ref. 1.2), made under the Environment Act 1995 (Ref. 2.1), were introduced in England and Wales in 1997 to protect this characteristic element of the countryside.

2.2.2 The Regulations prevent the removal of most countryside hedgerows without first submitting a hedgerow removal notice to the local planning authority. This is not required if the removal is part of a planning application (as is the case for the proposed works). However, the Regulations still have value in these circumstances because the prescribed survey methods result in detailed contextual information to inform ecological impact assessment.

2.2.3 The Regulations specify the criteria to be used to determine which hedgerows are Important. The criteria relate to the value of the hedgerows from an archaeological, historical, landscape or ecological perspective (see **Appendix A**). Hedgerows that are younger than 30 years old are excluded if supportive evidence of age can be provided, as are any hedgerows that mark the boundary of a house.

2.2.4 In addition, the Regulations only apply to hedgerows that meet at least one of these criteria:

- Hedgerows that are 20 m or more long.
- Hedgerows that are less than 20 m long, if they are connected at each end to another hedgerow – thereby forming a continuous network of hedgerows. The length of the adjoining hedgerows is immaterial, the significant factor being the connection.
- Any stretch in one of these hedgerows.
- Any hedgerows that are over 30 years old and qualify as Important under any one of those criteria.

2.3 Environment (Wales) Act 2016

2.3.1 Section 6 of the Environment (Wales) Act 2016 (Ref. 2.2) places a duty on public authorities to "s*eek to maintain and enhance biodiversity … and in so doing promote the resilience of ecosystems, so far as it is consistent with the proper exercise of those functions*."

2.3.2 To assist in complying with this duty, public authorities must have regard to relevant evidence provided in the State of Natural Resources Report (Ref. 2.3) and any relevant area statement for an area in which the authority exercises functions, as well as having regard to the list of species and habitats published under Section 7 of the Act.

2.3.3 Hedgerows are listed under Section 7 of the Act (Boundary and linear features). Section 7 is a list of habitats and species of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales. This list is currently under review by the Welsh Government in consultation with National Resources Wales.

2.4 Planning Policy Wales

2.4.1 Planning Policy Wales – Edition 12 (PPW) (Ref 2.4) is the Welsh Government's principal land use planning document, setting out national policies to guide local development plans and decisions. The PPW promotes sustainable development and the protection of natural and cultural heritage across Wales.

2.4.2 In relation to hedgerows, PPW emphasizes the importance of maintaining and enhancing green infrastructure, biodiversity, and landscape features. Hedgerows are recognized as valuable ecological assets, contributing to wildlife corridors, habitat connectivity, and the character of the countryside. Their protection is encouraged through careful planning and management.

2.5 Local Policy

2.5.1 There are several local planning policies set out in the Anglesey and Gwynedd Joint Local Development Plan 2017 (Ref 2.5) that relate to ecology and nature conservation:

2.5.2 Strategic Policy PS 19 relates to conserving and enhancing the natural environment. This policy requires both the protection and enhancement of biodiversity and to enhance or restore networks of natural habitats (of which hedgerows are included therein) in accordance with Policy AMG 5.

2.5.3 Policy AMG 5 relates to the protection and enhancement of local biodiversity. This policy places the requirement to protect and where appropriate, enhance biodiversity that has been identified as being important to the local area. Further considerations are given to creating, improving and managing wildlife habitats and natural wildlife habitats, which includes hedgerows.

2.5.4 Policy PYCFF 4 relates to retaining, and complementing, natural features through design and landscaping. Hedgerows are mentioned as topographical features to be retained, with the requirement to justify any circumstances that may result in their loss and removal.

2.5.5 The Strategic Policy PS 19 specifically highlights the need to protect, retain or enhance hedgerows of ecological value.

2.5.6 Following a decision by Cyngor Gwynedd and the Isle of Anglesey County Council to cease the joint working agreement on Planning Policy matters on 31 March 2023, the Gwynedd Planning Policy Service has been established.

2.5.7 The process of preparing a new Local Development Plan (LDP) for the Gwynedd Local Planning Authority area only has commenced. The new LDP will cover a period

between 2024 and 2039. The Anglesey and Gwynedd Joint LDP continues to provide the local policy framework for decisions on planning applications, until the Gwynedd LDP is adopted.

2.6 National Grid Policy

2.6.1 National Grid Policy (Ref 2.6) seeks to reduce the fragmentation of our habitats and species, prevent permanent habitat loss, and deliver new opportunities to reconnect the landscape and enhance the natural environment.

2.7 Biodiversity Policy

2.7.1 As a result of devolution and new country-level and international drivers and requirements, much of the work previously carried out by the UK Biodiversity Action Plan (BAP) (Ref 2.7) is now focused at a country-level rather than a UK-level and the UK BAP was succeeded by the UK 2024 Biodiversity Framework (Ref 2.8).

2.7.2 The original UK list of priority species and habitats, however, remains an important reference source and has been used to help draw up statutory lists of priorities in England, Scotland, Wales and Northern Ireland. In Wales the current lists are those under Section 7 of the Environment (Wales) Act 2016 (Ref 2.2), which includes hedgerows as a Habitat of Principal Importance (HoPI) requiring conservation.

2.7.3 The national strategy for biodiversity is delivered at local level via Local Biodiversity Action Plans (LBAP). Species and habitats of local conservation concern or value are included in the LBAP, and an action plan is created for each species and certain habitat types.

2.7.4 The proposed works lies in the Gwynedd Local Authority area for which the LBAP is Natur Gwynedd (Ref 2.9).

2.7.5 Cloddiau are included in the Natur Gwynedd LBAP. These features can support a range of bankside and hedgerow flora and fauna. Hedgerows are also linked with many of the other LBAP Habitat Action Plans and Species Action Plans. No Cloddiau were recorded in the Survey Area.

2.7.6 The Wales Biodiversity Partnership (WBP) (Ref 2.10) brings together key members from the public, private and voluntary sectors to promote and monitor biodiversity and ecosystem action in Wales. WBP provides a leadership role and an expert steer on priorities for action on biodiversity and ecosystems in Wales. The WBP Steering Group has now formally disbanded, and the biodiversity action work programme taken on by the Wales Biodiversity Strategy Board and the WBP working groups.

3. Methods

3.1 Survey Methods

3.1.1 A desk study and field surveys were carried out between May 2023 and October 2024, as detailed in the following sections.

3.2 Desk Study

Ecologically Important Hedgerows

3.2.1 To inform the survey, a desk-top scoping exercise was carried out using aerial photography (Bing and Google), Ordnance Survey (OS) maps, species records and design layouts to identify hedgerows in the Survey Area that could be affected by the proposed works; particular attention was paid where access tracks will intersect with hedgerows.

Historically Important Boundaries

3.2.2 Information was obtained to inform review and identification of historically Important hedgerows in the Survey Area. In line with the guidance on identifying historic hedgerows (**Appendix B)**, the following was obtained:

- Parish boundaries - taken from the 1901 County Series OS map (Ref 3.1).
- Tithe Map hedges - interpreted from the Rectified Tithe Maps (dated between 1838 and 1850) (Ref 3.2). The presence and categorisation of historic hedgerows at these locations were assessed and ground truthed through field surveys.
- Cloddiau were searched for where possible through a combination of desk-based study and field surveys.

3.3 Field Survey

3.3.1 The criteria used to identify Important hedgerows are provided in **Appendix A.**

3.3.2 Hedgerows can be species-rich or species-poor. A species-rich hedgerow has on average five or more woody native or archaeophyte species per 30 m length (Ref 1.2). This should be assessed with reference to the species list provided in Appendix 11 of the Hedgerow Survey Handbook (Ref 1.1). However, (consistent with the Regulations) where the hedgerow concerned occurs in upland Wales this threshold is reduced to four or more woody species. Glaslyn is approximately 5 m above sea level and is not part of “upland Wales”. Species-poor hedgerows are those with an average of four or less woody species per 30 m survey section, or three woody species where the hedgerow concerned is in upland Wales.

3.3.3 Priority hedgerows are those consisting predominantly (i.e. 80% or more cover) of at least one woody UK native tree or shrub species (Ref 1.2).

3.3.4 Climbers such as honeysuckle (*Lonicera periclymenum*) and bramble (*Rubus fruticosus* agg.) are recognised as integral to many hedgerows, however they require other woody plants to be present to form a hedgerow and are not considered trees or shrubs for the purposes of survey.

3.3.5 Phase 1 habitat surveys were conducted between May 2023 and October 2024 to identify and map the habitats present in the Survey Area (Glaslyn works site plus a 50 m buffer). This survey followed the Phase 1 habitat survey methodology (Ref 3.3) and the Hedgerow Survey Handbook (Ref 1.1).

3.3.6 This survey was extended to ground truth historical maps and the Local Environment Records Centre for North Wales data (Ref 3.4) to assess all hedgerows against the Wildlife and Landscape criteria detailed in the Regulations (Ref 1.2) (refer to **Appendix B**). All hedgerows were appraised against the definitions for species-rich or priority hedgerows.

3.3.7 A hedgerow survey of hedgerows within the Survey Area was carried out between May 2024 and October 2024.

3.3.8 Each hedgerow was inspected in its entirety with data gathered on the number of qualifying tree and shrub species present in 30 m survey sections. The number of 30 m survey sections required was determined by the length of the hedgerow concerned (as measured prior to, or during, survey) as follows:

- Where the length of the hedgerow did not exceed 30 m all qualifying tree and shrub species present in the hedgerow were counted.
- Where the hedgerow was 31 – 100 m long, qualifying tree and shrub species were counted for the central 30 m stretch of hedgerow.
- Where the hedgerow was 101 – 200 m long it was divided into equal halves and qualifying tree and shrub species were counted for the central stretch of 30 m in each half of the hedgerow. A mean species count was derived based on this.
- Where the hedgerow was greater than 201 m long it was divided into equal thirds and qualifying tree and shrub species were counted for the central stretch of 30 m in each third of the hedgerow. A mean species count was derived based on this.

3.4 Nature Conservation Evaluation

3.4.1 The Regulations (Ref 1.2) have been applied to identify those hedgerows that qualify as Important under the Regulations. However, the Regulations are intended for a very specific purpose, and it is not appropriate that they be applied as the sole criteria for determining the biodiversity value of hedgerows. Instead, Chartered Institute of Ecology and Environmental Management (Ref 3.5) guidance has been followed to assess the biodiversity value of hedgerows in the Survey Area. This allows resources to be assigned to one of the following geographic scales of value: International, National, County, Borough or District and Local (**Table 3-1**).

3.4.2 The assignment of value to a specific resource requires that the assessor make use of relevant published evaluation criteria (where available). The published evaluation criteria for hedgerows are listed in **Table 3-1** against the relevant geographic scale of biodiversity value and are subsequently described in more detail. Where published

evaluation criteria do not exist, then it has been necessary for the assessor to apply their best judgement, supported by a reasoned argument.

3.4.3 There are no criteria established that would allow the identification of hedgerows of county or higher importance, although general guidance given in Hill *et al.* (2005) (Ref 3.6) has been considered where relevant. Whilst hedgerows are a HoPI in the planning process and are suffering a nationwide deterioration in extent and quality, the habitat has not yet declined to the extent that an individual hedgerow network is of more than county nature conservation value (as supported in the Biodiversity Methods Handbook).

3.4.4 There are no relevant criteria for the identification of hedgerows at borough level or below, only wildlife sites.

Table 3-1 – Geographic scales of biodiversity value listed in descending order of importance and cross-referenced to the relevant published evaluation criteria for hedgerows (Ref 3.5)

Geographic scale of value	Published evaluation criteria
International	No published criteria, not applicable
National	No published criteria but guidance in Hill *et al*. (2005) (Ref 3.6)
County	No published criteria but guidance in Hill *et al*. (2005) (Ref 3.6)
Borough	Not applicable
Local	Not applicable

3.5 Limitations

3.5.1 Ecological desk studies are a valuable tool for understanding the distribution of species and the impact of human activities on ecosystems. However, there are several limitations to these studies. These studies rely on people, companies and authorities to provide and record data. This means that the data may be incomplete or inaccurate, as it is based on the observations of others. Additionally, the data may be biased, as it may be more likely to reflect the presence of common or easily observed species. If a species has been recorded in a particular area, it does not necessarily mean that it is still present. Species can move out of an area over time. As the hedgerows have been surveyed by suitably experienced ecologists this is not seen as a significant limitation.

3.5.2 The Tithe Maps (Ref 3.2) reviewed for the historically Important hedgerows are quite variable, with some having every hedge and road boundary marked, while others appear more sparsely recorded.

4. Results

4.1 Ecologically Important and Species-rich Hedgerows

4.1.1 Two hedgerows (4.5 and 4.6) were classified as important from the seven surveyed hedgerows. This equates to 441 m of ecologically Important hedgerow in the Survey Area. Both Important hedgerows were classified as Important under both criteria 7 & 8 of the Regulations (Ref 1.2), and no hedgerows were classed as Important under any other criteria in the Survey Area. Only hedgerow 4.5 is both Important and within the Glaslyn works site, equating to 94 m of Important hedgerow within the Glaslyn works site. All hedgerows assessed qualified as habitats of principal importance as defined by Section 7 of the Environment Act 2016 (Ref 2.2).

4.1.2 Four hedgerows (4.3, 4.5, 4.6, and 4.7) were classified as species-rich, which equates to approximately 604 m of species-rich hedgerows in the Survey Area. Of these, Hedges 4.3, and 4.5 are both species-rich and within the Glaslyn works site, equating to 169 m of species-rich Hedgerow within the Glaslyn works site. The remaining three hedgerows in the Survey Area (c. 300 m) were assessed as being species-poor.

Table 4-1 – Classification and species richness of hedgerows under the Regulations (Ref 1.2)

Hedgerow ID	Criteria met for importance	Species-rich yes or no
4.1	None	No
4.2	None	No
4.3	None	Yes
4.4	None	No
4.5	7 and 8	Yes
4.6	7 and 8	Yes
4.7	None	Yes

4.2 Priority Hedgerows

4.2.1 All seven of the surveyed hedgerows were comprised of native tree and shrub species, so all are examples of HoPI under section 7 of the Environment (Wales) Act 2016 (Ref 2.2).

4.2.2 None of the hedgerows are associated with a cloddiau, so none are a Natur Gwynedd LBAP and therefore subject, under the LBAP, to Habitat Acton Plans or Species Action Plans.

4.3 Nature Conservation Evaluation

4.3.1 Due to the absence of ancient hedgerows across Gwynedd, only those hedgerows containing cloddiau have a dedicated Habitat Action Plan in the Natur Gwynedd LBAP (Ref 2.10), and hedgerows are not covered by criteria for the identification of Local Wildlife Sites in Gwynedd County.

4.3.2 All surveyed hedgerows are of national priority and nature conservation importance under section 7 of the Environment (Wales) Act (Ref 2.2) with two hedgerows classified as Important under the Regulations (Ref 1.2).

5. Conclusions

5.1.1 Two of the seven assessed hedgerows are Important (4.5 and 4.6) under the Regulations (Ref 1.2). Only Hedgerow 4.5 is both Important and in the Glaslyn works site, equating to 94 m of Important hedgerow in the Glaslyn works site (**Appendix A: Figure 4.5.B.1**).

5.1.2 Four of the seven assessed hedgerows are classified as species-rich hedgerows. Two of these, Hedges 4.3, and 4.5 are both species-rich and in the Glaslyn works site, equating to 169 m of Species-Rich Hedgerow in the Glaslyn works site.

5.1.3 All seven surveyed hedgerows are Priority Habitat section 7 of the Environment (Wales) Act 2016 (Ref 2.2), with all hedgerows containing 80%+ or more coverage of UK native woody species.

5.1.4 The locations of all assessed hedgerows, together with the results of the assessment, are provided in **Appendix A: Figure 4.5.B.1**.

5.1.5 All surveyed hedgerows are of national priority and nature conservation importance under section 7 Priority Habitat under the Environment (Wales) Act 2016 (Ref 2.5). All hedgerows will initially be sought to be retained or improved where possible, and replaced where not.

5.1.6 The Regulations (Ref 1.2) prevent the removal of Important hedgerows without first submitting a hedgerow removal notice to the local planning authority. This is not required if the removal is part of a planning application, as is the case for the proposed works. In cases where a hedgerow is deemed Important according to the Hedgerow Regulations, the local authority may attach a condition to consent, for example that any removal is offset by appropriate mitigation measures. These measures may include reinstatement or replanting to a predefined standard, or the establishment of an equivalent boundary in another location.

5.1.7 Although two hedgerows are Important under the Regulations (Ref 1.2), all of the hedgerows present (as reflected by their status as HoPI) have an inherent ecological value individually and as part of the broader hedgerow network.

5.1.8 Apart from providing habitat for a diverse range of species, hedgerows also act as valuable corridors for wildlife movement. In line with paragraph 192 and the provisions of the Environment (Wales) Act (Ref 2.2), and the Local Plan (Ref 2.9), any development proposals for the Glaslyn works site should prioritise the preservation and enhancement of these corridors for the benefit of wildlife. Opportunities for hedgerow enhancement should include targeted gap planting with locally appropriate native species, management to encourage structural diversity, and the creation of buffer strips to improve connectivity with adjacent habitats. Such measures strengthen the resilience of the hedgerow network, increase its biodiversity value, and ensure compliance with best practice for habitat conservation.

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Appendix A – Figures

Figure 4.5.B.1: Hedgerow Survey.

N

Penmorfa

A487

59m

Track

Coed Tyn-llan

Coed yr Eglwys

Ty N-Llan

PW

Track

Drain

Nant yr Afon-oer

H4.1

H4.2

El Dist Sta

Coed Bryn-tŵr

56m

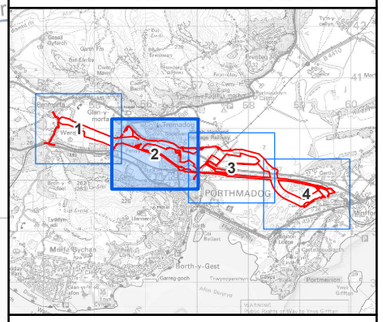
Track

Drain

Drain

Drain

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 50m Buffer of Glaslyn Works Site Boundary

Hedgerow Survey Results

- Important Hedgerow Species Rich
- Unimportant Hedgerow Species Rich
- Unimportant Hedgerow Species Poor

Rev	Date	Description	GIS	Chk	App
A	05/08/2025	Environmental Statement	MH	SR	NL

nationalgrid

Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.B.1
HEDGEROW SURVEY

Creator:	Date:	Checker:	Date:	Approver:	Date:
MH	05/08/2025	SR	05/08/2025	NL	05/08/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:5,000	A3	2 OF 4	A

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Metres

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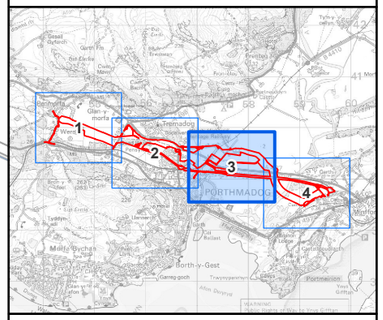
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

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- 50m Buffer of Glaslyn Works Site Boundary

Rev	Date	Description	GIS	Chk	App
A	05/08/2025	Environmental Statement	MH	SR	NL

nationalgrid

Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

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MH	05/08/2025	SR	05/08/2025	NL	05/08/2025

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Collects
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Track
Ty'n-y-berllan
96m
Conveyors
Y Garth
Conveyors
Workings
Collects
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Plas-newydd
Pit (dis)
Track
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Drain
Drain
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A487
FB
FB
A487
Track
Conveyors
Conveyors
Ford
Drain
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FB
H4.7
Drain
21m
A487
Drain
Sta
Sta
LC
LC
A497
Minffordd
26m
Cemetery
Path
35m
A497
STRYD FAWR / HIGH STREET
MAES-Y-GARTH
MAN-Y-TRAETH
CAE EITHIN
Llwyn Celyn
Swn Ywylan
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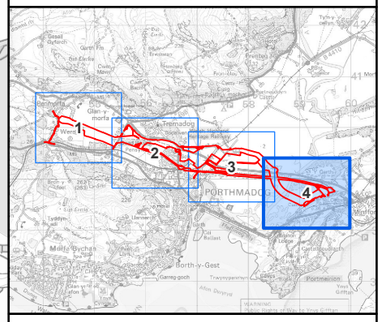
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 50m Buffer of Glaslyn Works Site Boundary

Hedgerow Survey Results

- Unimportant Hedgerow Species Rich

Rev	Date	Description	GIS	Chk	App
A	05/08/2025	Environmental Statement	MH	SR	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.B.1
HEDGEROW SURVEY

Creator:	Date:	Checker:	Date:	Approver:	Date:
MH	05/08/2025	SR	05/08/2025	NL	05/08/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:5,000	A3	4 OF 4	A

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Appendix B – Hedgerow Regulations Criteria

Wildlife and Landscape Criteria

In Gwynedd a hedgerow is Important for Wildlife and Landscape if it is at least 30 years old and meets one of the criteria for importance given below.

6. (1) The hedgerow—

(a) contains species listed or categorised as mentioned in sub-paragraph (3); or

(b) is referred to in a record held immediately before the relevant date by a biological record centre maintained by, or on behalf of, a local authority within the meaning of the Local Government Act 1972, and in a form recognised by the Nature Conservancy Council for England, the Countryside Council for Wales or the Joint Nature Conservation Committee, as having contained any such species—

(i) in the case of animals and birds, subject to sub-paragraph (2), within the period of five years immediately before the relevant date.

(ii) in the case of plants, subject to sub-paragraph (2), within the period of ten years immediately before the relevant date;

(2) Where more than one record referable to the period of five or, as the case may be, ten years before the relevant date is held by a particular biological record centre, and the more (or most) recent record does not satisfy the criterion specified in sub-paragraph (1)(b), the criterion is not satisfied (notwithstanding that an earlier record satisfies it).

(3) The species referred to in sub-paragraph (1) are those—

(a) listed in Part I (protection at all times) of Schedule 1 (birds which are protected by special penalties), Schedule 5 (animals which are protected) or Schedule 8 (plants which are protected) to the Wildlife and Countryside Act 1981;

(b) categorised as a declining breeder (category 3) in “Red Data Birds in Britain” Batten LA, Bibby CJ, Clement P, Elliott GD and Porter RF (Eds.), published in 1990 for the Nature Conservancy Council and the Royal Society for the Protection of Birds (ISBN 0 85661 056 9); or

(c) categorised as “endangered”, “extinct”, “rare” or “vulnerable” in Britain in a document mentioned in sub-paragraph (4).

(4) The documents referred to in sub-paragraph (3)(c) are—

(a) of the books known as the British Red Data Books:

1.“Vascular Plants” Perring FH and Farrell L, 2nd Edition, published in 1983 for the Royal Society for Nature Conservation (ISBN 0 902484 04 4);

2.“Insects” Shirt DB (Ed.), published in 1987 for the Nature Conservancy Council (ISBN 0 86139 380 5); and

3.“Invertebrates other than insects” Bratton JH (Ed.), published in 1991 for the Joint Nature Conservation Committee (ISBN 1 873701 00 4); and

(b) of the books known as the Red Data Books of Britain and Ireland:“Stoneworts” Stewart NF and Church JM, published in 1992 for the Joint Nature Conservation Committee (ISBN 1 873701 24 1).

7. (1) Subject to sub-paragraph (2), the hedgerow includes—

(a) at least 7 woody species;

(b) at least 6 woody species, and has associated with it at least 3 of the features specified in sub-paragraph (4);

(c) at least 6 woody species, including one of the following—black-poplar tree *(Populus nigra ssp betulifolia*); large-leaved lime (*Tilia platyphyllos*); small-leaved lime (*Tilia cordata*); wild service-tree (*Sorbus torminalis*); or

(d) at least 5 woody species, and has associated with it at least 4 of the features specified in sub-paragraph (4),

and the number of woody species in a hedgerow shall be ascertained in accordance with sub-paragraph (3).

(2) Where the hedgerow wholly or partly in the county (as constituted on 1st April 1997) of the City of Kingston upon Hull, Cumbria, Darlington, Durham, East Riding of Yorkshire, Hartlepool, Lancashire, Middlesbrough, North East Lincolnshire, North Lincolnshire, Northumberland, North Yorkshire, Redcar and Cleveland, Stockton-on-Tees, Tyne and Wear, Upland Wales, West Yorkshire or York, the number of woody species mentioned in paragraphs (a) to (d) of sub-paragraph (1) is to be treated as reduced by one.

(3) For the purposes of sub-paragraph (1) (and those of paragraph 8(b))—

(a) where the length of the hedgerow does not exceed 30 metres, count the number of woody species present in the hedgerow;

(b) where the length of the hedgerow exceeds 30 metres, but does not exceed 100 metres, count the number of woody species present in the central stretch of 30 metres;

(c) where the length of the hedgerow exceeds 100 metres, but does not exceed 200 metres, count the number of woody species present in the central stretch of 30 metres within each half of the hedgerow and divide the aggregate by two;

(d) where the length of the hedgerow exceeds 200 metres, count the number of woody species present in the central stretch of 30 metres within each third of the hedgerow and divide the aggregate by three.

(4) The features referred to in sub-paragraph (1)(b) and (d) (which include those referred to in paragraph 8(b)) are—

(a) a bank or wall which supports the hedgerow along at least one half of its length;

(b) gaps which in aggregate do not exceed 10% of the length of the hedgerow;

(c) where the length of the hedgerow does not exceed 50 metres, at least one standard tree;

(d) where the length of the hedgerow exceeds 50 metres but does not exceed 100 metres, at least 2 standard trees;

(e) where the length of the hedgerow exceeds 100 metres, such number of standard trees (within any part of its length) as would when averaged over its total length amount to at least one for each 50 metres;

(f) at least 3 woodland species within one metre, in any direction, of the outermost edges of the hedgerow;

(g) a ditch along at least one half of the length of the hedgerow;

(h) connections scoring 4 points or more in accordance with sub-paragraph (5);

(i) a parallel hedge within 15 metres of the hedgerow.

(5) For the purposes of sub-paragraph (4)(h) a connection with another hedgerow scores one point and a connection with a pond or a woodland in which the majority of trees are broad-leaved trees scores 2 points; and a hedgerow is connected with something not only if it meets it but also if it has a point within 10 metres of it and would meet it if the line of the hedgerow continued.

8. The hedgerow—

(a) is adjacent to a bridleway or footpath, within the meaning of the Highways Act 1980, a road used as a public path, within the meaning of section 54 (duty to reclassify roads used as public paths) of the Wildlife and Countryside Act 1981, or a byway open to all traffic, within the meaning of Part III of the Wildlife and Countryside Act 1981, and

(b) includes at least 4 woody species, ascertained in accordance with paragraph 7(3) and at least 2 of the features specified in paragraph 7(4)(a) to (g).

Archaeology and History Criteria

In Wales a hedgerow is important for archaeology and historic if it meets the following criteria from Schedule 1 of the Hedgerow Regulations:

1. The hedgerow marks the boundary, or part of the boundary, of at least one historic parish or township; and for this purpose “historic” means existing before 1850.

2. The hedgerow incorporates an archaeological feature which is—

(a) included in the schedule of monuments compiled by the Secretary of State under section 1 (schedule of monuments) of the Ancient Monuments and Archaeological Areas Act 1979(7); or

(b) recorded at the relevant date in a Sites and Monuments Record.

3. The hedgerow—

(a) is wholly or partly within an archaeological site included or recorded as mentioned in paragraph 2 or on land adjacent to and associated with such a site; and

(b) is associated with any monument or feature on that site.

4. The hedgerow—

(a) marks the boundary of a pre-1600 AD estate or manor recorded at the relevant date in a Sites and Monuments Record or in a document held at that date at a Record Office; or

(b) is visibly related to any building or other feature of such an estate or manor.

5. The hedgerow—

(a) is recorded in a document held at the relevant date at a Record Office as an integral part of a field system pre-dating the Inclosure Acts(8); or

(b) is part of, or visibly related to, any building or other feature associated with such a system, and that system—

(i) is substantially complete; or

(ii) is of a pattern which is recorded in a document prepared before the relevant date by a local planning authority, within the meaning of the 1990 Act(9), for the purposes of development control within the authority's area, as a key landscape characteristic.

Appendix C – Survey Data

Table C-1 – Ecological features of the hedgerows surveyed, and confirmation of whether they are species-rich or important under the Regulations, Criteria 7 (Ref. 1.2)

Hedge ID	Hedge length (m)	>30 years old?	Mean number of qualifying woody species	*Significant number of trees (no. of trees in hedgerow)?	*Three woodland herbs within 1m of hedge margins	*Gaps <10% of hedge?	*Bank or wall along at least half of hedge?	*Ditch along at least half of hedge?	*Connections scoring four points or more (points scored)?	*Parallel hedge within 15 m?	Protected species (as defined by the Regs)	Important hedgerow?	Species – rich?
4.1	200	✓	3	x (0)	x	✓	x	✓	x (0)	x	x	x	x
4.2	400	✓	2	x (0)	x	✓	x	✓	x (0)	x	x	x	x
4.3	85	✓	5	x (1)	x	✓	x	x	x (2)	x	x	x	✓
4.4	100	✓	2	x (1)	x	✓	✓	x	x (0)	x	x	x	x
4.5	300	✓	5	x (0)	✓	✓	x	x	x (0)	✓	x	✓	✓
4.6	200	✓	5	✓ (5)	✓	✓	x	x	x (2)	✓	x	✓	✓
4.7	170	✓	5	x (1)	x	✓	✓	x	x (1)	x	x	x	✓

***** Relate to the criteria for Importance under Section 7 and Section 8 of the Regulations (Ref. 1.2). Four or more of those asterisked features must be met to be Important under Section 7 with two or more features required to be Important under Section 8.

Table C-2 – Summary of hedgerows located parallel to BOATs (bridleway, footpath or byway open to all traffic) and whether they are important under paragraph 8 of the Regulations (Ref 1.2)

Hedge ID	Adjacent to BOAT	4+ woody species (see Table C-1)	2+ of * criteria (see Table C-1)	Important hedgerow?
4.1	x	x	✓	No
4.2	x	x	✓	No
4.3	✓	✓	x	No
4.4	x	x	✓	No
4.5	✓	✓	✓	Yes
4.6	✓	✓	✓	Yes
4.7	x	✓	✓	No

Table C-3 – Woody species (trees and shrubs) recorded from each of the seven hedgerows surveyed.

Hedge ID	Ash (*Fraxinus excelsior*)	Blackthorn (*Prunus spinosa*)	Common hawthorn (*Crataegus monogyna*)	Cypress (*Cupressus* sp.)	Elder (*Sambucus nigra*)	Hazel (*Corylus avellana*)	Holly (*Ilex aquifolium*)	Pedunculate oak (*Quercus robur*)	Privet (*Ligustrum* sp.)	Rose species (*Rosa* sp.)	Sessile oak (*Quercus petraea*)	Silver birch (*Betula pendula*)	Sycamore (*Acer pseudoplatanus*)	Willow species (*Salix* sp.)	Total
4.1			✓								✓			✓	3
4.2			✓								✓				2
4.3		✓	✓									✓	✓	✓	5
4.4			✓	✓					✓						3
4.5		✓	✓						✓				✓	✓	5
4.6	✓	✓	✓		✓	✓	✓	✓						✓	8
4.7		✓	✓			✓				✓	✓			✓	6

4.5.C: Aquatic Ecology Report

nationalgrid

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1. Introduction

1.1 Background

1.1.1 This appendix details the approach and findings of the aquatic ecology desk study and aquatic ecology surveys of freshwater habitats undertaken in 2024 for the Glaslyn element of the Pentir to Trawsfynydd Reinforcement Project and has been prepared by AECOM on behalf of National Grid Electricity Transmission plc (NGET). Baseline data presented in this appendix has been used to inform the assessment in the Environmental Statement (ES) **Volume 4, Chapter 5: Ecology and Nature Conservation**.

1.1.2 The terms of reference used to describe the Proposed Development in this report are broadly consistent with those defined in the main chapters of the ES.

1.1.3 This appendix is supported by **Figure 4.5.C.1** Aquatic Survey Locations (Annex 1).

1.2 Project Description

1.2.1 This appendix of the ES covers the Glaslyn Cables only (as shown in ES **Volume 4 Figure 4.2.2**):

- The proposed works are in Gwynedd, north-west Wales, between the existing Wern Cable Sealing End Compound (CSEC) (SH 543401) and the proposed Minffordd CSEC (SH 593387), Porthmadog (the 'Glaslyn works site').
- The Glaslyn works site covers an area approximately 0.35 hectares; however, the permanent development will be entirely within the existing substation footprint. The land within the Trawsfynydd works site would comprise the existing Trawsfynydd Substation, the access road, office and welfare facilities, material storage areas, laydown areas and car parking.
- The proposed works comprise:
  - Extending and upgrading the existing CSEC at Wern.
  - Decommissioning and removal of Garth CSEC.
  - Replacement of Garth CSEC with the new Minffordd CSEC.
  - Replacement of approximately 6 km of cables between Wern CSEC and Minffordd CSEC.
  - Removal of redundant cables in selected locations (with the remainder left in situ where constraints, such as ecology, preclude their removal).
  - Temporary construction compounds, construction areas and permanent and temporary accesses that are required to install and maintain the infrastructure listed above.
- The new cables will be installed through a combination of open cut and non-open cut techniques. The proposed non-open cut technique will be Horizontal Directional Drill (HDD)
- Based on the proposed works, the potential impacts associated with the Construction phase have been outlined below:

- Habitat loss – direct impacts associated with changes in land use resulting from the proposed works. For example, short-term temporary changes in land use associated with open trenching to facilitate the cable burial works under watercourses and permanent change in land use owing to the creation of a permanent watercourse crossings.
- Habitat degradation – direct or indirect impacts resulting in the reduction in the condition of a habitat and its suitability for some or all the species it supports, e.g. changes in water from construction.
- Species mortality – direct impacts on species populations associated with mortalities due to construction activities, e.g. open trenching in watercourses.
- Species disturbance – indirect impacts resulting from a change in normal conditions (i.e. light, noise, vibration, human activity) that result in individuals or populations of species changing behaviour or range.
- Spread of INNS – construction methods resulting in spread of INNS and degradation of habitats.

- Based on the proposed works, the potential impacts associated with the Operational phase have been outlined below:
  - Species disturbance – direct impacts resulting from Electromagnetic fields (EMF) being emitted from the buried High Voltage Cabales (HVC) that result in individuals or populations of fish changing behaviour or range.

1.3 Scope

1.3.1 The desk study and survey work undertaken in 2024 and reported in this appendix:

- Outline the legislation and guidance relevant to fish, aquatic macrophytes and aquatic macroinvertebrates;
- Present relative desk study information;
- Provide species data and information on the aquatic macroinvertebrate, macrophyte and fish species and assemblages in the relevant area
- Inform the ecological impact assessment and identification of mitigation measures (where required)

1.3.2 Recommendations for any avoidance, mitigation and enhancement for aquatic species are provided in ES **Volume 4, Chapter 5: Ecology and Nature Conservation**.

1.4 Study Area

1.4.1 The Study Area was defined to include ecological features likely to be at risk from direct and indirect impacts that might arise from the proposed works and is the initial basis for determining a Zone of Influence (ZoI). CIEEM guidance (Ref. 1.1) defines a ZoI as: "…*the area over which biodiversity features may be affected by biophysical changes as a result of the proposed project and associated activities*".

1.4.2 The ZoI is based on the:

- Nature of the proposed works, activities, and the potential for effects at the construction, operation and maintenance phases.

- Nature of the land use and habitats in the vicinity, the number of watercourses and waterbodies, their connectivity within and outside of the proposed works area and how they may be used by different species or species groups.
- Habitats, behaviours and preferences of different species or species groups and whether these could be affected both spatially and temporally.

1.4.3 In determining the extent of the ZoI in this assessment, consideration has been given to the fact that these works form a component of a larger overall Project.

1.4.4 All designated sites, sensitive habitats, and protected and notable species that occur within the ecological ZoI of the proposed works have been considered in this assessment.

2. Legislation

2.1.1 This assessment has been undertaken in the context of the following legislative instruments, planning policies and guidance documents:

- Convention on the Conservation of Migratory Species (CMS) of Wild Animals 1979 (or Bonn Convention) (Ref 2.1);
- Convention on Wetlands of International Importance ('Ramsar convention') (Ref 2.2);
- The Trade in Endangered Species of Wild Fauna and Flora (Amendment) (EU Exit) Regulations 2018 (Ref 2.3);
- Joint Nature Conservation Committee (JNCC) Global Red List (Ref 2.4);
- The Council of Europe's Convention on the Conservation of European Wildlife and Natural Habitats 1979 (or Bern Convention) (Ref 2.5);
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive') (Ref 2.6);
- Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 2.7);
- Oslo and Paris Conventions (OSPAR) 1992 (Ref 2.8);
- Environmental Protection Act 1990 (Ref 2.9);
- Environment (Wales) Act 2016 (Ref 2.10);
- The Salmon and Freshwater Fisheries Act (1975) (Ref 2.11);
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 'Water Framework Directive' or WFD) (Ref 2.12);
- Wildlife and Countryside Act 1981 (as amended) (WCA) (Ref 2.13);
- The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 2.14);
- The Eels (England and Wales) Regulations 2009 (Ref 2.15);
- Natural Environment and Rural Communities (NERC) Act 2006 (Ref 2.16); and
- JNCC Biodiversity Framework (2024) (Ref 2.17).

3. Methods

3.1 Desk Study

3.1.1 A desk-based study was conducted to identify nature conservation designations, protected and priority habitats and species relevant to the Proposed Works.

3.1.2 Designated sites in the Study Area were screened using the Multi Agency Geographic Information for the Countryside (MAGIC) website (Ref 3.1) and using data provided by Cofnod (Ref 3.2) obtained in November 2024, the North Wales Environmental Information Service, following the below criteria:

- 10 km from the Glaslyn works site for statutory designated sites of international nature conservation value with aquatic interest (Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Wetlands of International Importance that have been designed under the criteria of the Ramsar Convention of Wetlands (Ramsar) (Ref 2.2), as well as proposed or potential sites);
- 5 km from the Glaslyn works site for other statutory designated sites of aquatic interest (Site of Special Scientific Interest (SSSI), National Nature Reserves (NNR) and Local Nature Reserve (LNR));
- 2 km from the Glaslyn works site for non-statutory sites for nature conservation (e.g. Local Wildlife Sites (LWS), candidate LWS (cLWS) and Sites of Importance for Nature Conservation (SINC)).
- 2 km from the Glaslyn works site for Habitats of Principal Importance (HoPI), as listed under Section 7 of the Environment (Wales) Act (2016) (Ref 2.10);

3.1.3 Records of notable (protected and invasive) aquatic receptors (fish, macroinvertebrates, and macrophyte species) within 2 km of the Glaslyn works site from the last 10 years (2014 onwards) were collected from the following sources:

- Cofnod – the Local Environmental Records Centre for North Wales (Ref 3.2);
- National Biodiversity Network Atlas database (Ref 3.3) – records with licences allowing for commercial use (OGL, CCO and CC-BY); and,
- Natural Resources Wales (NRW) DataMapWales website (Ref 3.4, Ref 3.5 and Ref 3.6)

3.1.4 Water Framework Directive (WFD) waterbodies within 2 km of the Glaslyn works site was also collected from the NRW DataMapWales website (Ref 3.7).

3.2 Aquatic surveys

3.2.1 Survey sites were selected according to where watercourses were being crossed in the Glaslyn works area and have potential to be affected. A total of 21 sites were scheduled to be surveyed and those where species surveys were not recommended due to being unsuitable are represented by ‘n/a’ in the below table (**Table 3-1** - Glaslyn aquatic survey sites and **Figure 4.5.C.1**). The survey sites comprised of both Main Rivers and ordinary watercourses, all of which would be crossed by the proposed works

3.2.2 All surveys where access was possible were completed in their respective optimal seasons (see subsequent sections) in 2024.

Table 3-1 - Glaslyn aquatic survey sites

Site ID	National grid reference	Aquatic scoping	Macro-invertebrates	Macrophytes	Fish habitat	Fish
2A	SH 58708 38705	✓	✓	n/a	n/a	n/a
2B	SH 58547 39068	✓	✓	n/a	n/a	n/a
2C	SH 58547 39134	✓	✓	n/a	n/a	n/a
2D	SH 57016 39281	✓	✓	✓	✓	✓
2E	SH 57067 39545	✓	✓	n/a	n/a	n/a
2F	SH 56312 39686	✓	✓	✓	✓	✓
2G	SH 56127 39727	✓	✓	n/a	n/a	n/a
2H	SH 55947 39742	✓	✓	n/a	n/a	n/a
2I	SH 55044 39855	✓	✓	n/a	n/a	n/a
2J	SH 54807 39988	✓	✓	✓	✓	✓
2K	SH 57164 39441	✓	✓	✓	✓	n/a
2L	SH 57040 39511			Dry channel		
2M	SH 58552 38861	✓	✓	n/a	n/a	n/a
2N	SH 55936 39714	✓	✓	n/a	n/a	n/a
3 - Church	SH 54085 40300	✓	✓	n/a	n/a	n/a
3A	SH 53138 40457	✓	✓	n/a	n/a	n/a
Unnamed ditch - Tributary of Afon Glaslyn	SH 57858 39525	n/a	n/a	✓	✓	✓

Aquatic scoping surveys

3.2.3 During the initial visit to each survey site, aquatic scoping surveys were completed. This involved a qualified aquatic ecologist completing a walkover to assess the site for its suitability for notable aquatic species (protected and invasive) and the requirement for additional species surveys. This is based on expert judgement and involves assessing hydromorphological features of a watercourse, water quality, and the surrounding riparian environment.

Aquatic macroinvertebrate surveys

3.2.4 Aquatic macroinvertebrate surveys were undertaken at 14 sites in spring and autumn 2024. The specific locations and dates of the surveys are shown in **Table 3-2**.

Table 3-2 - Aquatic macroinvertebrate survey locations and dates

Water crossing reference ID	Watercourse name	Site name	National grid reference	Survey date	Season	Distance from the RLB
HDD.06	Afon Glaslyn	2A	SH 58695 38724	4/6/2024	Spring	Within
			SH 58908 39167	3/11/2024	Autumn	0.18 km north-east
HDD.06	Afon Glaslyn Tributary	2B	SH 58815 39043	3/11/2024	Autumn	0.04 km north-east
HDD.06/NRW.D.12	Afon Glaslyn Tributary	2C	SH 58642 39119	3/11/2024	Spring	0.08 km east
			SH 58315 39167	3/11/2024	Autumn	0.01 km south
NRW.MR.06	Unknown Tributary of Y Cyt	2D	SH 57024 39283	4/06/2024	Spring	Within
			SH 57029 39327	4/11/2024	Autumn	Within
HDD.05/NRW.MR.07	Unnamed Tributary of Y Cyt	2E	SH 57072 39546	4/06/2024	Spring	Within
NRW.MR.05	Unknown Tributary of Y Cyt	2F	SH 56306 39684	5/06/2024	Spring	Within
			SH 56280 39623	3/11/2024	Autumn	0.02 km south
NRW.D.02	Y Cyt	2G	SH 56108 39762	5/06/2024	Spring	Within
			SH 56124 39737	3/11/2024	Autumn	Within
HDD.04/NRW.MR.04	Y Cyt	2H	SH 55960 39745	5/06/2024	Spring	Within
NRW.D.02			SH 56161 39632	3/11/2024	Autumn	0.05 km south
HDD.02	Nant yr Afon-oer Tributary	2I	SH 55045 39849	4/06/2024	Spring	Within
			SH 55070 39919	3/11/2024	Autumn	Within

Water crossing reference ID	Watercourse name	Site name	National grid reference	Survey date	Season	Distance from the RLB
HDD.01/NRW.MR.01	Afon Bontafaen	2J	SH 54807 39972	4/06/2024	Spring	Within
			SH 54807 40013	4/11/2024	Autumn	Within
HDD.06/NRW/D.12	Afon Glaslyn Tributary	2K	SH 57637 39220	3/11/2024	Autumn	0.05 km north
HDD.06	Afon Glaslyn Tributary	2M	SH 58590 38853	3/11/2024	Autumn	Within
NRW.D.11	Unnamed Tributary Of Y Cyt	2N	SH 58869 39679	3/11/2024	Autumn	0.57 km north-east
Crossing at Afon Bontfaen	Afon Bontfaen	3A	SH 53725 40081	04/11/2024	Autumn	0.51 km west
Crossing at Unnamed Tributary of Nant yr Afon-oer	Unnamed Tributary of Nant yr Afon-oer	3-Church	SH 54085 40300	04/11/2024	Autumn	0.09 km west

3.2.5 The aquatic macroinvertebrate surveys were undertaken by suitably qualified and experienced aquatic ecologists. Sampling procedures followed those standardised by the Environment Agency (Ref 3.8), which conform to British Standard-European Standard-International Organisation for Standardisation (BS-EN-ISO) 10870:2012 Water Quality – Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters (Ref 3.9). These methods allow characterisation of aquatic macroinvertebrate communities and can be used to determine whether rare or notable species or communities are present. The samples were taken using a standard Freshwater Biological Association (FBA) (Ref 3.10) pattern kick net (mesh size: 1 mm). The habitats present were proportionally sampled through a combination of kick sampling and sweep sampling for three minutes followed by a one-minute active search of larger substrates in accordance with the standard methods. Collected samples were subsequently preserved in Industrial Methylated Spirit (IMS) for laboratory processing. No surveys were undertaken during or immediately following periods of high flow in accordance with best practice guidance.

3.2.6 Each of the samples collected was sorted and analysed in a laboratory setting by suitably trained and experienced aquatic ecologists. Lists of the aquatic macroinvertebrate taxa present were produced in line with Environment Agency guidance (Ref 3.8). The samples were identified to 'mixed-taxon level' using a stereo-microscope and identified to species level (where practicable), except for the following:

- Worms (Oligochaeta), which were identified to sub-class; Worms (Oligochaeta), which were identified to sub-class;
- Marsh beetles (Scirtidae), which were identified to family;
- True-fly larvae, which were identified to the maximum resolution possible; and

- Immature or damaged specimens, which were identified to the maximum resolution possible on a case-by-case basis.

3.2.7 Aquatic macroinvertebrate species were cross referenced against the JNCC Taxon Designations list (Ref 3.11) and the Nature Recovery Action Plan Wales Section 7 Priority species list to identify if any protected and/or notable species were identified. The survey data was then used to calculate metrics that can be used to inform an assessment of relative nature conservation value, habitat condition and general degradation as detailed below.

Community Conservation Index (CCI)

3.2.8 A Community Conservation Index (CCI) (Ref 3.12) was calculated for each site as detailed in **Appendix A.** The CCI classifies many groups of aquatic macroinvertebrates according to their scarcity and nature conservation value in the UK as understood at the time that the classification was developed. Species scores range from 1 to 10, with 1 being Very Common and 10 being Endangered. Since its initial publication, in some cases the references used in the CCI classification to define scarcity and value have been superseded by more recent assessments. The most recent scores have been used in this report.

Lotic-invertebrate Index for Flow Evaluation (LIFE)

3.2.9 Lotic-invertebrate Index for Flow Evaluation (LIFE) scores were calculated (Ref 3.13). This is an index that links benthic macroinvertebrate data to flow regimes prevailing in UK waters. Flow scores have been allocated to various macroinvertebrates based on species/family abundance and ecological association with different flows, as detailed in **Appendix B**. The overall LIFE score for a site is calculated as the sum of the individual scores divided by the number of scoring species/families. LIFE scores increase with current velocity, scores <6.00 generally indicating sluggish or still water conditions and score >7.5 indicate fast flows. LIFE allows the mean flow preference of invertebrates colonising a site to be determined so that effect of habitat changes such as sediment accumulation can be monitored.

Proportion of Sediment-sensitive Invertebrates (PSI)

3.2.10 Calculations were undertaken to determine the proportion of sediment sensitive macroinvertebrates present using the Proportion of Sediment-sensitive Invertebrates (PSI) index (Ref 3.14). Using this approach, individual taxa of aquatic macroinvertebrate are assigned a Fine Sediment Sensitivity Rating (FSSR) ranging from A to D, as detailed in **Appendix C**. The PSI score for each aquatic macroinvertebrate sample was derived from individual species scores and abundances. The derived PSI score corresponds to the percentage of fine sediment-sensitive taxa present in a sample and ranges from 0 to 100, where low scores correspond to watercourses with high fine sediment cover. The PSI score provides an indication of the extent to which watercourses are influenced by fine sediments, and therefore by inference the potential sensitivity of the associated aquatic macroinvertebrate community to changes in silt load and deposition.

Whalley, Hawkes, Paisley & Trigg (WHPT)

3.2.11 The aquatic macroinvertebrate data were analysed to generate the Whalley, Hawkes, Paisley & Trigg (WHPT) score Average Score Per Taxon (ASPT), and Number of scoring taxa (NTAXA) values, which provides an indication of the ecological quality in the watercourse (Ref 3.15). This assigns numerical value to taxa according to their sensitivity to organic pollution. The average of the values for each taxon in a sample,

known as ASPT is a stable and reliable index of organic pollution. Therefore, these assessments can indicate to what extent an aquatic macroinvertebrate community is exposed to organic pollution (further information is provided in **Appendix D.** It is important to note that these indices can vary between geological regions and habitat types. Ditches for example are unable to support many of the high-scoring taxa associated with fast flowing habitats. Therefore, the resultant metrics should be reviewed with an awareness of their potential limitations, and the site-specific context, as described in this report.

3.2.12 The WHPT method has been primarily designed to respond to organic pollution, however it is suitable for monitoring other types of impact and is used for assessing the WFD classification parameter “General degradation” (Ref 3.15).

River Invertebrate Classification Tool (RICT)

3.2.13 The resultant WHPT-ASPT and NTAXA values and environmental data collected were processed through the River Invertebrate Classification Tool version 3 (RICT) web application, available on the Freshwater Biological Association website (Ref 3.10).

3.2.14 RICT predicts the WHPT-ASPT and NTAXA scores for the surveyed locations based on the site location, altitude, alkalinity, slope, discharge category, distance from source, channel dimensions and substrate composition. The predicted scores are then compared to actual scores and the output is an Ecological Quality Ratio (EQR). The EQR can be translated into a WFD classification (High, Good, Moderate, Poor, or Bad). Alkalinity data should be obtained from monthly analysis of samples from each over a period of at least one year, whereas here, alkalinity was based on the average of two samples collected during the survey visits, which is typical for an assessment of this type.

3.2.15 Analysis using RICT is only suitable for freshwater (not estuarine or marine) sites on rivers or streams that are naturally permanently flowing. RICT analysis was not undertaken for those sites identified as ditches due the nature (i.e., not naturally permanently flowing condition) of the field drain habitats comprising the survey reaches.

Aquatic Macrophyte surveys

3.2.16 Aquatic Macrophyte surveys were completed at five locations by a suitably qualified aquatic ecologist in the optimal survey season (1st of June to 30th of September) – 9th to 13th September 2024 (

3.2.17 **Table** 3-3). The surveys were not undertaken during or immediately after periods of high flow.

Table 3-3 - Aquatic macrophyte survey locations and dates

Water crossing reference ID	Watercourse name	National Grid Reference			Survey date	Distance from works site
Water crossing reference ID	**Watercourse name**	**Upstream**	**Mid**	**Downstream**		
HDD.01/NRW.MR.01	Afon Bontfaen	SH 54808 40028	SH 54803 39945	SH 54795 39828	17/09/2024	Within
NRW.D.09	Unnamed ditch - Tributary of Afon Glaslyn 1	SH 57859 39529	SH 57855 39477	SH 57824 39460	17/09/2024	Within
HDD.05/NRW.D.07	Unnamed ditch - Tributary of Afon Glaslyn 2	SH 57136 39467	SH 57172 39439	SH 57209 39397	17/09/2024	Within
NRW.MR.06	Unnamed Tributary of Y Cyt 1	SH 57050 39377	SH 57031 39322	SH 57014 39269	18/09/2024	Within
NRW.MR.05	Unnamed Tributary of Y Cyt 2	SH 56283 39654	SH 56326 39698	SH 56368 39719	18/09/2024	Within

3.2.18 The aquatic macrophyte surveys followed guidance set out in the UKTAG River Assessment Method (Macrophytes and Phytobenthos) for use with LEAFPACS2(Ref 3.16), which conforms to BS EN 14184:2014 Water quality - Guidance for the surveying of aquatic macrophytes in running waters (Ref 3.17). The survey was carried out by walking in the channel of each watercourse along a 100 m transect, where safely accessible. Any inaccessible areas were bypassed as necessary before re-entering the channel at the next available access point. A list of macrophytes encountered was collated and their relative abundance was recorded using Taxon Cover Values, detailed below (**Table 3-4**).

Table 3-4 - Taxon cover value and corresponding percentage macrophyte cover

TCV	Percentage cover by macrophyte taxon
B	Bank only
C1	<0.1%
C2	0.1 to 1%
C3	1 to 2.5%
C4	2.5 to 5%
C5	5 to 10%
C6	10 to 25%
C7	25 to 50%
C8	50 to 75%
C9	>75%

3.2.19 Aquatic macrophyte data was processed through the River LEAFPACS2 calculator, available from the WFD UKTAG website (Ref 3.16). Four metrics were calculated using macrophyte species and group data:

- River macrophyte nutrient index (RMNI) – Macrophyte taxa are allocated a score based on their relative tolerance of nutrients. The overall observed RMNI score for a survey is the cover weighted average of the individual scores of the different taxa found.
- Number of macrophyte taxa (NTAXA) – The number of scoring taxa recorded in the field survey. Only true hydrophytes are included.
- Number of functional groups (NFG) – Hydrophytes are allocated to one of 24 “functional groups”. These are groups of organisms which exploit a resource in a similar way.
- Cover of filamentous green algae (ALG) – The percentage cover of filamentous green algae over the whole of the surveyed section.

3.2.20 LEAFPACS2 predicts the RMNI, NTAXA and NFG scores for the surveyed reach based on altitude, alkalinity, and slope. The predicted scores are then compared to reference scores and the output is an Ecological Quality Ratio (EQR). The EQR can be translated into a Water Framework Directive (WFD) classification (High, Good, Moderate, Poor, or Bad) as shown in Annex A.

3.2.21 River LEAFPACS2 analysis was designed to reflect the impact of nutrient enrichment on macrophyte communities, with High status indicating there is no impact and Bad status indicating there is a severe impact. The method may also be sensitive to alterations in river flow and/or modifications to morphological conditions which may impact macrophyte communities (Ref 3.16).

3.2.22 Aquatic macrophyte species were cross referenced against the JNCC Taxon Designations list (Ref 3.11) to identify if any protected and/or notable species were recorded during the surveys.

Fish surveys

3.2.23 Following the aquatic scoping surveys, fish surveys were scoped in or out for further assessment. The reasons for this are outlined in **Table 3-5**.

Table 3-5 - Fish Habitat Assessment

Surface water reference	Watercourse name	National Grid Reference	Scoped in/Scoped out	Rationale
HDD.01/NRW.MR.01	Afon Bontfaen	SH 54795 39828	Scoped In	Water depth (~0.75 m) suitable for supporting fish communities.
NRW.D.09	Unnamed ditch - Tributary of Afon Glaslyn 1	SH 57858 39525	Scoped Out	Dissolved oxygen below 5 mg/l which limits the suitability to support fish populations (Ref 3.18)
HDD.05/NRW.D.07	Unnamed ditch - Tributary of Afon Glaslyn 2	SH 57174 39437	Scoped Out	Water depths less than 5 cm so unsuitable to support fish communities.
NRW.MR.06	Unnamed Tributary of Y Cyt 1	SH 57031 39322	Scoped In	Suitable depths. Channel had high densities of macrophytes in the channel.
NRW.MR.05	Unnamed Tributary of Y Cyt 2	SH 56326 39698	Scoped Out	Channel had high densities of macrophytes within the channel

3.2.24 A team of AECOM fisheries scientists completed quantitative electric fishing surveys where possible using a bankside electric fishing , or where due to limitations, completed semi-quantitative sampling. The sampling procedure followed established best practice guidance (Ref 3.19; and Ref 3.20) and Environment Agency protocols (Ref 3.21).

3.2.25 During electric fishing, immobilised fish were captured in hand nets by people positioned either side of the anode and then transferred to water-filled containers. Following the completion of the survey, all caught fish were transferred into, water-filled, aerated holding tanks prior to data collection. If any eels were captured, they were kept in separate run specific holding tanks to all other fish species as they secrete mucus which can infest the gills of other fish. Dissolved oxygen levels in the holding tanks were monitored and maintained at optimum levels by continuous infusion using an oxygenation unit.

3.2.26 Following survey completion, all fish were identified to species level and measured to fork length (mm). After a sufficient recovery period in aerated holding tanks, the fish were returned to the survey site unharmed.

Limitations

Desk Study

3.2.27 The desk study is not exhaustive and relies on records being submitted and available in the Study Area.

Field surveys

3.2.28 Access to some water bodies was limited due to steep-sided banks and/or deep soft sediments and consequently assessments were predominantly undertaken from the banktops and macroinvertebrate samples were conducted using sweep sampling methodology (Spring: 2D, 2C, 2J, 2G and 2H; Autumn: 2B, 2D, 2H, 2I, 2J, 2M and 2N). Additionally access limited surveys at 2B where the railway line limited access, and 3A and 3 – Church were access had not been agreed for spring. During the autumn surveys, access was not possible at 2E due to the landowner refusing access. No macroinvertebrate samples were collected at 2L for both seasons due to access being refused.

3.2.29 Site accessibility for aquatic macroinvertebrate sampling locations differed between seasons for spring and autumn, leading to different survey locations for the same sample site between seasons. Although locations varied between seasons, both surveyed points were on the same watercourse within similar habitats and no more than 500 m apart, making the surveys representative. The impact of sampling different site locations for macroinvertebrate sampling is considered negligible.

3.2.30 Fish surveys could not be carried out at selected sites due to the habitat characteristics mentioned above and difficulty in access. For example, the site Unnamed Tributary of Y Cyt 1 could not be surveyed due to the lack of access preventing transport of fish sampling equipment into the field. The site Afon Bontfaen was not surveyed due to the presence of cattle in the field, an average water depth of 75 cm and the channel being trapezoidal limiting safe access. Dissolved oxygen at the proposed sampling point for Unnamed ditch - Tributary of Afon Glaslyn 1 and northwards was <20%, therefore, electric fishing was deemed unsafe. Although dissolved oxygen was present in greater concentration southwards, the water level was less than 5 cm and the channel was heavily terrestrialised.

3.2.31 Ecosystems are dynamic and constantly changing, and species may move, or new species may be recorded in subsequent years. For this reason and in accordance with current guidance, the field survey data detailed in this report are valid for two years from the date of the survey (Ref 3.22). After this date, updated surveys may be required, and advice should be sought from an appropriately qualified ecologist to determine the survey scope and methods.

4. Results

4.1 Desk Study

Statutory and Non-statutory Designated Sites

4.1.1 Seven statutory designated sites which contain aquatic ecology features were identified within 10 km of the Proposed Works (**Table 4-1**).

Table 4-1 - Statutory designated sites located up to 10 km of the Proposed Works Site that contain aquatic features

Statutory Designation	Site name	Description	Approximate Distance from Proposed Scheme Boundary
SAC	Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites	Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation are Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site.	Within
SSSI	Glaslyn	This site supports a diverse range of macrophytes including uncommon and nationally rare species across river, floodplain grassland and brackish water habitats. Several aquatic species have been recorded at this site including the nationally rare floating water plantain (*Luronium natans*), small water pepper (*Persicaria minor*) and brackish water-crowfoot (*Ranunculus baudotii*). Furthermore, the SSSI also supports the only known population of the boreal relict snail (*Vertigo lilljeborgi*) in UK.	Within
SAC	Pen Llŷn a'r Sarnau/Lleyn	A largely marine site encompassing tidal rivers and	0.54 km south

	Peninsula and the Sarnau	estuaries of significance to migratory fish, and which includes important habitat features for juvenile fish.	
SSSI	Tiroedd A Glannau Rhwng Cricieth Ac Afon Glaslyn	Wetland notable for its reedswamp, grazing marsh and fen meadow supporting a range of aquatic and fen flora from fen to open water habitats.	0.80 km south-west
SSSI	Afon Ddu	The Afon Ddu is of special interest for its population of the freshwater pearl mussel (*Margaritifera margaritifera*) which is one of the few remaining breeding populations of this species in Wales. The freshwater pearl mussel is dependent on the local salmonid populations' sea trout spawn in the river and native brown trout (*Salmo trutta fario*) are abundant. Otter and water vole have been recorded in the Afon Ddu catchment. There are areas of botanically interesting mire and wet heath adjacent to parts of the river and around Llyn Du which are also important in providing a protective buffer to the river channel and the mussels therein.	1.65 km north-east
SAC	Corsydd Eifionydd/Eifionydd Fens	Annex I habitats that are a primary reason for selection of this site: Transition mires Quaking bogs Annex II species that are a primary reason for selection of this site	6.12 km north-west
SAC	Rhinog	Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea*	6.66 km south-east

		uniflorae and/or of the Isoëto-Nanojuncetea • Blanket bogs (* if active bog) Annex II species present as a qualifying feature, but not a primary reason for site selection: Floating water-plantain *Luronium natans*.

4.1.2 Three non-statutory designated sites were identified within 2km of the proposed works (**Table 4-2**).

Table 4-2 - Non-statutory designated sites located within 2 km from the Proposed Works Site that contain aquatic features

Designation	Site name	Description	Approximate Distance from Proposed Scheme Boundary
cLWS	Coed Bryn-twr/Wern	Broadleaved woodland, acid grassland and standing water	Within
cLWS	Traeth Mawr Woodland	Broadleaved woodland and standing water	1.91 km north-east
cLWS	Glan-y-morfa-mawr pools	Standing water	1.90 km south

Water Framework Directive status

4.1.3 There are three Water Framework Directive (WFD) waterbodies that have the potential to be impacted either directly or indirectly by the proposed construction works (

4.1.4 **Table** 4-3).

Table 4-3 - Water Framework Directive (WFD) waterbodies located within 2 km of the Works Site

Water body	WFD water Body ID	Ecological Status	Approximate Distance from the Proposed Scheme Boundary
GB110065053860	Glaslyn - tidal to Afon Croesor	Moderate	Within
GB110065053800	Porthmadog Cut	Moderate	Within
GB110065053810	Portreuddyn (Glaslyn)	Moderate	1.12 km north

Glaslyn – tidal to Afon Croesor

4.1.5 Glaslyn – Tidal to Afon Croesor (WFD Water Body ID: GB110065053860) is a heavily modified waterbody with a 'Moderate' ecological status. It has been classified as 'Good' for macrophytes and diatoms both in 2018, and 'Moderate' for macroinvertebrates in 2018. It is not currently classified for fish.

Porthmadog Cut

4.1.6 Porthmadog Cut (WFD Water Body ID: GB110065053800) is a heavily modified waterbody with a 'Moderate' ecological status. It has been classified as 'Moderate' for macroinvertebrates in 2018, but it has not been classified for other biological elements such as fish, macrophytes, and diatoms.

Portreuddyn (Glaslyn)

4.1.7 Portreuddyn (Glaslyn) (WFD Water Body ID: GB110065053810) is a heavily modified river with a 'Moderate' ecological status. It is classified as 'Good' for macroinvertebrates in 2018 but it is not classified for fish, macrophytes nor diatoms.

Habitats of Principal Importance (HoPI)

4.1.8 Rivers are HoPI listed under Section 7 of the Environment (Wales) Act (2016) (Ref 2.10). Afon Glaslyn, Y Cyt, Afon Nant yr, Afon-oer Bontafaen and tributaries are present within and adjacent to the Glaslyn works site.

Notable species

Aquatic macroinvertebrates

4.1.9 There were four records of notable macroinvertebrate species identified in the desk study data found within 2 km of the Glaslyn works area.

Table 4-4 Notable macroinvertebrate species identified within the Study Area

Common name (Scientific name)	Conservation Designation (s)	Number of records	Most recent record	Location of the closest record	Data source
Scarce Blue-tailed Damselfly (*Ischnura pumilio*)	Near Threatened	2	2018	Within	Cofnod
Cased caddisfly (*Limnephilus fuscicornis*)	Nationally Scarce	1	2016	4 m north-east	Cofnod
		2	2016	7 m north	NRW
Variable Damselfly (*Coenagrion pulchellum)*	Global Red List post 2001 (Ref 2.4) – Near Threatened, LBAP RedList_GB_post2001-NT	4	2019	1.36 km south-west	Cofnod
Freshwater Pearl Mussel (*Margaritifera margaritifera)*	UK Biodiversity Framework (Ref 2.17) NERC Act 2006 Section 42 (Ref 2.16) Annex II and 5 of the Habitats Directive (Ref 2.6) LBAP Nationally Rare IUCN Critically Endangered (Ref 4.1) Environment (Wales) Act 2016 Schedule 7 (Ref 2.10) Wildlife and Countryside Act 1981 Schedule 5 (Ref 2.13)	3	2021	1.78 km north	Cofnod

Aquatic macrophytes

4.1.10 Two notable aquatic macrophyte species were identified within 2 km of the Glaslyn works area (

4.1.11 **Table** 4-5).

Table 4-5 - Notable aquatic macrophytes identified within the Study Area

Common name (Scientific name)	Conservation Designation (s)	Number of records	Most recent record	Location of the closest record	Data source
Sharp rush (*Juncus acutus*)	Nationally scarce	5	2019	0.41 km south	Cofnod
Dwarf spikerush (*Elocharis parvula*)	Wildlife and Countryside Act Schedule 8, Nationally rare	2	2022	0.44 km south-west	Cofnod

Fish

4.1.12 Three notable fish species have been identified within 2 km of the Glaslyn works area (**Table 4-6**).

Table 4-6 - Notable fish species identified within the Study Area

Common name (Scientific name)	Conservation Designation (s)	Number of records	Most recent record	Location of the closest record	Data source
European eel (*Angullia anguilla*)	Global Red List Post 2001 – Critically Endangered Appendix II of the Bonn Convention (Ref 2.1) NERC Act 2006 Section 42 (Ref 2.16) Section 7 (Species of Principal Importance), Environment (Wales) Act 2016 (Ref 2.10), Eels (England and Wales) Regulations (Ref 2.15) Salmon and Freshwater Fisheries Act (SAFFA) (Ref 2.11) OSPAR (Ref 2.8) The Trade in Endangered Species of Wild Fauna and Flora (Amendment) (EU Exit) Regulations 2018 (Ref 2.3)	1	2018	Within	Cofnod
		1	2022	Within	NRW
Brown/Sea trout (*Salmo trutta*).	Section 7 (Species of Principal Importance), Environment (Wales) Act 2016 (Ref 2.10), NERC Act 2006 Section 42 (Ref 2.16)	1	2022	Within	NRW
Atlantic salmon	Appendix III of the Bern Convention (Ref 2.5)	1	2022	Within	NRW

Common name (Scientific name)	Conservation Designation (s)	Number of records	Most recent record	Location of the closest record	Data source
(*Salmo salar*)	Annex II and V of the Habitats Directive (Ref 2.6) OSPAR (Ref 2.8) Section 7 (Species of Principal Importance), Environment (Wales) Act 2016 (Ref 2.10), Schedule 4 species, The Conservation of Habitats and Species Regulations 2017 (Ref 2.14) NERC Act 2006 Section 42 (Ref 2.16) Environment (Wales) Act Schedule 7 (Ref 2.10), Habitats Regulation Schedule 4, UK Biodiversity Framework (Ref 2.17)				

Invasive non-native species (INNS) and non-native species

4.1.13 Four Invasive non-native species (INNS) and three non-native species were identified in the Study Area. A summary of these and the respective legislation is summarised below in **Table 4-7**.

Table 4-7 - INNS and non-native species recorded within the Study Area

Common name (*Scientific name*)	Conservation Designation (s)	Number of records	Most recent record	Location of the closest record	Data source
New Zealand pigmyweed (*Crassula helmsii*)	Wildlife and Countryside Act 1981 Schedule 9 (Ref 2.13)		2016	1.37 km south	Cofnod
		2	2016	0.3 km south	NBN
Himalayan balsam (*Impatiens glandulifera*)	Wildlife and Countryside Act 1981 Schedule 9 (Ref 2.13), Invasive Alien Species (Enforcement and Permitting)	70	2024	Within	Cofnod
		5	2023	Within	NBN

Common name (*Scientific name*)	Conservation Designation (s)	Number of records	Most recent record	Location of the closest record	Data source
	Order 2019 (Ref 2.7)				
Japanese knotweed (*Fallopia japonica*)	Wildlife and Countryside Act 1981 Schedule 9 (Ref 2.13)	176	2024	Within	Cofnod
		6	2024	0.12 km south	NBN
Canadian waterweed (*Elodea canadensis*)	Wildlife and Countryside Act 1981 Schedule 9 (Ref 2.13)	2	2014	1.72 km south-east	Cofnod
Western shunk cabbage (*Lysichiton americanus*)	Non-native	8	2022	Within	Cofnod
Crangonyx pseudogracilis/floridanus	Non-native	5	2016	4 m	Cofnod
		7	2021	Within	NRW
New Zealand mud snail (*Potamopyrgus antipodarum*)	Non-native	7	2021	0.07 km north	NRW
		1	2019	1.23 km south	NBN

4.2 Aquatic surveys

Aquatic Macroinvertebrate Surveys

4.2.1 The aquatic macroinvertebrate taxa list is in **Appendix E**A description of the macroinvertebrate community at each site is provided below. Cross-reference with the JNCC Taxon Designations list revealed the presence of *Hydraena palustris*, a beetle, which has a Conservation Score of 8: RDB3 (rare). The non-native New Zealand mud snail (*Potamopyrgus antipodarum*) and *Crangonyx pseudogracilis/floridanus* were recorded across the sites.

Site 2A

4.2.2 This survey reach was on the Afon Glaslyn within an area of semi-improved grassland. The channel (average width: 100.0 m, average depth: 0.3 m) had a flow

less than 10 cm/sec and was not shaded. The substrate here was solely comprised of sand with no woody debris, tree roots, macrophytes, moss nor algae present during the surveys. During the walkover surveys, the habitat was identified as tidal with no dominate flow type present.

4.2.3 2A was the least diverse community during the spring surveys. The community was dominated by crustaceans (96%), solely the opossum shrimp *Neomysis integer* which inhabits brackish waters. The remaining community comprised of snails (3%) which included the non-native non-invasive, New Zealand mud snail *Potamopyrgus antipodarum*, and true flies (1%).

4.2.4 During the autumn surveys snails dominated the community (68%), followed by crustaceans (24%) and true flies (8%). New Zealand mud snail, the only snail species identified, was the most abundant taxa (68%), with the next abundant, opossum shrimp, comprising 21% of the community.

Site 2B

4.2.5 This survey reach was a tributary of the Afon Glaslyn, between the A487 and the railway line. The channel (average width: 7.0 m; average depth: 0.5 m) was slow flowing (<10cm/sec) with light shading. The survey was conducted in an area of marginal deadwater where the substate comprised equally of sand (50%) and silt (50%). Within the surveyed area, 30% was covered with non-filamentous algae, however, there was no woody debris, macrophytes, moss, nor tree roots.

4.2.6 In autumn the community at 2B was dominated by Oligochaeta (63%), the next dominant species was the New Zealand mud snail (29%). Trueflies were the next dominant group (8%) dominated by Chironomini (5%), with crustaceans forming 1% of the community.

Site 2C

4.2.7 The survey reach at 2C was to the north of the A487, within an area of semi-improved grassland. The channel (average width: 1.0 m; average depth: 0.15 m) was slow flowing (<10 cm/sec) with moderate turbidity. The survey was undertaken within an area of glide flow where the substrate was 100% silt. No woody debris, tree roots, macrophytes, moss nor algae present during the surveys

4.2.8 The spring community at 2C was dominated by snails (73%) including the non-native, non-invasive New Zealand mud snail. The next dominant groups included true flies (18%) and crustaceans (5%), which included the non-native, non-invasive amphipod *Crangonyx pseudogracilis/floridanus.*

4.2.9 Snails remained dominant in the autumn community at 2C (53%) with New Zealand mud snail comprising 50% of the community. In contract, crustaceans were the next dominant group in the autumn (23%), with the Pisidium/Euglesa group the second dominant taxa (12%). The non-native, non-invasive *C. pseudogracilis/floridanus* was present in the sample, making up 9% of the community.

Site 2D

4.2.10 The survey reach at 2D was to the east of Ysgol Eifionydd, within an area of improved grassland and tall herb. The channel (average width: 6.5 m; average depth: 0.6 m) was slow flowing (<10 cm/sec) with high turbidity. The surveyed area comprised of a glide with silt dominating the substrate (60%) with gravel (30%) and bedrock (10%) also present. No woody debris, tree roots, macrophytes, moss nor algae present during the surveys

4.2.11 During the spring surveys, the macroinvertebrate community at 2D was dominated by true flies (48%) with the Orthocladiinae subfamily comprising 21% of the whole sample. The next dominant family was snails (24%) with Pisidium/Euglesa comprising 13% of the community. Although the non-native, non-invasive New Zealand pygmy snail was present in the sample, it only made up 1% of the community.

4.2.12 The community at 2D in autumn was dominated by snails and limpet and mussel groups, both making up 32% of the community. The Pisidium/Euglesa group dominated the sample, comprising 32% of the sample. Although not dominating, both *C. floridanus/pseudogracilis* (9%) and New Zealand mud snail were identified in the sample (7%).

Site 2E

4.2.13 The 2E survey reach was to the north of the A487, west of Pen-y-Mount train station. The channel (average width: 2.5 m; average depth: 0.4 m) was dominated by slow flow (<10 cm/sec), with moderate shading and moderate turbidity. The substrate here was dominated by clay (70%) with silt also present (30%). During the walkovers, macrophytes were considered to cover 20% of the channel, with no woody debris, tree roots, moss nor algae present. The channel was also considered to be realigned, re-sectioned and over-deepened.

4.2.14 During the spring survey at 2E Pisidium/Euglesa (21%) dominated the community with snails comprising the largest taxa group in the sample (43%). New Zealand Mud snail was present in this community, comprising 11% of the sample. Limpets and mussels were the next dominant taxa group, comprising of 22% of the community.

Site 2F

4.2.15 The survey reach at 2F was on a tributary of the Y Cyt, to the south of the A487, within an area of scrub and improved grassland. The channel (average width: 1.0 m; average depth: 0.15 m) was slow flowing (<10 cm/sec) and lightly shaded. The substrate was dominated by silt (100%) with macrophytes covering 70% of the reach. No woody debris, tree roots, moss nor algae present during the surveys

4.2.16 During the spring surveys the community was dominated by snails (66%) with New Zealand mud snails comprising 63% of the community. The next dominant group were the true flies (28%), with Chironomini and Tanytarsini both forming 7% of the community.

4.2.17 In contrast to spring, the autumn community largely comprised of crustaceans (41%) dominated by *C. pseudogracilis/floridanus* (which comprised 21% of the whole community), and snails (26%), solely comprising of the non-native, non-invasive, New Zealand mud snail.

Site 2G

4.2.18 The 2G survey reach was a tributary of the Y Cyt adjacent to the A487, within an area of scrub. The channel (average width: 0.7 m; average depth: 0.15 m), was heavily shaded with moderate flow (10 – 25 cm/sec) the substate comprising of silt (50%) and clay (50%). The reach was within a glide, with small proportions of woody debris (2%) recorded during the walkover. No tree roots, macrophytes, moss nor algae were present during the surveys

4.2.19 The spring macroinvertebrate community of Site 2G was largely dominated by snails (34%), true flies (28%), and limpets and mussels (28%). All snails were observed as

the non-native, non-invasive, New Zealand mud snail, comprising, which were the most dominant taxa across the community (28%). The non-native, non-invasive, amphipod, *C. pseudogracilis/floridanus* comprised 2% of the community.

4.2.20 The autumn survey of 2G was dominated by the Pisidium/Euglesa group (54%), snails were the next dominant group, solely comprising of the New Zealand mud snail (15%). Notably, one count (0.2%) of the beetle *Hydraena palustris* was identified, which has a conservation score of 8: RDB3: Rare.

Site 2H

4.2.21 The reach at 2H was on the Y Cyt, in an area of improved grassland. The channel (average width: 4.0 m; average depth: 0.6 m) was slow flowing (<10 cm/sec) and heavily shaded. The substrate was dominated by boulders (60%) with sand (30%), cobbles (5%), and pebbles (5%) also present, with the flow type dominated by glide habitat. During the walkover, woody debris (5%) and urban trash was present within the channel. No tree roots, macrophytes, moss nor algae present during the surveys.

4.2.22 The community at 2H in spring was dominated by snails (84%) with Hydrobiidae forming 84% of the taxa identified, other taxa of snails were also present in smaller proportions including Stagnicola species and *Planorbarius corneus*. The next dominant group was limpets and mussels (7%) solely formed of the Pisidium/Euglesa group.

4.2.23 In autumn 2H remained dominated by snails (76%), with New Zealand mud snail dominating the sample. The next dominant group was true flies, with Chironomini and Oligochaeta comprising 6% and 2% of the community respectively. *C. floridanus/pseudogracilis* was present in the sample in low proportions (2%).

Site 2I

4.2.24 The survey reach for 2I was undertaken on the Nant Yr Afonoer, to the north of Coed Pen-amser. The channel (average width: 0.8 m; average depth: 0.7 m) was lightly shaded with slight turbidity, dominated by glide habitat. The substrate here was dominated by silt (100%). No woody debris, tree roots nor macrophytes were identified during the walkovers, however, the reach was to the south of a culvert.

4.2.25 In autumn 2I was dominated by limpets and mussels (62%), with the Pisidium/Euglesa group dominating the community. The next dominant taxa were C. *floridanus/pseudogracilis* (22%), followed by the water hoglouse *Asellus aquaticus* (8%).

Site 2J

4.2.26 The survey at 2J was on the Adon Bontfaen, in an area of broadleaved woodland and semi-improved grassland. The channel (average width: 2.0 m; average depth: 0.6 m) was slow flowing (<10 cm/sec) with moderate shading, the substrate was dominated by silt (100%). The reach was dominated by glide habitats, with both woody debris and macrophytes present covering 15% and 10% of the channel respectively. No tree roots, moss nor algae present during the surveys

4.2.27 Site 2J was the most diverse site during the spring surveys, dominated by New Zealand mud snail (58%). The next abundant species were the Pisidium/Euglesa group (10%) and *C. pseudogracilis/floridanus* (9%).

4.2.28 In contrast, the autumn sample at 2J was dominated by the Pisidium/Euglesa group (65%), with the New Zealand mud snail only comprising 6% of the sample. In autumn, no *C. pseudogracilis/floridanus* were identified within the sample.

Site 2K

4.2.29 The survey reach at 2K was on a tributary of the Afon Glaslyn, to the south of the Clwb Chwaraeon Madog CYF pitches. The channel (average width: 5.0 m; average depth: 0.6 m) was moderately shaded with moderate turbidity. The reach was within an area of glide flow, with the substate dominated by silt (90%) with bedrock (10%) also present. During the walkovers, macrophytes were identified covering 30% of the channel, no woody debris, tree roots, moss nor algae present during the surveys

4.2.30 The macroinvertebrate sample at 2K was dominated by water hoglice (35%) and *C. pseudogracilis/floridanus* (28%), with these crustaceans making up 62% of the sample. Snails accounted for 24% of the sample, dominated by Stagnicola species and New Zealand mud snails which comprised 19% and 4% of the entire community respectively.

Site 2M

4.2.31 The surveyed reach at 2M was in an area of marsh habitat with a water depth of 0.05 m forming a tributary of the Afon Glaslyn. The reach was within a glide with slow flow (<10 cm/sec) with slight turbidity, and the substrate within the reach was dominated by silt (100%). During the walkovers, macrophytes and non-filamentous algae were identified, covering 10% and 40% of the channel respectively. No woody debris, tree roots, nor moss present during the surveys.

4.2.32 In autumn 2M was the least diverse sample, with the community solely comprising of true flies (97%) and snails (3%). The community was dominated by the Chironomidae sub-families Chironomini (86%) and Tanypodinae (11%). The non-native, non-invasive New Zealand mud snail (2%) and bladder snail (1%) were also present in the community.

Site 2N

4.2.33 The 2N survey reach was on a tributary of the Y Cyt, within an area of improved grassland. The channel (average width: 1.2 m; average depth: 0.6 m) was dominated glides with slow flow (<10 cm/sec). The substrate here was dominated by cobbles (40%) and silt (40%), with boulders (20%) also present, during the walkover macrophytes were identified covering 30% of the channel. No woody debris, tree roots, moss nor algae present during the surveys

4.2.34 The community at 2N was dominated by New Zealand mud snail (84%), the next dominant were caddisflies with Limnephilidae comprising 8% of the sample. *C. pseudogracilis/floridanus* were present within the sample however only made up 1% of the community.

Site 3A

4.2.35 This survey was taken from the Afon Bontfaen near Porthmadog. The channel of (average width: 1.0 m; average depth: 0.6 m) was moderately shaded by trees and bramble, with downstream proportions being culverted. The substrate was dominated by gravel (60%), with sand (10%), pebble (20%), and cobble (10%) also present, with variable flow patterns including runs and glides. A small proportion of woody debris and macrophytes were present covering 3% and 2% of the channel respectively whilst no tree roots, moss nor algae present during the walkover surveys.

4.2.36 The autumn community at reach 3A wasdiverse, with stoneflies comprising the largest group (33%). True flies (26%), caddisflies (16%) and mayflies (12%) were

also present. However, a small quantity (1%) of the non-native, non-invasive, amphipod, *Crangonyx pseudogracilis/floridanus* was also discovered at the site.

Site 3-Church

4.2.37 Reach 3 – Church was a tributary of the Nant Yr Afon-Oer, surrounded by a church and cemetery, with land-use consisting of broadleaf woodland. The channel (average width: 0.5 m; average depth: 0.2 m) with moderate shading from overhanging vegetation. The substrate was dominated by pebbles (30%), cobbles (25%) and boulders (25%), with sand (10%) and gravel (10%) also present. In the reach, riffle and glide flow types dominated. No woody debris, tree roots, macrophytes, moss nor algae present during the surveys.

4.2.38 The autumn community at reach 3-Church, was dominated by stoneflies (29%) comprising predominantly of *Protonemura meyeri*. The next dominant groups were caddisflies (27%) and mayflies (24%).

Macroinvertebrate Index Results

4.2.39 Based on the criteria outlined in the Methodology, the CCI, WHPT Average Score Per Taxon (ASPT) and Number of scoring taxa (NTAXA), LIFE and PSI species values for each survey are summarised in **Table 4-8**.

Table 4-8 - Macroinvertebrate index scores

Site name	Season	WHPT-NTAXA	WHPT-ASPT	CCI score - interpretation	LIFE score (species) - interpretation	PSI score (species) - interpretation
2A	Spring	2	2.75	1.0 - Low conservation value	5.00 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
	Autumn	3	3.20	1.0 - Low conservation value	6.00 - Low sensitivity to reduced flows	33.33 - Sedimented
2B	Autumn	5	3.80	1.0 - Low conservation value	7.00 - Moderate sensitivity to reduced flows	16.67 - Heavily sedimented
2C	Spring	14	3.34	1.1 - Low conservation value	5.71 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
	Autumn	15	3.83	5.0 - Moderate conservation value	5.57 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
2D	Spring	20	3.32	4.6 - Low conservation value	5.83 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
	Autumn	11	3.10	1.0 - Low conservation value	5.20 - Low sensitivity to reduced flows	0.00 - Heavily sedimented

Site name	Season	WHPT-NTAXA	WHPT-ASPT	CCI score - interpretation	LIFE score (species) - interpretation	PSI score (species) - interpretation
2E	Spring	19	3.53	3.8 - Low conservation value	5.75 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
2F	Spring	17	4.06	5.3 - Moderate conservation value	5.92 - Low sensitivity to reduced flows	2.22 - Heavily sedimented
	Autumn	9	3.87	1.2 - Low conservation value	6.17 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
2G	Spring	11	3.83	4.0 - Low conservation value	6.29 - Low sensitivity to reduced flows	4.17 - Heavily sedimented
	Autumn	13	4.05	21.3 - Very High conservation value	6.00 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
2H	Spring	22	3.79	6.0 - Moderate conservation value	5.70 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
	Autumn	11	4.05	4.5 - Low conservation value	6.29 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
2I	Spring	18	3.79	4.7 - Low conservation value	6.00 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
	Autumn	7	3.47	1.0 - Low conservation value	5.50 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
2J	Spring	21	3.87	8.8 - Moderate conservation value	5.69 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
	Autumn	4	3.10	1.0 - Low conservation value	5.50* - Low sensitivity to reduced flows	0.00 - Heavily sedimented
2K	Autumn	11	3.53	1.0 - Low conservation value	5.50 - Low sensitivity to reduced flows	0.00 - Heavily sedimented
2M	Autumn	4	2.48	1.0 - Low conservation value	6.00* - Low sensitivity to reduced flows	0.00 - Heavily sedimented
2N	Autumn	12	4.15	Unclassifiable	5.60* - Low sensitivity to reduced flows	9.09* - Heavily sedimented

Site name	Season	WHPT-NTAXA	WHPT-ASPT	CCI score - interpretation	LIFE score (species) - interpretation	PSI score (species) - interpretation
3A	Autumn	18	6.71	13.0 - Fairly High conservation value	8.25 - High sensitivity to reduced flows	74.19 - Slightly sedimented
3 - Church	Autumn	19	7.47	10.4 - Fairly High conservation value	8.31 - High sensitivity to reduced flows	86.67 - Minimally sedimented/unsedimented

**Lack of scoring species may result in inaccurate scores, consequently family level scores have been presented*

4.2.40 The LIFE score for all sites across all survey seasons represented low to sensitivity to reduced flows, excluding 2B, 3A and 3 Church, with LIFE scores between 5.00 and 6.29. 2B had a LIFE score (7.00) representing a community which was moderately sensitive to reduced flows, whilst 3A and 3 Church had LIFE scores representative of the community being highly sensitive to reduced flows.

4.2.41 Across all seasons the community was heavily sedimented with PSI scores between 0.00 and 16.67. The only exception was the autumn community at 2A, which had a PSI score of 33.33, representing a sedimented habitat.

4.2.42 The communities represented low to moderate conservation value (1.00 – 6.00) across all survey reaches and seasons, excluding the autumn survey at 2G where the community was of very high conservation value. During the spring surveys, all taxa present were of local to very common. Conversely, most species were very common to occasional in autumn; the highest CCI-scoring species was the *Hydraena palustris* beetle, which has a Conservation Score of 8: RDB3 (rare), identified at 2G. Site 2N did not achieve a CCI score due to lack of scoring species.

4.2.43 The water quality at all sites during the spring surveys was poor with all WHPT scores less than 4.05. During the autumn surveys, the majority of reaches were indicative of poor or very poor water quality, (WHPT ASPT 3.10 – 4.05), with only 2H having moderately impacted water quality.

RICT Results

4.2.44 **Table 4-9** displays the Ecological Quality Ratio (EQR) and WFD macroinvertebrate status for the WHPT ASPT and NTAXA indices for each riverine survey site surveyed in spring and autumn 2024, alongside the most probable WFD status based on the combination of the modelled distributions for each of ASPT and NTAXA across all classes, termed MINTA (Minimum of NTAXA and ASPT EQRs). MINTA for Sites 2C-2J is based on the combination of spring and autumn EQR values, whereas MINTA for Sites 2B and 2K-2N, are based only on single season values and are included for interpretative purposes only.

Analysis using RICT is only suitable for freshwater (not estuarine or marine) sites on rivers or streams that are naturally permanently flowing. RICT analysis was not undertaken for those sites identified as ditches due to their nature (i.e., not naturally permanently flowing condition) as the application is only possible for sites on naturally and permanently flowing watercourses. Sites 2A, 2D, 2E, and 2M are not included within the RICT analysis, due to Sites 2A and 2M being tidally influenced and Sites 2D and 2E being identified as standing ditches.

Table 4-9 - Macroinvertebrate indicative WFD classification

Index	Season	Site 2B	Site 2C	Site 2F	Site 2G	Site 2H	Site 2I	Site 2J	Site 2K	Site 2N	Site 3A	Site 3 Church
WHPT-NTAXA Ecological Quality Ratio (EQR)	Spring	-	0.79 (H)	0.74 (G)	0.64 (M)	0.86 (H)	0.64 (M)	0.73 (G)	-	-	-	-
	Autumn	0.28 (B)	0.98 (H)	0.45 (B)	0.86 (H)	0.46 (B)	0.28 (B)	0.18 (B)	0.49 (B)	0.44 (B)	0.86 (H)	0.91 (H)
WHPT-ASPT Ecological Quality Ratio (EQR)	Spring	-	0.55 (B)	0.75 (M)	0.63 (P)	0.60 (P)	0.65 (P)	0.67 (P)	-	-	-	-
	Autumn	0.84 (M)	0.66 (P)	0.78 (M)	0.71 (P)	0.67 (P)	0.67 (P)	0.65 (P)	0.93 (G)	0.74 (M)	0.97 (G)	1.10 (H)
MINTA most probable WFD invertebrate classification	Spring and autumn combined	B†	P	M	P	P	B	B	B†	B†	G†	H†

EQRs are valued as High (H), Good (G), Moderate (M), Poor (P), and Bad (B)

† MINTA WFD classifications should be completed across the two seasons, whereas the classification presented here is based on the single-season data available and should be treated with caution.

Aquatic Macrophyte Surveys

4.2.45 The full aquatic macrophyte taxa list is in **Appendix EAppendix F**. Cross-referenced with the JNCC Taxon Designations list revealed that none of the macrophyte taxa identified during the surveys were protected and/or notable. The invasive Himalayan Balsam *Impatiens glandulifera* was recorded on Afon Bontfaen and Unnamed Tributary of Y Cyt 2 and the invasive Nuttall's waterweed *Elodea nuttallii* was found on the Unnamed Tributary of Y Cyt.

Afon Bontfaen

4.2.46 The habitat at the Afon Bontfaen site was a narrow channelised low energy reach with a silty substrate which was partially shaded by trees on the right bank, with open pasture on the left bank. The macrophyte community was dominated by emergent vegetation, particularly common reed *Phragmites australis*, with reed canary grass *Philaris arundinacea* and branched bur-reed *Sparganium erectum* also common. The amphibious water pepper *Persecaria hydropiper* was present. The only submerged taxa observed was starwort *Callitriche* sp. which was unidentifiable to species level due to an absence of fruit. Small stands of Himalayan balsam were present on the banks.

Unnamed ditch – Tributary of Afon Glaslyn 1

4.2.47 The habitat at the Unnamed ditch - Tributary of Afon Glaslyn 1 site was a narrow low energy ditch with a slit substrate running through open grassland and was highly vegetated with emergent and riparian vegetation. The moderate coverage of blanketweed *Vocheria* sp. suggested that nutrient levels may be high. Aside from starwort which was present in a few spots, the macrophyte recorded were all emergent. These included marsh horsetail *Equisetum palustre*, soft rush *Juncus effusus*, purple loosestrife *Lythrum salicaria*, water mint *Mentha aquatica* and water-hemlock *Oenanthe crocata*. Stands of Himalayan balsam were present on the banks.

Unnamed ditch - Tributary of Afon Glaslyn 2

4.2.48 The habitat at the Unnamed ditch - Tributary of Afon Glaslyn 2 site was an unshaded and marshy ditch with no surface water present at the time of survey. The macrophyte community reflected this, with just wetland aquatic macrophyte species present, including marsh horsetail, soft rush and purple loosestrife.

Unnamed Trib of Y Cyt 1

4.2.49 The habitat at the Unnamed Tributary of Y Cyt 1 site is an unshaded channelised reach running through improved grassland. Macrophyte growth was abundant. Submerged species present were starwort, Nuttall's waterweed, small pondweed *Potamogeton berchtoldii*, broad-leaved pondweed *Potamogeton natans* and small quantities of blanketweed. Emergent species dominated the channel, particularly branched bur-reed, but with lesser growth of reed canary grass, water pepper, water forget-me-not *Myosotis scorpiodes*, water mint and common water-plantain *Alisma plantago-aquatica*. Floating common duckweed *Lemna minor* was also present in small quantities.

Unnamed Tributary of Y Cyt 2

4.2.50 The habitat at the Unnamed Tributary of Y Cyt 2 site is an unshaded reach with some sinuosity and scattered trees running through unimproved grassland. The water depth was low and in places the channel was just silts and there was abundant terrestrial vegetation in parts of the channel. Himalayan balsam was present on the banks and on the bank tops. The aquatic macrophyte species present were largely wetland emergent species, with the exception of starwort in the wetted parts of the channel and greater water-moss *Fontinalis antipyretica* on the piers of a small bridge. Emergent vegetation was dominated by branched bur-reed, with reed canary grass, tufted forget-me-not *Myosotis laxa*, soft rush, water horsetail, hairy willowherb *Epilobium hirsuitum* and common water-plantain in smaller quantities. Floating leaved macrophytes present were a small quantity of common duckweed.

Macrophyte Indices and WFD classification

4.2.51 The River Macrophyte Nutrient Index (RMNI), number of macrophyte taxa (NTAXA), Number of Functional Groups (NFG) and cover of filamentous green algae (ALG), observed and predicted scores, overall Ecology Quality Ratio (EQR) and WFD macrophyte status for each survey reach are provided in **Table 4-10**.

Table 4-10 - Macrophyte WFD metrics

Metric		Afon Bontfaen	Unnamed ditch - Tributary of Afon Glaslyn 1	Unnamed ditch - Tributary of Afon Glaslyn 2	Unnamed Tributary of Y Cyt 1	Unnamed Tributary of Y Cyt 2
River macrophyte nutrient index (RMNI)	Observed	7.51	7.04	7.33	7.67	6.96
	Predicted	6.71	8.53	7.86	7.61	7.66
Number of macrophyte taxa (NTAXA)	Observed	1.00	3.00	0.00	6.00	3.00
	Predicted	6.99	8.99	8.99	8.90	8.82
Number of functional groups (NFG)	Observed	1.00	3.00	0.00	6.00	3.00
	Predicted	4.58	5.73	5.73	5.68	5.63
Cover of filamentous green algae (ALG)	Observed	0.00	3.80	0.00	0.05	0.00
Overall Ecological Quality Ratio (EQR)	-	0.45	1.19	NA	0.85	1.01
Indicative WFD macrophyte classification	-	Moderate	High	Unclassifiable	High	High

4.2.52 The EQR of 1.19, 0.85 and 1.01 for Unnamed ditch - Tributary of Afon Glaslyn 1, Unnamed Tributary of Y Cyt 1 and Unnamed Tributary of Y Cyt 2, respectively equates to a High WFD status. This indicates that these sites are minimally or unimpacted by eutrophication and/or modification to morphological conditions. By contrast, the EQR of 0.45 for Unnamed ditch - Tributary of Afon Glaslyn 1 corresponds to a Moderate WFD status, hence, a risk of moderate impact by eutrophication and/or modification to morphological conditions. The EQR for Unnamed ditch - Tributary of Afon Glaslyn 2 could not be classified due to the low number of functional taxa.

4.2.53 Alkalinity of all survey sites was <200 mgL-1, however, analysis of alkalinity data should be treated with caution as it is based on one-point measurements rather than samples collected monthly over a period of at least one year as recommended.

5. Discussion

5.1.1 A desk study and complementary field surveys were undertaken to help inform the proposed works at Glaslyn. This included a review of designated sites and species information of aquatic ecological features. Additional surveys were completed to complement this desk study to provide a holistic assessment of the baseline conditions of the site.

5.2 Designated Sites

5.2.1 There are eight statutory and three non-statutory designated sites in the Study Area that require consideration during the construction and operational phase of the project due to associated aquatic ecology features present at these sites.

5.2.2 Four WFD waterbodies have been identified within the Red Line Boundary, i.e., Portreuddyn (Glaslyn) (GB110065053810), Glaslyn - tidal to Afon Croesor (GB110065053860), Porthmadog Cut (GB110065053800) and Glaslyn (GB511006507300). The Glaslyn WFD waterbody is classified as 'Good' ecological status; the others as 'Moderate'.

5.3 Aquatic macroinvertebrates

5.3.1 Four notable aquatic macroinvertebrates were observed in the desk study, including: the scarce blue-tailed damselfly, the cased caddisfly, the variable damselfly, and four counts of the freshwater pearl mussel. However, none of these species were detected during the surveys conducted for this report. The desk study identified records of the non-native but non-invasive freshwater 'shrimp' *Crangonyx pseudogracilis/floridanus* and New Zealand mud snail in the Study Area.

5.3.2 Three non-native macroinvertebrate species were identified from the surveys: the freshwater amphipod, *Crangonyx pseudogracilis/floridanus*, the bladder snail *Physella* spp., and the New Zealand mud snail. All three non-native taxa are widespread and common across the UK. There are no statutory constraints arising from the presence of these non-native and non-invasive macroinvertebrate species but best practice biosecurity measures should be implemented for any in-channel works undertaken to prevent the spread of these species.

5.3.3 All survey locations were representative of ditches of standing water or slow flow with limited habitat diversity; all sites across both surveyed seasons had communities indicative of low sensitivity to reduced flows and heavy sedimentation. These watercourses were all between Tremadog and Penrhyndeudraeth where the topography is flatter reducing flow velocities leading to increased deposition and also in an agricultural landscape where runoff is likely, increasing the sediment load into the channel. 3A and 3 Church were exceptions to this, both with communities highly sensitive to reduced flows. 3A was indicative of the site being slightly sedimented and 3 Church indicative of minimally sedimented conditions. Both sites had faster flows than the other sites, demonstrated by the topography and by the dominance of taxa requiring faster flows, reducing sediment deposition.

5.3.4 Analysis using RICT indicated that all sites, excluding Site 2F, 3A and 3 Church, had generally poor water quality. Reach 2F had a Moderate WFD invertebrate classification, Reach 3A a Good WFD macroinvertebrate classification, whilst 3 Church achieved High macroinvertebrate classification. However, the classification of 3A and 3 Church should be treated with caution as the classification was based on one season of data. Poor and Moderate classifications indicate that both habitat and water quality pressures impact these sites, likely due to the sites' proximity to urban areas and roads as well as the surrounding land use, whilst Good and High classifications are indicative of limited pressures.

5.3.5 Overall, across both seasons, the communities at all sites were considered of low conservation concern, with all taxa scoring between very common and local conservation scores (CCI: 1 - 5). The exception to this was at Site 2G, where the community was of Very High conservation value due to the presence of the beetle *Hydraena palustris*, an IUCN Near-Threatened species which achieved a conservation score of 8: RDB3 Rare.

5.4 Aquatic macrophytes

5.4.1 Desk study research has revealed the presence of two notable aquatic macrophyte species, including sharp rush and dwarf spike rush. The desk study also identified four INNS: New Zealand pigmyweed, Himalayan balsam, Japanese knotweed and Canadian waterweed. Western skunk cabbage was also identified within desk study, which are non-native, non-invasive.

5.4.2 The invasive Himalayan Balsam was recorded at the Afon Bontfaen and Unnamed Tributary of Y Cyt 2 sites and the invasive Nuttal's waterweed was found at Unnamed Tributary of Y Cyt 1. Himalayan Balsam is listed in both Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) (Ref 2.13) and the Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 2.7). Nuttall's waterweed is listed under the Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 2.7). No additional notable aquatic macrophyte species were recorded at the survey sites. All species were common and widespread.

5.4.3 A moderate WFD macrophyte status for the Afon Bontfaen reaches indicates that the site has a moderate risk of being impacted by eutrophication and/or modification to morphological conditions. This site was within an area of farmland grazed by cattle and the channel is likely to be impacted by manure runoff from the surrounding landscape. Additionally, the channel, and surrounding watercourses, formed field boundaries and it is likely that they have been historically modified to the straight trapezoidal channels reducing the habitat for macrophytes.

5.4.4 A high WFD macrophyte status was instead found for Unnamed ditch - Tributary of Afon Glaslyn 1, Unnamed Tributary of Y Cyt 1 and Unnamed Tributary of Y Cyt 2, indicating that the sites are minimally or unimpacted by eutrophication and/or modification to morphological conditions. These watercourses, like Afon Bontaen, were within farmland however were all fenced reducing livestock access to the watercourse. Additionally, these watercourses had a range of habitats across the surveyed watercourse with varying water depths and flow types, increasing macrophyte habitat diversity.

5.4.5 No WFD macrophyte status could be estimated for the Unnamed ditch - Tributary of Afon Glaslyn 2 site due to the low number of functional taxa. This is likely due to the water depth here being less than 5 cm causing the channel to be predominately terrestrial species.

5.5 Fish

5.5.1 Three notable and migratory fish species were identified from the data search, all protected under Welsh, UK and European laws: European eel, brown/sea trout, and Atlantic salmon. Records of two of these species were identified within the Study Area.

5.5.2 In the desk study eel, brown trout and salmon were identified in the Y Cyt. The two unnamed tributaries of Y Cyt 1 and 2 and the Afon Bontfaen are tributaries of the Y Cyt. All three are likely to support eels but only one unnamed tributary of Y Cyt and the Afon Bontfaen had sufficient water depths to support salmonoid and coarse fish species.

5.5.3 No invasive and/or non-native fish species have been found in the desk study.

5.6 Mitigation measures

5.6.1 Given the presence of protected and non-native species, to inform the ecological impact assessment, mitigation measures have been identified below.

- Preconstruction surveys of all watercourses proposed to be crossed or culverted to inform mitigation for permanent and temporary watercourse crossings. These surveys will inform the presence of INNS and potential spawning habitat of protected fish species.
- Construction Environmental Management Plan (CEMP) to be adhered to prevent pollution spills from construction or temporary site drainage. This will also cover appropriate biosecurity measures for INNS.
- Works should be designed to avoid watercourses where practicable;
- Work being completed near to watercourses should be carried out within at least 10 m of watercourses which is considered sufficient to mitigate for potential hazards such as chemical spills to avoid potential direct impacts to watercourses.
- All in-channel works to be overseen by an ECoW with suitable aquatic experience to ensure no damage to notable species.
- Any lighting as part of the construction/operation to be directed away from watercourses.
- Prior to (pre-construction), and after (pre-reinstatement) open trenching, fish rescues will be required to ensure all fish within the impacted area are safely removed to avoid mortality.
- During open trenching, where over pumping is proposed, fish friendly pumps will be required that conform to the Eel Regulations, 2009
- During open trenching, where flume pipes are proposed, the invert of the flume pipe will need to be set below the existing watercourse bed to ensure continued longitudinal connectivity and fish passage.
- Were culverts are proposed for temporary and permanent crossings, culvert design will need to comply with best practise for fish passage which involves installing either box culverts or bottomless arch culverts. Where this is not possible, the culvert invert will need to be set below the existing watercourse bed

to ensure continued longitudinal connectivity and fish passage through the culvert.

- In watercourses are deemed suitable for notable fish species, in-channel works will need to be completed outside the migration and spawning seasons of the notable fish assemblage. A summary of these ecologically sensitive periods is provided in **Table 5-1** below.
- Where watercourses are deemed unsuitable for these species, and/or suitable spawning habitat is not present during the pre-construction surveys, the avoidance of both the migration and spawning season will not be required.

Table 5-1 - Key ecological timings for the migratory fish assemblage identified

Receptor	Life Stage	J	F	M	A	M	J	J	A	S	O	N	D
European eel	Elver/glass eel migration				■	■	■	■	■	■	■		
	Silver eel migration								■	■	■		
Atlantic salmon	Smolt migration			■	■	■							
	Adult migration								■	■	■	■	
	Spawning											■	■
Sea trout	Smolt migration			■	■	■							
	Adult migration						■	■	■	■	■		
Brown/sea trout	Spawning										■	■	■

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Appendix A – Community Conservation Index (CCI)

The Community Conservation Index (Ref 3.12) allows a classification of the nature conservation value associated with a macroinvertebrate community. The CCI score for one sample is derived from individual Conservation Scores (CS), assigned to some species of aquatic macroinvertebrates and relating closely to the available published Red Data Books and subsequently updated Red Lists. Conservation Scores assigned to individual species vary from 1 to 10, as detailed on the Error! Reference source not found. below. The derived CCI scores generally vary from 0 to > 20, as detailed in the **Table A-1** below. Table A-2 provides a guide to interpreting CCI scores.

Table A-1 - Conservation scores from the Community Conservation Index (Ref 3.12)

Conservation Score	Relation to Red Data Books
10	RDB1 (Endangered)
9	RDB2 (Vulnerable)
8	RDB3 (Rare)
7	Notable (but not RDB status)
6	Regionally notable
5	Local
4	Occasional (species not in categories 10-5, which occur in up to 10% of all samples from similar habitats)
3	Frequent (species not in categories 10-5, which occur in up to >10-25% of all samples from similar habitats)
2	Common (species not in categories 10-5, which occur in up to >25-50% of all samples from similar habitats)
1	Very common (species not in categories 10-5, which occur in up to >50-100 % of all samples from similar habitats)

Table A-2 - General guide to CCI scores (Ref 3.12)

CCI Score	Description	Interpretation
0 to 5.0	Sites supporting only common species and/or community of low taxon richness	Low conservation value
> 5.0 to 10.0	Sites supporting at least one species of restricted distribution and/or a community of moderate taxon richness	Moderate conservation value
> 10.0 to 15.0	Sites supporting at least one uncommon species, or several species of restricted distribution and/or a community of high taxon richness	Fairly high conservation value
> 15.0 to 20.0	Sites supporting several uncommon species, at least one of which may be nationally rare and/or a community of high taxon richness	High conservation value
> 20.0	Sites supporting several rarities, including species of national importance and/or a community of very high taxon richness	Very high conservation value

Appendix B Lotic-Invertebrate Index of Flow Evaluation (LIFE)

The Lotic-Invertebrate Index for Flow Evaluation (LIFE) provides an assessment of the impact of variable flows on benthic macroinvertebrate communities (Ref 3.13). Under the assessment, individual species of aquatic macroinvertebrates are assigned to a flow group varying from I to VI, as detailed on the Error! Reference source not found. below. The LIFE score for a macroinvertebrate sample is then derived (mean of individual scores) from individual taxon scores and abundances, as detailed in the Error! Reference source not found.. LIFE scores for a macroinvertebrate sample ranges from 1 to 12, where highest scores describe communities adapted to rapid flows.

Table B-1 Flow groups used to derive LIFE scores (Ref 3.13)

LIFE score Group	Description	Mean current velocity
I	Taxa primarily associated with rapid flows	Typically > 100 cm/s
II	Taxa primarily associated with moderate to fast flows	Typically 20 to 100 cm/s
III	Taxa primarily associated with slow or sluggish flows	Typically < 20 cm/s
IV	Taxa primarily associated with (usually slow) and standing waters	
V	Taxa primarily associated with standing waters	
VI	Taxa frequently associated with drying or drought impacted sites	

Table B-2 LIFE scoring matrix combining flow groups and abundance categories (Ref 3.13)

Flow groups	Abundance categories			
	A (1 to 9)	B (10 to 99)	C (100 to 999)	D/E (> 1000)
I	9	10	11	12
II	8	9	10	11
III	7	7	7	7
IV	6	5	4	3
V	5	4	3	2
VI	4	3	2	1

Appendix C Proportion of Sediment-sensitive Invertebrates (PSI)

The Proportion of Sediment-sensitive Invertebrates (PSI) index allows an assessment of the extent to which a water body is composed of, or covered by, fine sediments (Ref 3.14). Under this system, individual species of aquatic macroinvertebrates are assigned a Fine Sediment Sensitivity Rating (FSSR) as detailed in **Table C- 1**, and an abundance rating. The PSI score for the aquatic macroinvertebrate sample is then derived from the individual species scores and abundances, as detailed in The PSI score corresponds to the percentage of fine sediment-sensitive taxa present in a sample and ranges from 0 to 100, with low scores corresponding to waterbodies with high fine sediment cover (**Table C- 2**).

Table C-1 - Fine Sediment Sensitivity Rating (FSSR) groups used to derive PSI scores

FSSR group	Description
A	Highly sensitive
B	Moderately insensitive
C	Moderately insensitive
D	Highly insensitive

Table C-2 - Abundance categories and scoring matrix used to derive PSI scores

FSSR group	Abundance categories			
	A (1 to 9)	B (10 to 99)	C (100 to 999)	D/E (> 1000)
A	2	3	4	5
B	2	3	4	5
C	1	2	3	4
D	1	2	3	4

Appendix D Whalley, Hawkes, Paisley & Trigg (WHPT) Metric

There are approximately 4,000 species of aquatic macroinvertebrates in the British Isles. To simplify the analysis of the samples and the data we do not identify individual species but only the major types (taxa), mostly at the family taxonomic level. A key piece of information is the number of different taxa at a site. A fall in the number of taxa indicates ecological damage, including pollution (organic, toxic and physical pollution such as siltation, and damage to habitats or the river channel).

The WHPT scoring system (Ref 3.15) is based upon the sensitivity of macroinvertebrate families to organic pollution. It replaces the Biological Monitoring Working Party (BMWP) system (Ref D.1) previously used in the UK.

The WHPT system assigns a numerical value to about 100 different taxa (known as the WHPT-scoring taxa) according to their sensitivity to organic pollution. In addition to the presence of macroinvertebrate taxa at a sampling Reach, as in the BMWP scoring system, the WHPT system also uses another type of information, this being the abundances of different scoring taxa.

Taxa abundances are classified in four categories (Class 1: 1 to 10 individuals, Class 2: 11 to 100 individuals, Class 3: 101 to 1,000 individuals, and Class 4: > 1,000 individuals). A score (Pressure Sensitivity Scores (PSs) is then assigned to each taxa, depending of the taxa sensitivity and abundances recorded.

The total WHPT score for a sample corresponds to the sum of PSs of scoring taxa recorded. The Average Score Per Taxon (ASPT) values are calculated as the Sum PSs divided by the number of scoring taxa (NTAXA). Three metrics are calculated:

- WHPT score
- NTAXA
- ASPT

Some animals are more susceptible to organic pollution than others, and the presence of sensitive species indicates good water quality. This fact is taken into account by the WHPT metrics.

The most useful way of summarising the biological data was found to be one that combined the number of taxa and the ASPT. The best quality is indicated by a diverse variety of taxa, especially those that are sensitive to pollution. Poorer quality is indicated by a smaller than expected number of taxa, particularly those that are sensitive to pollution. Organic pollution sometimes encourages an increased abundance of the few taxa that can tolerate it. However, maximum achievable values will vary between geological regions. For example, pristine lowland streams in East Anglia will always score lower than pristine Welsh mountain streams because they are unable to support many of the high-scoring taxa associated with fast flowing habitat. WHPT scores and ASPT for different types watercourse are dependent on the quality and diversity of habitat, natural water chemistry (associated with geology, distance from source etc.), altitude, gradient, time of year the sample was taken and other factors.

Appendix E Macroinvertebrate Taxa Lists

Table E-1 - Macroinvertebrate taxa list spring 2024

Family	Species	Site 2A	Site 2C	Site 2D	Site 2E	Site 2F	Site 2G	Site 2H	Site 2I	Site 2J
Flatworms										
Planariidae	*Polycelis sp.*	0	0	0	0	4	8	0	0	0
Planariidae	*Polycelis nigra/tenuis*	0	2	0	0	0	0	0	0	0
Planariidae	*Polycelis felina*	0	0	0	0	3	5	0	0	0
Dugesiidae	*Schmidtea lugubris/polychroa*	0	4	1	1	1	0	0	3	0
Snails										
Lymnaeidae	*Lymnaeidae (juvenile/damaged)*	0	0	74	14	0	0	0	0	5
Lymnaeidae	*Stagnicola sp.*	0	0	1	13	0	0	1	0	3
Lymnaeidae	*Lymnaea stagnalis*	0	3	1	0	0	0	0	0	0
Lymnaeidae	*Ampullaceana balthica*	0	250	2	2	1	20	0	7	70
Hydrobiidae	*Hydrobiidae (juvenile/damaged)*	0	0	0	0	0	0	1850	0	0
Hydrobiidae	*Potamopyrgus antipodarum*	30	350	13	108	1000	100	0	2	900
Physidae	*Physidae (juvenile/damaged)*	0	0	14	93	0	0	1	0	5
Physidae	*Physella sp.*	0	25	1	19	25	0	4	1	70
Succineidae	*Succinea sp.*	0	1	0	0	1	0	1	0	0
Planorbidae	*Planorbidae (juvenile/damaged)*	0	0	130	148	0	0	0	0	0

Planorbidae	*Planorbarius corneus*	0	0	0	0	1	0	4	4	6
Planorbidae	*Planorbis sp.*	0	0	40	28	0	0	0	0	0
Planorbidae	*Planorbis carinatus*	0	0	5	4	0	0	0	0	0
Planorbidae	*Gyraulus albus*	0	0	0	0	0	0	1	0	0
Limpets and mussels										
Sphaeriidae	*Sphaeriidae (juvenile/damaged)*	0	1	0	0	0	0	0	0	0
Sphaeriidae	*Sphaerium sp.*	0	0	4	0	0	0	0	0	0
Sphaeriidae	*Pisidium/Euglesa/Odhneripisidium*	0	0	147	211	175	100	148	240	150
Sphaeriidae	*Musculium lacustre*	0	0	0	4	0	0	0	0	0
Worms										
Oligochaeta	*Oligochaeta*	0	5	22	80	2	1	3	10	4
Leeches										
Glossiphoniidae	*Glossiphoniidae (juvenile/damaged)*	0	0	0	0	0	0	1	0	0
Glossiphoniidae	*Theromyzon tessulatum*	0	0	1	0	0	0	0	0	0
Glossiphoniidae	*Glossiphonia complanata*	0	0	0	0	0	0	0	0	1
Glossiphoniidae	*Helobdella stagnalis*	0	2	0	1	0	0	0	0	0
Erpobdellidae	*Erpobdella octoculata*	0	0	0	2	0	0	1	0	1
Mites										
Hydracarina	*Hydracarina*	0	0	4	26	0	0	0	1	2
Crustaceans										

Ostracoda		0	1	1	0	0	1	0	0	0
Mysidae	*Neomysis integer*	900	0	0	0	0	0	0	0	0
Crangonyctidae	*Crangonyx sp. (floridanus/pseudogracilis)*	0	25	6	0	25	6	12	210	140
Asellidae	*Asellidae*	0	0	0	7	0	0	32	0	0
Asellidae	*Asellus aquaticus*	0	20	1	2	20	8	7	50	2
Mayflies										
Baetidae	*Cloeon dipterum*	0	0	1	0	0	0	0	0	4
Damselflies										
Coenagrionidae	*Coenagrionidae (juvenile/damaged)*	0	0	0	0	0	0	0	1	1
True bugs										
Gerridae	*Gerridae (nymph/damaged)*	0	0	0	0	0	0	1	1	0
Gerridae	*Gerris lacustris*	0	0	0	0	0	0	1	0	0
Veliidae	*Veliidae (nymph/damaged)*	0	0	1	1	0	0	3	0	0
Nepidae	*Nepa cinerea*	0	0	0	0	0	0	1	0	1
Pleidae	*Plea minutissima*	0	0	1	0	0	0	0	0	0
Corixidae	*Corixidae (nymph/damaged)*	0	10	92	20	1	0	44	0	3
Corixidae	*Sigara sp.*	0	0	1	0	0	0	1	0	5
Corixidae	*Sigara dorsalis*	0	0	0	0	0	0	0	0	1
Corixidae	*Sigara semistriata*	0	0	0	0	0	0	0	0	1
Hydrometridae	*Hydrometra stagnorum*	0	0	0	0	0	0	0	2	0

Notonectidae	*Notonectidae (nymph/damaged)*	0	0	0	0	0	0	7	0	0
Notonectidae	*Notonecta sp.*	0	0	14	0	0	0	0	0	0
Notonectidae	*Notonecta glauca*	0	0	0	1	0	0	0	0	0
Beetles										
Haliplidae	*Haliplidae (larvae/damaged)*	0	5	3	0	0	0	0	0	1
Haliplidae	*Haliplus ruficollis group*	0	0	3	2	0	0	0	0	4
Gyrinidae	*Gyrinus sp.*	0	0	0	0	0	0	0	0	3
Gyrinidae	*Gyrinus substriatus*	0	0	0	0	0	0	0	0	1
Dytiscidae	*Dytiscidae (larvae/damaged)*	0	0	7	6	2	1	4	2	5
Dytiscidae	*Hydroporus sp.*	0	0	0	0	18	0	0	1	0
Dytiscidae	*Hydroporus gyllenhalii*	0	0	2	0	0	0	0	0	0
Dytiscidae	*Hydroporus pubescens*	0	0	0	0	1	0	0	0	0
Dytiscidae	*Hydroporus tessellatus*	0	0	0	0	1	0	0	0	0
Dytiscidae	*Agabus bipustulatus*	0	0	0	0	1	0	0	1	0
Dytiscidae	*Agabus sturmii*	0	0	0	0	0	1	0	0	0
Dytiscidae	*Ilybius ater*	0	0	0	0	1	0	0	0	0
Dytiscidae	*Ilybius fuliginosus*	0	0	0	0	1	0	0	0	0
Hydrophilidae	*Hydrophilidae (larvae/damaged)*	0	0	0	0	1	0	0	0	0
Hydrophilidae	*Helophorus sp.*	0	0	0	0	10	3	0	1	2
Hydrophilidae	*Helophorus aequalis*	0	0	1	0	0	0	0	0	0

Hydrophilidae	*Helophorus brevipalpis*	0	0	0	2	6	1	1	1	0
Hydrophilidae	*Anacaena globulus*	0	0	0	0	0	0	0	0	0
Hydrophilidae	*Anacaena lutescens*	0	0	0	0	0	0	1	0	0
Caddisflies										
Limnephilidae	*Limnephilidae (juvenile/damaged)*	0	0	0	0	0	0	0	0	1
Limnephilidae	*Limnephilus lunatus*	0	0	0	4	10	0	9	5	26
True flies										
Chironomidae	*Chironomidae (damaged/pupea)*	0	0	54	0	0	0	9	0	0
Chironomidae	*Tanypodinae*	0	40	16	16	0	60	1	15	30
Chironomidae	*Orthocladiinae*	6	40	249	0	0	0	1	2	20
Chironomidae	*Chironomini*	3	50	140	172	125	10	19	25	80
Chironomidae	*Tanytarsini*	1	25	70	7	125	30	34	3	10
Chironomidae	*Prodiamesinae*	0	0	8	0	0	0	0	0	3
Tipulidae	*Tipula sp.*	0	0	0	0	1	1	0	0	0
Simuliidae	*Simuliidae (damaged/juvenile)*	0	0	0	0	0	0	0	0	1
Dixidae	*Dixidae (damaged/juvenile)*	0	0	0	1	0	0	0	0	0
Dixidae	*Dixella sp.*	0	0	0	0	4	0	0	0	0
Dixidae	*Dixella aestivalis*	0	0	0	0	0	0	3	0	0
Psychodidae		0	0	0	0	0	0	0	1	0
Ceratopogonidae		0	0	0	0	0	0	0	2	0

Tabanidae		0	1	0	0	0	0	0	0	0
Culicidae	*Culicidae*	0	0	0	0	0	0	1	0	0
Sciomyzidae		0	0	1	0	0	0	1	0	0
Collembola		0	0	0	0	0	0	0	1	0
Other Taxa										
	Eiseniella tetraedra	0	0	0	0	0	0	0	0	0
	Diptera sp.	1	0	0	0	0	0	1	1	1
Anthuridae	*Cyathura carinata*	1	0	0	0	0	0	0	0	0

Table E-2 - Macroinvertebrate taxa list autumn 2024.

Family	Species	Site 2A	Site 2B	Site 2C	Site 2D	Site 2F	Site 2G	Site 2H	Site 2I	Site 2J	Site 2K	Site 2M	Site 2N
Flatworms													
Planariidae	*Polycelis nigra/tenuis*	0	0	7	0	0	6	0	0	0	0	0	0
Dugesiidae	*Schmidtea lugubris/polychroa*	0	0	1	0	0	3	0	0	0	0	0	3
Snails													
Lymnaeidae	*Stagnicola sp.*	0	0	19	11	0	0	0	0	0	19	0	0
Hydrobiidae	*Potamopyrgus antipodarum*	26	32	348	13	30	66	78	0	3	4	9	500
Physidae	*Physidae (juvenile/damaged)*	0	0	1	0	0	0	0	0	0	0	0	0
Physidae	*Physella sp.*	0	0	0	5	0	0	0	0	0	1	4	0
Planorbidae	*Planorbis planorbis*	0	0	0	31	0	0	0	0	0	0	0	0
Limpets and mussels													
Sphaeriidae	*Pisidium/Euglesa/Odhneripisidium*	0	0	83	60	5	232	1	443	35	3	0	4
Worms													
Oligochaeta	*Oligochaeta*	0	73	44	1	0	48	2	1	8	1	0	2
Leeches													
Glossiphoniidae	*Glossiphonia complanata*	0	0	0	2	0	1	1	0	0	0	0	0
Glossiphoniidae	*Helobdella stagnalis*	0	0	0	0	0	1	0	0	0	0	0	0
Erpobdellidae	*Erpobdellidae (juvenile/damaged)*	0	0	0	0	0	0	0	0	0	0	0	1
Erpobdellidae	*Erpobdella testacea*	0	0	1	0	0	0	0	0	0	0	0	0
Mites													
Hydracarina	*Hydracarina*	0	0	0	4	6	0	2	0	0	0	0	0
Oribatei	*Oribatei*	0	0	0	0	0	0	0	0	0	0	0	1
Crustaceans													
Ostracoda		0	0	30	0	0	0	0	0	0	0	0	0
Mysidae	*Neomysis integer*	8	0	0	0	0	0	0	0	0	0	0	0

Gammaridae	*Gammarus sp.*	1	1	0	0	0	0	0	0	0	0	0	0
Crangonyctidae	*Crangonyx floridanus/pseudogracilis*	0	0	64	18	24	25	2	155	0	27	0	3
Asellidae	*Asellus aquaticus*	0	0	66	29	23	25	2	58	0	34	1	24
Stoneflies													
Nemouridae	*Nemoura avicularis*	0	0	0	0	0	0	0	0	0	0	0	1
Damselflies	.	.	.	.	.	.	.	.	.	.	.	.	.
Coenagrionidae	*Pyrrhosoma nymphula*	0	0	0	0	0	0	0	0	0	0	0	2
True bugs													
Corixidae	*Hesperocorixa sahlbergi*	0	0	0	0	2	0	0	0	0	0	0	0
Corixidae	*Sigara dorsalis*	0	0	1	0	0	0	0	0	0	0	0	0
Beetles													
Haliplidae	*Haliplus fluviatilis*	0	0	0	0	2	0	0	0	0	0	0	0
Haliplidae	*Haliplus lineaticollis*	0	0	0	0	1	0	0	0	0	1	0	0
Haliplidae	*Haliplus ruficollis group*	0	0	0	1	0	0	0	0	0	0	0	0
Dytiscidae	*Dytiscidae (larvae/damaged)*	0	0	0	0	1	1	1	0	0	1	0	3
Dytiscidae	*Agabus sturmii*	0	0	0	0	1	0	0	0	0	0	0	0
Hydraenidae	*Hydraena palustris*	0	0	0	0	0	1	0	0	0	0	0	0
Elmidae	*Oulimnius sp.*	0	0	0	0	0	0	1	0	0	0	0	0
Alderflies													
Sialidae	*Sialidae (juvenile/damaged)*	0	0	0	0	0	0	0	0	0	0	0	0
Sialidae	*Sialis lutaria*	0	0	0	0	0	0	1	2	0	0	0	0
Caddisflies													
Limnephilidae	*Limnephilidae (juvenile/damaged)*	0	0	12	0	14	3	1	2	0	1	0	50
Limnephilidae	*Limnephilus extricatus*	0	0	0	0	0	2	2	0	0	0	0	0
Limnephilidae	*Glyphotaelius pellucidus*	0	0	0	0	0	0	1	0	0	0	0	0
True flies													
Chironomidae	*Tanypodinae*	0	1	9	0	3	1	1	50	0	1	60	1

Chironomidae	*Orthocladiinae*	0	0	0	0	0	0	0	1	1	0	0	1
Chironomidae	*Chironomini*	1	6	2	8	2	4	6	1	6	2	480	0
Chironomidae	*Tanytarsini*	2	1	4	7	0	4	1	0	1	3	0	1
Chironomidae	*Prodiamesinae*	0	0	0	0	0	2	0	0	0	0	0	0
Ceratopogonidae		0	0	2	0	0	2	0	0	0	0	0	0
Tabanidae		0	1	1	0	0	0	0	0	0	0	0	0

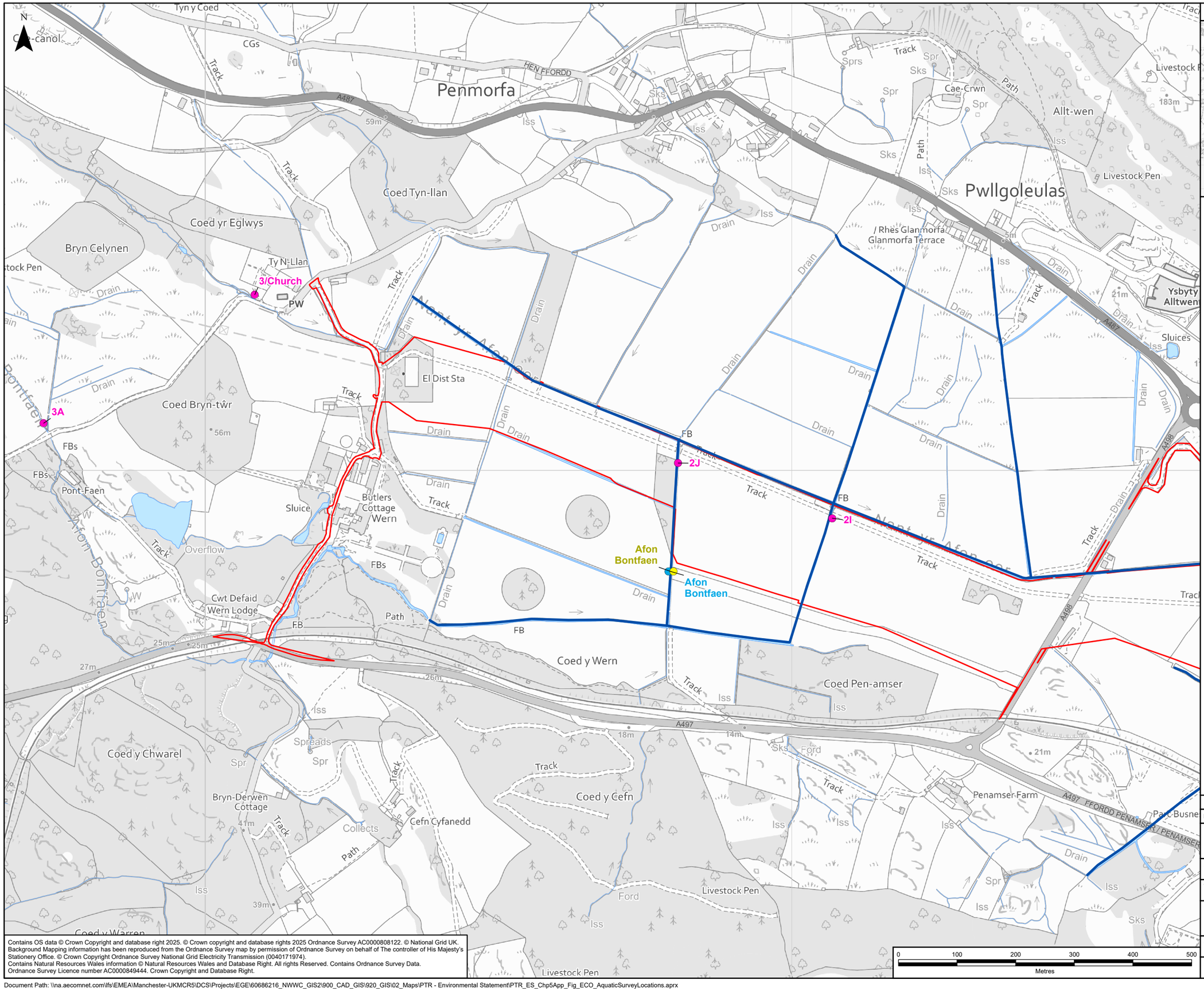
Appendix F Macrophyte taxa list

Table F-1 - Water Framework Directive boundary values for macrophytes in rivers

Ecological Quality Ratio (EQR)	WFD Ecological Status for Macrophytes
≥ 0.80	High
≥ 0.60	Good
≥ 0.40	Moderate
≥ 0.20	Poor
< 0.20	Bad

Table F- 2 Macrophyte taxa list and associated cover values

Scientific name	Common name	Afon Bontfaen	Unnamed ditch - Tributary of Afon Glaslyn 1	Unnamed ditch - Tributary of Afon Glaslyn 2	Unnamed Tributary of Y Cyt	Unnamed Tributary of Y Cyt 2
Alisma plantago-aquatica	Common water-plantain				C2	C1
Callitriche sp.	Starwort	C2	C2		C2	C2
Elodea nuttallii	Nuttall's waterweed				C2	
Epilobium hirsutum	Hairy willowherb					C2
Equisetum fluviatile	Water horsetail					C3
Equisetum palustre	Marsh horsetail		C2	C3		
Fontinalis antipyretica	Greater water-moss					C2
Impatiens glandulifera	Himalayan balsam	C2				C4
Juncus effusus	Soft rush		C3	C5	C1	C3
Lemna minor	Common duckweed				C2	C2
Lythrum salicaria	Purple loosestrife		C3	C2		
Mentha sp.	Water mint		C4		C1	
Myosotis laxa	Tufted forget-me-not					C1
Oenanthe crocata	Water-hemlock		C3			
Persecaria hydropiper	Water pepper	C3				C1
Phalaris arundinacea	Reed canary grass	C3			C4	C4
Potamogeton berchtoldii	Small pondweed				C2	
Potamogeton natans	Broad-leaved pondweed				C3	
Phragmites australis	Common reed	C4				
Sparganium erectum	Branched bur-reed	C3			C8	C6
Voucheria sp.	Blanketweed		C4		C1	



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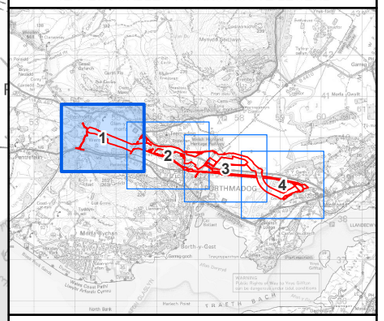

Legend

- Glaslyn Works Site Boundary
- Main River
- Ordinary Watercourse
- Fish Habitat Survey Location
- Macroinvertebrate Survey Location
- Macrophyte Survey Location

Rev	Date	Description	GIS	Chk	App
A	01/08/2025	Environmental Statement	JH	RC	JS

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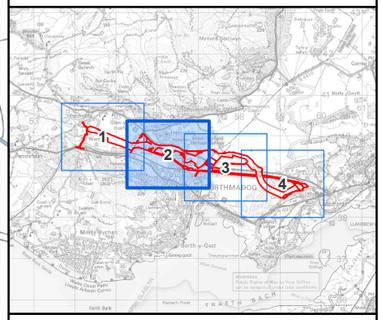

Legend

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Rev	Date	Description	GIS	Chk	App
A	01/08/2025	Environmental Statement	JH	RC	JS

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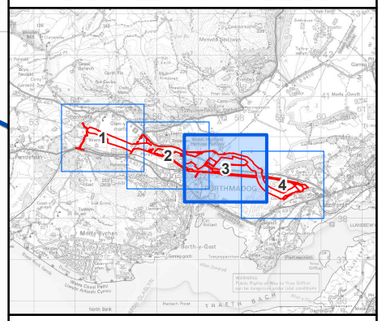

Legend

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- Macroinvertebrate Survey Location
- Macrophyte Survey Location

Rev	Date	Description	GIS	Chk	App
A	01/08/2025	Environmental Statement	JH	RC	JS

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JH	01/08/2025	RC	01/08/2025	JS	01/08/2025

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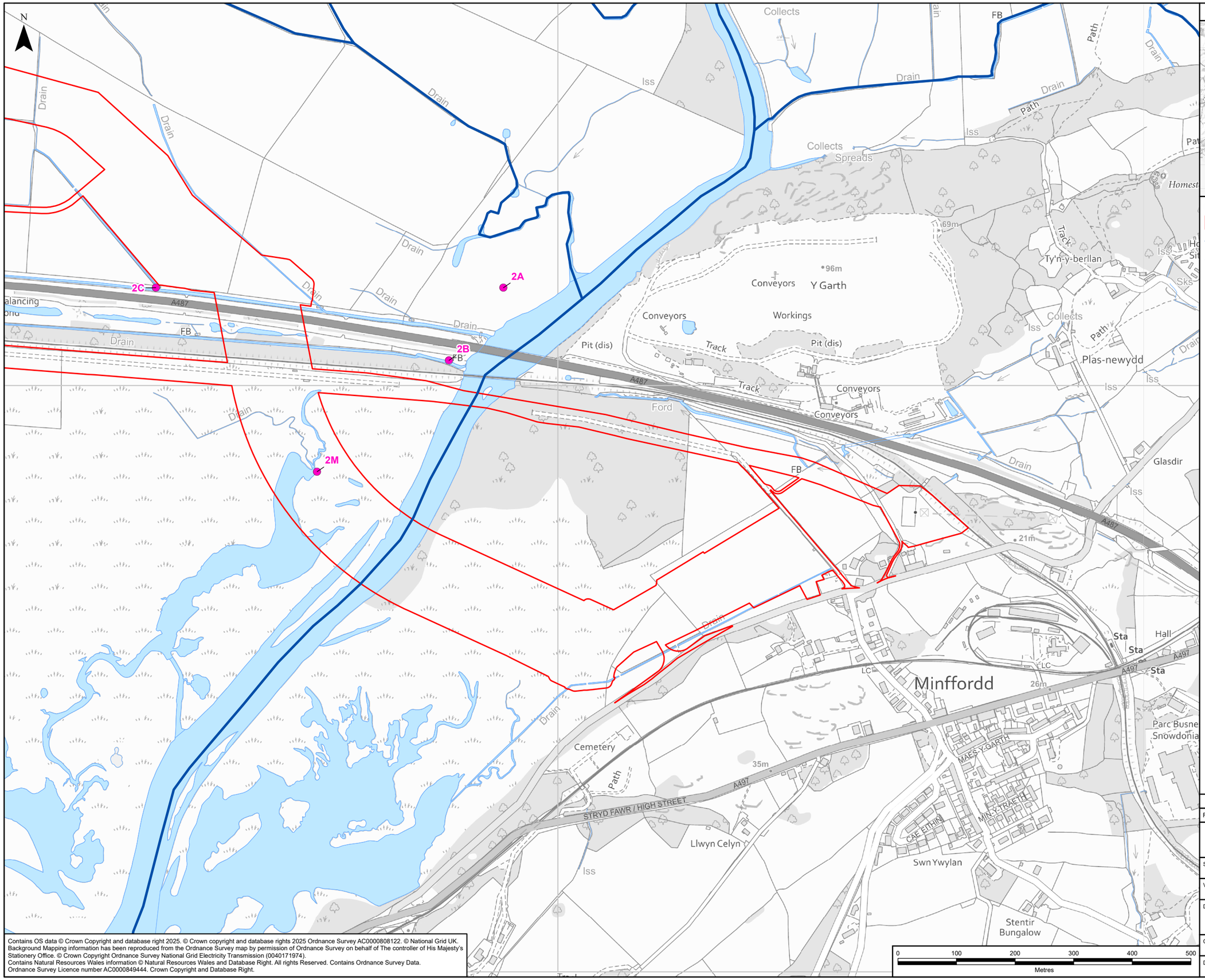

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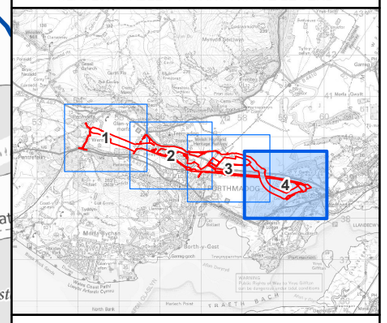

Legend

- Glaslyn Works Site Boundary
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- Macroinvertebrate Survey Location

Rev	Date	Description	GIS	Chk	App
A	01/08/2025	Environmental Statement	JH	RC	JS

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GLASLYN CABLES WORKS

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AQUATIC SURVEY LOCATIONS

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4.5.D Breeding Bird Survey Report - CONFIDENTIAL

4.5.E Wintering Bird Survey Report - CONFIDENTIAL

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1. Introduction

1.1 Introduction

1.1.1 This document has been prepared on behalf of National Grid Electricity Transmission plc (NGET) who seek to construct and operate the Pentir to Trawsfynydd Reinforcement Project (the 'Project').

1.1.2 This document concerns the section of the Project relating to Glaslyn Cables (the proposed works) and is a Technical Appendix to the **Environmental Statement (ES) Volume 4, Glaslyn Cables, Chapter 5: Ecology and Nature Conservation** being submitted as part of the Environmental Impact Assessment (EIA), which accompanies the consent applications for the Project.

1.2 Description of the Proposed Works

1.2.1 The proposed works are in Gwynedd, North-West Wales, between the existing Wern Cable Sealing End Compound (CSEC) (SH 543401), and the existing Garth CSEC (SH 59592 38765), Porthmadog (the 'Glaslyn works site').

1.2.2 The proposed works comprise:

- Extending the existing CSEC at Wern, including a new access road to the east.
- Decommissioning and removal of Garth CSEC.
- Construction of a new CSEC and Tunnel Head House at Minffordd.
- Replacement and upgrading of approximately 6 km of cables between Wern CSEC and Minffordd CSEC.
- Removal of redundant cables in selected locations (with the remainder left *in situ* where constraints, such as ecological, preclude their removal).
- Temporary construction compounds, construction areas and permanent and temporary accesses that are required to install and maintain the infrastructure listed above.

1.2.3 The new cables will be installed through a combination of open cut and non-open cut techniques. The proposed non-open cut technique will be Horizontal Directional Drill (HDD).

1.2.4 A full description of the proposed works is provided in **ES Volume 4 Glaslyn Cables, Chapter 2: Glaslyn Cable Works**. The location of the Glaslyn works site is shown in **Volume 4 Glaslyn Cables, Chapter 2: Glaslyn Cables Works, Figure 4.2.1 of the ES.**

1.3 Introduction to the Bat Report

1.3.1 This report presents the methods and results of a suite of bat surveys undertaken in 2023 and 2024 within the Glaslyn works site and a review of existing ecological data to identify any records for roosting, foraging and commuting bat species in and up to 2 km

from the proposed works. The report provides baseline information on bats that could potentially be affected by the proposed works.

1.3.2 Baseline information was obtained through desk-based assessments and the following field surveys completed during 2023 and 2024:

- Preliminary roost assessments (PRAs) of structures and ground level tree assessments (GLTA) of any trees in the survey area (as described in **Section 1.4**).
- Dusk emergence surveys and endoscope surveys of any trees and structures with bat roost suitability in and immediately adjacent to the survey area.
- Night-time bat walkovers (NBWs) and deployment of automated bat detectors in potential foraging and commuting habitat in the survey area.

1.3.3 This technical appendix is supported by the following figures (Appendix A):

- **Figure 4.5.F.1**: Relevant Designated Sites for Bats
- **Figure 4.5.F.2**: Bat Species Desk Study Records
- **Figure 4.5.F.3**: Bat Roost Suitability of Building and Trees
- **Figure 4.5.F.4**: Bat Emergence - Barn
- **Figure 4.5.F.5**: Bat Emergence and Endoscope - Tree
- **Figure 4.5.F.6**: Transect Bat Activity Surveys and Automated Bat Detector Locations

1.4 Survey Area

1.4.1 The survey area included the Glaslyn works site and an approximate 50 metre (m) buffer. Some observations beyond this were recorded where they were useful to the assessment.

Objectives

1.4.2 The purpose of this assessment is to:

- Outline the legislation and guidance relevant to bats.
- Present relevant desk study information such as existing records of bats 2 km of the Glaslyn works site, and information on internationally designated sites of relevance to bats up to 30 km and nationally designated sites of relevance to bats up to 5 km of the Glaslyn works site (Study Area).
- Present baseline information on the assemblages and distribution of foraging and commuting bats present within and adjacent to the proposed works.
- Identify and assess the potential for roosting bats in survey area.
- Identify the distribution and assemblage of bat species within the Glaslyn works site as well as areas that may be important for roosting, foraging and commuting bats.

1.4.3 This report does not specify mitigation or provide an impact assessment of the proposed works on bats, this information will be presented in ES **Volume 4 Glaslyn Cables, Chapter 5: Ecology and Nature Conservation.**

2. Legislation and Policy

2.1 Introduction

2.1.1 This section lists the legislation, planning policy framework and guidance that is relevant to bats.

2.1.2 More detailed information can be found in **Volume 8, Appendix 1.1.A: Legislation, Policy and Guidance**.

2.2 Legislation

2.2.1 All UK bat species are protected under Regulation 43 of the Conservation of Habitats and Species Regulations 2017 (as amended) (Ref. 2.1). This makes it an offence to deliberately capture, injure or kill a bat; deliberately disturb a bat; or damage or destroy a breeding site or resting place used by a bat.

2.2.2 Deliberate capture or killing is taken to include "accepting the possibility" of such capture or killing. Deliberate disturbance of bats includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species of bat to which the individuals belong.

2.2.3 Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2017 (as amended) (Ref. 2.1) remain an offence under the Wildlife and Countryside Act 1981 (as amended) (Ref 2.2), as it is an offence to recklessly disturb, injure, or kill bats, or damage their roosts, although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided.

2.2.4 A bat roost is defined as being "any structure or place that is used for shelter or protection", and since bats regularly move roost site throughout the year, a roost is protected whether or not bats are present at the time.

2.2.5 It is illegal to carry out work affecting bats or their roosts if that work would result in one of the above offences. Licences to permit otherwise illegal activities relating to bats and their roost sites can be issued for specific purposes and by the relevant licensing authority, which in Wales is Natural Resources Wales (NRW).

2.2.6 The Environment (Wales) Act 2016 (Ref. 2.3) provides Wales' approach to planning and managing natural resources at a national and local level (Part 1 of the Act). Section 7 of Part 1 of this Act ("Biodiversity lists and duty to take steps to maintain and enhance biodiversity") replaces the duty in Section 40 of the NERC Act (Ref. 2.4) in relation to Wales and provides a list of organisms and habitat types in Wales which are considered to be of key significance to sustain and improve biodiversity in relation to Wales. Eight of the UK bat species are listed as species of principal importance within Section 7 of the Act: barbastelle bat (*Barbastella barbastellus)*, Bechstein's bat (*Myotis bechsteinii)*, noctule (*Nyctalus noctula)*, common pipistrelle (*Pipistrellus pipistrellus),* soprano pipistrelle (*Pipistrellus pygmaeus)*, brown long-eared bat (*Plecotus auritus)*, greater horseshoe bat (*Rhinolophus ferrumequinum)* and lesser horseshoe bat (*Rhinolophus hipposideros)*.

2.2.7 Section 6 of the Environment (Wales) Act 2016 (Ref. 2.3) places a duty on public authorities to 'seek to maintain and enhance biodiversity' so far as it is consistent with the proper exercise of those functions. In so doing, public authorities must also seek to 'promote the resilience of ecosystems'. The duty replaces the Section 40 duty in the NERC Act (Ref. 2.4), in relation to Wales, and applies to those authorities that fell within the previous duty.

2.2.8 To assist in complying with this duty, public authorities must have regard to relevant evidence provided in the State of Natural Resources Report and any relevant area statement for an area in which the authority exercises functions, as well as having regard to the list of living organisms and habitats published under Section 7 of the Act Section 7 is a list of species and habitats of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales. This list is currently under review by the Welsh Government in consultation with NRW.

2.2.9 Compliance with the above legislation may require the attainment of relevant protected species licences from NRW prior to the implementation of the proposed works.

2.3 Natural Resources Wales Licences

2.3.1 Any operations that may impact upon bats or their places of rest or shelter may require a NRW European Protected Species Mitigation Licence (EPSML) (Ref 2.5). An EPSML is required where development or construction activity will impact bats through:

- Capturing, injury or killing.
- Damaging or destroying their breeding or resting place.
- Obstructing access to their resting or sheltering place.
- Disturbing a bat while it's in a structure, or place of shelter, or protection.

2.3.2 In the first instance, impacts to bats should be avoided by retaining known or potential roost site such as structures or trees with suitable features. In addition, through considerate construction practices (e.g. restricting work to hours of daylight, avoiding light spill, reducing noise) near to roosts, commuting routes and foraging areas, and through the implementation of buffer zones from known roosts.

2.3.3 Where such buffer zones cannot be implemented, it is likely that the works will require a licence from NRW. The licence application will include a Method Statement using a NRW template, which will stipulate how bats will benefit from mitigation measures, habitat creation, habitat management and habitat maintenance.

2.3.4 Consultation is recommended with NRW where bats may be affected.

2.4 Planning Policy

National Policy

2.4.1 Government planning policy guidance throughout the UK requires local planning authorities to take account of the conservation of protected species when determining planning or development consent applications. This makes the presence of a protected species a material consideration when assessing a development proposal.

2.4.2 In Wales this is implemented through Planning Policy Wales - Edition 12 (PPW (12), February 2024 (Ref 2.6) and is supplemented by Technical Advice Note (TAN) 5 (Ref 2.7), which sets out the land use planning polices of the Welsh Government.

2.4.3 Chapter 6 of PPW (12) sets out the Welsh Government's objectives for the natural heritage of Wales which includes the safeguarding of protected species. It states at paragraph 6.4.35 that '*the presence of a species protected under European or UK legislation, or under Section 7 of the Environment (Wales) Act 2016, is a material consideration when a planning authority is considering a development proposal which, if carried out, would be likely to result in disturbance or harm to the species or its habitat and to ensure that the range and population is sustained*'. It further states at paragraph 6.4.35 that '*an ecological survey to confirm whether a protected species is present and an assessment of the likely impact of the development on a protected species may be required in order to inform the development management process*.'

2.4.4 Planning Policy Wales (12) includes a step-wise approach to protecting and enhancing biodiversity and building resilient ecological networks by ensuring that any adverse environmental effects are minimised and mitigated. PPW (12) also includes the following objectives:

- '*Secure the maintenance and enhancement of ecosystem resilience and resilient ecological networks by improving diversity, extent, condition, and connectivity*'
- '*The contribution of the designated site to wide resilient ecological networks should be recognised and captured as part of a strategic approach to planning policy and decision making*';
- '*Proposed SSSIs [Sites of Special Scientific Interest] will be treated in the same way as notified SSSIs*'
- '*Policies for non-statutory sites should make it clear that such designations do not preclude appropriate developments where there are no adverse impacts on the features for which a site is designated and on wider ecosystem resilience*'.

Local Policy

2.4.5 The following local planning policies set out in the Anglesey and Gwynedd Joint Local Development Plan 2017 (Ref 2.8) relate to ecology and nature conservation which in combination with other planning policies will guide local authority expectations in relation to the proposed works:

- Strategic Policy PS 19 relates to conserving and enhancing the natural environment.
- Policy AMG 5 relates to the protection and enhancement of local biodiversity.
- Policy AMG 6 relates to protecting sites of regional or local significance.

2.4.6 The following planning policy is also relevant to Ecology and Nature Conservation:

- Anglesey and Gwynedd Joint Local Development Plan Review Report (Ref. 2.9).

Biodiversity Policy

2.4.7 As a result of devolution, and new country-level and international drivers and requirements, much of the work previously carried out by the UK Biodiversity Action Plan (BAP) is now focussed at a country-level rather than a UK-level. The UK BAP was succeeded in July 2012 by the UK Post-2010 Biodiversity Framework. The UK list of priority species and habitats, however, remains an important reference source and has

been used to help draw up statutory lists of priorities in England, Scotland, Wales and Northern Ireland. In Wales the current lists are those under Part 1, Section 7 of the Environment (Wales) Act 2016 (Ref. 2.3).

2.4.8 The national strategy for biodiversity is delivered at local level via Local Biodiversity Action Plans (LBAPs). Species and habitats of local conservation concern or value are included in the LBAP and an action plan is created for each species and certain habitat types (respectively termed Species Action Plans, SAPs; and Habitat Action Plans, HAPs).

2.4.9 The LBAP relevant to the proposed works is the Natur Gwynedd LBAP for Gwynedd developed by a partnership of organisations and individuals (Ref. 2.10). A Species Action Plan has been produced for lesser horseshoe bats in the Natur Gwynedd LBAP.

2.4.10 The Wales Biodiversity Partnership (WBP) brings together key members from the public, private and voluntary sectors to promote and monitor biodiversity and ecosystem action in Wales. WBP provides a leadership role and an expert steer on priorities for action on biodiversity and ecosystems in Wales. The WBP Steering Group has now formally disbanded, and the biodiversity action work programme has been taken on by the Wales Biodiversity Strategy Board (WBSB) and the WBP working groups.

3. Methodology

3.1 Desk Study

3.1.1 Desk study data relevant to bats was obtained from the following sources and referred to as the study area:

- Internationally designated sites for bats, up to 30 km from the Glaslyn work site and up to 5 km for nationally designated sites for bats from the Glaslyn work site using data provided by Cofnod (Ref 3.1), the North Wales Environmental Information Service, most recently updated in November 2024.
- Existing records of bat species from the last 10 years up to 2 km from the Glaslyn work site using data provided by Cofnod (Ref 3.1), obtained in November 2024. Only records up to ten years old were used in the assessment (i.e. November 2014 to November 2024 inclusive), as any records older than ten years may be unlikely to be representative of these species' status in the local area.
- Bat data made available from previous site surveys for the proposed works were also reviewed and included in this assessment, where available and relevant.
- Features of ecological interest in the surrounding the Glaslyn work site using aerial photographs and Ordnance Survey maps.

3.2 Previous Bat Survey Work

3.2.1 Areas within the Glaslyn works site have previously been subject to bat survey work in 2014 (Ref 3.2) and the report was reviewed for relevant information on bats. Unpublished reports prepared in 2018-2019 (Ref 3.3) (relating to the National Grid North Wales Connection Project that was paused in 2019), were also reviewed for relevant information on bats within the Glaslyn works site.

3.3 Field Surveys

3.3.1 The survey area included the Glaslyn works site and an approximate 50 m buffer (some observations beyond this were recorded where they were useful to the assessment).

3.3.2 All bat surveys carried out before September 2023 (automated bat detector deployments monthly between April 2023 and 23 September 2023), walked transects monthly between April 2023 and 23 September 2023 and PRA's in 2023) were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition (Ref. 3.4) and British Standards Institution (2015) BS 8596:2015 (Ref. 3.5).

3.3.3 GLTAs following the updated guidance; BCT Good Practice Guidelines 4th Edition (Ref. 4.3.6) were undertaken in January 2024 and February 2024. A NBW undertaken in May 2024 and automated bat detector deployment in June 2024 also followed the updated guidance. Recommendations have been made in line with 4th edition guidance and (if appropriate) features have been reclassified as per this updated guidance and are therefore robust.

Preliminary Roost Assessment – Structures

3.3.4 In May 2023 an internal inspection of a barn building (B4.1) was undertaken in the survey area. The internal inspection was carried out by an ecologist who is registered to use the NRW bat survey licence using a high-powered torch. All potential roost features (PRFs) throughout the structures were checked for the presence of roosting bats or evidence of roosting bats.

Bat Roost Appraisal – Trees (Pre-15 September 2023)

3.3.5 Bat roost suitability surveys of the suitable trees on Glaslyn works site plus a minimum 50 m buffer was carried out on 25 May 2023, 27 July 2023, and 14 September 2023. The bat roost suitability surveys were undertaken by an ecologist who is registered to use the NRW bat survey licence.

3.3.6 Trees were examined from the ground using close focusing binoculars and a high-powered torch for PRFs such as loose bark, cavities and ivy (*Hedera helix*) that could be utilised by bats. Trees were also checked for any signs of bats such as droppings.

3.3.7 PRFs were identified from the ground (using torch and binoculars as necessary) and the trees and structures classified as having Negligible, Low, Moderate or High bat roost suitability, in accordance with Collins (2016) (Ref. 3.5) as this was the current guidance used when these surveys were undertaken however as noted above were categorised to follow the most recent guidance (2023) (Ref 3.6).

3.3.8 PRFs searched for included suitable holes, cracks or splits in trees, buildings or other structures. Where such features existed, an inspection was made for evidence of bat use such as droppings, staining, foraging remains, auditory evidence or observations of live or dead bats.

Table 3.1 – Criteria for Assessing the Suitability of Potential Roost Features

Roost suitability	Description for structures	Description for trees
Confirmed	Confirmed signs of bat presence and/or occupation (droppings, oily staining around entry points, insect remains, odour, scratching) and actual bat presence.	Confirmed signs of bat presence and/or occupation (droppings, oily staining around entry points, insect remains, odour, scratching) and actual bat presence.
High	A structure with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potential for longer periods of time due to their size, shelter, protection, conditions (e.g., temperature, humidity, height above ground level, light levels or levels of disturbance) and surrounding habitat.	A tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potential for longer periods of time due to their size, shelter, protection, conditions (e.g. temperature, humidity, height above ground level, light levels or levels of disturbance) and surrounding habitat.
Moderate	A structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection,	A tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions

Roost suitability	Description for structures	Description for trees
	conditions (e.g., temperature, humidity, height above ground level, light levels or levels of disturbance) and surrounding habitat but unlikely to support a roost of high conservation status.	and surrounding habitat but unlikely to support a roost of high conservation status.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter protection, appropriate conditions and/or suitable habitat to be used on a regular basis or by large numbers of bats (i.e., unlikely to be suitable for maternity or hibernation).	Tree of sufficient size and age to contain potential roost features but with none seen from the ground or features seen have only very limited roosting potential.
Negligible	Negligible habitat features in the survey area likely to be used by roosting bats.	Trees with no potential to support bats.

Source: Category descriptions from Collins, 2016 to be applied using professional judgement

Ground Level Tree Assessments (After 15 September 2023)

3.3.9 Ground-Level Tree Assessments (GLTAs)were undertaken in the survey area in January 2024 and February 2024 by an ecologist who is registered to use the NRW bat survey licence.

3.3.10 At the time of the surveys, tree removal locations were unknown, however, only those trees potentially impacted or likely to be removed during the proposed works were assessed.

3.3.11 Following the inspections, each tree was either classified as having no PRF's (NONE), requiring further assessment (FAR) or one or more PRF's visible (PRF). Those classed as FAR and PRF were then required to be further surveyed and then classified as having no PRFs or suitability for one or a low number of individual bats (PRF-I), or suitability for multiple bats or for hibernation (PRF-M) using the criteria set out in Collins (2023) (Ref 3.6).

3.3.12 The assessment also factored in the geographic location, surrounding habitat and connectivity to the wider landscape of the Glaslyn works site.

Dusk Emergence Surveys – Structures

3.3.13 The barn building (B4.1) was assessed as having Moderate bat roost suitability in May 2023 and was subject to four dusk emergence surveys between August and September 2024.

3.3.14 The dusk emergence surveys commenced approximately 15 minutes before sunset and continued for at least a further 90 minutes after sunset.

3.3.15 Surveyors positioned themselves to cover all PRFs that were visible on the building and watched for any bats emerging from the building. Night vision aids (Canon XA11 infrared cameras, Pulsar Helion 2 XP50 PRO – Thermal Monocular Scopes and Pulsar XP50 – Thermal Binoculars) were used to aid bat observations.

3.3.16 The time, location, number, species (where possible), and direction of flight were recorded for each bat pass (either echolocation heard, or activity seen, or both) encountered during each survey visit. Any other bat activity was also recorded during the survey.

3.3.17 The surveys were carried out using Anabat Scout, Elekon Batlogger M and Anabat Walkabout detectors to allow sonogram analysis. A Walkabout bat detector was placed inside the Barn (B4.1) on 07 August 2024 to record any bat calls from inside the structure. Notes were made on the weather conditions during each survey (**Table 4.5**) and any limitations.

Dusk Emergence Surveys – Trees

3.3.18 Bat dusk emergence surveys were completed on four trees (Tree 4.G34A (12 August 2024, 03 September 2024, 23 September 2024), Tree 4.W73A (12 August 2024, 29 August 2024, 19 September 2024), Tree 4.T142 (12 August 2024, 29 August 2024, 19 September 2024) and Tree 4.G293A (29 August 2024, 19 September 2024)) with PRF for roosting bats, which were present in the Glaslyn works site and likely to require removal.

3.3.19 Trees 4.T142 and 4.G293A were assessed as 'PRF' during GLTAs in 2024 using the latest bat guidance. Trees 4.G34A and 4.W73A were initially assessed in 2023 using the previous relevant bat guidance at the time of survey and were re assessed using the latest bat survey guidance in 2024 and categorized as 'PRF'.

3.3.20 All four trees were assessed as being unsafe to climb, therefore dusk emergence surveys were carried out to determine if the trees were PRF-I or PRF-M. **Appendix A, Figure 4.5.F.3,** shows the locations of the trees that required additional surveys, and the bat roost suitability level identified following these surveys.

3.3.21 The dusk emergence surveys commenced approximately 15 minutes before sunset and continued for at least a further 90 minutes after sunset.

3.3.22 Surveyors positioned themselves to cover all PRFs that were visible on the tree and watched for any bats emerging from the tree. Night vision aids (Canon XA11 infrared cameras, Pulsar Helion 2 XP50 PRO – Thermal Monocular Scopes and Pulsar XP50 – Thermal Binoculars) were used to aid bat observations.

3.3.23 The time, location, number, species (where possible), and direction of flight were recorded for each bat pass (either echolocation heard, or activity seen, or both) encountered during each survey visit. Any other bat activity was also recorded during the survey.

3.3.24 The surveys were carried out using Anabat Scout, Elekon Batlogger M and Anabat Walkabout detectors to allow sonogram analysis. Notes were made on the weather conditions during each survey (**Table 4.5**) and any limitations.

Endoscope Surveys

3.3.25 Tree endoscope surveys were completed on three trees (Tree 4.W43A (07 August 2024, 28 August 2024, 23 September 2024), Tree 4.T62 (12 August 2024, 28 August 2024, 19 September 2024), Tree 4.W73B (12 August 2024, 29 August 2024, 19 September 2024)) with PRF for roosting bats which were present in the Glaslyn works site and were likely to require removal.

3.3.26 Tree 4.W73B was assessed as 'PRF' in 2024 during GLTAs using the latest bat guidance. Tree 4.W43A and Tree 4.T62 were initially assessed in 2023 using the previous relevant bat guidance at the time of survey and were therefore re assessed using the latest bat survey guidance in 2024 and categorized as 'PRF'. All three trees were categorized as 'PRF'. The endoscope surveys were carried out to determine if the trees were PRF-I or PRF-M.

3.3.27 **Appendix A, Figure 4.5.F.3**, shows the locations of the trees which required surveys.

3.3.28 The trees were endoscoped by an ecologist who is registered to use the NRW bat survey licence using a torch and Rigid Micro CA-350X inspection camera.

Bat Activity Surveys

3.3.29 The bat activity survey effort for the Glaslyn works site was determined through the size of the Glaslyn works site, potential impacts and the quality of habitat present that is suitable for foraging and commuting bats, in accordance with the criteria detailed in **Table 3.2**. Habitats present within the Glaslyn works site include improved and marshy grasslands grazed by cattle and sheep, with discrete woodland blocks. Watercourses and drains are present throughout the survey area. The survey area comprises the Glaslyn work site.

3.3.30 Meirionnydd Oakwoods and Bat Sites Special Area of Conservation (SAC) is located within the eastern side of Glaslyn works site. This large composite SAC is designated in part for lesser horseshoe bats as it supports known maternity roosts and some hibernacula in sections of the site (this site spans a large area and the roosts are not understood to be within the woodland section of the SAC which falls within the Glaslyn works site) and comprises the centre of the distribution for lesser horseshoe bats in Wales (Ref 3.7). The area of the SAC within the Glaslyn works site was assessed as having Moderate suitability habitat for foraging and commuting bats, this is due to being designated for a variety of habitats including woodland, heath and rivers which is of value to foraging and commuting bats, and linear features are favoured by horseshoe bats.

3.3.31 The Porthmadog area in the centre of the Glaslyn works site was assessed as having Low suitability habitat for foraging and commuting bats. The habitats in this area comprised of a scattered mosaic of grassland, scrub and woodland habitats amongst a suburban landscape. The Welsh Highland Heritage Railway also runs through the survey area from the north of Porthmadog towards the north-east.

3.3.32 The Wern Manor area in the west of the Glaslyn works site was assessed as having Low suitability habitat for foraging and commuting bats due to habitats broadly being categorised as improved grassland and grazed (livestock) pasture in the western areas of the survey area and north of the A487.

Table 3.2 – Criteria for Assessing the Suitability of Habitats for Bat Activity

Habitat suitability	Description
High	Continuous, high-quality habitat that is well concerted to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.
Moderate	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
Low	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e., not very well connected to the surrounding landscape by another habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Negligible	Negligible habitat features on site likely to be used by commuting or foraging bats.

Source: Category descriptions from Collins, 2016 (Ref. 3.4) to be applied using professional judgement.

Table 3.3 – Recommended Survey Effort for Bat Activity Surveys

Habitat suitability	Walked transect survey	Automated detector survey
High	Up to two survey visits per month (April – October). At least one of the surveys should comprise dusk and pre-dawn (or dusk to dawn) in one 24-hour period.	Three locations per transect, data to be collected on five consecutive nights per month.
Moderate	One survey visit per month (April – October). At least one of the surveys should comprise dusk and pre-dawn (or dusk to dawn) in one 24-hour period.	Two locations per transect, data to be collected on five consecutive nights per month.
Low	One survey visit per season (spring – April and May, summer – June, July and August, autumn – September and October).	One location per transect, data to be collected on five consecutive nights per season.

Source: Category descriptions from Collins, 2016 (Ref. 3.4) to be applied using professional judgement.

Bat Activity Transect Surveys (Pre-15 September 2023)

3.3.33 In accordance with guidance outlined in Collins (2016) (Ref 3.4), walked bat activity transect surveys at Transect 1 (SAC) were undertaken once per active month (April 2023 – October 2023) with one of the surveys (October 2023) comprising one dusk and pre-dawn visit (or dusk to dawn) in a 24-hour period.

3.3.34 Walked bat activity transect surveys at Transect 2 (Porthmadog) were undertaken once during spring (May 2023) and autumn (October 2023) and twice in the summer season (June and July 2023). Guidance for Low habitat suitability requires one survey visit per season; however, an additional summer survey was undertaken to provide a further representation of bat activity in the area to compensate for there being no automated bat detectors deployed at Porthmadog.

3.3.35 Walked bat activity transect surveys at Transect 3 (Wern Manor) were undertaken once per season (May, August and September 2023).

3.3.36 Bat activity transect surveys at Transect 1 on 15 September 2023, 4 October 2023 and 5 October 2023 and at Transect 2 on 19 October 2023 were carried out after the new bat guidance was published on 15 September 2023. For consistency, these transects were undertaken following the same guidance as the previous transects in both areas.

3.3.37 Each survey commenced at sunset and lasted for at least 2 hours; this coincides with peak activity periods as bats emerge and disperse from their roosts. The October pre-dawn visit at Transect 1 commenced 2 hours before sunrise and lasted for two hours until dawn to capture specific pre-dawn behaviours including bats returning to their roosts.

3.3.38 The transect surveys involved walking a defined transect route that provided a representative coverage of the habitats of potential value to bats that would be impacted by the Glaslyn works. The transect route was walked at a steady pace by two suitability experienced ecologists (as shown on **Appendix A, Figure 4.5.F.6**). Surveys were undertaken in suitable weather conditions, i.e., no rain or strong wind and with temperatures above 10°C at sunset, as detailed in **Table 4.10**.

3.3.39 Elekon Batlogger and Anabat Scout detectors were used to record bat calls. During the transect surveys, ‘listening points’ at fixed locations were included along the transect route at potentially important features with regards to bats. At each ‘listening point’, bat activity was monitored for a period of three minutes. Any additional activity encountered whilst walking between points was also noted.

Night-time Bat Walkovers (After 15 September 2023)

3.3.40 A NBW was undertaken close to Wern Manor on 28 May 2024 to take account of using an existing road as a temporary access route to the Glaslyn works site which passes through ancient woodland and habitat adjacent to Wern Manor that includes a lesser horseshoe bat roost. The road will be unaltered, only used as a temporary measure until a haul road is constructed from the opposite direction.

3.3.41 The walkover commenced at sunset and continued for approximately 2-3 hours after sunset. The survey was conducted during suitable weather conditions (i.e., without heavy rain or strong wind, and with a sunset temperature over 10°C).

3.3.42 The route is shown in **Appendix A, Figure 4.5.F.6**.

3.3.43 The NBW involved two surveyors commencing the survey at sunset, they then waited between 30-60 minutes after sunset at a designated start point before proceeding to

walk along a pre-determined route as shown on **Figure 4.5.F.6**. The start point was positioned at potential flight lines close to potential roost locations such as buildings or woodland. All bat activity encountered whilst walking between points was also noted.

3.3.44 Surveyors carried a full spectrum bat echolocation detector (Batlogger M, Batlogger M2, Anabat Scout or Echo Meter Touch 2 Pro) to record bat calls during the survey. The time, location, species (where possible), and direction of flight (where possible) was recorded for each bat pass (discrete burst of echolocation heard, or bat activity observed) encountered during the surveys. The echolocation calls detected for all surveys were recorded in WAV format by the detectors to allow for further analysis in Analook W (version 4.5) or BatExplorer (version 2.2.4.0).

Automated Bat Detector Surveys

3.3.45 Automated bat detectors (Anabat Swifts and SM4s) were deployed to record activity remotely at different locations along the transects in the survey area.

3.3.46 Automated bat detectors were deployed in three different locations in the SAC (Transect 1) on separate occasions in April, May, June, July, August, September, and October 2023.

3.3.47 Automated bat detectors were deployed in two different locations in the Wern Manor area (Transect 3) on separate occasions in May, August and September 2023.

3.3.48 An automated bat detector was deployed in the Wern Manor area (Transect 4) in May 2024.

3.3.49 The automated bat detectors were positioned in representative habitat to record bat activity throughout the Glaslyn works site, see **Appendix A, Figure 4.5.F.6** for details of the automated bat detector locations.

3.3.50 Automated bat detectors were not deployed in Porthmadog (Transect 2) as no suitable locations were identified due to all potential deployment locations being on public land and therefore at risk of being damaged or removed.

Table 3.4 – Automated Bat Detector Locations and Dates of Deployment

Location	Automated Bat Detector & Location	Dates (2023)
SAC	ABD 1 - Power Lines	April, May, June, July, August, September, October
	ABD 2 - River	April, May, June, July, August, September, October
	SBD 3 -Wood	April, May, June, July, August, September, October
Wern Manor	ABD 1 - Wern Manor West	May, August, September
	ABD 2 - Wern Manor West	May, August, September

3.3.51 The automated bat detectors were left in situ for a minimum of five consecutive nights, in appropriate weather conditions per monitoring period. Weather conditions have been summarised for the location of the Glaslyn works site; temperature, wind speed and

precipitation on each day the automated bat detector recorded bat activity (see **Appendix B, Tables B.1 and B.2** for details).

3.3.52 The automated bat detectors were set to start recording half an hour before sunset and to stop recording half an hour after sunrise. All microphones were positioned at least 1 m above the ground in a position clear of vegetation to maximise detection.

Bat Sonogram Analysis

3.3.53 Sound recordings during surveys were made in full spectrum Wave Audio File ('WAV') to allow subsequent verification of species or species groups, where required. Records of bat passes were subsequently analysed using BatExplorer, AnalookW 4.2d and Kaleidoscope software.

3.3.54 Ten percent of all pipistrelle (*Pipistrellus* sp.) species and noise recordings, in addition to all remaining species recordings, were identified by a suitably experienced ecologist. Reference was made to bat call identification guidance (Ref 3.8) where necessary. Following this, 10% of all species verified were subject to a second check by an appropriately experienced ecologist for quality assurance purposes.

3.3.55 Analysis provides information on the species present at each location, as well as the number and timing of bat passes. For automated detection, a bat pass is defined as a single automated bat detector file made up of bat pulses of a single species; this can be one bat in a file or many bats in a file. The number of passes recorded on automated bat detectors gives an indication of the level of bat activity at a given location, but this cannot be reliably correlated to actual bat abundance because there is no observational context.

Data Analyses

Bat Activity Index (BAI)

3.3.56 BAI values were calculated by averaging the total number of bat passes per hour for each automated bat detector unit at each location per month. The term 'pass' is defined as a single file made up of bat pulses of a single species i.e. this may be one bat in a file or many bats in a single file.

3.3.57 Limited guidance is available on what constitutes low to high bat activity on a site based on number of passes. A relative scale was used that follows the protocol recommended by Ecobat (Ref 3.9) in this report where, for automated detector data:

- Low activity: 0-20th percentiles.
- Low to moderate activity: 21st-40th percentiles.
- Moderate activity: 41st-60th percentiles.
- Moderate to high activity: 61st-80th percentiles.
- High activity: 81st-100th percentiles.

3.3.58 For transect data relative bat activity levels were described to aid the discussion. No guidance is available on what constitutes low, moderate or high bat activity based on number of passes during a transect. A relative scale is used in this report where:

- Very low activity is up to 5 passes per survey.
- Low activity is 6 to 25 passes per survey.

- Moderate activity is 26 to 99 passes per survey.
- High activity is 100 passes per survey.

3.3.59 Reference to surveyor observations, including numbers of individual bats seen, flight routes and behaviour and detectability of individual species are also made to inform the overall evaluation.

3.4 Biodiversity Evaluation

3.4.1 Evaluation of ecological importance of identified ecological features within a proposed development site is required to inform an Ecological Impact Assessment (EcIA). This report presents the evaluation of importance for bats, and the impact assessment is presented in **Volume 4 Glaslyn Cables, Chapter 5: Ecology and Nature Conservation.**

3.4.2 An assessment of importance for bats (in the absence of full survey data) has been made with reference to published guidance and criteria in the UK Bat Mitigation Guidelines (Ref 3.10).

3.5 Assumptions and Limitations

Desk Study

3.5.1 The aim of a desk study was to help characterise the baseline context of the study area and provide valuable background information that may not be captured by surveys alone. Information obtained from the desk study was dependent upon people and organisations having made and submitted records for the area of interest. A lack of records for a particular species does not necessarily mean that this species does not occur in the study area. Likewise, the presence of records does not automatically mean that these still occur in the area of interest or are relevant in the context of the proposed works.

Field Survey

3.5.2 Bats are highly mobile animals. Therefore, these surveys only provide a snapshot of current roosting, foraging and commuting behaviour and as such survey data is typically considered valid for up to two years.

3.5.3 A tree with bat roost features (Tree 4.T244), was identified during the initial field survey within the Glaslyn works site but outside of the proposed works area (See Appendix A, Figure Ref 4.5.F.3). Since it was deemed unaffected by direct or indirect impacts, no further surveys were conducted at that time. However, due to changes in the proposed working area, this tree could now be directly impacted, however the exact route of the access track in this location may be possible to move to avoid this tree during detailed design. Three additional trees (4.T269, 4.T449 and 4.T450) were not assessed for bat roost suitability as land access was restricted at the time of survey. Additional surveys of these trees will be carried out pre-construction during the appropriate season, unless these trees can be retained. The findings will determine suitable mitigation measures, which may include obtaining an NRW licence if roosting bats are confirmed.

3.5.4 The May 2023 ABD 1 (SAC Power Lines) (automated bat detector) failed due to a corrupted SD card which resulted in no data being captured at that location in May

2023. Given the wider time series of data collected, one missed month is unlikely to meaningfully affect the understanding of the importance of the site for bats.

3.5.5 The October 2023 ABD 1 (SAC Power Lines) (automated bat detector) also failed due to a corrupted SD card which resulted in no data being captured at that location in October 2023. Given the wider time series of data collected, one missed month is unlikely to meaningfully affect the understanding of the importance of the site for bats.

3.5.6 Automated bat detectors were not deployed in Porthmadog (Transect 2) as no suitable locations were identified due to all potential deployment locations being on public land and therefore at risk of being damaged or removed. As per guidance (Ref 3.4), dusk bat activity surveys were undertaken each season in this area. An additional summer transect survey was undertaken to provide a further representation of bat activity in the area.

3.5.7 A dusk bat activity survey of Transect 1 (SAC) was cancelled on 03 October 2023 due to heavy rain and strong winds. The survey was therefore undertaken the following evening on 04 October 2023 (dusk) with a strong breeze remaining, however the weather was dry and bats were recorded during the survey.

3.5.8 There was light rain during the dusk bat activity survey on 19 October 2023 Transect 2 (Porthmadog) for the first 50 minutes of the survey. This is not a significant limitation as the cloud cleared and the drizzle stopped fully. Bats were also recorded as active throughout the survey period.

3.5.9 The emergence surveys of the Barn (B4.1) and Tree 4.G34A on 03 September 2024 were both aborted at 21:15 (1 hour and 15 minutes after sunset) after heavy rain started at 21:10. This is not a significant limitation as bats were recorded as active throughout the surveys.

3.5.10 Equipment failure of a thermal scope positioned to view the eastern aspect of the Barn (B4.1) was encountered during the dusk emergence survey of the Barn (B4.1) on 28 August 2024 however this was mitigated by a follow up survey on the same aspect of the Barn (B4.1) the following evening (29 August 2024).

3.5.11 The night vision aid positioned on the western side of the Barn (B4.1) malfunctioned and only recorded the final hour of the dusk emergence survey of the Barn (B4.1) on 28 August 2024, however this was not a significant limitation as the Barn (B4.1) was observed by a surveyor during the time that the night vision aid was not working.

3.5.12 The dusk emergence surveys of the Barn (B4.1) (07 August 2024, 28 August 2024, 29 August 2024), Tree 4.W73A (12 August 2024, 29 August 2024, 19 September 2024) and Tree 4.T142 (29 August 2024) started between 15 and 10 minutes before sunset. BCT guidelines recommend dusk emergence surveys commence 15 minutes before sunset, as this was only a variance in some cases as little as 5 minutes it is not considered a significant limitation.

3.5.13 The view of the PRF identified on Tree 4.T142 was restricted due to dense ivy, however this was mitigated by a night vision aid being deployed in addition to a surveyor to observe the PRF.

3.5.14 The three endoscope surveys of Tree 4.W43A were limited due to the cavity appearing to extend further than the 1 m length of the endoscope.

3.5.15 The three endoscope surveys of Tree 4.W73B were limited due to the cavity appearing to extend further than the 1 m length of the endoscope.

3.5.16 Some bat activity transects were altered to account for access restrictions caused by livestock. During the transect route deviations the surveyor's professional judgement was used to cover and represent the Glaslyn works site and to ensure health and safety protocols were followed.

3.5.17 Field data observations of bat activity recorded by the surveyors on the mobile mapping tablet were lost or corrupted from the survey of Transect 2 (Porthmadog) on 29 June 2023, however the route followed the same route as the other transects for that area and bats were recorded by detectors, allowing an assessment of bat numbers and activity within that area during the survey.

3.5.18 It is accepted that *Myotis* bat species are difficult to identify from echolocation alone, therefore these species are aggregated as *Myotis* bat(s). This aggregation, where used, is widely accepted (Walters *et al*. 2012 (Ref 3.11); Parsons & Jones, 2000 (Ref 3.12) and does not affect the evaluation of the results of activity surveys.

3.5.19 Similarly, long-eared bats cannot be identified to species level by their echolocation call alone. However, given the survey location is outside of the known or potentially suitable range of the grey long-eared bat (*Plecotus austriacus*), all long-eared bat calls recorded will have been of brown long-eared bat. No other limitations were encountered.

4. Results

4.1 Desk Study

4.1.1 The desk study returned several designated sites for bats in the study area summarised in **Table 4.1**.

4.1.2 The statutory designated site information is shown in **Appendix A, Figure 4.5.F.1**.

Table 4.1 – Statutory sites designated for bats in 30 km (international designated sites for bats) and 5 km (national designated sites for bats) of the Glaslyn works

Site name (designation)	Approximate distance from Glaslyn works site	Qualifying features
Coedydd Derw a Safleoedd Ystlumod Meirion/ Meirionnydd Oakwoods and Bat Sites Special Area of Conservation (SAC)	In the Glaslyn works site	Lesser horseshoe bats are an Annex II species that are a primary reason for selection of the site as a SAC. This large composite site includes most of the known maternity roosts in Meirionnydd and some hibernacula and is the centre of distribution for lesser horseshoe bats in Wales. The sheltered river valleys provide excellent tree cover and numerous suitable maternity roosts.
Glaslyn Site of Special Scientific Interest (SSSI) (incorporates Traeth Glaslyn North Wales Wildlife Trust site)	In the Glaslyn works site	The SSSI supports two separate nursery roosts of lesser horseshoe bats. The combination of woodland and grazed pastures in the Glaslyn valley provides a rich source of invertebrate prey throughout the year. Brown long-eared bats, Daubenton's bats (*Myotis daubentoniid*) and pipistrelle bats (*Pipistrellus* sp.) have also been recorded roosting at the site. Part of the site is included in the Coedydd Derw a Safleoedd Ystlumod Meirion/ Merionnydd Oakwoods and Bat Sites Special Area of Conservation.
Ysbyty Bron y Garth SSSI	In the Glaslyn works site	Breeding population and maternity roost of lesser horseshoe bats. The SSSI is adjacent to the Meirionnydd Oakwoods and Bat Sites SAC.
Aberdunant SSSI	2.16 km north	The site lies within the boundary of Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC and consists of two disused mine levels and a lodge that support hibernating lesser horseshoe bats, together with a nursery roost within a nearby barn. The site also supports broadleaved woodland which is used by foraging and commuting bats.

Site name (designation)	Approximate distance from Glaslyn works site	Qualifying features
Coedydd Dyffryn Ffestiniog (Gogleddol) SSSI	2.14 km east	The site is of special interest for its biological features, including its population of lesser horseshoe bats. The SSSI forms part of the Meirionnydd Oakwoods and Bat Sites SAC. The colonies of lesser horseshoe bats form part of a much larger population in the Vale of Ffestiniog, which are probably linked to populations in the Glaslyn valley and south towards Harlech. Nursery roosts occur in suitable buildings which are situated close to or within woodland. Disused buildings and mine workings provide cool stable temperatures for hibernation. Woodland edges, hedgerows and lines of trees form important commuting habitat, and the woodland and associated pastures provide foraging habitat. Other species of bat roost here, including brown long-eared and *Pipistrellus spp.*
Mwyngloddiau Llanfrothen SSSI	2.34 km north-east	The SSSI consists of a series of mine shafts, adits and other disused mine workings and is of special interest for hibernating bats, particularly lesser horseshoe bats. The mines are also used by other bat species, including Daubenton's bat.
Dolorgan Barn SSSI	3.90 km south-east	Dolorgan Barn is of special interest as a breeding roost of the lesser horseshoe bat; the adjoining area of mixed woodland is used by the bats as a feeding area and as commuting to other feeding habitats in the valley. The building is also used as a roost site by small numbers of brown long-eared bats and by unidentified bat species of the genus *Myotis*.
Coedydd Nanmor SSSI	4.06 km north-east	The SSSI is of special interest for its biological features comprising semi-natural broadleaved woodland, assemblages of mosses, liverworts, lichens, a population of lesser horseshoe bats, a population of silver-studded blue butterflies (*Plejebus argus*), and the small red damselfly (*Ceriagrion tenellum*). The site is a component part of the Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC.
Glyn Cywarch SSSI	4.57 km south-east	The SSSI is of special interest as a breeding roost of the lesser horseshoe bat. It comprises a potting shed which supports the breeding roost, and an adjacent wall which is used by bats as a flight route to gain access to feeding habitat in the nearby woodland of Coed y Glyn. Small numbers of pipistrelle bats and brown long-eared bats also roost in the building.

Site name (designation)	Approximate distance from Glaslyn works site	Qualifying features
Coedydd Beddgelert a Cheunant Aberglaslyn SSSI	4.85 km north	The SSSI is of special interest for its geomorphological and biological features. These comprise fluvial geomorphological landforms, semi-natural broadleaved woodland, assemblages of mosses, liverworts, lichens and a population of lesser horseshoe bats. The site is a component part of the Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC.
Coedydd De Dyffryn Maentwrog SSSI	4.92 km east	The SSSI is of special interest for its biological interest, including semi-natural broadleaved woodland, a rare moss, liverworts, lichens, slime moulds and a population of lesser horseshoe bats.
Glynllifon SAC	12.92 km north	The Annex II species that is a primary reason for selection of this site is lesser horseshoe bat.
Mwyngloddiau Fforest Gwydir/Gwydyr Forest Mines SAC	24.36 km north-east	Lesser horseshoe bat is a qualifying feature, but not a primary reason for site selection.

4.1.3 The desk study returned existing records of at least nine different bat species in the study area, including (number of records in brackets); soprano pipistrelle (96), common pipistrelle (*Pipistrellus pipistrellus*) (58), unidentified pipistrelle species (*Pipistrellus* sp.) (31), lesser horseshoe (28), noctule (15), *Myotis* (8), unidentified bat species (*Chiroptera* sp.) (6), brown long-eared bat (3) and whiskered bat (*Myotis mystacinus/ brandtii*) (1).

4.1.4 **Table 4.2** below provides further information on bat records returned in the study area.

Table 4.2 – Bat Records Returned from Cofnod in the Study Area

Common name	Scientific name	Conservation designation(s)	Number of records	Description of records
Soprano pipistrelle	*Pipistrellus pygmaeus*	WCA Schedule 5 CHS2 NERC S.42 HabDir 4 Bern2 Bonn2 LBAP	95	Sixty-one records with dates ranging between 2016 and 2018 are in or adjacent to the Glaslyn works site. These records are spread across the Glaslyn works site but found in clusters to the west, in the centre and adjacent to the SAC to the east of the Glaslyn works site. The most recent records for soprano pipistrelle date from 2020. The nearest roost record is

Common name	Scientific name	Conservation designation(s)	Number of records	Description of records
				from 2018 and located approximately 635 m east of the Glaslyn works site.
Common pipistrelle	*Pipistrellus pipistrellus*	WCA Schedule 5 CHS2 NERC S.42 HabDir 4 Bern2 Bonn2 LBAP	58	Thirty-two records are in or adjacent to the Glaslyn works site and are records of foraging or commuting from bat activity surveys between 2016 and 2018. The majority of records are from activity surveys with the most recent being from 2020.
Pipistrelle sp.	*Pipistrellus* sp.	WCA Schedule 5 CHS2 NERC S.42 HabDir 4 Bern2 Bonn2 LBAP	31	All records are dated between 2016 and 2018, and twenty-five records are in or adjacent to the Glaslyn works site. All records are from bat activity surveys with the exception of one from 2018 which relates to a bat roost approximately 180 m north-east of the Glaslyn works site.
Lesser Horseshoe	*Rhinolophus hipposideros*	WCA Schedule 5 CHS2 NERC S.42 HabDir 2 & 4 Bern2 Bonn2 LBAP	24	Eight records are in or adjacent to Glaslyn works site, seven of these records relate to passes during bat activity surveys during 2017 and 2018. One record relates to a bat roost at Wern Manor. The records outside of the Glaslyn works site relate to a mixture of bat activity and roost records. The nearest roost record is at St. John's Vicarage approximately 390 m south-west of the Glaslyn works site, recorded in 2019.
Noctule bat	*Nyctalus noctula*	WCA Schedule 5 CHS2 NERC S.42 HabDir 4 Bern2 Bonn2 LBAP	15	Six records dated between 2016 and 2018 are in or adjacent to the Glaslyn works site. Four of those records are in the western side of the Glaslyn works site and two are in the eastern side of the Glaslyn works site and all relate to commuting and foraging during bat activity surveys. The most recent record dates from 2020 and relates to a pass during a dusk emergence survey of a building, approximately 1.3 km east of the Glaslyn works site.

Common name	Scientific name	Conservation designation(s)	Number of records	Description of records
Myotis bat species	*Myotis* sp.	WCA Schedule 5 CHS2 NERC S.42 HabDir 4 Bern2 Bonn2 LBAP	8	Four records from bat activity surveys are in or adjacent to the Glaslyn works site. The most recent record is from 2019 and relates to a bat recording approximately 1.3 km south-west of the Glaslyn works site.
Unidentified bat	*Chiroptera* sp.	WCA Schedule 5 CHS2 NERC S.42 HabDir 4 Bern2 Bonn2 LBAP	5	One record relating to a bat pass dated from 2018 is located in the Glaslyn works site. Two records relate to roosts comprising a roost from 2020 located approximately 684 m east of the Glaslyn works site and a maternity roost from 2020 in a residential property approximately 831 m east of the proposed works boundary.
Brown long-eared bat	*Plecotus auritus*	WCA Schedule 5 CHS2 NERC S.42 HabDir 4 Bern2 Bonn2 LBAP	3	The closest record is in the Glaslyn works site and relates to foraging during bat activity surveys in 2017 and 2018. One record relates to an emergence from a building in 2020 approximately 1.4 km south-west of the Glaslyn works site. A record from 2020 relating to a recording on an automated bat detector in a building is approximately 1.3 km east of the Glaslyn works site.
Whiskered/ Brandt's bat	*Myotis mystacinus/ brandtii*	WCA Schedule 5 CHS2 NERC S.42 HabDir 4 Bern2 Bonn2	1	One record from 2019 of a bat flying around a pool and landing on a roof approximately 763 m east of the Glaslyn works site.

Previous Survey Work

4.1.5 In 2014 (Ref. 3.2) 15 transect surveys were carried out which were located in the Glaslyn works site. Species recorded were common pipistrelle, soprano pipistrelle, noctule, lesser horseshoe, and *Myotis* species. Although no confirmed roosts were discovered during the surveys, it was identified that linear features such as hedgerows,

watercourses, and the Cloddiau banks provide commuting features for bats between potential roost sites and foraging areas.

4.1.6 As part of the Wider Works Scheme relating to the National Grid North Wales Connection Project that was paused in 2019; surveys between 2016 and 2018 took place (Ref. 3.3). Two trees with moderate roost potential were surveyed in 2017 and 2018 and no bats were observed exiting PRFs or returning to roost and it was therefore concluded that bat roosts were absent from these trees at the time of the surveys.

4.1.7 None of the six trees with low bat roost potential, surveyed in 2017 and 2018 as part of the Wider Works Scheme were considered to be suitable for hibernating bats as none of the identified features or trees were likely to provide stable cool temperatures required for hibernation.

4.1.8 During the bat activity surveys, at Transect 1, at the eastern end of the Glaslyn works site, an assemblage comprising 11 species (excluding unidentified pipistrelle species) was recorded during transect and automated bat detector surveys: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle (*Pipistrellus nathusii), Myotis* sp., Daubenton's, lesser horseshoe, greater horseshoe, brown long-eared, noctule, Leisler's (*Nyctalus leisleri),* and serotine (*Eptesicus serotinus)*.

4.1.9 At Transect 2/3, in the centre of the Glaslyn works site, an assemblage comprising five species was recorded during activity transects comprising: common and soprano pipistrelle, *Myotis* sp., noctule, and lesser horseshoe bats.

4.1.10 At Transect 4, at the western end of the Glaslyn works site, an assemblage comprising nine species was recorded during activity transect and automated bat detector surveys including: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, *Myotis* sp., Daubenton's bat, lesser horseshoe, noctule, serotine, and unidentified noctule/Leisler's/or serotine.

4.1.11 Across all of the transect surveys the highest number of bat passes were from soprano pipistrelles.

4.2 Field Surveys

Bat Roost Appraisal – Structures

4.2.1 **Table 4.3** provides a summary of the roost suitability of the building in the Glaslyn works site and the location is shown on **Appendix A, Figures 4.5.F.3 and 4.5.F.4** and photographs in **Appendix C**.

Table 4.3 – Building Roost Suitability

Building name	Roost Suitability	Description
Barn (B4.1) (Photographs 1 - 4; Appendix C)	Moderate	Stone built barn with slate tiled pitched roof, open on all sides. Cavities in stone walls and around lintels suitable to support small numbers of crevice dwelling bats. Apex suitable for night roosting brown long eared bats and horseshoe species.

Ground Level Tree Assessments (After 15 September 2023)

4.2.2 Trees in the survey area which are potentially impacted or likely to be removed during the proposed works were assessed for their suitability to support roosting bats by at least one experienced ecologist holding a bat survey licence from NRW.

4.2.3 The trees assessed for their suitability to support roosting bats pre-15 September 2023 were also re-surveyed in 2024 following the updated guidance (Collins, 2023) (Ref 3.6).

4.2.4 Further details on each tree with PRFs are contained in **Table 4.4** below and photographs are provided in **Appendix B**. Only trees with identified PRFs and likely to be removed impacted as a result of the proposed works are included within **Table 4.4**.

Table 4.4 – Assessment of Trees with Suitability to Support Roosting Bats

Reference	Description	PRFs	Bat Roost Suitability (Collins 2023)
Tree 4.G34A (Photograph 5; Appendix C)	Oak (*Quercus* sp.) Adjacent to Barn (B4.1) and nearby stream ditch.	Knot hole 2 m high, broken limbs higher up.	PRF Tree unsafe to climb
Tree 4.W43A (Photographs 6 & 7; Appendix C)	Willow (*Salix* sp.) Edge of woodland block.	Split in trunk leading up to a cavity.	PRF can endoscope from ground.
Tree 4.T62 (Photograph 8; Appendix C)	Sycamore (*Acer pseudoplatanus*) on field boundary, adjacent to ditch	Butt rot present. Hollow trunk decaying with possible cavities. Knot holes with cavities extending upwards.	PRF can potentially be inspected from ground using endoscope if tall enough. Adjacent to ditch which may hinder climb.
Tree 4.T105 (Photograph 9; Appendix C)	Alder adjacent to stream on field boundary	Hollow trunk with lots of features including holes and broken limbs with PRF	PRF Tree unsafe to climb
Tree 4.G91A (Photograph 10; Appendix C)	Alder adjacent to stream on field boundary	Large vertical split in trunk but open and exposed	PRF Tree unsafe to climb
Tree 4.T89 (Photograph 11; Appendix C)	Oak on field boundary	Multiple holes and splits but most upward	PRF Tree unsafe to climb

Reference	Description	PRFs	Bat Roost Suitability (Collins 2023)
		facing and exposed	
Tree 4.W73C (Photograph 12; Appendix C)	Semi mature beech in poor condition	One feature, a hollowed-out knot hole	PRF Tree unsafe to climb
Tree 4.W73B (Photograph 13; Appendix C)	Sycamore	Hollow trunk which leads up to a cavity approx. 0.5 m, dry inside	PRF No need to climb, can be endoscoped without ladder as accessible from ground.
Tree 4.W73A (Photographs 14 & 15; Appendix C)	Sycamore in small woodland	Cavity in main trunk and multiple holes	PRF Tree possible to climb Can be partially endoscoped from ground but holes too high to access from ground
Tree 4.T142 (Photographs 16 & 17; Appendix C)	Semi mature oak on field boundary	Horizontal split in limb may lead to a cavity. Ivy cover.	PRF Tree unsafe to climb.
Tree 4.T.E1 (Photograph 18; Appendix C)	Oak	Several holes in limbs	PRF Tree possible to climb
Tree 4.G248A (Photograph 19; Appendix C)	Large mature alder covered in ivy	Covered in ivy which potentially obscures further features.	PRF Tree possible to climb
Tree 4.T251 (Photograph 20; Appendix C)	Mature ash tree dying from ash die back.	Single possible knot hole maximum	PRF Tree unsafe to climb
Tree 4.G248B (Photograph 21; Appendix C)	Large mature field maple covered in ivy	Covered in ivy which potentially obscures further features.	PRF Tree possible to climb
Tree 4.G293A (Photograph 22; Appendix C)	Mature willow	Knot holes and broken branches all around	PRF Tree possible to climb.

Reference	Description	PRFs	Bat Roost Suitability (Collins 2023)
Tree 4.T398 (Photographs 23 & 24; Appendix C)	Mature sessile oak	Hole in branch on south-western aspect.	PRF Tree unsafe to climb.
Tree 4.T327 (Photographs 25 & 26; Appendix C)	Willow	Crack and hole present on main trunks	PRF Tree unsafe to climb/ may be possible to endoscope
Tree 4.T244 (Photographs 27 & 28; Appendix C)	Oak	One hole on tree branch	PRF Tree unsafe to climb

Dusk Emergence Survey – Structures

Barn (B4.1)

4.2.5 Four dusk emergence surveys were undertaken on the Barn (B4.1).

4.2.6 During the dusk emergence survey on 07 August 2024 the following activity was recorded:

- A soprano pipistrelle bat was observed emerging from the roof edge on the northern side of the building at 21:30 and this was confirmed following a review of the infrared camera footage.
- Bats were observed foraging and commuting along the hedgerow to the west of the Barn (B4.1). Bats were also observed foraging and commuting along the track, mainly coming from north to south and also seen in the field to the west.
- The majority of the bat activity recorded was from soprano pipistrelles. *Myotis*, lesser horseshoe, brown long eared and common pipistrelle were other bat species recorded during the survey.
- An automated bat detector placed inside the Barn (B4.1) recorded several calls from *Myotis* species and low numbers of pipistrelle species, likely to be bats flying through the barn structure.

4.2.7 During the dusk emergence survey on 12 August 2024 the following activity was recorded:

- The majority of bat activity recorded was from *Myotis* bat species and soprano pipistrelle. Lesser horseshoe and common pipistrelle were recorded in low numbers.
- No bats were observed emerging from the building during the survey and this was confirmed following a review of the infrared camera footage.

4.2.8 During the dusk emergence survey on 28 August 2024 and repeat survey on 29 August 2024 the following activity was recorded:

- A soprano pipistrelle was observed emerging from the north-west corner of the Barn (B4.1) at 20:21 and this was confirmed following a review of the infrared camera footage.
- Soprano pipistrelle, common pipistrelle, *Myotis* sp, serotine and lesser horseshoe bats were recorded near to the Barn (B4.1) during the emergence survey. Soprano pipistrelle and *Myotis* sp. were the most frequently recorded species. The other bat species were only recorded in low numbers.
- *Myotis* species were observed and recorded foraging inside the Barn (B4.1).

4.2.9 During the dusk emergence survey of the eastern aspect of the Barn (B4.1) on 03 September 2024 the following activity was recorded:

- Soprano pipistrelle, common pipistrelle, *Myotis* sp., noctule and lesser horseshoe bat species were recorded near to the Barn (B4.1) during the emergence survey. *Myotis* species were the most frequently observed species and the remaining species were recorded in low numbers only.
- No bats were observed emerging from the Barn (B4.1) during the survey and this was confirmed following a review of the infrared camera footage.

Dusk Emergence Survey - Trees

Tree 4.G34A

4.2.10 During the dusk emergence survey on 12 August 2024 the following bat activity was recorded:

- Soprano pipistrelle and *Myotis* bat species were recorded in low numbers foraging and commuting near to Tree 4.G34A during the emergence survey.
- No bats were observed emerging from Tree 4 during the survey and this was confirmed following a review of the infrared camera footage.

4.2.11 During the dusk emergence survey on 03 September 2024 the bat following activity was recorded:

- Low numbers of soprano pipistrelle, lesser horseshoe, *Myotis* species and common pipistrelle bats were recorded commuting and foraging near Tree 4.G34A during the emergence survey.
- No bats were observed emerging from the tree during the survey and this was confirmed following a review of the infrared camera footage.

4.2.12 During the dusk emergence survey on 23 September 2024 the following bat activity was recorded:

- Soprano pipistrelle, common pipistrelle, *Myotis* sp., noctule, Leisler, unidentified pipistrelle species and lesser horseshoe bats were recorded foraging and/or commuting near Tree 4.G34A during the survey. The majority of the recordings were from soprano pipistrelle (108) and pipistrelle species (29). The other bat species were only recorded in low numbers (<10).
- No bats were observed emerging from the tree during the survey and this was confirmed following a review of the infrared camera footage.

Tree 4.W73A

4.2.13 During the dusk emergence survey on 12 August 2024 the following bat activity was recorded:

- Soprano pipistrelle, common pipistrelle, *Myotis* sp, noctule, Leisler and lesser horseshoe bats were recorded foraging and commuting near Tree 4.W73A during the emergence survey. The majority of recordings was for soprano pipistrelle (92) and noctule (27). The other bat species were only recorded in low numbers.
- No bats were observed emerging from the tree during the survey and this was confirmed following a review of the infrared camera footage.

4.2.14 During the dusk emergence survey on 29 August 2024 the following activity was recorded:

- Soprano pipistrelle, common pipistrelle, pipistrelle species, noctule, *Myotis*, brown long eared and lesser horseshoe bat were recorded foraging and commuting near Tree 4.W73A during the emergence survey. The majority of the recordings were from soprano pipistrelle bats and common pipistrelle bats. The other bat species were only recorded in low numbers (<10).
- No bats were observed emerging from the tree during the survey and this was confirmed following a review of the infrared camera footage.

4.2.15 During the dusk emergence survey on 19 September 2024 the following activity was recorded:

- Soprano pipistrelle, common pipistrelle, pipistrelle species, *Myotis*, Leisler, noctule, brown long eared, serotine and lesser horseshoe bats were recorded consistently foraging and commuting near Tree 4.W73A during the emergence survey. The majority of the recordings were of soprano pipistrelle, common pipistrelle and *Myotis* bat species. The other species were only recorded in low numbers.
- No bats were observed emerging from the tree during the survey and this was confirmed following a review of the infrared camera footage.

Tree 4.T142

4.2.16 During the dusk emergence survey on 12 August 2024 the following bat activity was recorded:

- Soprano pipistrelle, common pipistrelle, Leisler, noctule, brown long eared and *Myotis* bat species were recorded foraging and commuting near Tree 4.T142 during the emergence survey. Soprano pipistrelle were the most frequently recorded species. The other bat species were only recorded in low numbers.
- No bats were observed emerging from Tree 4.T142 during the survey and this was confirmed following a review of the infrared camera footage.

4.2.17 During the dusk emergence survey on 29 August 2024 the following bat activity was recorded:

- Soprano pipistrelle, common pipistrelle, noctule and *Myotis* bat species were recorded foraging and commuting near Tree 4.T142 during the emergence survey.
- Soprano pipistrelle were the most frequently recorded species. The other bat species were only recorded in low numbers.

- No bats were observed emerging from Tree 4.T142 during the survey and this was confirmed following a review of the infrared camera footage.

4.2.18 During the dusk emergence survey on 19 September 2024 the following bat activity was recorded:

- Low numbers of bats including common pipistrelle, soprano pipistrelle, noctule and *Myotis* bat species were recorded foraging and commuting near Tree 4.T142 during the emergence survey. Common pipistrelle were the most frequently recorded species.
- No bats were observed emerging from Tree 4.T142 during the survey and this was confirmed following a review of the infrared camera footage.

Tree 4.G293A

4.2.19 During the dusk emergence survey on 29 August 2024 the following bat activity was recorded:

- Low numbers of bats including common pipistrelle, soprano pipistrelle, *Myotis* sp. and lesser horseshoe were recorded near Tree 4.G293A during the emergence survey. Individual bats were observed foraging and commuting from the north. Soprano pipistrelle were the most frequently recorded species.
- No bats were observed emerging from the tree during the survey and this was confirmed following a review of the infrared camera footage.

4.2.20 During the dusk emergence survey on 19 September 2024 the following bat activity was recorded:

- Soprano pipistrelle, common pipistrelle, and *Myotis* bat species were recorded commuting and foraging near Tree 4.G293A during the emergence survey. Soprano pipistrelle and common pipistrelle were the most frequently recorded species during the survey. *Myotis* species were recorded in low numbers only.
- No bats were observed emerging from Tree 4.G293A during the survey and this was confirmed following a review of the infrared camera footage.

Weather Conditions

4.2.21 A summary of the weather conditions for the dusk emergence surveys undertaken are shown in **Table 4.5** below.

Table 4.5 – Weather Conditions During Dusk Emergence Surveys

Date	Weather Conditions[1]	Sunset Time / Start and End Time
07 August 2024 Barn (B4.1)	14°C - 15°C, slight breeze, 5/8 cloud cover, dry	Sunset: 20:58 Start Time: 20:50 End Time: 23:00

[1] * Indicates weather missing from survey data and obtained from other source (Ref 3.13)

Date	Weather Conditions[1]	Sunset Time / Start and End Time
12 August 2024 Tree 4.G34A & Barn (B4.1)	17°C, gentle breeze, 6/8 cloud cover, dry	Sunset: 20:48 Start Time: 20:30 End Time: 23:20
12 August 2024 Tree 4.W73A	17°C, calm, light breeze, 3/8 cloud cover, dry	Sunset: 20:48 Start Time: 20:45 End Time: 22:45
12 August 2024 Tree 4.T142	16°C - 17°C, light breeze, 2/8 cloud cover, dry	Sunset: 20:48 Start Time: 20:30 End Time: 22:45
28 August 2024 Barn (B4.1)	14°C - 16°C, light breeze, 8/8 cloud cover, dry	Sunset: 20:13 Start Time: 20:03 End Time: 22:13
29 August 2024 Barn (B4.1)	11°C - 13°C, light breeze, 4/8 cloud cover, dry*	Sunset: 20:11 Start Time: 20:00 End Time: 22:10
29 August 2024 Tree 4.W73A	16°C, still, 0/8 cloud cover, dry	Sunset: 20:11 Start Time: 20:10 End Time: 22:10
29 August 2024 Tree 4.T142	11°C - 15°C, still, 1/8 cloud cover, dry	Sunset: 20:11 Start Time: 20:00 End Time: 22:11
29 August 2024 Tree 4.G293A	14°C, no wind, 1/8 cloud cover, dry	Sunset: 20:11 Start Time: 19:56 End Time: 21:41
03 September 2024 Tree 4 & Barn (B4.1)	15°C, light air, 6/8 cloud cover, light rain at start, heavy rain at end	Sunset: 20:01 Start Time: 19:43 End Time: 21:15
19 September 2024 Tree 4.W73A	17°C - 20°C, light air, 1/8 cloud cover, dry	Sunset: 19:21 Start Time: 19:15 End Time: 21:15
19 September 2024 Tree 4.G293A	18°C, light air, 1/8 cloud cover, dry	Sunset: 19:21 Start Time: 19:06 End Time: 20:51

Tree Endoscope Surveys

Tree 4.W43A

4.2.22 During the endoscope survey of the tree on 07 August 2024 the following was recorded:

- No evidence of bats noted, however, the cavity appears to extend further than the 1 m length of the endoscope.

4.2.23 During the endoscope survey of the tree on 28 August 2024 the following was recorded:

- No evidence of bats noted, however, the cavity appears to extend further than the 1 m length of the endoscope.

4.2.24 During the endoscope survey of the tree on 23 September 2024 the following was recorded:

- No evidence of bats noted, however, the cavity appears to extend further than the 1 m length of the endoscope.

4.2.25 As no bats were recorded during the endoscope surveys then this tree has been assigned on a precautionary basis at PRF-I (as whilst no bats were recorded the feature/s are still potential suitable to support roosting bats).

Tree 4.T62

4.2.26 During the endoscope survey of the tree on 12 August 2024 the following was recorded:

- No evidence of bats found. No bat droppings observed.
- Cavity is narrow with a possible small solitary wasp nest inside.

4.2.27 During the endoscope survey of the tree on 28 August 2024 the following was recorded:

- No evidence of bats noted. No bat droppings observed.
- Cavity is narrow with a possible small solitary wasp nest inside.
- Basal cavity and two knot holes checked – no evidence of bats.
- Main cavity blocked with debris, possibly the wasp nest.

4.2.28 During the endoscope survey of the tree on 19 September 2024 the following was recorded:

- No evidence of bats noted. No bat droppings observed.
- Cavity is narrow with a possible small solitary wasp nest inside.
- Basal cavity and two knot holes checked – no evidence of bats.
- Main cavity blocked with debris, possibly the wasp nest.

4.2.29 As no bats were recorded during the endoscope surveys then this tree has been assigned on a precautionary basis at PRF-I (as whilst no bats were recorded the feature/s are still potential suitable to support roosting bats).

Tree 4.W73B

4.2.30 During the endoscope survey of the tree on 12 August 2024 the following was recorded:

- No evidence of bats. No bat droppings observed.
- Cavity was wide and appeared to extend further than the 1 m length of the endoscope.
- Two developing knot holes at a height of 3 - 4 metres.

4.2.31 During the endoscope survey of the tree on 29 August 2024 the following was recorded:

- No evidence of bats noted. No bat droppings observed.
- Cavity was wide and appeared to extend further than the 1 m length of the endoscope.
- Two developing knot holes at a height of 3 - 4 metres.

4.2.32 During the endoscope survey of the tree on 19 September 2024 the following was recorded:

- No evidence of bats noted. No bat droppings observed.
- Cavity was wide and appeared to extend further than the 1 m length of the endoscope.
- Two developing knot holes at a height of 3 - 4 metres.

4.2.33 As no bats were recorded during the endoscope surveys then this tree has been assigned on a precautionary basis at PRF-I (as whilst no bats were recorded the feature/s are still potential suitable to support roosting bats).

Bat Activity Transect Surveys

4.2.34 The SAC area in the east of the Glaslyn works site was assessed as having moderate suitability habitat for foraging and commuting bats. The Porthmadog area in the centre of the Glaslyn works site and Wern Manor area in the west of the Glaslyn works site were both assessed as having low suitability habitat for foraging and commuting bats.

Transect 1 - SAC

4.2.35 Bat activity was observed or recorded during all eight of the walked bat activity transect surveys.

4.2.36 During the activity transect surveys common pipistrelle, soprano pipistrelle, pipistrelle species, noctule, *Myotis* species, Nathusius' pipistrelle, Leisler's and lesser horseshoe bats were recorded or observed. Bat activity is shown on **Appendix A, Figure 4.5.F.6**.

4.2.37 Soprano pipistrelle was the most abundant species during all transects (except April and May, where it was second most recorded behind common pipistrelle) and was the only species recorded during all eight activity transects, with highest activity recorded in June and August. Common pipistrelle bat and *Myotis* species were the second and third most frequently recorded species/genus throughout the surveys, with common pipistrelle second most recorded in July-October and *Myotis* species second most recorded in June. Low numbers of the remaining species were recorded sporadically and only in some months, with Nathusius' pipistrelle only recorded in April (three passes) and Leisler's recorded one pass in June and one pass in August.

4.2.38 Foraging and commuting behaviour from common and soprano pipistrelles was observed over the field and along the scrub line, with individual bats seen commuting along the track and foraging at the edge of the woodland.

4.2.39 The highest number of bat passes across all the surveys was on the dusk activity survey on 29 June 2023 with 260 bat passes, closely followed by 23 August 2023 with 253 passes. Only a single soprano pipistrelle was recorded during the dawn October survey and no other bat species detected.

4.2.40 **Table 4.6** summarises the number of calls recorded of each species during the dusk (and one dawn) activity transects.

Table 4.6 – Bat Activity Transect 1 Results

Date	Number of Bat Passes (bats seen or heard)								Total Number of Bat Passes	Level of Bat Activity
	Myotis sp.	Common pipistrelle	Soprano pipistrelle	Unidentified pipistrelle (*Pipistrellus* sp.) (50kHz[1])	Nathusius' Pipistrelle	Noctule	Lesser Horseshoe	Leislers		
23 April 2023	0	86	77	3	3	1	0	0	**170**	**High**
23 May 2023	1	47	40	0	0	0	2	0	**90**	**Moderate**
29 June 2023	16	12	224	0	0	7	0	1	**260**	**High**
25 July 2023	1	12	52	0	0	0	2	0	**67**	**Moderate**
23 August 2023	26	60	154	1	0	9	2	1	**253**	**High**
15 September 2023 (Dawn)	5	12	27	1	0	0	0	0	**45**	**Moderate**
04 October 2023 (Dusk)	1	5	50	0	0	0	1	0	**57**	**Moderate**
05 October 2023 (Dawn)	0	0	1	0	0	0	0	0	**1**	**Very Low**
Total	**50**	**234**	**625**	**5**	**3**	**17**	**7**	**2**	**943**	

1 Pipistrelle bats with a peak frequency between 49 kilohertz (kHz) and 51 kHz has been classified as 'pipistrelle species' and are either common or soprano pipistrelle.

Transect 2 - Porthmadog

4.2.41 Bat activity was observed or recorded during all four of the walked bat activity transect surveys.

4.2.42 During the activity transect surveys common pipistrelle, soprano pipistrelle, unidentified pipistrelle species, noctule, brown long-eared, *Myotis* bat, Leisler's and lesser horseshoe bats were recorded or observed. Bat activity is shown on **Appendix A, Figure 4.5.F.6**.

4.2.43 Soprano pipistrelle was the most abundant species during all surveys and was recorded during all four activity transects (alongside common pipistrelle and *Myotis* species). Common pipistrelle and lesser horseshoe species were the second most and third most frequently recorded species respectively. Unidentified pipistrelle and lesser horseshoe were only recorded in three of the surveys, with noctule recorded in two of the surveys (May and October) and a single brown long-eared and a single Leisler's both recorded during one survey (July and October respectively).

4.2.44 Foraging and commuting behaviour was observed by mainly soprano pipistrelles across all transect surveys, particularly along the field edge.

4.2.45 The highest number of bat passes across all the surveys was on the dusk activity survey on 19 October 2023 with 588 bat passes, nearly twice the number of the next highest activity (May 2023). Lowest activity was during the June transect. This increased activity may represent bats mating, increasing feeding and seeking suitable hibernation sites prior to beginning torpor.

4.2.46 **Table 4.7** summarises the number of calls recorded of each species during the dusk activity transects.

Table 4.7 – Bat Activity Transect 2 Results

Date	Number of Bat Passes (bats seen or heard)								Total Number of Bat Passes	Level of Bat Activity
	Myotis sp.	Common pipistrelle	Soprano pipistrelle	Unidentified pipistrelle (*Pipistrellus* sp.) (50kHz[1])	Noctule	Lesser Horseshoe	Brown long-eared	Leisler' s		
24 May 2023	17	64	216	0	1	5	0	0	303	**High**
29 June 2023	4	22	143	2	0	0	0	0	171	**High**
27 July 2023	8	42	220	6	0	2	1	0	279	**High**
19 October 2023	17	118	393	5	11	43	0	1	588	**High**
Total	**46**	**246**	**972**	**13**	**12**	**50**	**1**	**1**	**1,341**	

1 Pipistrelle bats with a peak frequency between 49 kHz and 51 kHz has been classified as 'pipistrelle species' and are either common or soprano pipistrelle.

Transect 3 – Wern Manor

4.2.47 Bat activity was observed or recorded during all three of the walked bat activity transect surveys.

4.2.48 During the activity transect surveys common pipistrelle, soprano pipistrelle, noctule, lesser horseshoe and *Myotis* bat were recorded or observed. Bat activity is shown on **Appendix A, Figure 4.5.F.6**.

4.2.49 Soprano pipistrelle was the most abundant and frequent species, with almost four times the number of passes as the next most recorded species (*Myotis* sp.). All species were recorded during all transects, except in May when no noctule were recorded. Common pipistrelle bat was the second most recorded species in May and August, and *Myotis* sp. was the second most recorded species in September. Both noctule and lesser horseshoe were recorded the least frequently, with seven and eight passes in total respectively. The highest number of bat passes across all the surveys was on the dusk activity survey on 25 May 2023 with 371 bat passes, with a similar number on 13 September 2023 (344) and significantly less passes in August (78).

4.2.50 **Table 4.8** summarises the number of calls recorded of each species during the dusk activity transects.

Table 4.8 – Bat Activity Transect 3 Results

Date	Number of Bat Passes (bats seen or heard)					Total Number of Bat Passes	Level of Bat Activity
	Myotis sp.	Common pipistrelle	Soprano pipistrelle	Noctule	Lesser Horseshoe		
25 May 2023	29	74	262	0	6	**371**	**High**
24 August 2023	10	16	45	6	1	**78**	**Moderate**
13 September 2023	117	18	207	1	1	**344**	**High**
Total	**156**	**108**	**514**	**7**	**8**	**793**	

Transect 4 – Additional NBW 2024

4.2.51 Bat activity was observed or recorded during the NBW.

4.2.52 During the survey near Wern Manor on 28 May 2024 common pipistrelle, soprano pipistrelle, unidentified pipistrelle species, noctule, *Myotis* and lesser horseshoe were recorded or observed.

4.2.53 Soprano pipistrelle was the most abundant species during the survey and was recorded 143 times. Common pipistrelle bats were recorded 27 times with low numbers recorded for the other species. Bat activity is shown on **Appendix A, Figure 4.5.F.6**.

4.2.54 **Table 4.9** summarises the number of calls recorded of each species during the survey.

Table 4.9 – Additional NBW Results

Date	Number of Bat Passes (bats seen or heard)						Total Number of Bat Passes	Level of Bat Activity
	Unidentified pipistrelle (*Pipistrellus* sp.) (50kHz[1])	Common pipistrelle	*Myotis*	Soprano pipistrelle	Noctule	Lesser Horseshoe		
28 May 2024	3	27	8	143	5	5	**191**	**High**
Total	**3**	**27**	**8**	**143**	**5**	**5**	**191**	

1 Pipistrelle bats with a peak frequency between 49 kHz and 51 kHz has been classified as 'pipistrelle species' and are either common or soprano pipistrelle.

4.2.55 The weather conditions for all transect/NBW surveys are summarised in Table 4.10 below.

Table 4.10 – Transect Survey Dates, Timing and Weather

Transect/NBW	Date	Sunset Time / Start and End Time[2]	Weather Conditions[3]
1 (SAC)	20 April 2023	Start Time: 20:24 End Time: 23:24 Sunset: 20:24	9-15°C, Wind speed 10 mph, clear, dry. Wind dropped to occasional low gusts then picked up again after 20:30.
1 (SAC)	23 May 2023	Start Time: 21:20 End Time: 00:20 Sunset: 21:20	15°C, No wind, Cloud cover 1-3 Oktas, Humidity 62%, dry. Cool in evening, very hot preceding day.

Transect/NBW	Date	Sunset Time / Start and End Time[2]	Weather Conditions[3]
1 (SAC)	29 June 2023	Start Time: 21:45 End Time: 00:28 Sunset: 21:45	17°C, light air, broken and heavy clouds, dry, mild
1 (SAC)	25 July 2023	Start Time: 21:22 End Time: 00:08 Sunset: 21:22	13°C, light air, few clouds, dry
1 (SAC)	23 August 2023	Start Time: 20:26 End Time: 23:21 Sunset: 20:26	17°C, still, broken and heavy clouds, dry, recent rain
1 (SAC)	15 September 2023 (Dawn)	Start Time: 03:46 End Time: 06:50 Sunrise: 06:48	Overcast, light breeze, recent rain
1 (SAC)	04 October 2023 (Dusk)	Start Time: 18:47 End Time: 21:47 Sunset: 18:47	16°C, broken and heavy clouds, fresh breeze, dry.
1 (SAC)	05 October 2023 (Dawn)	Start Time: 04:22 End Time: 06:34 Sunrise: 07:24	13-14°C, light rain, overcast, slight breeze.
2 (Porthmadog)	24 May 2023	Start Time: 21:21 End Time: 00:24 Sunset: 21:21	12-16°C, light air, few clouds, dry, warm.
2 (Porthmadog)	29 June 2023	Start Time: 21:45 End Time: 00:27 Sunset: 21:45	12-14°C, overcast, slight breeze, dry.
2 (Porthmadog)	27 July 2023	Start Time: 21:19 End Time: 00:15 Sunset: 21:19	17°C, overcast, still, dry, recent rain.
2 (Porthmadog)	19 October 2023	Start Time: 18:30 End Time: 21:17 Sunset: 18:12	15°C - 18°C, broken and heavy clouds, light breeze, recent rain. Drizzle through first 50 mins of survey which stopped fully, and cloud cleared.
3 (Wern Manor)	25 May 2023	Start Time: 21:22 End Time: 23:43 Sunset: 21:22	12°C - 16°C, no cloud, moderate breeze easing to light air, dry.

Transect/NBW	Date	Sunset Time / Start and End Time[2]	Weather Conditions[3]
3 (Wern Manor)	24 August 2023	Start Time: 20:24 End Time: 23:18 Sunset: 20:24	14°C, few clouds, light air, dry.
3 (Wern Manor)	13 September 2023	Start Time: 19:37 End Time: 22:37 Sunset: 19:36	17°C - 18°C, broke and heavy clouds, light air, recent rain. Slight drops of rain at end of survey but dry throughout.
4 (NBW)	28 May 2024	Start Time: 21:28 End Time: 23:43 Sunset: 21:28	Overcast, gentle breeze, recent rain, dry

Automated Bat Detector Surveys

4.2.56 **Table 4.11** summarises the number of passes per bat species across each consecutive night of survey during each month (April-October 2023) at each location in the SAC, and **Table 4.12** summarises the number of passes per bat species across each consecutive night of survey during each month (May, August and September 2023) across the two locations at Wern Manor.

4.2.57 The BAI and indicative bat activity level based on percentile analysis is also provided. For the analysis, the number of survey hours per night (between sunset and sunrise) were 10 hours, 9.5 hours or 9 hours for April (depending on location), 7.5 hours for May, 7 hours for June, 8 hours for July, 10 hours for August, 11 hours for September and 12.5 hours for October. Locations of the automated bat detectors are shown on **Appendix A, Figure 4.5.F.6.**

SAC

4.2.58 The automated bat detectors recorded calls from eleven species/taxa, including: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, pipistrelle species (50kHz), *Myotis* species, noctule, Leisler's bat, brown long-eared bat, serotine, lesser horseshoe and greater horseshoe.

4.2.59 The most frequently recorded species at all automated bat detector locations was soprano pipistrelle. Common pipistrelle were the second most frequently recorded species in all months except July, August and September 2023 (with *Myotis* species third most recorded), with *Myotis* species the second most recorded in August and September and lesser horseshoe the second most recorded species in July (and common pipistrelle the third most recorded). The remaining species were all recorded infrequently during the survey periods, with relatively low numbers of calls.

4.2.60 The highest activity in the survey area (80th to 100th percentiles), as summarised in **Table 4.11** was recorded in:

- April and July-September 2023 at ABD 1 (SAC Power Lines) with Low-Moderate activity.
- May and August 2023 at ABD 2 (SAC River) with Moderate-High activity.

- April 2023 at ABD 3 with High activity (SAC Wood).

Wern Manor

4.2.61 The automated bat detectors recorded calls from ten species/taxa, including: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, pipistrelle species (50kHz), *Myotis* species, noctule, serotine, Leisler's bat, brown long-eared bat and lesser horseshoe.

4.2.62 The most frequently recorded species at all automated bat detector locations was soprano pipistrelle by a significant margin. Common pipistrelle were the second most frequently recorded species in May and August 2023 (with *Myotis* species third most recorded), with *Myotis* species second most recorded species in September 2024 (followed by lesser horseshoe). The remaining species were all recorded infrequently during the survey periods, with relatively low numbers of calls.

4.2.63 The highest activity in the survey area (80th to 100th percentiles) as summarised in Table 4.12 was recorded in:

- August 2023 at ABD 1 with Moderate-High activity.
- September 2023 at ABD 2 with High activity.

Table 4.11 – Summary of automated bat detector survey results during May-October 2023 (SAC)

Location	*Myotis* sp.	Common pipistrelle	Soprano pipistrelle	Nathusius Pipistrelle	Unidentified pipistrelle (*Pipistrellus* sp.) (50kHz[4])	Noctule	Serotine	Leislers	Brown long-eared	Lesser Horseshoe	Greater Horseshoe	Total Bat Passes (over 5 nights)	Bat Activity Index (mean passes/hr over 5 nights)	Bat Activity Level (Percentile)
April 2023														
ABD 1 (SAC Power Lines)	4	71	19	19	0	0	0	0	4	9	0	126	2.19	**Low-Moderate**
ABD 2 (SAC River)	283	45	51	0	0	19	0	0	0	2	0	400	7.02	**Low-Moderate**

[4] Pipistrelle bats with a peak frequency between 49 kHz and 51 kHz has been classified as 'pipistrelle species' and are either common or soprano pipistrelle.

Location	*Myotis* sp.	Common pipistrelle	Soprano pipistrelle	Nathusius Pipistrelle	Unidentified pipistrelle (*Pipistrellus* sp.) (50kHz[4])	Noctule	Serotine	Leislers	Brown long-eared	Lesser Horseshoe	Greater Horseshoe	Total Bat Passes (over 5 nights)	Bat Activity Index (mean passes/hr over 5 nights)	Bat Activity Level (Percentile)
ABD 3 (SAC Wood)	371	601	1676	0	0	45	0	0	0	120	0	2813	78.14	**High**
Species Total	658	717	1746	19	0	64	0	0	4	131	0	3339		
May 2023														
ABD 1 (SAC Power Lines)														**N/A – Automated bat detector failed**
ABD 2 (SAC River)	80	717	1216	1	0	31	0	0	9	36	0	2090	59.71	**Moderate-High**
ABD 3 (SAC Wood)	92	70	479	0	69	3	1	1	3	44	0	762	20.32	**Moderate**
Species Total	172	787	1695	1	69	34	1	1	12	80	0	2852		
June 2023														
ABD 1 (SAC Power Lines)	0	13	36	0	9	5	0	0	0	10	0	73	3.48	**Low**

Location	*Myotis* sp.	Common pipistrelle	Soprano pipistrelle	Nathusius Pipistrelle	Unidentified pipistrelle (*Pipistrellus* sp.) (50kHz[4])	Noctule	Serotine	Leislers	Brown long-eared	Lesser Horseshoe	Greater Horseshoe	Total Bat Passes (over 5 nights)	Bat Activity Index (mean passes/hr over 5 nights)	Bat Activity Level (Percentile)
ABD 2 (SAC River)	61	59	314	0	65	20	0	1	0	1	0	521	14.89	**Moderate**
ABD 3 (SAC Wood)	4	2	61	0	0	8	0	0	1	3	0	79	3.76	**Low**
Species Total	65	74	411	0	74	33	0	1	1	14	0	673		
July 2023														
ABD 1 (SAC Power Lines)	6	95	83	0	0	3	0	1	0	23	0	211	5.28	**Low-Moderate**
ABD 2 (SAC River)	14	31	224	0	14	4	0	0	1	0	0	288	7.20	**Moderate**
ABD 3 (SAC Wood)	10	15	131	0	0	1	0	1	0	203	0	361	22.56	**Moderate**
Species Total	30	141	438	0	14	8	0	2	1	226	0	860		
August 2023														
ABD 1 (SAC Power Lines)	9	135	173	0	0	10	0	3	4	44	0	378	7.56	**Low-Moderate**

Location	*Myotis* sp.	Common pipistrelle	Soprano pipistrelle	Nathusius Pipistrelle	Unidentified pipistrelle (*Pipistrellus* sp.) (50kHz[4])	Noctule	Serotine	Leislers	Brown long-eared	Lesser Horseshoe	Greater Horseshoe	Total Bat Passes (over 5 nights)	Bat Activity Index (mean passes/hr over 5 nights)	Bat Activity Level (Percentile)
ABD 2 (SAC River)	798	424	1056	0	0	35	16	1	1	65	0	2396	47.92	**Moderate-High**
ABD 3 (SAC Wood)	171	76	986	0	0	22	0	2	0	23	0	1280	25.60	**Moderate-High**
Species Total	978	635	2215	0	0	67	16	6	5	132	0	4054		
September 2023														
ABD 1 (SAC Power Lines)	66	154	323	5	0	6	0	10	5	40	3	612	13.91	**Low-Moderate**
ABD 2 (SAC River)	135	10	82	1	1	9	0	1	0	1	0	240	4.36	**Low-Moderate**
ABD 3 (SAC Wood)	134	10	83	1	4	4	0	2	0	1	0	239	4.34	**Low**
Species Total	335	174	488	7	5	19	0	13	5	42	3	1091		
October 2023														
ABD 1 (SAC Power Lines)														**N/A – automated bat detector failed**

Location	*Myotis* sp.	Common pipistrelle	Soprano pipistrelle	Nathusius Pipistrelle	Unidentified pipistrelle (*Pipistrellus* sp.) (50kHz[4])	Noctule	Serotine	Leislers	Brown long-eared	Lesser Horseshoe	Greater Horseshoe	Total Bat Passes (over 5 nights)	Bat Activity Index (mean passes/hr over 5 nights)	Bat Activity Level (Percentile)
ABD 2 (SAC River)	107	130	921	1	13	7	0	1	0	2	0	1182	18.91	**Moderate**
ABD 3 (SAC Wood)	310	442	2070	0	0	5	0	4	0	3	0	2834	45.34	**Moderate-High**
Species Total	**417**	**572**	**2991**	**1**	**13**	**12**	**0**	**5**	**0**	**5**	**0**	**4016**		

Table 4.12 – Summary of automated detector survey results during May, August & September 2023 (Wern Manor)

Location	*Myotis* sp.	Common pipistrelle	Soprano pipistrelle	Nathusius Pipistrelle	Unidentified pipistrelle (*Pipistrellus* sp.) (50kHz[5])	Noctule	Leislers	Serotine	Lesser Horseshoe	Brown long-eared	Total Bat Passes (over 5 nights)	Bat Activity Index (mean passes/hr over 5 nights)	Bat Activity Level (Percentile)
May 2023													
ABD 1 (Wern Manor West)	24	21	102	0	3	3	0	0	2	0	155	4.13	**Low**
ABD 2 (Wern Manor West)	31	63	445	0	59	2	0	0	5	6	611	16.29	**Low-Moderate**
Species Total	55	84	547	0	62	5	0	0	7	6	766		
August 2023													
ABD 1 (Wern Manor West)	124	153	1412	0	0	14	8	9	77	6	1803	36.06	**Moderate-High**
ABD 2 (Wern Manor West)	23	170	1366	0	0	26	13	10	23	6	1637	32.74	**Moderate**
Species Total	147	323	2778	0	0	40	21	19	100	12	3440		
September 2023													

[5] Pipistrelle bats with a peak frequency between 49 kHz and 51 kHz has been classified as 'pipistrelle species' and are either common or soprano pipistrelle.

Location	*Myotis* sp.	Common pipistrelle	Soprano pipistrelle	Nathusius Pipistrelle	Unidentified pipistrelle (*Pipistrellus* sp.) (50kHz[5])	Noctule	Leislers	Serotine	Lesser Horseshoe	Brown long-eared	Total Bat Passes (over 5 nights)	Bat Activity Index (mean passes/hr over 5 nights)	Bat Activity Level (Percentile)
ABD 1 (Wern Manor West)	66	50	253	1	0	9	1	1	95	35	511	7.74	**Low**
ABD 2 (Wern Manor West)	318	49	1777	1	0	3	44	1	43	0	2236	40.65	**High**
Species Total	**384**	**99**	**2030**	**2**	**0**	**12**	**45**	**2**	**138**	**35**	**2747**		

June 2024 Automated Bat Detector

4.2.64 An automated bat detector was deployed at Wern Manor in June 2024 to take account of incorporating a road into the Glaslyn works site which passes through ancient woodland and habitat adjacent to Wern Manor which supports a lesser horseshoe bat roost. The road will be unaltered, only driven over as a temporary measure until a haul road is constructed from the opposite direction.

4.2.65 The most frequently recorded species during the June 2024 automated bat detector deployment was soprano pipistrelle by a significant margin. Common pipistrelle were the second most frequently recorded species in June 2024 and *Myotis* species third most recorded. The remaining species were all recorded infrequently during the survey periods, with relatively low numbers of calls. **Table 4.13** below shows a summary of the June 2024 automated bat detector results.

Table 4.13 – Summary of automated bat detector survey results during June 2024 (Wern Manor)

Location	*Myotis* sp.	Common pipistrelle	Soprano pipistrelle	Nathusius Pipistrelle	Unidentified pipistrelle (*Pipistrellus* sp.) (50kHz)	Noctule	Leislers	Serotine	Lesser Horseshoe	Brown long-eared	Total Bat Passes (over 5 nights)	Bat Activity Index (mean passes/hr over 5 nights)	Bat Activity Level (Percentile)
June 2024													
ABD 1 Species Total	57	74	517	0	49	1	0	0	29	0	727	14.8	**Low - Moderate**

4.2.66 Weather conditions have been summarised for the survey area; temperature, wind speed, cloud cover and precipitation on each day the automated bat detectors recorded bat activity. A summary of weather conditions and information as to when the automated bat detectors were deployed, and the duration are shown in tables within **Appendix B**.

5. Evaluation and Summary

5.1 Desk Study

5.1.1 The Meirionnydd Oakwoods and Bat Sites SAC is located partly in the Glaslyn works site. The lesser horseshoe bat is an Annex II species that is a primary reason for the selection of the SAC. The SAC is a large composite site that comprises multiple Sites of Special Scientific Interest (SSSI) and is the centre of distribution for lesser horseshoe bats in Wales.

5.1.2 Glaslyn SSSI (incorporating Traeth Glaslyn North Wales Wildlife Trust site) is also partly located in the Glaslyn works site to the east and supports two separate nursery roosts of lesser horseshoe bats. Ysbyty Bron y Garth SSSI is also located within the Glaslyn works site. This SSSI is adjacent to the large composite Meirionnydd Oakwoods and Bat Sites SAC and supports a breeding population and maternity roost of lesser horseshoe bats within the SAC but not understood to be within the area that lies within the Glaslyn works site.

5.1.3 Biological records obtained in September 2024 provided 244 records of nine different species of bats within 2 km of the Glaslyn works site.

5.2 Previous Surveys

Roosting Bats - Trees

5.2.1 Similar to the surveys undertaken as part of this assessment, previous surveys have concluded that bat roosts were absent from the trees potentially impacted by the proposed works at the time of the surveys.

5.2.2 None of the trees surveyed previously were considered to be suitable for hibernating bats as none of the identified features or trees are likely to provide stable cool temperatures required for hibernation.

5.2.3 No structures were required to be surveyed for roosting bats as part of the previous surveys.

Bat Activity

5.2.4 Similar to the surveys undertaken as part of this assessment, previous survey work has identified that linear features such as hedgerows, watercourses, and the Cloddiau banks provide commuting features for bats between potential roost sites and foraging areas.

5.2.5 The number of bat passes differed between each transect and survey periods, however, the highest number of bat passes were from soprano pipistrelles across all of the transect surveys conducted in previous assessments and this assessment.

5.2.6 Similar to the surveys undertaken as part of this assessment, previous surveys recorded up to eleven species of bat in the survey area during walked transects and automated bat detector deployments.

5.3 Roosting Bats – Buildings

5.3.1 Detailed internal and external inspections were undertaken in May 2023 and the Barn (B4.1) was assessed as having Moderate bat roost suitability. The building was therefore subject to follow up dusk emergence surveys between August and September 2024. A soprano pipistrelle bat was observed emerging from the Barn (B4.1) on one occasion on 07 August 2024 and on one occasion on 28 August 2024.

5.3.2 Based on the survey work to date it is concluded that the Barn (B4.1) is a non-breeding day roost (a non-breeding roost where either individual or small groups of bats rest or shelter in the day) used by soprano pipistrelle bats. This building is assessed as being of Low Value Conservation Significance to bats based on criteria within the Bat Mitigation Guidelines (Ref. 5.1) as the building supports individual bats of common species.

5.4 Roosting Bats – Trees

5.4.1 Based on the dusk emergence surveys and dusk endoscope surveys undertaken in 2024 it is reasonable to conclude that Tree 4.G34A, Tree 4.W43A, Tree 4.T62, Tree 4.W73B, Tree 4.W73A, Tree 4.T142 and Tree 4.G293A do not support roosting bats. However, these trees do have features suitable for bats and as a precaution have been categorised as PRF-I.

5.4.2 Trees 4.T327, 4.T105, 4.G91A, 4.T89, 4.W73C, 4.T.E1, 4.G248A, 4.T251, 4.G248B, and 4.T398 have been identified as having PRFs but further surveys have not been undertaken on these to confirm whether these trees are PRF-I or PRF-M. It is not anticipated that these trees would be removed as part of the proposed works.

5.4.3 It is emphasised that these trees remain suitable to be used by bats, and that roosts could establish in the future. Therefore, it would be precautionary to avoid impacting these trees.

5.4.4 A further tree with bat roost features; Tree 4.T244, was identified during the initial field survey within the Glaslyn works site but outside of the proposed works area (See Appendix A, Figure Ref 4.5.F.3). Since it was deemed unaffected by direct or indirect impacts, no further surveys were conducted at that time. However, due to changes in the proposed working area, this tree could now be directly impacted, however the exact route of the access track in this location may be possible to move to avoid this tree during detailed design. Three additional trees (4.T269, 4.T449 and 4.T450) were not assessed for bat roost suitability as land access was restricted at the time of survey. Additional surveys of these trees will be carried out pre-construction during the appropriate season, unless these trees can be retained. The findings will determine suitable mitigation measures, which may include obtaining an NRW licence if roosting bats are confirmed.

5.5 Foraging and Commuting Bats

5.5.1 The number of bat passes differed between each transect and survey periods. Usage is difficult to place into context because the automated bat detectors do not record the numbers of bats present or the direction of movement, however they provide a useful baseline of bat usage over an extended period of time that cannot reasonably be recorded during transect surveys, which capture a snapshot of bat usage in a particular area at a particular time.

5.5.2 Up to nine species of bat were recorded in the survey area during walked transects between April and October 2023, with an additional two species (serotine and greater horseshoe) recorded during automated bat detector deployments at five locations over two sites. Three of these species are common and widespread (common pipistrelle, soprano pipistrelle and brown long-eared), with noctule being uncommon but widely distributed. Lesser horseshoe is rare in the UK but has a stronghold in North West Wales with core populations present, as represented by their occurrence from the survey data.

5.5.3 The remaining species are rare in North West Wales, with the greater horseshoe population largely concentrated in the South and West of Wales and a limited number of roosts known for greater horseshoe.

5.5.4 The serotine bat is a highly mobile species and a generalist utilising a mosaic of habitats. Therefore, combined with the low numbers detected and paucity of records at the Glaslyn works site it is unlikely that the Glaslyn works site is a key foraging area for the species. The habitats within the Glaslyn works site are used occasionally by low numbers of foraging or commuting serotines.

5.5.5 The vast majority of activity was from soprano pipistrelle, with lower activity from common pipistrelle, *Myotis* species and lesser horseshoe and few records of the remaining species. Behaviours including foraging (with feeding buzzes) and commuting were recorded during the walked transects, occasionally with more than one bat present.

5.5.6 In 2023 at the SAC site, Low to Low-Moderate activity was recorded on ABD 1, Low-Moderate to Moderate-High activity was recorded in ABD 2 and Low to High activity was recorded on ABD 3. Activity didn't vary significantly by month at ABD 1, with no clear pattern at ABD 2 or 3 either (for example, at ABD 3 location highest activity was in April/October when bats are just emerging/entering hibernation). At Wern Manor, activity was seasonably variable, with low activity recorded at ABD 1 in May and September and Moderate-High activity in August, and Low-Moderate activity recorded at ABD 2, increasing through to High activity in September. Cold weather in September, October and April recorded during automate bat detector deployments may be responsible for overall reduced number of calls recorded compared to peak season from May to August.

5.5.7 The automated bat detectors close to the river and woodland (2 and 3) had similar levels of activity throughout the year, whereas activity was generally lower close to the power lines. Several transect observations recorded bats utilising woodland edges, field edges and access tracks to the north and south of the Survey Area at the SAC site. These areas in the woodland and along its edges offer opportunities for bats to forage in shelter with increased protection from predation. The high levels of activity in May-August are likely to be the result of regular or continuous foraging activity by a small number of bats in the survey area, based on observational data from the transect surveys and number of individual bats represented in the automated bat detector data, rather than necessarily indicating the presence of a large number of bats.

5.6 Nature Conservation Value

5.6.1 Using the scoring system recommended in the Bat Mitigation Guidelines (Ref 3.10), the bat species assemblage within the Glaslyn works site was valued at a District level.

5.6.2 There are currently no known roosts within the trees within or adjacent to the Glaslyn works site, however there is the potential for small numbers of bats to have occasional/ transitional/ opportunistic roosts. Therefore, the importance of roosts is unlikely to exceed Site importance for each species.

5.6.3 One building (Barn B4.1) within the Glaslyn works site supports a non-breeding soprano pipistrelle roost soprano pipistrelle bats and is valued at Site level.

5.6.4 Leisler's bat and Nathusius' pipistrelle bat has been discounted given this species wide-ranging behaviour, the low number of bat passes recorded and the absence of any evidence of more than a chance transitory occurrence during the bat activity surveys. Greater horseshoe bat has also been discounted as only 3 passes were recorded throughout the bat activity surveys indicating the greater horseshoe bats do not use the Glaslyn works site for foraging.

5.6.5 Further details regarding the determination of value is presented in **Table 5.1**.

Table 5.1 Summary of conservation importance foraging bats

Species	Importance of roosts	Importance or commuting and foraging habitat (summary and justification)	Importance of assemblage
Widespread: Common pipistrelle Soprano pipistrelle Brown long-eared	No known roosts within trees, potential for small numbers of bats to have occasional/ transitional/ opportunistic roosts within trees. Non-breeding soprano pipistrelle roost within Barn B4.1. Unlikely to exceed Site importance for each species.	There is high reliance on habitats by two widespread unthreatened bat species (soprano and common pipistrelles) as demonstrated by the regular use and the large number of passes recorded.	(1 point per species) Score 3 for this part of the assemblage.
Widespread in many geographies but not as abundant in all: Myotis species Noctule	No known roosts.	Moderate reliance on habitats by Myotis species and noctule as shown by regular use.	(2 points per species) Score 6 for this part of the assemblage.

Species	Importance of roosts	Importance or commuting and foraging habitat (summary and justification)	Importance of assemblage
Rarer or restricted distributions: Lesser horseshoe	No known roosts.	Moderate reliance on habitats by lesser horseshoe (unthreatened) as shown by regular use, however only in some areas of the Glaslyn work site.	(3 points per species) Score 3 for this part of the assemblage.
Rarest Annex II species and very rare Serotine	No known roosts.	Moderate reliance on habitats by lesser horseshoe (unthreatened) as shown by regular use, however only in some areas of the Glaslyn work site.	(4 points per species) Score 4 for this part of the assemblage.
Summary evaluation:	Site importance as potential roosting habitat.	The commuting and foraging habitats are considered to be of County importance for all species.	Overall assemblage is of County importance (16 points)

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Appendix A - Figures

N

CAERNARFON BAY/
BAE CAERNARFON

Glynllifon SAC

Glynllifon SAC

Glynllifon SAC

Coedydd Nanmor SSSI

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Coedydd Beddgelert a Cheunant Aberglaslyn SSSI

Aberdunant SSSI

Glaslyn SSSI

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Mwyngloddiau Llanfrothen SSSI

Coedydd De Dyffryn Maentwrog SSSI

Ysbyty Bron y Garth SSSI

Glyn Cywarch SSSI

Dolorgan Barn SSSI

Glaslyn SSSI

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Coedydd Derw a Safleoedd Ystlumod Meirion / Meirionnydd Oakwoods and Bat Sites SAC

Mwyngloddiau Fforest Gwydir / Gwydyr Forest Mines SAC

Mwyngloddiau Fforest Gwydir / Gwydyr Forest Mines SAC

SNOWDONIA NATIONAL PARK/
PARC CENEDLAETHOL ERYRI

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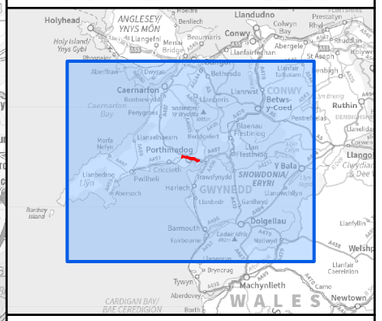
0 5 10 15 20
Kilometres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 5km Buffer of Glaslyn Works Site Boundary
- 30km Buffer of Glaslyn Works Site Boundary

Relevant[1] Designated Sites for Bats

- Special Area of Conservation (SAC)
- Site of Special Scientific Interest (SSSI)

NOTES

1: Relevant designated sites are nationally designated sites up to 5km from the Glaslyn works site boundary and internationally designated sites for bats, up to 30km from the Glaslyn works site boundary.

Rev	Date	Description	GIS	Chk	App
A	20/08/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

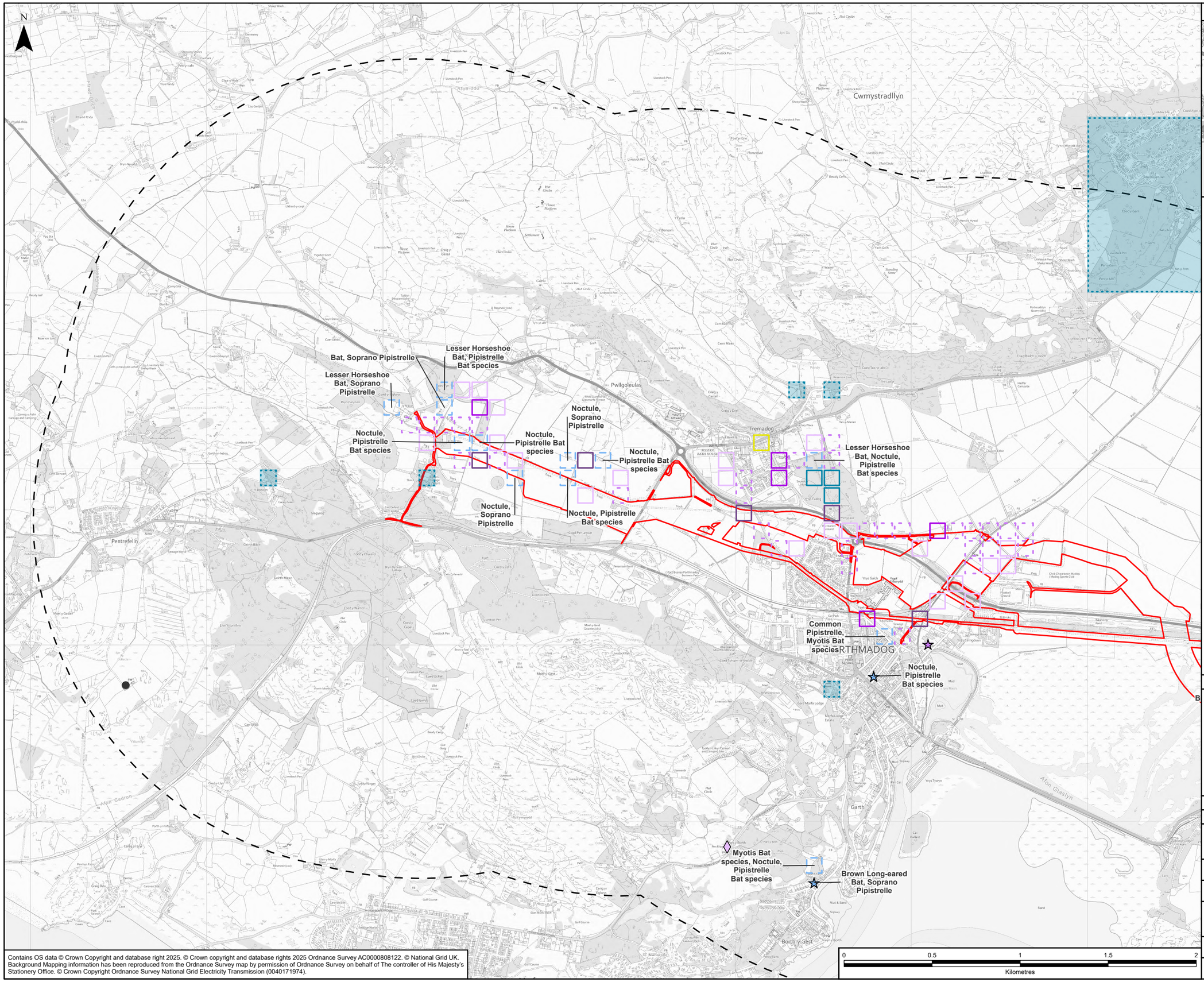
Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.1
RELEVANT DESIGNATED SITES FOR BATS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	20/08/2025	LM	20/08/2025	NL	20/08/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:240,000	A3	1 OF 1	A

Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatDesignatedSites.aprx



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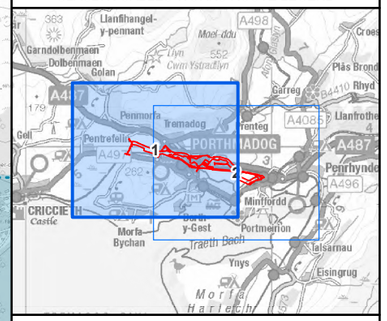
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 2km Buffer of Glaslyn Works Site Boundary

Desk Study Species Records - Bat Species[1]

- Bat
- Soprano Pipistrelle Roost
- Multiple Pipistrelle Bat Species Records
- Multiple Bat Species Records
- Common Pipistrelle
- Lesser Horseshoe Bat
- Lesser Horseshoe Bat Roost
- Noctule
- Pipistrelle Bat species
- Soprano Pipistrelle
- Multiple Bat Species Records
- Multiple Pipistrelle Bat Species Records

NOTES

1: Records provided by Cofnod for Ecological Records Search Request up to 2km of the works site boundary. Due to the accuracy of the grid references supplied some records are approximate. Any records with a grid reference accurate to a 100m square or less have been represented by a polygon rather than a point.

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.2 BAT SPECIES DESK STUDY RECORDS

Creator:	Date:	Checker:	Date:	Approver:	Date:
AB	10/09/2025	LM	10/09/2025	NL	10/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:20,000	A3	1 OF 2	A

Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatDeskStudy.aprx

N

Noctule, Pipistrelle Bat species

Lesser Horseshoe Bat, Noctule, Pipistrelle Bat species

Common Pipistrelle, Myotis Bat species

Noctule, Pipistrelle Bat species

Myotis Bat species, Noctule, Pipistrelle Bat species

Brown Long-eared Bat, Soprano Pipistrelle

Lesser Horseshoe Bat, Pipistrelle Bat species

Lesser Horseshoe Bat, Pipistrelle Bat species

Lesser Horseshoe Bat, Myotis Bat species, Soprano Pipistrelle

Lesser Horseshoe Bat, Pipistrelle Bat species

Lesser Horseshoe Bat, Pipistrelle Bat species

Noctule, Soprano Pipistrelle

Lesser Horseshoe Bat, Pipistrelle Bat species

Bat, Pipistrelle Bat Species

Lesser Horseshoe Bat, Myotis Bat species, Pipistrelle Bat Species

Brown Long-eared Bat, Noctule, Pipistrelle Bat species, Lesser Horseshoe Bat Roost

Brown Long-eared Bat, Pipistrelle Bat species

Noctule, Pipistrelle Bat species

Bat, Pipistrelle Bat Species

Common Pipistrelle, Myotis Bat species, Noctule

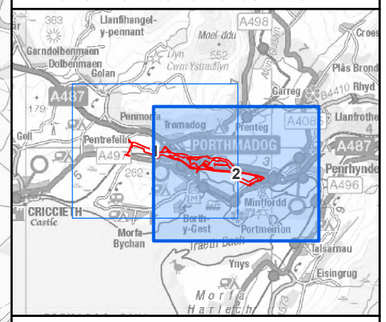
Myotis Bat species, Pipistrelle Bat species

Lesser Horseshoe Bat, Myotis Bat species, Pipistrelle Bat species

Myotis Bat species, Noctule, Pipistrelle Bat species

0 0.5 1 1.5 2
Kilometres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 2km Buffer of Glaslyn Works Site Boundary

Desk Study Species Records - Bat Species[1]

- Bat
- Common Pipistrelle
- Lesser Horseshoe Bat
- Pipistrelle Bat species Roost
- Soprano Pipistrelle Roost
- Whiskered/Brandt's Bat
- Multiple Pipistrelle Bat Species Records
- Multiple Bat Species Records
- Multiple Bat Species and Roost Records
- Common Pipistrelle
- Lesser Horseshoe Bat
- Lesser Horseshoe Bat Roost
- Noctule
- Pipistrelle Bat species
- Soprano Pipistrelle
- Multiple Bat Species Records
- Multiple Pipistrelle Bat Species Records

NOTES

1: Records provided by Cofnod for Ecological Records Search Request up to 2km of the works site boundary. Due to the accuracy of the grid references supplied some records are approximate. Any records with a grid reference accurate to a 100m square or less have been represented by a polygon rather than a point.

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.2
BAT SPECIES DESK STUDY RECORDS

Creator:	Date:	Checker:	Date:	Approver:	Date:
AB	10/09/2025	LM	10/09/2025	NL	10/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:20,000	A3	2 OF 2	A

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N

4.G34A

B4.1

4.W43A

4.T62

4.W73A

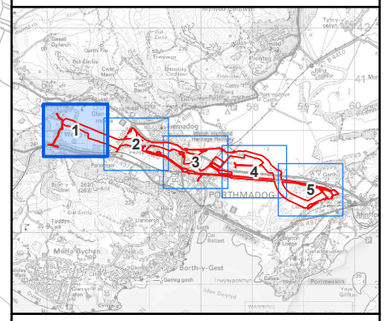
4.W73B

4.W73C

4.T89

4.G91A

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

Glaslyn Works Site Boundary

Tree - Bat Roost Suitability - Potential Roost Feature (PRF)

PRF-I

PRF

Structure - Bat Roost Suitability

Confirmed

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0 100 200 300 400 500

Metres

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.3
BAT ROOST SUITABILITY OF BUILDING AND TREES

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:3,750	A3	1 OF 5	A

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N

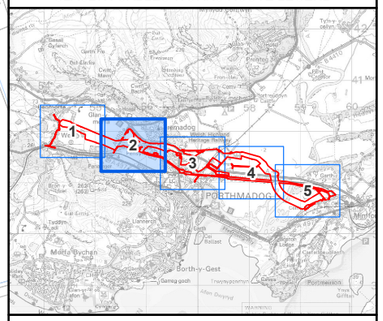
4.G91A

4.T105

4.T142

4.T.E1

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

Glaslyn Works Site Boundary

Tree - Bat Roost Suitability - Potential Roost Feature (PRF)

PRF-I

PRF

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GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.3
BAT ROOST SUITABILITY OF BUILDING AND TREES

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CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:3,750	A3	2 OF 5	A

0 100 200 300 400 500
Metres

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N

4.G248A

4.G248B

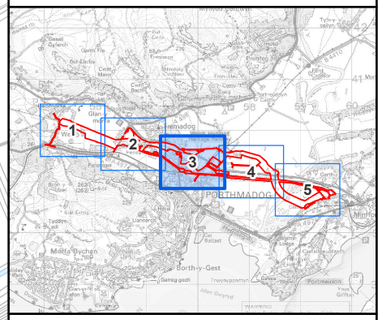
4.T251

4.T269

4.T.E1

4.T244

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

Glaslyn Works Site Boundary

Tree - Bat Roost Suitability - Potential Roost Feature (PRF)

PRF

Tree Requiring Ground Level Tree Assessment

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0 100 200 300 400 500

Metres

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Document Title:
FIGURE 4.5.F.3
BAT ROOST SUITABILITY OF BUILDING AND TREES

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:3,750	A3	3 OF 5	A

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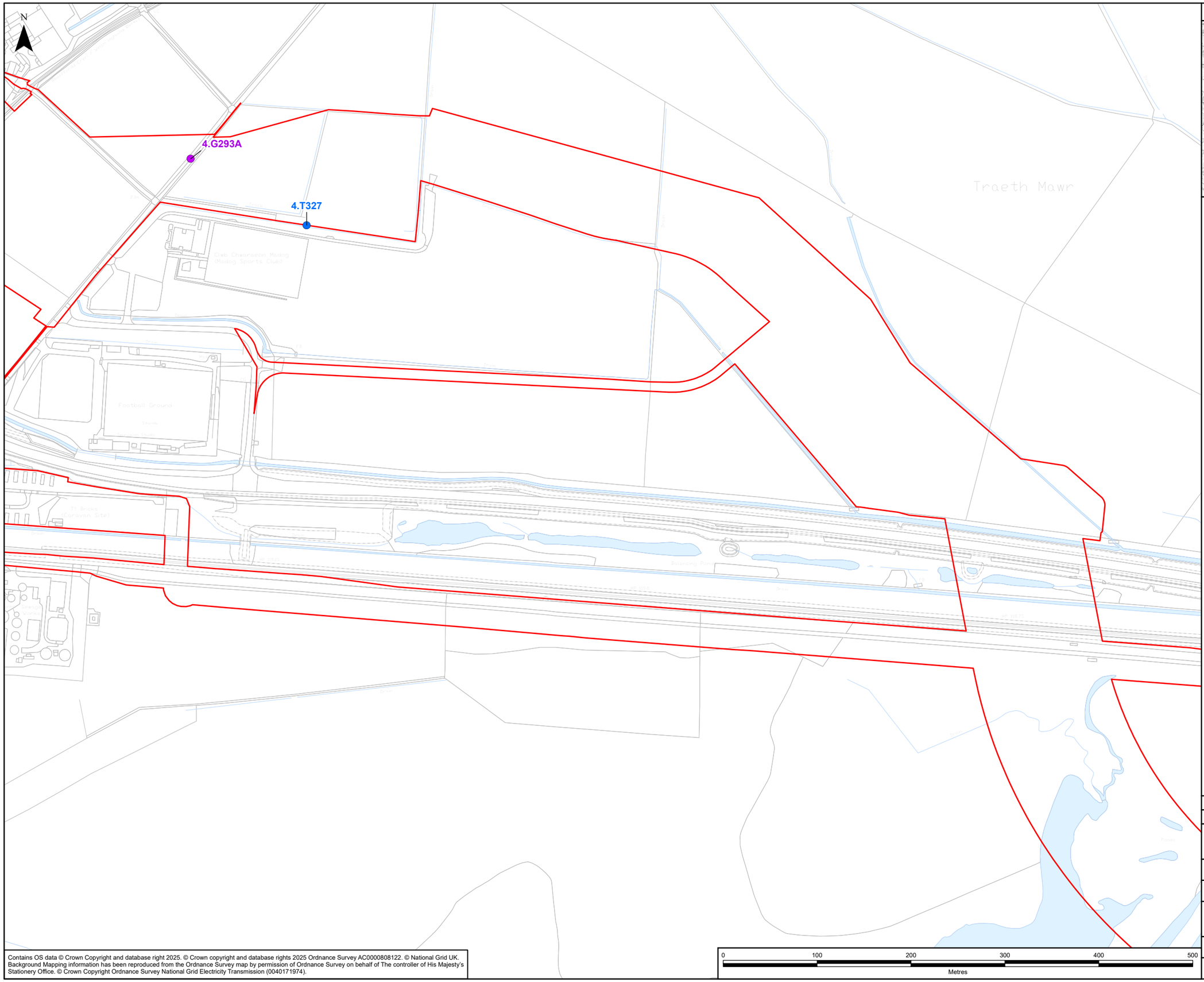
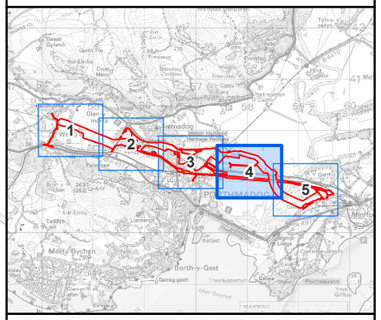


GLASLYN CABLES WORKS ROUTE LEGEND



Legend

Glaslyn Works Site Boundary

Tree - Bat Roost Suitability - Potential Roost Feature (PRF)

PRF-I

PRF

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.3
BAT ROOST SUITABILITY OF BUILDING AND TREES

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

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N

4.T450

4.T449

4.T398

Minffordd

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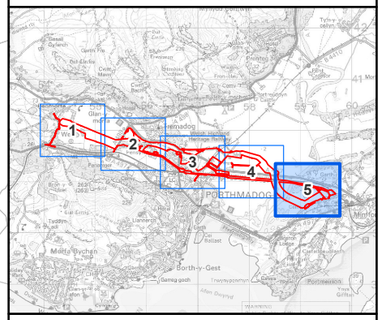
0 100 200 300 400 500
Metres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

Glaslyn Works Site Boundary

Tree - Bat Roost Suitability - Potential Roost Feature (PRF)

PRF

Tree Requiring Ground Level Tree Assessment

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title:
FIGURE 4.5.F.3
BAT ROOST SUITABILITY OF BUILDING AND TREES

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:3,750	A3	5 OF 5	A

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N

A

Electricity Distribution Site



North west corner of building, viewed from North west

Date (Time)	Survey Result	Reference
07/08/2024 (21:30)	Soprano Pipistrelle Emergence	Ref A
12/08/2024	No Emergence	
28/08/2024 (20:21)	Soprano pipistrelle emergence	Ref A
03/09/2024	No Emergence	

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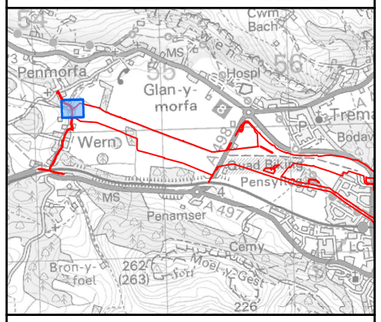
0 10 20 30 40 50
Metres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Barn Footprint
- Bat Emergence

Rev	Date	Description	GIS	Chk	App
A	20/08/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.4
BAT EMERGENCE - BARN

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	20/08/2025	LM	20/08/2025	NL	20/08/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:500	A3	1 OF 1	A

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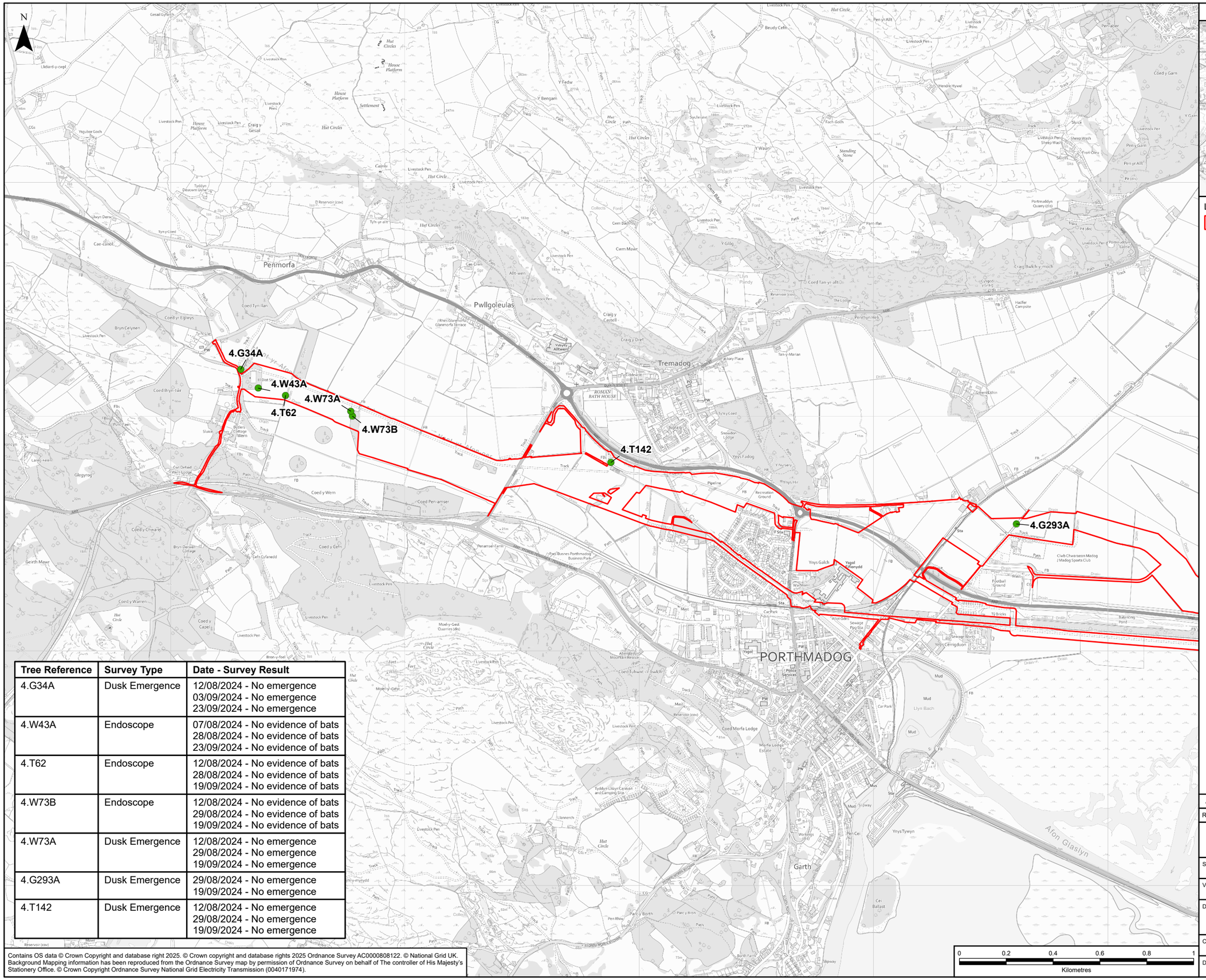

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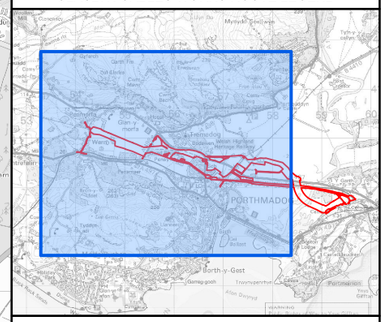

Legend

- Glaslyn Works Site Boundary
- Tree

Tree Reference	Survey Type	Date - Survey Result
4.G34A	Dusk Emergence	12/08/2024 - No emergence 03/09/2024 - No emergence 23/09/2024 - No emergence
4.W43A	Endoscope	07/08/2024 - No evidence of bats 28/08/2024 - No evidence of bats 23/09/2024 - No evidence of bats
4.T62	Endoscope	12/08/2024 - No evidence of bats 28/08/2024 - No evidence of bats 19/09/2024 - No evidence of bats
4.W73B	Endoscope	12/08/2024 - No evidence of bats 29/08/2024 - No evidence of bats 19/09/2024 - No evidence of bats
4.W73A	Dusk Emergence	12/08/2024 - No emergence 29/08/2024 - No emergence 19/09/2024 - No emergence
4.G293A	Dusk Emergence	29/08/2024 - No emergence 19/09/2024 - No emergence
4.T142	Dusk Emergence	12/08/2024 - No emergence 29/08/2024 - No emergence 19/09/2024 - No emergence

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A	20/08/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.5
BAT EMERGENCE AND ENDOSCOPE - TREES

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	20/08/2025	LM	20/08/2025	NL	20/08/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:15,000	A3	1 OF 1	A

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N

End point

ABD 2

1x SP 21:20

1x SP 21:20

1x SP 21:07

1x SP 21:01

2x CP 20:45

1x SP 20:45

1x SP 20:40

ABD 1

1x SP 20:40

ABD 3

1x CP 22:25

Start point

1x SP 22:20

0 100 200 300 400 500

Metres

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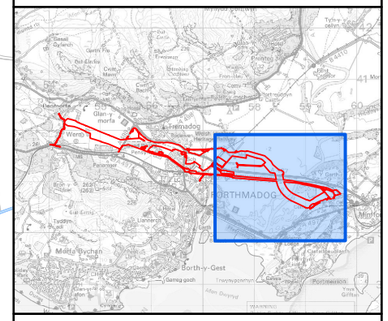
Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatActivityTransects.aprx

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Automated Bat Detector (ABD) Location
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

nationalgrid

Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 1 (SAC) - BAT ACTIVITY SURVEY APRIL 2023 & AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:7,500	A3	1 OF 8	A

N

Start point

ABD 2

1x SP 23:57

1x SP 23:55

1x SP 23:51

SP 23:31

ABD 1

End point

1x SP 22:47

1x CP 22:38

ABD 3

0 100 200 300 400 500

Metres

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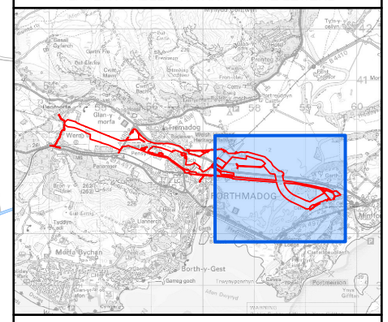
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Automated Bat Detector (ABD) Location
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

nationalgrid

Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 1 (SAC) - BAT ACTIVITY SURVEY MAY 2023
& AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:7,500	A3	2 OF 8	A

Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatActivityTransects.aprx

N

1x SP 23:48
1x SP 23:53
2x SP 23:51
SP 00:00
1x CP 00:13
ABD 2
SP 22:19
1x SP 22:17
SP 22:08
1x SP 22:10
1x SP 22:12
SP 22:00
1x SP 21:54
1x SP 22:23
1x SP 22:25
1x SP 22:15
1x SP 22:30
1x SP 22:20
End point
1x SP 22:41
ABD 1
1x SP 23:20
1x SP 22:51
1x SP 22:50
ABD 3
2x SP 23:18
2x SP 23:08
Start point
1x SP 22:57
1x CP 22:56
1x My 23:03
1x Noc 23:05

0 100 200 300 400 500
Metres

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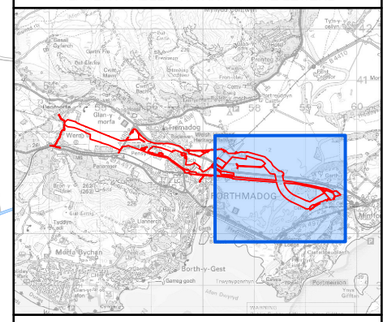
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Automated Bat Detector (ABD) Location
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

Myotis Species

- Myotis (My)

Bat Species Flight Line (Number of Bats and Record Time)

Pipistrelle Species

- Soprano pipistrelle (SP)

Nyctalus Species

- Noctule (Noc)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

nationalgrid

Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 1 (SAC) - BAT ACTIVITY SURVEY JUNE 2023 & AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:7,500	A3	3 OF 8	A

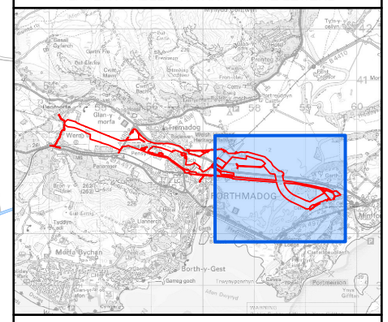
Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatActivityTransects.aprx

N

1x CP 22:21
2x SP 22:11
1x SP 22:09
2x SP 21:58
1x SP 21:54
Start point
1x SP 21:51
1x SP 23:55
1x LH 00:10
End point
1x SP 23:47
ABD 2
1x SP 22:45
ABD 3
1x CP 22:41
1x LH 23:08
ABD 1

0 100 200 300 400 500
Metres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Automated Bat Detector (ABD) Location
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

Rhinolophus Species

- Lesser horseshoe (LH)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 1 (SAC) - BAT ACTIVITY SURVEY JULY 2023
& AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:7,500	A3	4 OF 8	A

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N

1x SP 22:51

1x SP 22:49

1x SP 22:50

1x SP 22:51

End point

ABD 2

1x SP 21:06

1x SP 20:48

SP 20:45

1x SP 20:55

ABD 1

SP 21:54

ABD 3

1x Lei 21:33

1x SP 21:24

1x My 21:19

Start point

1x CP 21:40

1x CP 21:46

0 100 200 300 400 500

Metres

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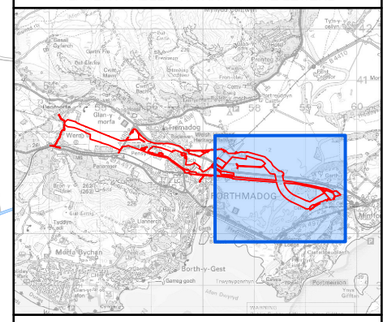
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Automated Bat Detector (ABD) Location
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

Myotis Species

- Myotis (My)

Nyctalus Species

- Leisler's (Lei)

Bat Species Flight Line (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 1 (SAC) - BAT ACTIVITY SURVEY AUGUST 2023 & AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:7,500	A3	5 OF 8	A

Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatActivityTransects.aprx

N

Start point

1x SP 04:19

ABD 3

ABD 2

1x CP 05:49

1x SP 05:44

1x SP 06:08

1x SP 05:41

1x SP 05:36

ABD 1

1x SP 05:30

End point

0 100 200 300 400 500

Metres

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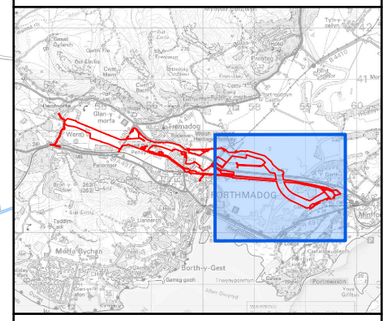
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Automated Bat Detector (ABD) Location
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

Bat Species Flight Line (Number of Bats and Record Time)

Pipistrelle Species

- Soprano pipistrelle (SP)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 1 (SAC) - NIGHT-TIME
BAT WALKOVER SEPTEMBER 2023 &
AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:7,500	A3	6 OF 8	A

Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatActivityTransects.aprx

N

End point

1x SP 21:49

ABD 2

1x CP 19:49

ABD 1

2x SP 19:21

1x SP 19:24

1x SP 19:18

1x SP 19:20

ABD 3

1x CP 20:14

1x SP 20:36

Start point

0 100 200 300 400 500

Metres

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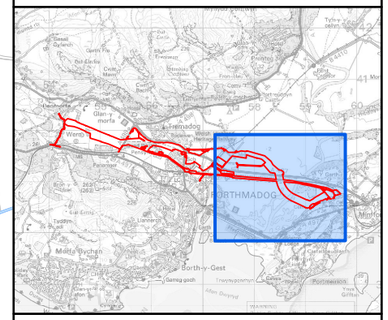
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Automated Bat Detector (ABD) Location
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

Bat Species Flight Line (Number of Bats and Record Time)

Pipistrelle Species

- Soprano pipistrelle (SP)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 1 (SAC) - NIGHT-TIME
BAT WALKOVER OCTOBER (DUSK) 2023 &
AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:7,500	A3	7 OF 8	A

Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatActivityTransects.aprx

N

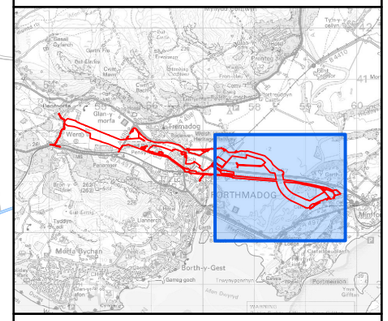
Start point

ABD 2

ABD 1

ABD 3

End point



Legend

- Glaslyn Works Site Boundary
- Automated Bat Detector (ABD) Location
- Route
- Survey Start/End Location

NOTES

1: No bats were seen or heard by surveyors during the survey. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 1 (SAC) - NIGHT-TIME
BAT WALKOVER OCTOBER (DAWN) 2023 &
AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:7,500	A3	8 OF 8	A

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Metres

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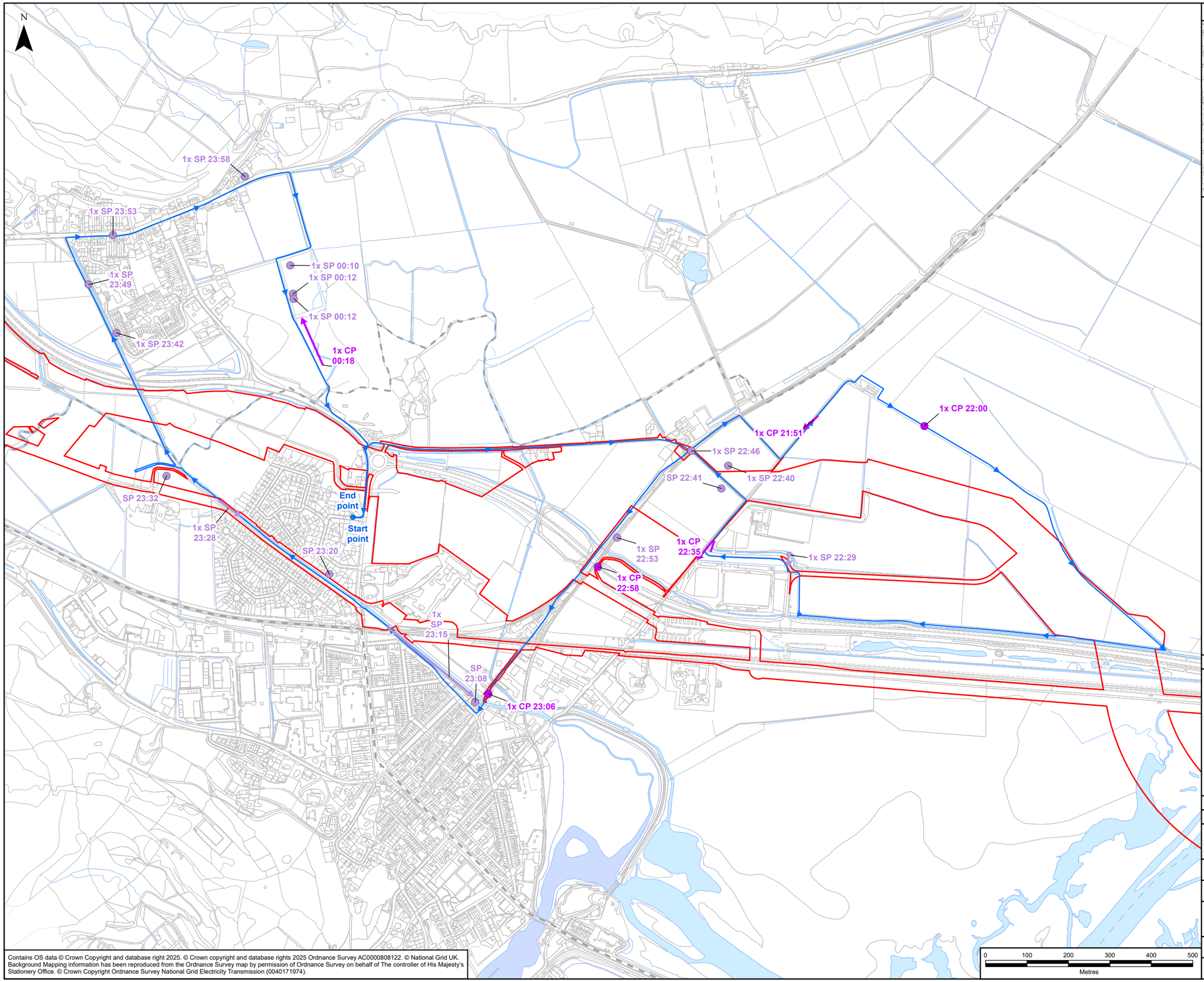

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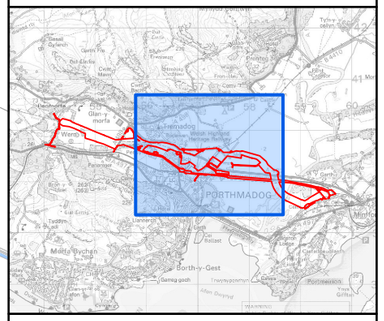
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

Bat Species Flight Line (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 2 (PORTHMADOG) - BAT ACTIVITY SURVEY MAY 2023 & AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:8,500	A3	1 OF 4	A

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N

1x CP 21:52
2x SP 21:43
1x LH 21:44
1x CP 21:37
1x SP 21:55
1x SP 22:01
SP 21:30
1x SP 21:27
2x SP 21:27
End point
SP 22:12
1x SP 00:16
Start point
1x My 00:06
1x SP 23:51
1x SP 23:48
CP 23:57
1x SP 23:59
1x SP 23:54
CP 22:57
1x SP 22:46
2x SP 23:04
2x CP 23:04
1x CP 23:10
2x SP 23:31
SP 23:32
1x SP 22:18
1x SP 22:20
1x SP 22:34
CP 22:29
1x SP 22:35

0 100 200 300 400 500
Metres

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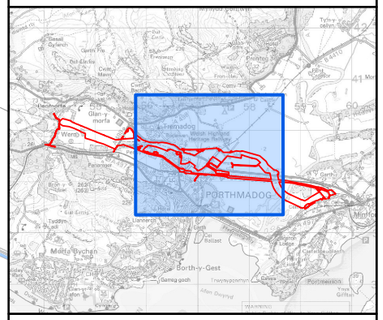
GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

Rhinolophus Species

- Lesser horseshoe (LH)

Bat Species Flight Line (Number of Bats and Record Time)

Pipistrelle Species

- Soprano pipistrelle (SP)

Myotis Species

- Myotis (MY)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 2 (PORTHMADOG) - BAT ACTIVITY SURVEY JULY 2023 & AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:8,500	A3	3 OF 4	A

Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatActivityTransects.aprx

N

1x LH 18:34
1x SP 18:35
1x SP 18:52
1x SP 18:24
1x SP 18:26
1x SP 18:24
1x CP 21:06
1x SP 21:01
1x SP 19:47
1x CP 21:04
1x SP 21:12
1x SP 21:10
1x CP 19:44
1x Unk P 19:43
SP 19:48
1x CP 19:48
End point
Start point
1x CP 19:55
1x CP 20:05
1x LH 20:05
1x SP 19:55
1x SP 19:37
SP 19:58
1x SP 20:01
2x SP 20:13
1x SP 20:13
1x CP 19:24
1x CP 19:31
6x SP 20:44
3x SP 20:10

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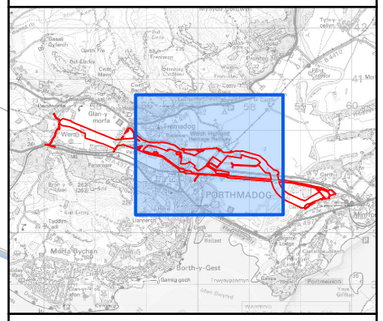
0 100 200 300 400 500
Metres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)
- Unknown pipistrelle (Unk P)

Rhinolophus Species

- Lesser horseshoe (LH)

Bat Species Flight Line (Number of Bats and Record Time)

Pipistrelle Species

- Soprano pipistrelle (SP)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 2 (PORTHMADOG) - NIGHT-TIME BAT WALKOVER OCTOBER 2023 & AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:8,500	A3	4 OF 4	A

Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatActivityTransects.aprx

N

3x SP 23:44

CP 23:37

1x My 23:06

3x CP 23:07

LH 23:07

1x SP 23:00

SP 22:52

End point

Start point

ABD 2

ABD 1

2x SP 21:19

1x SP 22:38

CP 23:21

1x CP 22:05

1x SP 21:55

1x CP 21:32

1x SP 22:07

1x SP 22:14

1x SP 22:15

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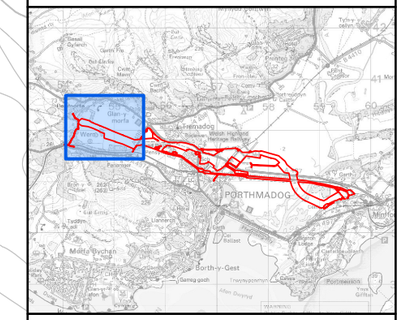
0 100 200 300 400 500

Metres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Automated Bat Detector (ABD) Location
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

Myotis Species

- Myotis (My)

Rhinolophus Species

- Lesser horseshoe (LH)

Bat Species Flight Line (Number of Bats and Record Time)

Pipistrelle Species

- Soprano pipistrelle (SP)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 3 (WERN MANOR) - BAT ACTIVITY SURVEY MAY 2023 & AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:4,500	A3	1 OF 3	A

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N

1x CP 21:18

1x CP 21:19

1x SP 21:50

1x SP 21:49

2x SP 20:39

1x Noc 20:36

1x SP 20:33

1x CP 20:43

1x SP 20:43

End point

Start point

Noc 20:52

ABD 2

1x CP 21:02

1x CP 21:55

1x Noc 21:38

1x SP 21:38

ABD 1

1x Noc 22:42

1x CP 22:14

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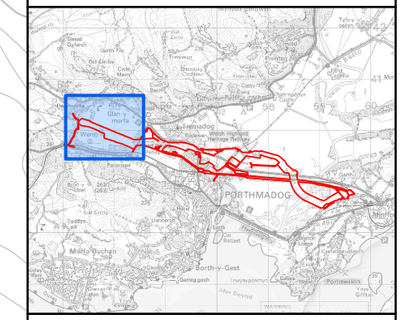
0 100 200 300 400 500

Metres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Automated Bat Detector (ABD) Location
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

Nyctalus Species

- Noctule (Noc)

Bat Species Flight Line (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 3 (WERN MANOR) - BAT ACTIVITY SURVEY AUGUST 2023 & AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:4,500	A3	2 OF 3	A

Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatActivityTransects.aprx

N

1x LH 21:43

1x CP 21:19

3x CP 21:17

1x SP 21:57

1x CP 21:47

1x SP 19:39

Start point

End point

1x SP 22:32

1x SP 19:51

1x SP 22:27

1x SP 22:30

ABD 1

1x SP 22:00

1x SP 22:24

1x My 21:09

1x My 21:33

ABD 2

1x My 21:32

1x CP 22:16

1x SP 20:33

1x My 19:54

1x SP 19:55

1x SP 20:00

1x SP 19:59

2x SP 20:27

2x SP 20:02

1x SP 20:24

1x SP 20:46

SP 20:45

1x SP 20:12

1x SP 20:14

1x SP 20:16

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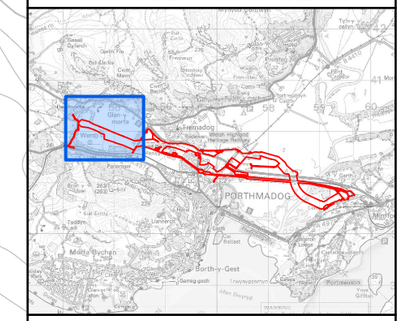
0 100 200 300 400 500

Metres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Automated Bat Detector (ABD) Location
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

Myotis Species

- Myotis (My)

Rhinolophus Species

- Lesser horseshoe (LH)

Bat Species Flight Line (Number of Bats and Record Time)

Pipistrelle Species

- Soprano pipistrelle (SP)

Myotis Species

- Myotis (MY)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 3 (WERN MANOR) - NIGHT-TIME BAT WALKOVER SEPTEMBER 2023 & AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:4,500	A3	3 OF 3	A

Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatActivityTransects.aprx

N

1x Noc 23:14
1x SP 23:13
1x SP 23:28
1x CP 23:18
1x SP 23:09
1x SP 23:20
1x CP 23:21
1x SP 23:21
1x CP 23:06
1x My 23:04
1x CP 22:39
1x My 23:02
1x SP 22:46
1x CP 22:56
1x LH 22:57
2x SP 22:06
Start point
End point
1x SP 22:30
1x SP 22:10
2x SP 22:25
1x CP 22:15

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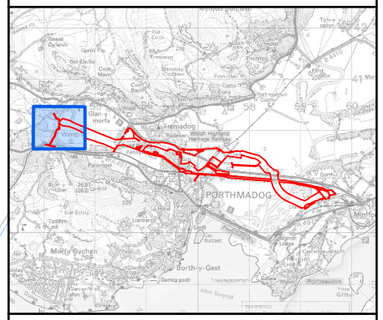
0 100 200 300 400 500
Metres

GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- Route
- Survey Start/End Location

Bat Species (Number of Bats and Record Time)

Pipistrelle Species

- Common pipistrelle (CP)
- Soprano pipistrelle (SP)

Myotis Species

- Myotis (My)

Rhinolophus Species

- Lesser horseshoe (LH)

Nyctalus Species

- Noctule (Noc)

NOTES

1: Only bats seen or heard by surveyors during the survey are illustrated in this figure. All data captured on hand held detectors are summarised within the report.
2: Bat activity surveys carried out before 15th September 2023 were undertaken in accordance with the Bat Conservation Trust's (BCT) Good Practice Guidelines 3rd Edition. Bat activity surveys carried out after 15th September 2023 were undertaken in accordance with the updated BCT Good Practice Guidelines 4th Edition and referred to as Night-Time Bat Walkover surveys.

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	LM	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.F.6
TRANSECT 4 (ADDITIONAL TRANSECT) - NIGHT-TIME BAT WALKOVER MAY 2024 & AUTOMATED BAT DETECTOR LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	LM	11/09/2025	NL	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:3,000	A3	1 OF 1	A

Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5App_Fig_ECO_BatActivityTransects.aprx

Appendix B – ABD Weather Conditions

Table B.1 –Automated Bat Detector Deployment Dates and Weather Conditions - SAC

Location	Date	Weather Conditions (temperature range, max wind, precipitation, cloud cover)	Sunrise and Sunset Time
ABD 1 (SAC – Power Lines)	21 April 2023	3°C – 10°C, 5 mph, fog, overcast	06:05, 20:26
	22 April 2023	5°C – 6°C, 6 mph, overcast, light rain	06:03, 20:28
	23 April 2023	5°C – 8°C, 13 mph, clear, then overcast with light rain	06:01, 20:29
ABD 2 (SAC – River)	22 April 2023	5°C – 6°C, 6 mph, overcast, light rain	06:03, 20:28
	23 April 2023	6.4°C - 13°C, 13 mph, clear, then overcast with light rain	06:01, 20:29
	24 April 2023	-1°C - 6°C, 10 mph, light rain, passing clouds	05:59, 20:31
	25 April 2023	2°C - 6°C, 6 mph, dry and overcast	05:56, 20:33
	26 April 2023	4°C - 11°C, 8 mph, dry and overcast	05:54, 20:35
ABD 3 (SAC – Wood)	30 April 2023	9°C - 10°C, 23 mph, light rain and low cloud	05:46, 20:42
	01 May 2023	8°C - 12°C, 5 mph, dry and overcast	05:44, 20:43
	02 May 2023	6°C - 14°C, 14 mph, dry and overcast	05:42, 20:45
	03 May 2023	5°C - 12°C, 17 mph, dry and overcast	05:40, 20:47
ABD 1 (SAC – Power Lines)	26 May 2023	6°C - 16°C, 7 mph, dry, clear	05:04, 21:24
ABD 2 (SAC – River)	24 May 2023	7°C - 13°C, 9 mph, dry, clear	05:06, 21:21
	25 May 2023	5°C - 15°C, 9 mph, dry, clear	05:05, 21:22
	26 May 2023	6°C - 16°C, 7 mph, dry, clear	05:04, 21:24
	27 May 2023	11°C - 17°C, 15 mph, dry, clear	05:02, 21:25
	28 May 2023	7°C - 14°C, 12 mph, dry, passing clouds	05:01, 21:26
ABD 3 (SAC – Wood)	25 May 2023	5°C - 15°C, 9 mph, dry, clear	05:05, 21:22
	26 May 2023	6°C - 16°C, 7 mph, dry, clear	05:04, 21:24
	27 May 2023	11°C - 17°C, 15 mph, dry, clear	05:02, 21:25

Location	Date	Weather Conditions (temperature range, max wind, precipitation, cloud cover)	Sunrise and Sunset Time
	28 May 2023	7°C - 14°C, 12 mph, dry, passing clouds	05:01, 21:26
	29 May 2023	8°C - 14°C, 13 mph, dry, clear	05:00, 21:27
ABD 1 (SAC – Power Lines)	28 June 2023	11°C - 16°C, 8 mph, dry, passing cloud	04:53, 21:45
	29 June 2023	12°C - 14°C, 20 mph, dry, overcast	04:54, 21:45
	30 June 2023	13°C - 16°C, 21 mph, light rain, overcast	04:54, 21:45
ABD 2 (SAC – River)	29 June 2023	12°C - 14°C, 20 mph, dry, overcast	04:54, 21:45
	30 June 2023	13°C - 16°C, 21 mph, light rain, overcast	04:54, 21:45
	01 July 2023	12°C - 14°C, 21 mph, dry, overcast	04:55, 21:45
	02 July 2023	11°C - 12°C, 22 mph, brief light rain, overcast	04:56, 21:44
	03 July 2023	10°C - 12°C, 20 mph, brief light rain, overcast	04:56, 21:44
ABD 3 (SAC – Wood)	29 June 2023	12°C - 14°C, 20 mph, dry, overcast	04:54, 21:45
	30 June 2023	13°C - 16°C, 21 mph, light rain, overcast	04:54, 21:45
	01 July 2023	12°C - 14°C, 21 mph, dry, overcast	04:55, 21:45
ABD 1 (SAC – Power Lines)	27 July 2023	14°C - 16°C, 23 mph, light rain, low cloud	05:26, 21:18
	28 July 2023	13°C - 14°C, 29 mph, light rain, overcast	05:27, 21:17
	29 July 2023	13°C - 15°C, 29 mph, brief light rain, overcast	05:29, 21:15
	30 July 2023	15°C - 16°C, 35 mph, light rain, low cloud	05:30, 21:14
	31 July 2023	13°C - 15°C, 29 mph, dry, overcast	05:32, 21:12
ABD 2 (SAC – River)	25 July 2023	11°C - 13°C, 17 mph, dry, overcast	05:23, 21:22
	26 July 2023	15°C - 16°C, 23 mph, light rain, low cloud	05:24, 21:20
	27 July 2023	14°C - 16°C, 23 mph, light rain, low cloud	05:26, 21:18

Location	Date	Weather Conditions (temperature range, max wind, precipitation, cloud cover)	Sunrise and Sunset Time
	28 July 2023	13°C - 14°C, 29 mph, light rain, overcast	05:27, 21:17
	29 July 2023	13°C - 15°C, 29 mph, brief light rain, overcast	05:29, 21:15
ABD 3 (SAC – Wood)	27 July 2023	14°C - 16°C, 23 mph, light rain, low cloud	05:26, 21:18
	28 July 2023	13°C - 14°C, 29 mph, light rain, overcast	05:27, 21:17
ABD 1 (SAC – Power Lines)	25 August 2023	11°C - 12°C, 13 mph, light rain, overcast	06:14, 20:22
	26 August 2023	12°C - 13°C, 12 mph, light rain, overcast	06:16, 20:19
	27 August 2023	11°C - 13°C, 9 mph, brief light rain, overcast	06:17, 20:17
	28 August 2023	13°C - 14°C, 9 mph, dry, overcast	06:19, 20:15
	29 August 2023	12°C - 13°C, 12 mph, brief light rain, overcast	06:21, 20:12
ABD 2 (SAC – River)	24 August 2023	11°C - 12°C, 12 mph, brief light rain, passing cloud	06:12, 20:24
	25 August 2023	11°C - 12°C, 13 mph, light rain, overcast	06:14, 20:22
	26 August 2023	12°C - 13°C, 12 mph, light rain, overcast	06:16, 20:19
	27 August 2023	11°C - 13°C, 9 mph, brief light rain, overcast	06:17, 20:17
	28 August 2023	13°C - 14°C, 9 mph, dry, overcast	06:19, 20:15
ABD 3 (SAC – Wood)	24 August 2023	11°C - 12°C, 12 mph, brief light rain, passing cloud	06:12, 20:24
	25 August 2023	11°C - 12°C, 13 mph, light rain, overcast	06:14, 20:22
	26 August 2023	12°C - 13°C, 12 mph, light rain, overcast	06:16, 20:19
	27 August 2023	11°C - 13°C, 9 mph, brief light rain, overcast	06:17, 20:17

Location	Date	Weather Conditions (temperature range, max wind, precipitation, cloud cover)	Sunrise and Sunset Time
	28 August 2023	13°C - 14°C, 9 mph, dry, overcast	06:19, 20:15
ABD 1 (SAC – Power Lines)	14 September 2023	12°C - 14°C, 12 mph, light rain, low cloud	06:48, 19:35
	15 September 2023	13°C - 16°C, 7 mph, brief light rain, low cloud	06:49, 19:32
	16 September 2023	13°C - 16°C, 16 mph, light rain, low cloud	06:51, 19:30
	17 September 2023	15°C - 17°C, 23 mph, light rain, low cloud	06:53, 19:27
ABD 2 (SAC – River)	14 September 2023	12°C - 14°C, 12 mph, light rain, low cloud	06:48, 19:35
	15 September 2023	13°C - 16°C, 7 mph, brief light rain, low cloud	06:49, 19:32
	16 September 2023	13°C - 16°C, 16 mph, light rain, low cloud	06:51, 19:30
	17 September 2023	15°C - 17°C, 23 mph, light rain, low cloud	06:53, 19:27
	18 September 2023	10°C - 12°C, 29 mph (gusts to 47mph), light rain, overcast	06:55, 19:25
ABD 3 (SAC – Wood)	14 September 2023	12°C - 14°C, 12 mph, light rain, low cloud	06:48, 19:35
	15 September 2023	13°C - 16°C, 7 mph, brief light rain, low cloud	06:49, 19:32
	16 September 2023	13°C - 16°C, 16 mph, light rain, low cloud	06:51, 19:30
	17 September 2023	15°C - 17°C, 23 mph, light rain, low cloud	06:53, 19:27
	18 September 2023	10°C - 12°C, 29 mph (gusts to 47mph), light rain, overcast	06:55, 19:25
ABD 1 (SAC – Power Lines)	4 October 2023	13°C - 14°C, 24 mph, light rain, overcast	07:22, 18:47
	5 October 2023	14°C - 15°C, 35 mph, rain, low cloud	07:24, 18:44
	6 October 2023	14°C - 15°C, 38 mph, some light rain, low cloud	07:26, 18:42

Location	Date	Weather Conditions (temperature range, max wind, precipitation, cloud cover)	Sunrise and Sunset Time
	7 October 2023	14°C - 15°C, 30 mph, dry, passing cloud	07:27, 18:40
	8 October 2023	14°C - 16°C, 23 mph, dry, passing cloud	07:29, 18:37
ABD 2 (SAC – River)	4 October 2023	13°C - 14°C, 24 mph, light rain, overcast	07:22, 18:47
	5 October 2023	14°C - 15°C, 35 mph, rain, low cloud	07:24, 18:44
	6 October 2023	14°C - 15°C, 38 mph, some light rain, low cloud	07:26, 18:42
	7 October 2023	14°C - 15°C, 30 mph, dry, passing cloud	07:27, 18:40
	8 October 2023	14°C - 16°C, 23 mph, dry, passing cloud	07:29, 18:37
ABD 3 (SAC – Wood)	4 October 2023	13°C - 14°C, 24 mph, light rain, overcast	07:22, 18:47
	5 October 2023	14°C - 15°C, 35 mph, rain, low cloud	07:24, 18:44
	6 October 2023	14°C - 15°C, 38 mph, some light rain, low cloud	07:26, 18:42
	7 October 2023	14°C - 15°C, 30 mph, dry, passing cloud	07:27, 18:40
	8 October 2023	14°C - 16°C, 23 mph, dry, passing cloud	07:29, 18:37

Table B.2 –Automated Bat Detector Deployment Dates and Weather Conditions – Wern Manor

Location	Date	Weather Conditions (temperature range, max wind, precipitation, cloud cover)	Sunrise and Sunset Time
ABD 1 (Wern Manor – West)	26 May 2023	6°C - 16°C, 7 mph, dry, clear	05:04, 21:24
	27 May 2023	11°C - 17°C, 15 mph, dry, clear	05:02, 21:25
	28 May 2023	7°C - 14°C, 12 mph, dry, passing clouds	05:01, 21:26
	29 May 2023	8°C - 14°C, 13 mph, dry, clear	05:00, 21:27

Location	Date	Weather Conditions (temperature range, max wind, precipitation, cloud cover)	Sunrise and Sunset Time
	30 May 2023	9°C - 16°C, 14 mph, dry, clear becoming overcast	04:59, 21:29
ABD 2 (Wern Manor – West)	25 May 2023	5°C - 15°C, 9 mph, dry, clear	05:05, 21:22
	26 May 2023	6°C - 16°C, 7 mph, dry, clear	05:04, 21:24
	27 May 2023	11°C - 17°C, 15 mph, dry, clear	05:02, 21:25
	28 May 2023	7°C - 14°C, 12 mph, dry, passing clouds	05:01, 21:26
	29 May 2023	8°C - 14°C, 13 mph, dry, clear	05:00, 21:27
ABD 1 (Wern Manor – West)	25 August 2023	11°C - 12°C, 13 mph, light rain, overcast	06:14, 20:22
	26 August 2023	12°C - 13°C, 12 mph, light rain, overcast	06:16, 20:19
	27 August 2023	11°C - 13°C, 9 mph, brief light rain, overcast	06:17, 20:17
	28 August 2023	13°C - 14°C, 9 mph, dry, overcast	06:19, 20:15
	29 August 2023	12°C - 13°C, 12 mph, brief light rain, overcast	06:21, 20:12
ABD 2 (Wern Manor – West)	24 August 2023	11°C - 12°C, 12 mph, brief light rain, passing cloud	06:12, 20:24
	25 August 2023	11°C - 12°C, 13 mph, light rain, overcast	06:14, 20:22
	26 August 2023	12°C - 13°C, 12 mph, light rain, overcast	06:16, 20:19
	27 August 2023	11°C - 13°C, 9 mph, brief light rain, overcast	06:17, 20:17
	28 August 2023	13°C - 14°C, 9 mph, dry, overcast	06:19, 20:15
ABD 1 (Wern Manor – West)	13 September 2023	12°C - 15°C, 22 mph, dry and overcast to light rain and overcast	06:46, 19:37
	14 September 2023	12°C - 14°C, 12 mph, light rain, low cloud	06:48, 19:35
	15 September 2023	13°C - 16°C, 7 mph, brief light rain, low cloud	06:49, 19:32

Location	Date	Weather Conditions (temperature range, max wind, precipitation, cloud cover)	Sunrise and Sunset Time
	16 September 2023	13°C - 16°C, 16 mph, light rain, low cloud	06:51, 19:30
	17 September 2023	15°C - 17°C, 23 mph, light rain, low cloud	06:53, 19:27
ABD 2 (Wern Manor – West)	13 September 2023	12°C - 15°C, 22 mph, dry and overcast to light rain and overcast	06:46, 19:37
	14 September 2023	12°C - 14°C, 12 mph, light rain, low cloud	06:48, 19:35
	15 September 2023	13°C - 16°C, 7 mph, brief light rain, low cloud	06:49, 19:32
	16 September 2023	13°C - 16°C, 16 mph, light rain, low cloud	06:51, 19:30
	17 September 2023	15°C - 17°C, 23 mph, light rain, low cloud	06:53, 19:27

Table B.3 –Automated Bat Detector Deployment Dates and Weather Conditions – June 2024

Location	Date	Weather Conditions (temperature range, max wind, precipitation, cloud cover)	Sunrise and Sunset Time
June 2024 ABD	01 June 2024	7°C - 17°C, 11 mph, dry, low cloud	04:57, 21:32
	02 June 2024	7°C - 18°C, 10 mph, dry, low cloud	04:56, 21:33
	03 June 2024	12°C - 16°C, 12 mph, dry, overcast	04:55, 21:34
	04 June 2024	9°C - 13°C, 25 mph, dry, low cloud	04:54, 21:35
	05 June 2024	11°C - 20°C, 20 mph, dry, low cloud	04:54, 21:36

Appendix C – Photographs

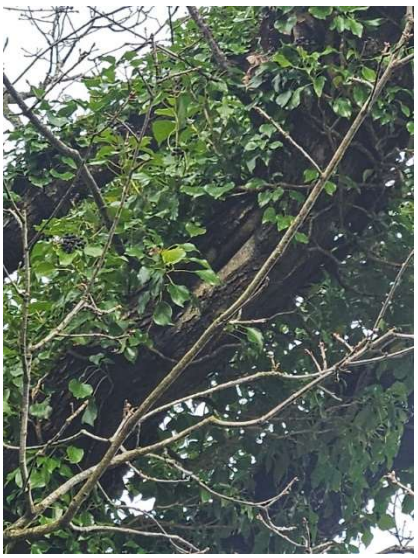
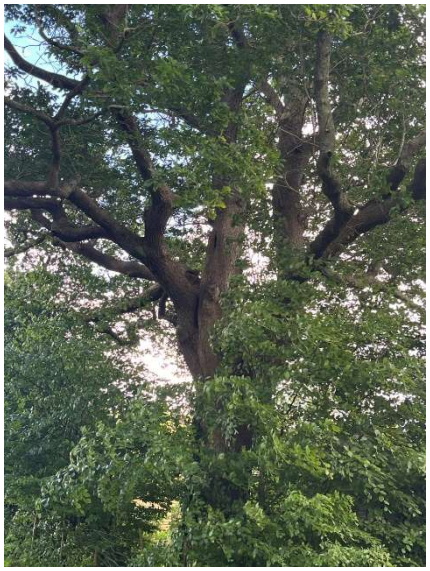
Reference and Photograph Number	Photographs
Barn (B4.1) Photographs 1 - 4	   
Tree F4.G34A Photograph 5	

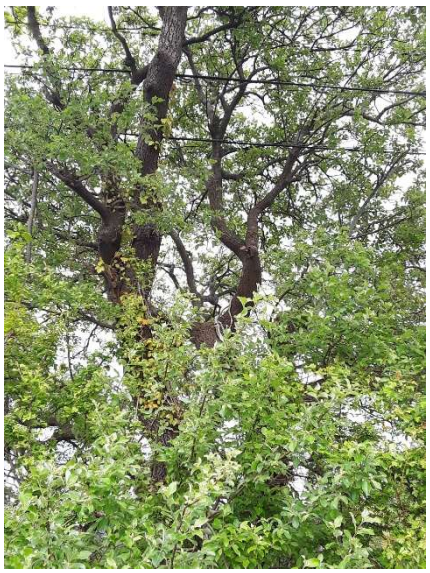
Reference and Photograph Number	Photographs
Tree 4.W43A Photographs 6 & 7	 
Tree 4.T62 Photograph 8	

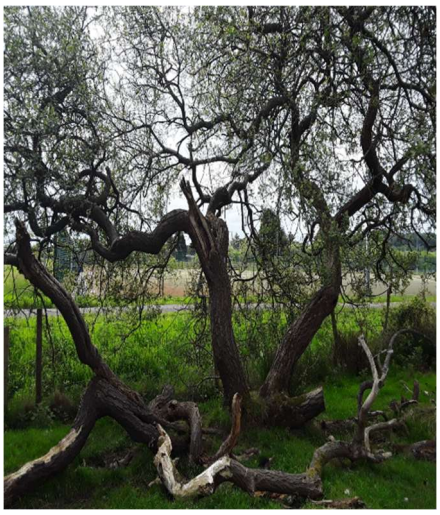
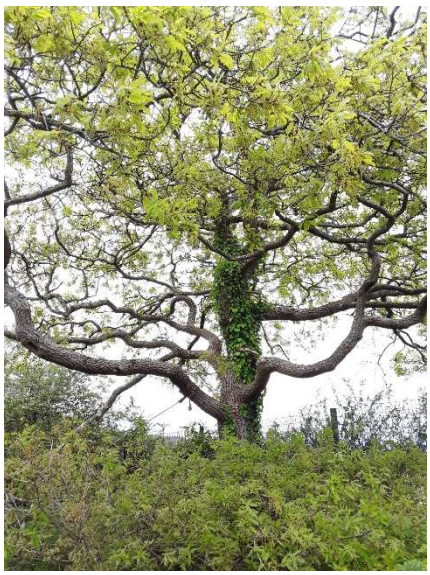
Reference and Photograph Number	Photographs
Tree 4.T105 Photograph 9	
Tree 4.G91A Photograph 10	

Reference and Photograph Number	Photographs
Tree 4.T89 Photograph 11	
Tree 4.W73C Photograph 12	

Reference and Photograph Number	Photographs
Tree 4.W73B Photograph 13	
Tree 4.W73A Photographs 14 & 15	

Reference and Photograph Number	Photographs
Tree 4.T142 Photographs 16 & 17	 
Tree 4.T.E1 Photograph 18	
Tree 4.G248A Photograph 19	

Reference and Photograph Number	Photographs
Tree 4.T251 Photograph 20	
Tree 4.G248B Photograph 21	
Tree 4.G293A Photograph 22	

Reference and Photograph Number	Photographs	
Tree 4.T398 Photographs 23 & 24		
Tree 4.T327 Photographs 25 & 26		
Tree 4.T244 Photographs 27 & 28		

4.5.G Badger Survey Report- CONFIDENTAL

4.5.H Ecology Report: Glaslyn Riparian Mammals (Confidential)

4.5.IEcology Report: Glaslyn Great Crested Newt Survey

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1. Introduction

1.1 Introduction

1.1.1 This document has been prepared on behalf of National Grid Electricity Transmission plc (NGET) who seek to construct and operate the Pentir to Trawsfynydd Reinforcement Project (the 'Project').

1.1.2 This document concerns the section of the Project relating to Glaslyn Cables (the 'proposed works') and is a Technical Appendix to Environmental Statement (ES) **Volume 4, Chapter 5: Ecology and Nature Conservation** being submitted as part of the Environmental Impact Assessment (EIA) which accompanies applications for consent by NGET to construct and operate developments which comprise parts of the Project.

1.2 Description of the Proposed Works

1.2.1 The proposed works are in the administrative boundary of Gwynedd Council, North West Wales, between the existing Wern Cable Sealing End Compound (CSEC) (SH 543401) and existing Garth CSEC cable sealing end compound (SH 59592 38765), Porthmadog (the 'Glaslyn works site').

1.2.2 The proposed works comprise:

- Extending the existing CSEC at Wern, including a new access road to the east.
- Decommissioning and removal of Garth CSEC.
- Construction of a new CSEC and Tunnel Head House at Minffordd.
- Replacement and upgrading of approximately 6 km of cables between Wern CSEC and Minffordd CSEC.
- Removal of redundant cables in selected locations (with the remainder left *in situ* where constraints, such as ecological, preclude their removal).
- Temporary construction compounds, construction areas and permanent and temporary accesses that are required to install and maintain the infrastructure listed above.

1.2.3 The new cables will be installed through a combination of open cut and non-open cut techniques. The proposed non-open cut technique will be Horizontal Directional Drill.

1.2.4 A description of the proposed works is provided in ES **Volume 4, Chapter 2: Glaslyn Cable Works.** The location of the Glaslyn works site is shown on **Figure 4.5.I.1.**

1.3 Introduction to the Great Crested Newt Report

1.3.1 The Site required an evaluation of the potential to provide suitable habitat for great crested newts (*Triturus cristatus*).

1.3.2 This report details the baseline information collated for great crested newts and identifies relevant legislation and planning policy which are outlined in **Section 2** of this report.

Study Area and Survey Areas

1.3.3 The Study Area discussed in this report, is defined as the boundary of the Glaslyn works site and a 2 km buffer. This area was used for the desk-based assessment to collate existing ecological records relating to great crested newts.

1.3.4 The Survey Area included the Glaslyn works site, and a 250 metre (m) buffer, as shown in **Appendix A: Figure 4.5.I.1**. The habitats can be broadly categorised as improved grassland and grazed (sheep and/or cattle) pasture in the western areas of the Survey Area and north of the A487 further east, saltmarsh to the south of the A487 within the east of the Survey Area, and a scattered mosaic of grassland, scrub and woodland habitats amongst a suburban landscape within the approximate centre of the Survey Area north of the town of Porthmadog. Ponds and drainage ditches are scattered throughout the Survey Area.

1.4 Objectives

1.4.1 The purpose of this assessment is to determine the status of great crested newt within the Survey Area through desk-based and field-based surveys to inform ES **Volume 4, Chapter 5: Ecology and Nature Conservation**. Additional detail on the methods used are provided in **Section 3** of this report. The great crested newt assessment was undertaken to:

- Identify and assess waterbodies present within the Survey Area (where there may be potential for direct or indirect effects as result of the proposed works) for their potential to support great crested newt.
- Determine the status of great crested newt within the Survey Area.
- Evaluate the nature conservation value of the habitats with the Survey Area for great crested newt to provide baseline evidence to support the ecological impact assessment.
- Identify any mitigation requirements for the proposed works to prevent or reduce negative impacts to great crested newts.

2. Legislation and Planning Policy

2.1 Introduction

2.1.1 This section lists the legislation, planning policy framework and guidance that is relevant to great crested newts.

2.1.2 More detailed information can be found in **Volume 8, Appendix: Appendix 1.1.A: Legislation, Policy and Guidance**.

Statutory Legislation

2.1.3 Key legislation for great crested newts in the UK and Wales relevant to this assessment is:

- The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 2.1).
- Wildlife and Countryside Act (WCA) 1981 (as amended) (**Error! Reference source not found.**2.2).
- Natural Environment and Rural Communities Act (NERC) Act 2006 (as amended) (Ref 2.3).
- Environment (Wales) Act 2016 (as amended) (Ref 2.4).

2.1.4 The UK is no longer a member of the European Union (EU). However, EU legislation which applied directly or indirectly to the UK before 11.00 p.m. on 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'.

2.1.5 The Secretary of State for the Environment, Food and Rural Affairs and Welsh Ministers have made changes to parts of the Conservation of Habitats and Species Regulations 2017 (referred to as the 2017 Regulations) (Ref 2.1) which translate the Habitats Directive into UK law so that they operate effectively. Most of these changes involve transferring functions from the European Commission to the appropriate authorities in the UK. All other processes or terms in the 2017 Regulations remain unchanged and existing guidance is still relevant.

2.1.6 Great crested newts are protected under Regulation 43 of the 2017 Regulations as amended by the 2019 Regulations. This makes it an offence to deliberately capture, injure or kill an animal; deliberately disturb an animal; or damage or destroy a breeding site or resting place used by an animal.

2.1.7 Deliberate capture or killing is taken to include "accepting the possibility" of such capture or killing. Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.

2.1.8 Where development works are at risk of causing one or more of the offences listed above, a developer can apply for a mitigation licence from Natural Resources Wales (NRW) to facilitate the works that would otherwise be illegal.

2.1.9 Great crested newts are also protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) (Ref 2.2). This makes it an offence to intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb an animal in such a place.

2.1.10 Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2017 remain an offence under the Wildlife and Countryside Act 1981 although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided.

2.1.11 The Environment (Wales) Act 2016 provides Wales' approach to planning and managing natural resources at a national and local level (Part 1 of the Act). Section 7 of Part 1 of this Act ("Biodiversity lists and duty to take steps to maintain and enhance biodiversity") replaces the duty in Section 40 of the NERC Act in relation to Wales and provides a list of organisms and habitat types in Wales which are considered to be of key significance to sustain and improve biodiversity in relation to Wales.

2.1.12 Section 6 of the Environment (Wales) Act 2016 places a duty on public authorities to 'seek to maintain and enhance biodiversity' so far as it is consistent with the proper exercise of those functions. In so doing, public authorities must also seek to 'promote the resilience of ecosystems'. The duty replaces the section 40 duty in the NERC Act in relation to Wales and applies to those authorities that fell within the previous duty.

2.1.13 To assist in complying with this duty, public authorities must have regard to relevant evidence provided in the State of Natural Resources Report and any relevant area statement for an area in which the authority exercises functions, as well as having regard to the list of living organisms and habitats published under Section 7 of the Act (which replaces the section 42 list for Wales provided in the NERC Act) (Ref 2.3). Section 7 is a list of species and habitats of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales, which includes great crested newts. This list is currently under review by the Welsh Government in consultation with NRW.

2.2 Natural Resources Wales Licences

2.2.1 Any operations that may impact upon great crested newts or their breeding sites and resting places, may require a NRW European Protected Species (EPS) Mitigation Licence (Ref 2.5). An EPS Mitigation Licence is required where development and/or construction activity will impact great crested newt through:

- Maintaining, restoring, or destroying ponds or water bodies.
- Introducing fish into ponds used by great crested newts.
- Removal of vegetation, scrub, brash piles used by great crested newts.
- Excavations and other ground works.
- Surveys using torches, nets, or traps.

2.2.2 In the first instance, impacts to great crested newt should be avoided through considerate construction practices such as the implementation of “buffer zones” from known places of shelter and breeding.

2.2.3 Where such buffer zones cannot be implemented it is likely that the works will require a licence from NRW. The licence application will include a method statement using a NRW template which will stipulate how great crested newts will benefit from mitigation measures, habitat creation, habitat management and habitat maintenance.

2.3 Planning Policy

National Policy

2.3.1 Government planning policy guidance throughout the UK requires local planning authorities to take account of the conservation of protected species when determining planning or development consent applications. This makes the presence of a protected species a material consideration when assessing a development proposal.

2.3.2 In Wales this is implemented through Planning Policy Wales - Edition 12 (PPW (12)), February 2024 (Ref 2.6), supplemented by a series of Technical Advice Notes (TANs) (Ref 2.7) which sets out the land use planning polices of the Welsh Government.

2.3.3 Chapter 6 of PPW (12) sets out the Welsh Government’s objectives for the natural heritage of Wales which includes the safeguarding of protected species. It states that ‘the presence of a species protected under European or UK legislation, or under Section 7 of the Environment (Wales) Act 2016 (Ref 2.4), is a material consideration when a planning authority is considering a development proposal which, if carried out, would be likely to result in disturbance or harm to the species or its habitat’. It also states that ‘an ecological survey to confirm whether a protected species is present and an assessment of the likely impact of the development on a protected species may be required in order to inform the development management process.’

2.3.4 PPW (12) includes a step-wise approach to protecting and enhancing biodiversity and building resilient ecological networks by ensuring that any adverse environmental effects are minimised and mitigated. Additionally, PPW (12) also includes the following objectives:

- ‘Secure the maintenance and enhancement of ecosystem resilience and resilient ecological networks by improving diversity, extent, condition, and connectivity’.
- ‘The contribution of the designated site to wide resilient ecological networks should be recognised and captured as part of a strategic approach to planning policy and decision making’.
- ‘Proposed SSSIs [Site of Special Scientific Interest] will be treated in the same way as notified SSSIs’.
- ‘Policies for non-statutory sites should make it clear that such designations do not preclude appropriate developments where there are no adverse impacts on the features for which a site is designated and on wider ecosystem resilience’.

Local Policy

2.3.5 The following local planning policies set out in the Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026 (Ref 2.8) relate to ecology and nature conservation which in combination with other planning policies will guide local authority expectations in relation to the proposed works:

- Strategic Policy PS 19 relates to conserving and enhancing the natural environment.
- Policy AMG 4 relates to coastal protection.
- Policy AMG 5 relates to the protection and enhancement of local biodiversity.
- Policy AMG 6 relates to protecting sites of regional or local significance.

2.3.6 Following a decision by Cyngor Gwynedd and the Isle of Anglesey County Council to cease the joint working agreement on Planning Policy matters on 31 March 2023, the Gwynedd Planning Policy Service has been established.

2.3.7 The process of preparing a new Local Development Plan (LDP) for the Gwynedd Local Planning Authority area only has commenced. The new LDP will cover a period between 2024 and 2039. The Anglesey and Gwynedd Joint LDP continues to provide the local policy framework for decisions on planning applications, until the Gwynedd LDP is adopted

Biodiversity Policy

2.3.8 As a result of devolution, and new country-level and international drivers and requirements, much of the work previously carried out by the UK Biodiversity Action Plan (BAP) is now focussed at a country-level rather than a UK-level. The UK BAP was succeeded in July 2012 by the 'UK Post-2010 Biodiversity Framework'. The UK list of priority species and habitats, however, remains an important reference source and has been used to help draw up statutory lists of priorities in England, Scotland, Wales and Northern Ireland. In Wales the current lists are those under Part 1, Section 7 of the Environment (Wales) Act 2016 (Ref 2.4).

2.3.9 The national strategy for biodiversity is delivered at local level via Local Biodiversity Action Plans (LBAPs). Species and habitats of local conservation concern or value are included in the LBAP and an action plan is created for each species and certain habitat types (respectively termed Species Action Plans and Habitat Action Plans).

2.3.10 The LBAP relevant to the proposed works is the Natur Gwynedd LBAP for Gwynedd developed by a partnership of organisations and individuals (Ref 2.9).

2.3.11 The Wales Biodiversity Partnership (WBP) brings together key members from the public, private and voluntary sectors to promote and monitor biodiversity and ecosystem action in Wales. WBP provides a leadership role and an expert steer on priorities for action on biodiversity and ecosystems in Wales. The WBP Steering Group has now formally disbanded, and the biodiversity action work programme has been taken on by the Wales Biodiversity Strategy Board and the WBP working groups.

3. Methods

3.1 Desk Study

3.1.1 Cofnod (North Wales Environmental Information Service) (Ref 3.1) was commissioned to provide relevant biological records within 2 km of the Glaslyn works site. This was most recently updated in November 2024. The following items were requested:

- Great crested newt records.
- Designated sites (statutory and non–statutory) which support great crested newt.

3.1.2 Only records up to ten years old were considered within the assessment (i.e. November 2014 to November 2024 inclusive), as any records older than ten years may be unlikely to be representative of the current status of great crested newt in the local area.

3.1.3 Ordnance Survey maps and the Where's the Path website (Ref 3.2) have been used to identify the presence of water bodies within the Survey Area and to help establish if the land within the Survey Area is potentially suitable for great crested newts. They also helped to establish any potential barriers to great crested newt movement between the works site and the ponds. This species can use suitable terrestrial habitat up to 500 m from a breeding pond, though there is a notable decrease in great crested newt abundance beyond 250 m from a breeding pond.

3.2 Field Survey

3.2.1 Waterbodies within the Survey Area were assessed for their potential to support great crested newt, following English Nature (2001) (Ref 3.3) and Froglife (2001) (Ref 3.4) guidance.

3.2.2 Sixteen waterbodies were identified within the Survey Area, as shown in **Appendix A: Figure 4.5.I.1**. Two ponds were inaccessible at the time of the survey, one pond was scoped out due to considerable barriers between the pond and the Glaslyn works site, however, thirteen ponds were assessed for their suitability for great crested newt, three were immediately considered unsuitable and ten were subjected to Habitat Suitability Indices (HSI) to determine their suitability for great crested newt. From the results of these, those considered suitable had environmental DNA samples taken to determine the presence/absence of great crested newt, where accessible.

3.3 Biodiversity Evaluation

3.3.1 An essential prerequisite step to allow ecological impact assessment of the proposed works was an evaluation of the relative biodiversity importance of the ecological features present (encompassing nature conservation designations, ecosystems, habitats and species). This was necessary to set the terms of reference for the subsequent ecological impact assessment.

3.3.2 The method of evaluation used has been developed with reference to the Chartered Institute of Ecology and Environmental Management (Ref 3.5). This gives guidance on scoping and carrying out environmental assessments, and places appraisal in the

context of relevant policies. Data received through consultation, desk study and field-based surveys were used to identify ecological features of biodiversity importance or potential importance, and the main factors contributing to their importance described and related to available guidance.

3.3.3 Species can be of biodiversity importance for a variety of reasons, and their relative importance should always be determined on a case-by-case basis. Importance may relate for example to the uniqueness of the assemblage, or to the extent to which species are threatened throughout their range, or to their rate of decline.

3.3.4 The importance of great crested newt has been defined with reference to the relevant geographical level for this species. Relevant published national and local guidance and criteria can be used, where available, to inform the assessment of biodiversity importance and to assist consistency in evaluation. Current population and conservation status for great crested newt has been taken from the Review of the Current Conservation Status (CCS) of the great crested newt in Wales (Ref 3.6).

3.4 Assumptions

Desk Study

3.4.1 The aim of a desk study was to help characterise the baseline context of the Study Area and provide valuable background information that may not be captured by surveys alone. Information obtained from the desk study was dependent upon people and organisations having made and submitted records for the area of interest. A lack of records for a particular species does not necessarily mean that this species does not occur in the Study Area. Likewise, the presence of records of great crested newt does not automatically mean that these still occur within the Study Area or are relevant in the context of the proposed works.

Field Survey

3.4.2 Great crested newt surveys offer only snapshots of the location being assessed and do not take account of potential future changes in abundance or presence at a given site. However, by completing contemporary surveys to best practice, the risks of providing unrepresentative assessments are minimalised.

3.4.3 Access restrictions meant that two waterbodies present within the Survey Area have not been assessed for their suitability to support great crested newt and hence cannot be ruled out on this basis at this stage.

4. Results

4.1 Desk Study

4.1.1 The desk study returned no recent or historic records of great crested newt in the Study Area. These desk study results include negative results for great crested newts from previous studies undertaken within the Glaslyn works site.

4.1.2 There are no statutory or non-statutory designated sites within the Study Area which are known to support great crested newt.

4.1.3 There are no clear barriers between most the ponds and the proposed works, other than for Pond 4.3, Pond 4.12 and Pond 4.13 which are north of the A487. The road separates the ponds from the proposed works and may act as a barrier to great crested newt dispersal.

4.1.4 The A487 may also act as a barrier for great crested newt dispersal to the north from ponds 4.7, 4.8, 4.9, 4.10 and 4.10a, however there are no barriers to dispersal from these ponds south towards the proposed works.

4.2 Field Survey

4.2.1 HSI surveys were undertaken on ten waterbodies in the Survey Area on the 14 May and 26 June 2024; the results are shown in **Appendix A: Figure 4.5.I.1**. This survey method was used to further refine the scope of surveys and determine whether waterbodies were suitable (i.e. scoped in for further survey) or unsuitable (i.e. scoped out of further survey) for great crested newts. A further six waterbodies were identified within the Survey Area, two of which were inaccessible at the time of the survey, one was considered unsuitable due to significant boundaries between the waterbody and the Glaslyn works site and three were considered unsuitable due to fast flowing water.

4.2.2 Eight of these 10 waterbodies had eDNA samples taken to determine presence/absence of great crested newt. The results are shown in **Appendix A, Figure 4.5.I.1** and are summarised below in **Table 4-1.**

Table 4-1Table 4-1 – HSI and eDNA survey results

Feature	Description of feature	HSI score (and category)	eDNA completed - result	Approx distance from the Glaslyn works site
Drain 4.1 (D4.1/D6.60)	Flowing drain through bamboo and woodland	HSI not completed as unsuitable upon visit due to fast flowing water.	No	Within
Pond 4.2 (P4.2/P6.61)	Ornamental pond set in concrete, former lily pond.	0.66 (Average)	Yes – Negative for GCN	163 m south east

Feature	Description of feature	HSI score (and category)	eDNA completed - result	Approx distance from the Glaslyn works site
Pond 4.3 (P4.3)	Mitigation pond, reedmace present along banks as well as dominant around edge, willow scrub, 90% fenced off limiting access	0.59 (Below Average)	Yes – Negative for GCN	146 m north
Drain 4.4 (D4.4)	Probable drain in active building site behind palisade fence. No land access.	Not completed	No	239 m south west
Drain 4.5 (D4.5)	Drain within retail park. Viewed from distance as no land access.	Not completed	No	262 m south
Ditch 4.6 (D4.6)	Stagnant ditch adjacent to bypass.	0.86 (Excellent)	Yes – Negative for GCN	15 m south
Pond 4.7 (P4.7)	Large pond heavily vegetated by common reed.	0.77 (Good)	Yes – Negative for GCN	46 m north
Pond 4.8 (P4.8)	Linear waterbody heavily vegetated by common reed.	0.62 (Average)	No – too shallow to collect eDNA samples at time of survey. However, the pond is hydrologically linked to Pond 4.7 and 4.9 which returned negative results for GCN.	56 m north
Pond 4.9 (P4.9)	Shallow linear water body, vegetated with common reed.	0.58 (Below Average)	Yes – Negative for GCN	56 m west
Pond 4.10 (P4.10)	Shallow highway pond, densely vegetated by common reed.	0.73 (Good)	Yes – Negative for GCN	Within

Feature	Description of feature	HSI score (and category)	eDNA completed - result	Approx distance from the Glaslyn works site
Pond 4.10a (P4.10a)	Linear highway pond.	0.63 (Average)	No – no access to eDNA. Dense vegetation surrounding the waterbody made access to water impossible/unsafe. It is hydrologically linked to pond 4.10 which came back negative for GCN.	Within
Drain 4.11 (D4.11)	Flowing drain under highway.	HSI not completed as unsuitable upon visit due to fast flowing water.	No	42 m north
Pond 4.12 (P4.12)	Overflow pond within quarry. Pond has a hydrological link with the site.	0.84 (Excellent)	Yes – Negative for GCN	131 m north
Pond 4.13 (P4.13)	Pond within quarry on adjacent side of the A487 to the Site	HSI not completed as barriers to movement from the A487 are significant between the Site and the waterbody. There is also no hydrological link between this pond and the Site.	N/A	166 m north
Pond 4.14 (P4.14/P6.59)	Large open waterbody	0.47 (Poor)	Yes – Negative for GCN	162 m north west
Pond 4.15 (P4.15/P6.58)	Running watercourse	HSI not completed as unsuitable upon visit due to fast flowing water.	No	216 m west

5. Evaluation, Conclusion and Recommendations

5.1 Evaluation

5.1.1 The desk study returned no recent or historic records of great crested newt within the Study Area. There are no designated sites within the Study Area which are known to support great crested newt.

5.1.2 Although a number of waterbodies within the Survey Area have suitability to support great crested newt, the negative results of the eDNA surveys, completed on eight of 14 ponds (eDNA was undertaken on all suitable ponds where access was allowed or possible), with a further inaccessible pond being hydrologically linked to a pond with a negative result, indicate a likely absence of this species within the Survey Area.

5.1.3 It is unlikely that great crested newts are present within the Survey Area and hence are unlikely to be at risk of being impacted by the proposed works.

5.2 Conclusion

5.2.1 The primary purpose of this report is to provide an assessment of the presence or likely absence of great crested newt and their biodiversity importance within the Survey Area to **ES Volume 4 Glaslyn Cables, Chapter 5: Ecology and Nature Conservation**. An assessment of potential impacts (considering embedded mitigation), any additional mitigation and residual effects has been undertaken and included within **ES Volume 4 Glaslyn Cables, Chapter 5: Ecology and Nature Conservation**.

5.2.2 The surveys carried out on 7 May, 14 May and 26 June 2024 indicate an absence of great crested newt within the Survey Area.

5.2.3 Should any of the waterbodies within the Survey Area be impacted by the proposed works, pre-construction checks will be required in advance of construction to ensure that the distribution of great crested newts remains the same, and that any mitigation proposed is appropriate. It is assumed at this stage that all waterbodies will remain avoided as part of the proposed works and appropriate buffer zones will be implemented.

5.3 Recommendations

5.3.1 Recommendations are unlikely to change significantly due to likely absence of great crested newt within the Glaslyn works site and wider Survey Area, although they should be reviewed pre-construction to ensure they remain appropriate.

5.3.2 Waterbodies should remain avoided wherever possible throughout the proposed works, with an appropriate 10 m buffer. Should a waterbody fall within an area of works, appropriate mitigation measures will need to be considered to avoid adverse implications to amphibians. Pre-construction surveys may also be required to for great crested newt if works do not commence within the next two years.

5.3.3 Pollution prevention measures will be required, specifically those required for works within sensitive habitats and near waterbodies and watercourses.

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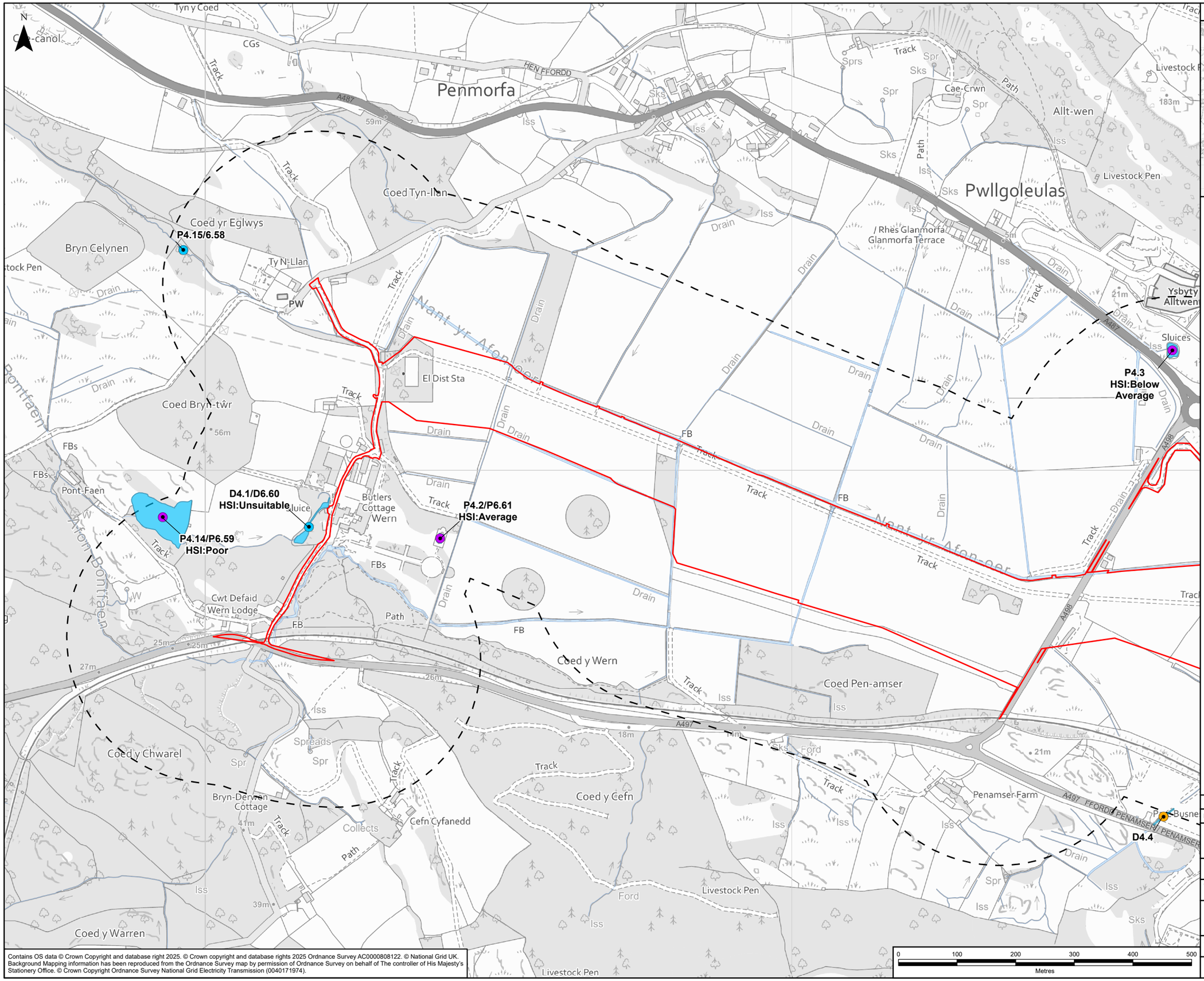
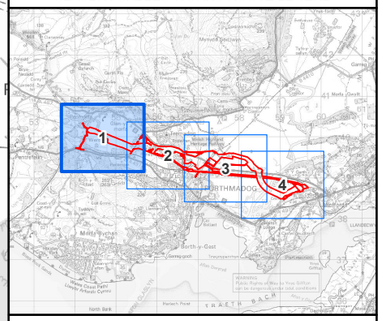
Appendix A – Figures

Figure 4.5.I.1 – Pond Locations, HSI and eDNA Results.



GLASLYN CABLES WORKS ROUTE LEGEND



Legend

- Glaslyn Works Site Boundary
- 250m Buffer of Glaslyn Works Site Boundary

Waterbody Status

- eDNA - Negative/ GCN Likely Absent
- Screened Out
- No Access/Not Suitable for eDNA
- Waterbody

Rev	Date	Description	GIS	Chk	App
A	02/09/2025	Environmental Statement	CA	TA	NL

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES GLASLYN CABLES WORKS

Document Title: FIGURE 4.5.I.1 POND LOCATIONS, HSI AND eDNA RESULTS

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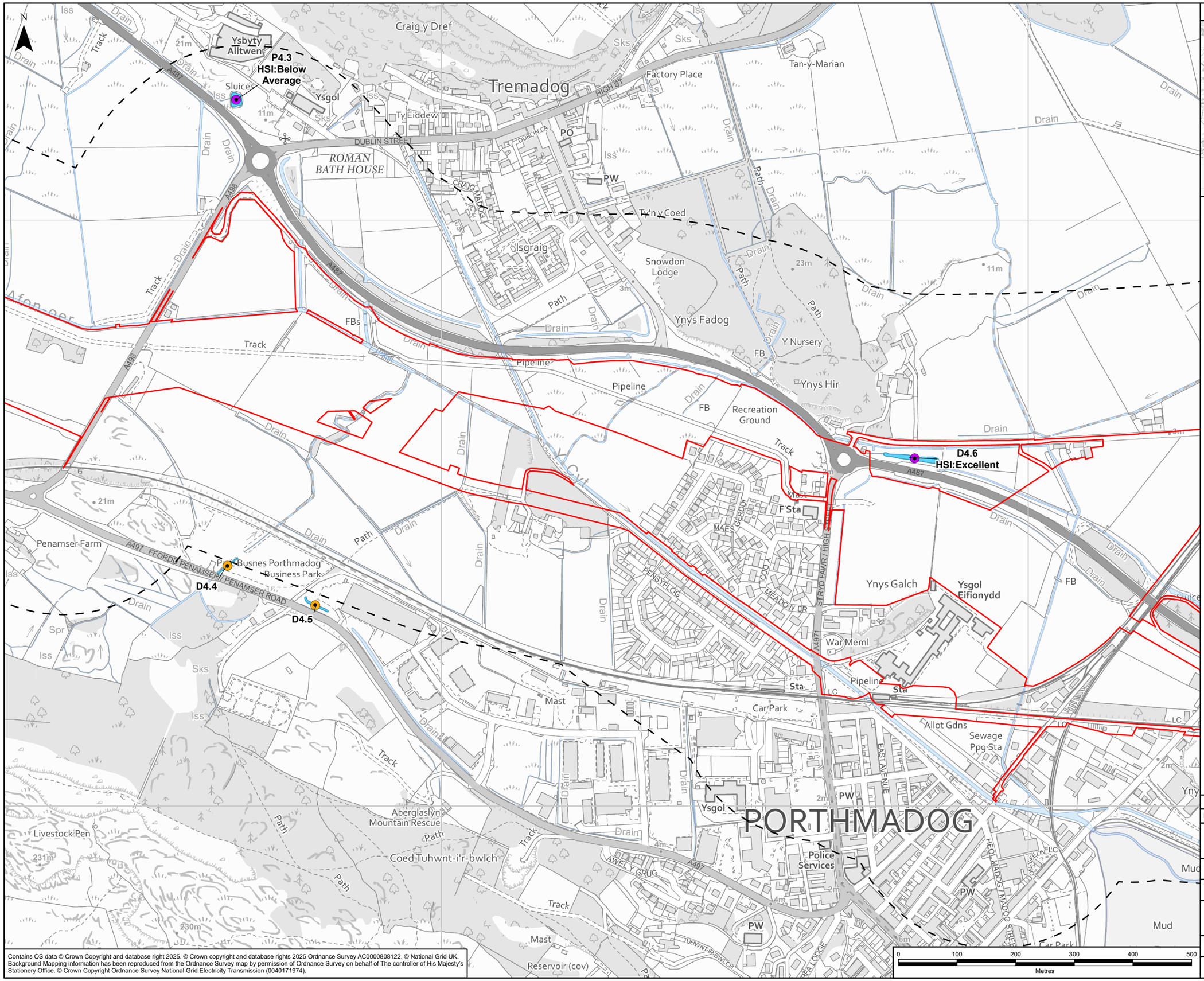

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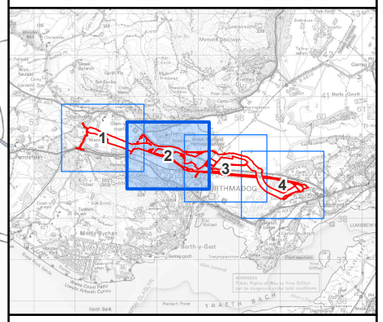

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N

D4.6
HSI:Excellent

P4.7
HSI:Good

P4.8
HSI:Average

P4.9
HSI:Below Average

P4.10
HSI:Good

P4.10a
HSI:Average

HMADOG

Ynys Galch

Ysgol Eifionydd

Clwb Chwaraeon Madog / Madog Sports Club

Football Ground

Mast

CG

Ty Bricks

Balancing Pond

Allot Gdns

Sewage Ppg Sta

Sewage Works

Ynys Cerrigduon

Car Park

Llyn Bach

Mud

Meml

PO

Sta

Pipeline

Track

Path

Drain

FB

A487

A497

HEOL MADOG / MADOG STREET

STRYD FAWR / HIGH STREET

DORA STREET

BANK PLACE

SMITH STREET

EAST AVENUE

GLAN LLYN

PW

LC

11m

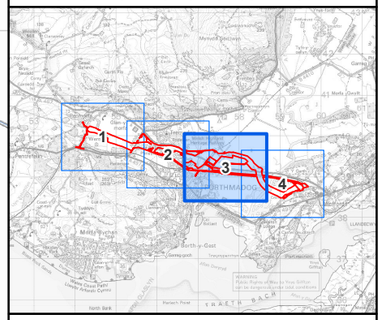
6m

5m

3m

2m

GLASLYN CABLES WORKS ROUTE LEGEND



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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
GLASLYN CABLES WORKS

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FIGURE 4.5.I.1
POND LOCATIONS, HSI AND eDNA RESULTS

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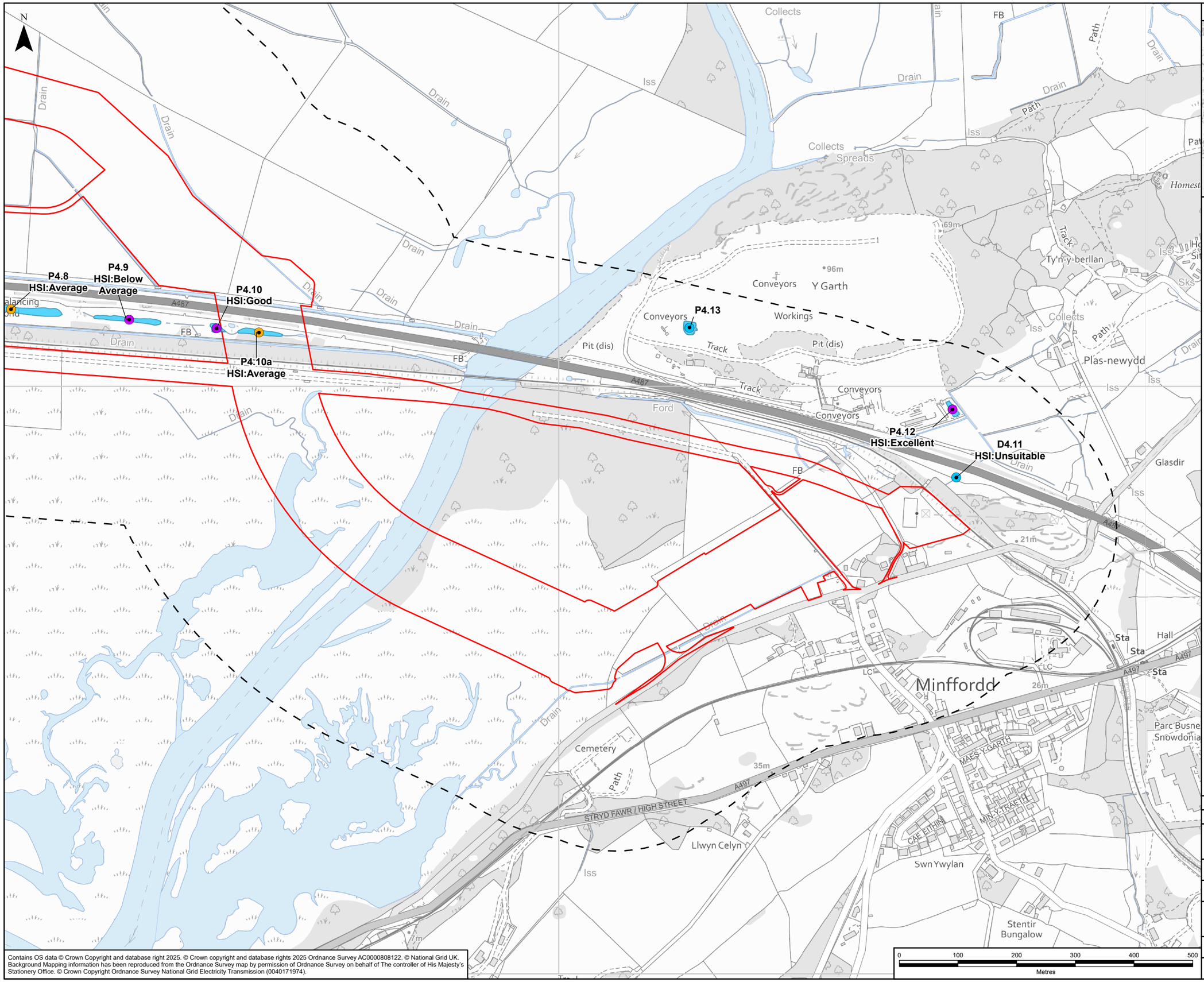
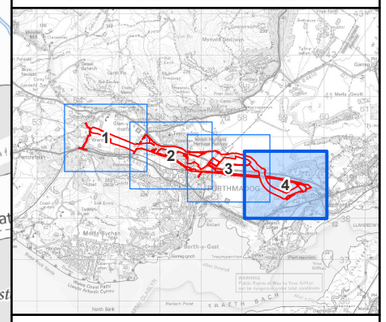


GLASLYN CABLES WORKS ROUTE LEGEND



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Appendix B – Photographs

Waterbody reference	Photo
Ditch 4.1 (D4.1/D6.60)	

Waterbody reference	Photo
Pond 4.2 (P4.2/P6.61)	
Pond 4.3 (P4.3)	

Waterbody reference	Photo
Drain 4.4 (D4.4)	
Drain 5 (D4.5)	

Waterbody reference	Photo
Ditch 4.6 (D4.6)	
Pond 4.7 (P4.7)	

Waterbody reference	Photo
Pond 4.8 (P4.8)	
Pond 4.9 (P4.9)	

Waterbody reference	Photo
Pond 4.10 (P4.10)	
Pond 4.10a (P4.10a)	

Waterbody reference	Photo
Drain 4.11 (D4.11)	
Pond 4.12 (P4.12)	
Pond 4.13 (P4.13)	N/A - not visited so no photograph taken

Waterbody reference	Photo
Pond 4.14 (P4.14/P6.59)	
Pond 4.15 (P4.15/P6.58)	

4.5.J. Glaslyn Cables Statutory Designated Sites Citations

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1. Statutory designated for nature conservation

1.1.1 This document concerns the section of the Pentir to Trawsfynydd Reinforcement Project relating to Glaslyn Cables and is a Technical Appendix to **Volume 4, Chapter 5: Ecology and Nature Conservation** being submitted as part of the Environmental Statement (ES) which accompanies the applications for consent for the Project.

1.1.2 This Appendix provides details on the designated sites in the ecology Study Areas of the Glaslyn works site, as described below and in **Section 5.3** of ES **Volume 4 Chapter 5: Ecology and Nature Conservation**.

1.1.3 **Table 1.1** presents the international designated sites (Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar sites) within 10 kilometres (km) of the Glaslyn works site (extended to 30 km for SACs designated for bats), and their respective reasons for designation. These sites are shown in ES **Volume 4, Figures 3.5.1 and 3.5.2**.

1.1.4 **Table 1.1** also presents the national and local statutory designated sites (Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR) and Local Nature Reserves (LNR)) within 5 km of the Glaslyn works site, and their respective reasons for designation. These sites are shown in ES **Volume 4, Figure 3.5.2**.

1.1.5 There are six international statutory sites designated for nature conservation in the 10 km Study Area and two further SAC designated for bats within 30 km of the Glaslyn works site. Twenty-two other national and local statutory designated sites for nature conservation are present in the 5 km Study Area.

Table 1.1 – Statutory sites designated for nature conservation within 10 km (international) and 5 km (national and Local) of the Glaslyn works site (extended to 30 km for international sites designated for bats)

Site name and designation	Description	Approximate distance (km) and direction from closest point to the Glaslyn Works Site
Coedydd Derw a Safleoedd Ystlumod Meirion /Meirionnydd Oakwoods and Bat Sites SAC	Annex I habitats that are a primary reason for selection of this site are: • Old sessile oak woods with Ilex and Blechnum in the British Isles. • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*). **Priority feature*. Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site are: • Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. • Northern Atlantic wet heaths with *Erica tetralix*. • European dry heaths. • Tilio-Acerion forests of slopes, screes and ravines *Priority feature. • Bog woodland **Priority feature*. The Annex II species that is a primary reason for selection of this site is lesser horseshoe bat (*Rhinolophus hipposideros*). This large composite site includes most of the known maternity roosts in Meirionnydd and some hibernacula and comprises the centre of distribution for lesser horseshoe bats in Wales. The sheltered river valleys provide excellent tree cover and numerous suitable maternity roosts.	Within the Glaslyn works site
Pen Llyn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC	Annex I habitats that are a primary reason for selection of this site are: • Sandbanks which are slightly covered by sea water all the time. • Estuaries.	0.54 km south

Site name and designation	Description	Approximate distance (km) and direction from closest point to the Glaslyn Works Site
	• Coastal lagoons **Priority feature*. • Large shallow inlets and bays. • Reefs. Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site are: • Mudflats and sandflats not covered by seawater at low tide. • Salicornia and other annuals colonizing mud and sand. • Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*). • Submerged or partially submerged sea caves. Annex II species present as a qualifying feature, but not a primary reason for site selection are: • Bottlenose dolphin (*Tursiops truncates*). • Otter (*Lutra lutra*). • Grey seal (*Halichoerus grypus*).	
Northern Cardigan Bay/Gogledd Bae Ceredigion SPA	The area regularly supports wintering red-throated diver (*Gavia stellata*) in numbers of European importance, as defined in the UK SPA selection guidelines (JNCC 1999), namely more than 1% of the GB population.	2.94 km south-west
Morfa Harlech a Morfa Dyffryn SAC	Annex I habitats that are a primary reason for selection of this site are: • Embryonic shifting dunes. • "Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")". • "Fixed coastal dunes with herbaceous vegetation ("grey dunes")" * *Priority feature*. • Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*).	3.18 km south

Site name and designation	Description	Approximate distance (km) and direction from closest point to the Glaslyn Works Site
	• Humid dune slacks. The Annex II species that is a primary reason for selection of this site is petalwort (*Petalophyllum ralfsii*). This species has been recorded in dune slacks in the two dune systems at this site; it is most frequent at Morfa Dyffryn.	
Corsydd Eifionydd/Eifionydd Fens SAC	Annex I habitats that are a primary reason for selection of this site are: • Transition mires and quaking bogs. Annex II species that are a primary reason for selection of this site are: • Marsh fritillary butterfly (*Euphydryas* (*Eurodryas, Hypodryas*) *aurinia*). • Slender green feather-moss (*Drepanocladus* (*Hamatocaulis*) *vernicosus*).	6.12 km north-west
Rhinog SAC	Annex I habitats that are a primary reason for selection of this site are: • European dry heaths. • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles. • Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site are: • Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea.* • Northern Atlantic wet heaths with *Erica tetralix.* • Alpine and Boreal heaths. • Blanket bogs (* if active bog) **Priority feature*. • Depressions on peat substrates of the *Rhynchosporion*.	6.66 km south-east

Site name and designation	Description	Approximate distance (km) and direction from closest point to the Glaslyn Works Site
	The Annex II species that is present as a qualifying feature, but not a primary reason for site selection is floating water-plantain (*Luronium natans*).	
Glynllifon SAC	The Annex II species that is a primary reason for selection of this site is lesser horseshoe bat.	12.92 km north
Mwyngloddiau Fforest Gwydir/ Gwydyr Forest Mines SAC	Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site are: • Calaminarian grasslands of the *Violetalia calaminariae*. The Annex II species that is present as a qualifying feature, but not a primary reason for site selection is lesser horseshoe bat.	24.36 km north-east
Glaslyn SSSI	The Afon Glaslyn is considered important as an oligotrophic low altitude, low gradient river, supporting the nationally rare floating water plantain (*Luronium natans*). The muddy river margins support another national rarity, the Welsh mudwort (*Limosella australis*) and the wetland habitats adjoining the river support the only known population of the boreal relict snail (*Vertigo lilljeborgi*) in East Gwynedd. The floodplain grassland comprises marshy grassland, neutral grassland, acid grassland and brackish to freshwater transitional marsh communities. There is considerable floristic variation within the rush-dominated marshy grassland with species-rich areas characterised by the presence of the uncommon whorled caraway (*Carum verticillatum*) and globeflower (*Trollius europaeus*). Orchids include greater butterfly-orchid (*Platanthera chlorantha*), lesser butterfly-orchid (*Platanthera bifolia*), early marsh-orchid (*Dactylorhiza incarnata*) and northern marsh-orchid (*Dactylorhiza majalis* spp*. Purpurella*). The site citation also refers to the presence of the very restricted Welsh marsh orchid (*Dactylorhiza majalis* ssp *cambrensis*). However, as a consequence of taxonomic research, this species is now grouped within *Dactylorhiza purpurella* The brackish to freshwater transitional marsh communities supporting both salt-loving and freshwater plants; the coastal grazing marsh here supports a population of the nationally scarce sharp rush (*Juncus acutus*). A number of other uncommon plants occur in pools and bare mud within these areas of brackish grassland including needle spike-rush (*Eleocharis acicularis*), small water-pepper (*Persicaria minor*) and brackish water-crowfoot (*Ranunculus baudotii)*. In	Within the Glaslyn works site

Site name and designation	Description	Approximate distance (km) and direction from closest point to the Glaslyn Works Site
	places, this transitional vegetation gives way to sea rush saltmarsh and slender spike-rush (*Eleocharis uniglumis*) saltmarsh. This site also supports dwarf spike-rush (*Eleocharis parvula*) saltmarsh which occurs on the muddy edges of creeks, pools and the banks of the Afon Glaslyn close to Porthmadog. The site supports one of the most extensive areas of alluvial wet woodland in Wales and is a good example of alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*), yellow pimpernel (*Lysimachia nemorum*) woodland. Wet woodland of this type is of European importance with mature alder coppice dominating the canopy with some grey willow (*Salix cinerea*) and scattered ash. Areas of oak woodland with sessile oak (*Quercus petraea*) accompanied by birch species (usually downy birch *Betula pubescens*) occur on the drier rocky ridges. The sessile oak woodland of southern Snowdonia form one of the most important areas for woodland conservation in Europe. This type of Atlantic woodland is often described as 'temperate rainforest' due to the prevailing damp humid climate and associated abundance of ferns, lichens and the luxuriant growth of mosses and liverworts. The site supports two separate nursery roosts of lesser horseshoe bats. The combination of woodland and grazed pastures in the Glaslyn valley provides a rich source of invertebrate prey throughout the year. Brown long-eared bats (*Plecotus auritus*), Daubenton's bats (*Myotis daubentonii*) and pipistrelle bats (*Pipistrellus* spp.) have also been recorded roosting at the site. The Glaslyn floodplain also supports a breeding bird assemblage of lowland damp grassland, and the marshes attract overwintering wildfowl and waders as well as a variety of birds on passage including wintering whooper swans (*Cygnus cygnus*) which use some of the unimproved fields for feeding and the river and Cob for roosting. Otter and water vole (*Arvicola amphibius*) are also known to occur. Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta trutta*) use the river as a migration route to access their spawning grounds higher up the catchment.	
Ysbyty Bron y Garth SSSI	This site is of special interest for its population of breeding lesser horseshoe bats which make use of a detached building, part of a former hospital, to give birth and raise their young between	Within the Glaslyn works site

Site name and designation	Description	Approximate distance (km) and direction from closest point to the Glaslyn Works Site
	spring and autumn. An area beyond the building consists of agricultural land with scrub, hedgerows and deciduous trees which provide important feeding and commuting habitat.	
Coed Tremadog SSSI and NNR	Coed Tremadog is selected for its biological interest as an example of woodsage/oak/birch (*Teucrium scorodonia/Quercus/Betula*) woodland type, for its vascular plant species richness and sub-habitat diversity. The woodland is of entomological interest for its dipteran fauna and is the only extensive example of a cliff/scree woodland in the sub-region.	0.37 km north-east and 0.38 km north-east
Morfa Harlech SSSI and NNR	The SSSI lies within the boundary of Pen Llŷn a'r Sarnau/Lleyn Peninsula and the Sarnau SAC and is of both geomorphological and biological interest. The marine biological interest comprises the exposed sandy shore of Morfa Harlech beach and the Glaslyn and Dwyryd estuary. The hard cliffs of the Portmeirion peninsula and Ynys Giftan support maritime lichen communities. The sand dunes at Morfa Harlech are one of the largest moderately calcareous systems in Britain. The mobile dune communities and the humid dune slack communities (in seasonally wet hollows) are of European importance supporting nationally scarce flora. Morfa Harlech is a nationally important site for Aculeata (wasps and bees) and is of regional importance for breeding waders. During September to March nationally important numbers of pintail (*Anas acuta*) feed and roost on the extensive areas of mud and saltmarsh in the Glaslyn/Dwyryd estuary. The sand lizard (*Lacerta agilis*) has been introduced into two areas of sand dune at Morfa Harlech. Glaslyn/Dwyryd estuary is considered an important breeding and feeding habitat for otter and the ditches associated with embankments and adjacent farmland provide suitable bankside habitat for the water vole.	0.54 km south and 0.83 km south-east
Tiroedd a Glannau Rhwng Cricieth ac Afon Glaslyn SSSI	This site is of special interest for its geological, botanical and marine biological features. The features of special scientific interest include: • A range of sand dune habitats and associated communities. • A range of wetland habitats and associated communities including: — Marshy grassland.	0.80 km south-west

Site name and designation	Description	Approximate distance (km) and direction from closest point to the Glaslyn Works Site
	— Reedswamp. — Wet woodland. • Four Nationally Scarce species of flowering plant and fern: — Sharp rush. — Variegated horsetail (*Equisetum variegatum*). — Lanceolate spleenwort (*Asplenium obovatum* subsp. *lanceolatum*). — Dune fescue (*Vulpia fasciculata*). • Marine habitats and communities. • A nationally important type of cave community characterised by a velvety coating of the red seaweed known as *Rhodothamniella floridula.* • Nationally important honeycomb worm reef community. • Diverse seagrass beds. • Diverse shallow rockpools with encrusting coralline seaweed and the red seaweed coral weed. • Community zonation patterns characteristic of sandy shores with a moderate degree of exposure to waves and tidal streams. • Important geological exposure of glacial sediments at Morannedd.	
Parc Y Borth LNR	Parc y Borth LNR contains both oak woodland and wildflower meadows.	1.30 km south-west
Pen y Banc LNR	Pen y Banc LNR includes coastal rocks, secluded sandy coves and mixed woodland. The estuary supports a number of birds during the winter, including curlew (*Numenius arquata*), redshank (*Tringa totanus*) and black-necked grebe (*Podiceps nigricollis*). Large flocks of	1.31 km south

Site name and designation	Description	Approximate distance (km) and direction from closest point to the Glaslyn Works Site
	sandwich terns (*Sterna sandvicensis*) can be seen in summer. Flora around the site includes coastal heath species.	
Afon Ddu SSSI	The Afon Ddu is of special interest for its population of the freshwater pearl mussel (*Margaritifera margaritifera*) which is one of the few remaining breeding populations of this species in Wales. The freshwater pearl mussel is dependent on the local salmonid populations' sea trout spawn in the river and native brown trout (*Salmo trutta fario*) are abundant. Otter and water vole have been recorded in the Afon Ddu catchment. There are areas of botanically interesting mire and wet heath adjacent to parts of the river and around Llyn Du which are also important in providing a protective buffer to the river channel and the mussels therein.	1.65 km north-east
Coedydd Dyffryn Ffestiniog (Gogleddol) SSSI	The site is of special interest for semi-natural broadleaved woodland, woodland bird assemblage, moss, liverwort, lichen and slime mould assemblages and lesser horseshoe bats. Uncommon fern species recorded comprise lanceolate spleenwort (*Asplenium billotii*), hay-scented buckler fern (*Dryopteris aemula*), Wilson's filmy fern (*Hymenophyllum wilsonii*) and Tunbridge filmy fern (*Hymenophyllum tunbridgense*). Nine nationally scarce mosses have been recorded. The main lichen interest is found on well-lit trees associated with open areas and at the woodland edges with the majority of rare and scarce species occurring on sessile oaks. The slime mould (*Myxomycetes*) flora that is found on moss covered boulders in the damp, humid conditions of the stream cut gorges, is of national importance. The colonies of lesser horseshoe bats form part of a much larger population in the Vale of Ffestiniog, which are probably linked to populations in the Glaslyn valley and south towards Harlech. Nursery roosts occur in suitable buildings which are situated close to or within woodland. Disused buildings and mine workings provide cool stable temperatures for hibernation. Woodland edges, hedgerows and lines of trees form important commuting habitat, and the woodland and associated pastures provide foraging habitat. Other species of bat roost here, including brown long-eared and *Pipistrellus* spp. The woodland supports breeding bird species typical of western oak woods. Lesser-spotted woodpecker (*Dendrocopos minor*), a very local species, as well as woodcock (*Scolopax rusticola*), and tree pipit (*Anthus trivialis*) are recorded breeding here. Other breeding birds of	2.14 km east

Site name and designation	Description	Approximate distance (km) and direction from closest point to the Glaslyn Works Site
	conservation importance are song thrush (*Turdus philomelos*), bullfinch (*Pyrrhula pyrrhula*) and spotted flycatcher (*Muscicapa striata*). Goshawk (*Accipiter gentilis*) hunts over the woodland and breeds nearby. Otters are occasionally seen in the streams and rivers in the area but not known to breed. A wide variety of moth and butterfly species have been recorded in the woodland, including several rare and scarce species of micro-lepidoptera, fungus gnat, hoverfly and cranefly. The most noteworthy is *Cheilosia semifasciata.*	
Aberdunant SSSI	The site lies within the boundary of Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC and consists of two disused mine levels and a lodge that support hibernating lesser horseshoe bats, together with a nursery roost within a nearby barn. The site also supports broadleaved woodland which is used by foraging and commuting bats.	2.16 km north
Mwyngloddiau Llanfrothen SSSI	The site consists of a series of mine shafts, adits and other disused mine workings and is of special interest for hibernating bats, particularly lesser horseshoe bats. The mines are also used by other bat species, including Daubenton's bat.	2.34 km north-east
Dolorgan Barn SSSI	Dolorgan Barn is of special interest as a breeding roost of the lesser horseshoe bat; the adjoining area of mixed woodland is used by the bats as a feeding area and as commuting to other feeding habitats in the valley. The building is also used as a roost site by small numbers of brown long-eared bats and by unidentified bat species of the genus *Myotis*.	3.90 km south-east
Maes Meillion a Gefail-y-cwm SSSI	The site is of special interest for its species-rich grasslands and their associations with a range of other habitats including wet pasture, flush and swamp. Such vegetation is now increasingly scarce in the Welsh lowlands, most having been lost to agricultural improvement.	3.95 km south-east
Coedydd Nanmor SSSI	The site is of special interest for its biological features comprising semi-natural broadleaved woodland, assemblages of mosses, liverworts, lichens, a population of lesser horseshoe bats, a population of silver-studded blue butterflies (*Plejebus argus*), and the small red damselfly (*Ceriagrion tenellum*).	4.06 km north

Site name and designation	Description	Approximate distance (km) and direction from closest point to the Glaslyn Works Site
	The site is a component part of the Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC.	
Hafod Garregog NNR	This site is a sessile oakwood known for its diversity in mosses, ferns, liverworts and lichens and woodland bird assemblages.	4.50 km north-east
Glanllynnau a Glannau Pen-ychain i Gricieth SSSI	This site is of special interest for its geological and marine biological features consisting of an 8 km length of shoreline with nationally and regionally important intertidal communities. The nationally important *Sabellaria alveolata* (marine worm) reef biotope, is found in extensive reaches with outcrops of the nationally important clay with Piddocks (mollusc) biotope also present.	4.53 km south-west
Glyn Cywarch SSSI	The site is of special interest as a breeding roost of the lesser horseshoe bat. It comprises a potting shed which supports the breeding roost, and an adjacent wall which is used by bats as a flight route to gain access to feeding habitat in the nearby woodland of Coed y Glyn. Small numbers of pipistrelle bats and brown long-eared bats also roost in the building.	4.57 km south-east
Coedydd Beddgelert a Cheunant Aberglaslyn SSSI	The site is of special interest for its geomorphological and biological features. These comprise fluvial geomorphological landforms, semi-natural broadleaved woodland, assemblages of mosses, liverworts, lichens and a population of lesser horseshoe bats. Additionally, invertebrate surveys have indicated that a characteristic fauna of western oakwoods occurs at this site and includes the nationally scarce soldier beetle *Malthodes guttifer*. The site is a component part of the Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC.	4.84 km north
Coedydd De Dyffryn Maentwrog SSSI	The site is of special interest for its biological interest, including semi-natural broadleaved woodland, a rare moss, liverworts, lichens, slime moulds and a population of lesser horseshoe bats.	4.92 km east

Site name and designation	Description	Approximate distance (km) and direction from closest point to the Glaslyn Works Site
Ceunant Llennyrch NNR	The oak woodland here is a remnant of the Celtic rainforest known for its 230 species of mosses and liverworts, many of them uncommon or rare. Ceunant Llennyrch, is also one of the richest woodland lichen sites in Wales.	4.92 km east

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4.5.K Glaslyn Cables Arboricultural Impact Assessment

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1. Introduction

1.1 Background

1.1.1 This document forms part of the Environmental Statement (ES), which accompanies applications by National Grid Electricity Transmission plc (NGET) to construct and operate developments which comprise parts of the Pentir to Trawsfynydd Reinforcement Project (the 'Project').

1.1.2 This report identifies the likely direct and indirect impacts of the proposed works along with suitable mitigation measures. The Tree Protection Plan (TPP) (**Appendix C**) identifies trees to be removed and how retained trees are to be successfully protected. The assessment will include trees with the potential to be affected by the proposed works to the Glaslyn Cables as part of the Project.

1.1.3 The survey area comprises the following areas:

- access road to Wern from the A497 and including tree features adjacent tracks and field boundaries to Rhes Glyn;
- the fields north and south of the Nant yr Afon oer to the A498;
- fields to the south of the A487 and to the north of Penamser Road;
- fields to the south and east of Tremadog on northern and southern sides of the A487;
- the land around Madog Sports Club and surrounding fields and,
- a shelterbelt between the A487 and the Welsh Highland Heritage Railway Line between Porthmadog and Minffordd.
- At its eastern extent the survey area included land between Afon Glaslyn, High Street, Minffordd, and the A487.

1.1.4 The survey area and the trees captured are shown in the Tree Constraints Plan (**Appendix A**) and the TPP (**Appendix C**)

1.1.5 The Glaslyn Cables works site ('the Site') is between the existing Wern Cable Sealing End Compound (CSEC) (SH 543401) and the proposed CSEC, Porthmadog. The proposed works include the installation of replacement 400 kilovolt (kV) cables, the Minffordd CSEC, the raising of the Tunnel Head House (THH) consented under the Eryri Visual Impact Provision (EVIP) project, and the extension of the Wern CSEC, as well as the decommissioning of the existing 132 kV and 400 kV cable circuits and the Garth CSEC.

1.1.6 This report identifies preliminary information in relation to the nature and level of constraints posed by existing trees on the Site and it considers the likely direct and indirect arboricultural impacts of the proposed works and identifies mitigation measures as appropriate.

1.1.7 Two options are considered in relation to T795 (sheet 4 of the TPP) to address both open cut or trenchless (HDD) installation methods.

1.2 Trees and the Planning Process

Planning Policy Wales

1.2.1 Planning Policy Wales (PPW) (Edition 12, 2024) (Ref 1.1) seeks to ensure that new development is sustainable and underlines the importance of Green Infrastructure, of which trees form an integral part. The primary objective of PPW (Ref 1.1) is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural wellbeing of Wales.

1.2.2 PPW (Ref 1.1) contains specific policies in relation the importance and protection of trees, woodlands and hedgerows and tree replacement requirements. These are set out in **Appendix D.1**.

Local Policy Context

1.2.3 Local Planning Authorities (LPA) in the UK have a statutory duty to consider both the protection and planting of trees when considering planning applications. The potential impact of development on all trees (including those not protected by a Tree Preservation Order (TPO) or other statutory designation) is a material consideration. The survey area is in Gwynedd Council.

1.2.4 The Anglesey and Gwynedd Joint Local Development Plan 2011 - 2026, adopted 31 July 2017 (Ref 1.2), illustrates how important trees, woodland and hedgerows are to the character of the area and outlines the policies of the two local authorities (outside of Eryri) with regards to the protection of trees. The Council's policies, relating to development and trees and woodland, are in **Appendix D.2**.

British Standard

1.2.5 *'BS5837:2012 Trees in relation to design demolition and construction - Recommendations (BS5837)'* (Ref 1.3) provides a framework which sets out how trees should be considered in this context also explicitly applies to development where planning consent is not required.

1.2.6 BS5837 (Ref 1.3) recommends that a tree survey is undertaken to identify the quality and benefits of trees and the spatial constraints associated with them. This is used to produce a TCP showing the above and below ground constraints associated with trees. This drawing is used to inform the design process and to allow the retention of good quality trees where appropriate.

1.2.7 An arboricultural impact assessment is then developed to identify the likely direct and indirect impacts of a proposed works, and a TPP is prepared to identify trees to be removed or retained and to illustrate how retained trees are to be protected. An arboricultural method statement (AMS) is often required as a condition of planning consent to detail how sensitive operations are to be achieved in proximity to retained trees.

1.3 Methodology

1.3.1 The tree survey has been based on the topographical survey plan provided (Ref: GLAS-ARUP-ZZ-XX-M2-X-1111_MPNL). Trees which were not included on the topographical survey plan have been plotted indicatively with reference to site features and publicly

available aerial photography. Such trees have been marked with an '*' on the Tree Survey Schedule included as **Appendix B**. All positions for these trees must be considered indicative only and the relative distances of features must be measured out on site as required.

1.3.2 The initial fieldwork was undertaken in January 2017 for a previous (approved) planning application. This was reviewed and new data was collected by fieldwork in November 2023, with a further survey of other areas undertaken in February 2024. During the fieldwork, dimensional data and observational information were collected. A diameter tape measure was used to measure stem diameters where feasible.

1.3.3 Both the reviewed data from 2017 and the newly collected data from 2023 and 2024 have been combined and included in this report. The trees have been renumbered to include the newly collected data and to present the tree numbers sequentially.

1.3.4 The survey was otherwise conducted in accordance with the requirements of BS5837:2012 Trees in relation to design, demolition and construction - Recommendations (BS5837) (Ref 1.3).

1.3.5 The fieldwork informing this report has comprised a preliminary, non-intrusive, visual survey undertaken from ground level with the specific intention of evaluating the quality and benefits of trees in the survey area.

1.3.6 Where further inspection is deemed appropriate to ascertain the condition of the tree or other arboreal features, this has been identified in the preliminary management recommendations. Average dimensions or dimensional ranges have occasionally been used, where appropriate, to best describe features.

1.3.7 The Root Protection Area (RPA) is the notional extent of what is considered to be the key rooting area for tree health and function. This is generally depicted as a circle but can be amended to a polygon with an equivalent area in accordance with Section 4.6.2 of BS5837 (Ref 1.3) where the RPA is likely to have developed asymmetrically. Without strong evidence to guide changes to the RPA of plotted tree features an assumption has been made that the hard surfacing has not restricted root growth and therefore the RPA of all surveyed trees is depicted as a circle and no RPAs have been amended. The RPA of veteran or ancient trees has been amended to increase the buffer zone in accordance with standing advice (Ref 1.4) from Natural England and the Forestry Commission which requires the RPA to be a radius equivalent to 15 x stem diameter or canopy spread +5 metres (m) (whichever is greater).

1.3.8 A TCP showing the position of trees and the spatial constraints associated with them is included as **Appendix A** of this report, which corresponds with the Tree Survey Schedule presented in **Appendix B**.

1.3.9 The tree categorisation process recommended by BS5837:2012 (Ref 1.3) is summarised in the **Table 1-1** and corresponds with the tree canopy outline shown on the tree constraint plan included as **Appendix A** and the information in the Tree Survey Schedule included as **Appendix B**.

Table 1-1 – BS5837:2012 (Ref 1.3) tree categorisation process

Category	Definition
A	High quality, minimum of 40+ years remaining contribution
B	Moderate quality, minimum of 20+ years remaining contribution
C	Low quality, minimum of 10+ years remaining contribution
U	Unsuitable for retention, <10 years remaining contribution
1	Arboricultural value
2	Landscape value
3	Conservation or cultural value

2. General Arboricultural Principles

2.1 General Principles

2.1.1 Trees are dynamic living organisms which provide essential benefits to society and the wider environment. Any project with the potential to impact on trees must take into consideration the value of trees, the impact of any proposed activity along with any potential future conflicts on the Site. Suitable measures to safeguard retained trees or mitigate the loss of trees (to be removed) will need to be fully considered and may be subject to a condition of planning consent.

2.1.2 Tree branches and roots frequently grow across site boundaries and off-site trees can pose a significant constraint and should be carefully considered when assessing the developable space in a site.

2.2 Below Ground Constraints

2.2.1 Below ground tree roots and the soil environment in which they grow need to be protected if the tree is to be retained. Trees grow in association with fungi and other soil organisms which are of key importance to tree health. Roots are essential for anchorage, the uptake of water and nutrients, and the storage of energy (carbohydrates) for the future growth and function of the tree.

2.2.2 Roots can be damaged by physical severance or wounding (e.g. following excavation of the soil) which can lead to the development of decay and a decline in vitality and/or instability. Raising the soil level can bury tree roots at a depth where suitable conditions for growth are less available. Toxic materials discharged into the soil (such as cement-based aggregates, fuel and chemicals) can lead to root death and dysfunction. Soils can be compacted to levels inhospitable to tree growth with even a single pass of machinery, regular pedestrian traffic or the storage of plant and materials. Relieving compaction can be problematic and may require costly remedial works. Changes in drainage/water levels can also have significant long-term impacts for tree health.

2.2.3 The effects of these incursions may take many years to manifest, with a resulting decline in amenity value and potentially the death or failure of the tree. It should be noted that older trees are particularly sensitive to damage and changes in conditions.

2.2.4 The RPA is a notional area considered to be the minimum zone that must be protected to avoid any adverse impacts on retained trees. This area is deemed to be particularly important for tree stability, growth, function and health. However, roots may extend far greater distances, with the distribution of the root system relating directly to the availability of suitable conditions for growth (namely oxygen, water and nutrients). It is generally accepted that tree roots are predominantly in the upper 1000 millimetres (mm) of soil; however, roots may develop at deeper levels where conditions allow.

2.2.5 RPAs are calculated as per BS5837:2012 Annexe C, D and Section 4.6 in the BS 5837:2012 Document (Ref 1.3).

2.2.6 The RPA of the existing tree stock is an important material consideration when considering site constraints and planning development activities. The RPA of significant trees on the Site are shown on the TCP (**Appendix A**).

2.2.7 The default position must be that all development, including any associated services will occur outside the RPAs of retained trees. Where this is unavoidable, it may be appropriate to use special measures to install structures, services or surfacing in RPAs which allow the protection of roots and soil structure which are essential for tree growth and keep any incursion to a minimum.

2.2.8 Further steps to improve or increase the useable rooting area available to the tree may also be required.

2.3 Soils

2.3.1 On shrinkable clay soil, tree growth can lead to the differential movement of structures as moisture is removed from the soil during the growing season. Soils must be carefully assessed, and any foundations must be installed following the recommendations of National House Building Council Standards Chapter 4.2: Building Near Trees (2024) (Ref 2.1) to avoid potential future damage. Where trees which predate existing structures are to be removed, this can result in heave as the soils are re-wet.

2.3.2 The advice of a suitably qualified engineer must be obtained to inform any potential issue of heave. Specific advice in relation to this issue is beyond the scope of this report.

2.4 Above Ground Constraints

2.4.1 Tree stems and branches can restrict available space on a site. Damage or wounding (including excessive pruning) can significantly reduce the amenity contribution of the tree and may lead to the development of dysfunction and decay, with significant long term implications for tree health. The future impact of existing trees should be carefully considered, including individual species characteristics (such as potential future size, fruit fall, shade etc.) and how the tree will interact with any proposed development and future land use. Annual tree growth can lead to direct damage if stems/branches come into physical contact with structures and this must also be taken into consideration.

2.5 Trees and Risk in the Context of Development

2.5.1 Tree owners/managers have a legal duty to prevent foreseeable harm. It is generally accepted that this duty can be fulfilled by undertaking proactive inspections of significant trees to identify obvious defects and by taking appropriate remedial action or gaining further advice as appropriate. Further guidance is available from the National Tree Safety Group (Ref 2.2).

2.5.2 The tree survey carried out as the basis of this report is primarily for planning purposes, focusing on the quality and benefits of the trees and is not specifically designed to assess the safety of trees on the Site. However, when obvious issues have been identified recommendations have been included in the Tree Survey Schedule.

2.5.3 The Construction (Design and Management) Regulations (2015) (Ref 2.3) states that developers and contractors have responsibilities for health and safety as a result of their actions. Should trees be left in an unstable or hazardous condition the Health and Safety Executive could seek to prosecute those responsible along with the potential for claims for damages.

2.6 Trees and Wildlife

2.6.1 Consideration must be given to the presence of species protected under the Wildlife and Countryside Act 1981 - as amended (Ref 2.4), the Countryside Rights of Way Act 2000 (Ref 2.5) and the Conservation of Habitats and Species Regulations 2017 (Ref 2.6), in particular the presence of bats and nesting birds. It is recommended that wherever possible, significant tree and hedge works take place outside of the typical bird nesting season of March to September. The advice of a suitably qualified Ecologist is recommended in relation to any potential impacts on protected species.

2.7 Tree Works

2.7.1 Any tree surgery recommendations in this report are to be undertaken in accordance with BS3998: 2010 Tree work – Recommendations (BS3998) (Ref 2.7) by suitably qualified and insured contractors. Significant pruning works are best undertaken when trees are dormant or outside periods of high functional activity to reduce the overall impact on energy available to the tree for growth and processes. In general, the optimum period for works is between November to February and July to August (subject to the presence of protected species) when the tree is less active and better placed to respond to wounding and a reduction in leaf area.

3. Statutory and Non-Statutory Designations

3.1 Statutory Designations

Tree Preservation Orders (TPO)

3.1.1 AECOM received information on the location of TPOs and Conservation Areas from Gwynedd Council in January 2024. Areas covered by TPO are shown in sheets 5 and 6 and the Tremadog Conservation Area in sheet 5 of the TCP (**Appendix A**) and TPP (**Appendix C**).

3.1.2 **Table 3-1** shows the trees and woodlands confirmed as being subject to a TPO and those in the Tremadog Conservation Area.

Table 3-1 Trees in the survey area protected by TPO and trees in Conservation Areas

Trees subject to TPO	Trees in a Conservation Area
W167, W216, W217, T221, W223, H225, T226, T227, T228, T708, T713, T720, T721, T727, T728, T731, T741, T742, T743, W744 T764, T765, T769.	T204, T206 and G207

3.1.3 It is an offence to cause or permit the cutting down, topping, lopping, uprooting, wilful damage, wilful destruction of trees subject to a TPO without the local planning authority's written consent, or without giving notice of the intention to undertake tree works for relevant trees in a Conservation Area. If TPO consent is given, it can be subject to conditions which have to be followed.

3.1.4 Although the survey has captured tree features in the Tremadog Conservation Area, the Site boundaries do not extend to it. No trees within the Tremadog Area will be impacted by the proposed works.

The Hedgerow Regulations

3.1.5 The Hedgerow Regulations 1997 (Ref 3.1) protect agricultural or countryside hedgerows which meet the requirements of an 'important hedgerow'. These include a minimum length of 20 m (or meets another hedge at each end) and a minimum age of at least 30 years.

3.1.6 A wide range of other ecological and archaeological/heritage features can constitute an important hedgerow and further advice from a qualified ecologist is recommended in advance of any planned works which could impact established hedgerows on or bordering agricultural or countryside land.

3.1.7 Prior to the removal or destruction of a protected hedgerow an application must be made to the Local Planning Authority. Full planning consent is an exemption to this requirement.

Felling Licence

3.1.8 National Grid as a licence holder for transmission under The Electricity Act 1989 (Ref 3.2) is a statutory undertaker and is exempt from requiring a felling licence to clear around existing infrastructure. Where tree clearance is required for the installation of new infrastructure a felling licence may be required by the Natural Resources Wales to fell more than 5 cubic metres (m^3) of timber in any calendar quarter (subject to relevant exemptions including tree safety works, tree works for a statutory undertaking and tree works in gardens, churchyards and designated public open space).

Planning Consent

3.1.9 Full planning consent is an exemption from the need to apply for consent for works to trees protected by a Tree Preservation Order, the need to give notice of the intention to undertake works in a Conservation Area and the need to apply for a Felling Licence with Natural Resources Wales (to fell more than 5 m^3 per calendar quarter). Prior to any tree works the status of trees to be removed or pruned must be verified with the LPA and Natural Resources Wales as appropriate.

Unidentified fungal bracket on T40

3.1.10 An unidentified fungus has been observed growing on dead scaffold branches of a veteran oak to the west of the survey area, outside of the RLB, T40 (**Appendix A** – Sheet 1). The RPA of tree T40 extends within the Site. Attempts to identify the fruiting body from the ground have proven inconclusive. Initial identification considered it possible that the bracket was potentially the rare oak polypore (*Piptoporous quercinus*) which is a red data listed fungus listed on Schedule 8 of the Wildlife and Countryside Act 1981 (Ref 2.4) and protected under Schedule 13 of the same Act. It has also been suggested that the fungal bracket could be from beefsteak fungus (*Fistulina hepatica*) or oak bracket (*Pseudoinonotus dryadeus*) which are both commonly found on mature oak trees.

3.1.11 The veteran status of the tree provides some degree of protection to the fungus as well as the tree. However, due to the statutory protection of oak polypore, it is recommended that further assessment is undertaken by a mycologist to ascertain the species.

3.1.12 Photographs of the fruiting body can be found in **Appendix E**.

3.2 Non-Statutory Designations

3.2.1 The Welsh Government's DataMapWales (Ref 3.3) contains the Ancient Woodland Inventory 2021 layer, which details numerous areas of designated ancient woodland that are recorded in or close to the proposed works site. These are included on the TCP (included as **Appendix A**).

3.2.2 W29 shown on TCP Sheet 1 at the far west of the Site, north of Butlers Cottage, is shown as Restored Ancient Woodland. To its south are two areas designated as Ancient Semi Natural Woodland (ASNW) in the areas covered by G655 and W601 (TCP sheet 2). Other ASNW across the Site include W167 (TCP sheet 5) towards the centre

of the Site between Penamser Road and the A487, and W217 and W223 (TCP sheets 5 and 6) are areas of a larger Restored Ancient Woodland situated just north of the operational area, to the north of the Recreation Ground on the A487.

3.2.3 In accordance with PPW Step Wise Approach, which suggests the use of "*appropriate buffers to protect these from construction and operational impacts"* a 15 m buffer has been introduced around any Ancient Woodland features that may be potentially damaged.

3.2.4 NRW advice to planning authorities in relation to ancient woodland states "*The BS 5837 Tree Survey, PEA and/or EcIA assessments should be used to inform the stand-off or protection zone for each individual woodland and veteran and ancient trees. Some zones may only require a root protection area to prevent negative impacts on individual trees or groups of trees, and others are likely to extend further."*

3.2.5 The 15 m buffer is based on the Natural England and Forestry Commission (Ref 1.4) guidelines for ancient woodland in England which states that the proposal should have a buffer zone of at least 15 m from the boundary of the woodland to avoid root damage. Ancient woodland buffers are included on the TCP (**Appendix A**). The default position should be that no works should be undertaken within or near this buffer and beyond the buffer zone works which could influence factors such as soils, water and air quality within the buffer must also be carefully considered, with the objective to maintain existing conditions (e.g. no changes to local drainage patterns where this could impact on the buffer zone).

3.2.6 AECOM also checked the Woodland Trust Ancient Tree Inventory (Ref 3.4) for the presence of any notable, veteran or ancient trees in or adjacent to the Site and none were identified. A veteran tulip tree (*Tulipifera liriodendron*) is listed in the private garden of Butlers Cottage circa 300 m south of the western end of the survey area.

3.2.7 A Biodiversity Action Plan Habitat Inventory listing for a traditional orchard is recorded in Butlers Cottage grounds. Priority habitats are a material consideration in planning decisions because they can be sensitive to development.

3.2.8 The Woodland Trust Ancient Tree Inventory contains a database of recorded ancient, notable or veteran trees. The tree survey fieldwork findings identified these trees as not on, in or encroaching the Site boundary. However, trees with veteran and/or ancient characteristics have been identified during detailed tree survey fieldwork (discussed further in **Section 4** of this report).

3.2.9 According to the Ancient Tree Forum (ATF) book 'Ancient and Other Veteran Trees' (Ref 3.5), *"the term veteran is used to describe all trees that have markedly ancient characteristics, irrespective of chronological age".* Ancient characteristics, termed veteran features, include attributes such as crown retrenchment (Ref 3.6), signs of decay in the trunk, branches or roots, exposed deadwood and fungal fruiting bodies.

3.2.10 There is no agreed definition of veteran trees across national and devolved governments, national planning policies and non-government organisations. AECOM has considered trees for veteran potential where they are at least mature for the species and where extensive decayed or dead wood habitat and specialist wood decay fungi are present. Veteran trees are generally considered to be survivors and are expected to have a reasonable degree of anticipated longevity.

3.2.11 The tree survey identified 18 veteran or ancient trees (these features are identified with a star symbol on the TCP in **Appendix A**). Veteran and ancient trees are considered to provide irreplaceable habitat and are given a very high priority in the planning process.

3.2.12 Veteran and ancient trees have been assigned a buffer zone in accordance with standing advice from Natural England and Forestry Commission (2022) (Ref 1.4) (15 x stem diameter or canopy spread + 5 m, whichever is greater) which complies with wider best practice on veteran tree protection.

4. Field Observations

4.1 The Site

4.1.1 The Site boundary is shown on the TCP in **Appendix A** 60686216-ACM-XX-XX-AB-TCP-006 and in the TPP in **Appendix C** 60686216-ACM-XX-XX-AB-TPP-000 of this report. The survey area consists of the land in the red line boundary (RLB) which runs from Wern to the west to Garth to the east and includes the working areas around the proposed extension to the CSEC, the cable route, the construction access roads and compounds. The survey captured trees now outside of the RLB, which have been included in the report for completeness.

4.1.2 The Glaslyn works site runs through undulating land. The Site is characterised by predominantly rural land uses with scattered woodland.

4.1.3 The eastern extent of the Glaslyn works site intersects the Glaslyn Site of Special Scientific Interest (SSSI), which is designated for its biological interest including floodplain grassland, riverine habitat, vascular plant and breeding bird assemblage and broadleaved woodland, particularly alluvial wet woodland.

4.1.4 The Glaslyn works site also intersects part of the Coedydd Derw, a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods, and Bat Sites Special Area of Conservation (SAC), which is designated for a variety of habitats including woodland, heath and rivers, and the lesser horseshoe bat. A very small area of Ysbyty Bron y Garth SSSI is crossed by the Glaslyn works site where existing underground Glaslyn Cables require decommissioning.

Soil types

4.1.5 AECOM checked the LandIS Soilscapes viewer and the survey area crosses three main soil types[1]:

- Soilscape 13: Freely draining acid loamy soils over rock.
- Soilscape 1: Saltmarsh soils.
- Soilscape 21: Loamy and clayey soils of coastal flats with naturally high groundwater.

4.2 The Trees

4.2.1 A total of 810 tree features have been recorded in the surveys, which covered the area between the existing Wern CSEC and Garth CSEC; 18 were recorded as ancient or veteran and 13 of these are in the RLB.

4.2.2 Of these surveyed tree features, 80 features are of high quality (category A); 258 of moderate quality (category B); 428 of low quality (category C); and 44 identified as

[1] LandIS - Land Information System - Soilscapes soil types viewer

unsuitable for retention as living trees for more than ten years in the context of the current land use (category U).

4.2.3 **Table 4-1** below summarises the number of trees in each quality category recorded in or adjacent to the survey area.

Table 4-1 Summary of tree features in each quality category

Quality Category	A	B	C	U
Number of tree features	80	258	428	44

4.2.4 The trees on Site are predominantly semi mature to mature and in good to fair condition. The most common species across the Site are oak *(Quercus robur)* which amounts to 14.5% of the individual trees surveyed, followed by sycamore *(Acer pseudoplatanus)* at 12.4%, ash *(Fraxinus excelsior)* at 10% and hawthorn *(Crataegus monogyna)* at 7.5%.

4.2.5 The most significant trees in the survey are the ancient and veteran trees, which are afforded a higher level of protection in the planning process due to their irreplaceable conservation and habitat value. The following trees are the most notable:

- T27 a sessile oak *(Quercus petraea)* with a stem diameter of 1000 mm.
- T39 a common oak *(Quercus robur)* with a stem diameter of 1080 mm.
- T40 a sessile oak *(Quercus petraea)* with a stem diameter of 1480 mm.
- T48 a sycamore *(Acer pseudoplatanus)* with a stem diameter of 940 mm.
- T71 a crack willow *(Salix fragilis)* with a stem diameter of 600 mm.
- T76 an ash *(Fraxinus excelsior)* with a stem diameter of 600 mm.
- T105 a common alder *(Alnus glutinosa)* with a stem diameter of 500 mm.
- T306 a grey willow *(Salix cinerea)* with a stem diameter of 400 mm.
- T322 a grey willow *(Salix cinerea)* with a stem diameter of 330 mm.
- T602 common oak *(Quercus robur)* with a stem diameter of 1150 mm.
- T614 a beech *(Fagus sylvatica)* with stem diameters of 600 mm and 500 mm.
- T625 a beech *(Fagus sylvatica)* with a stem diameter of 730 mm.
- T645 a common oak *(Quercus robur)* with a stem diameter of 880 mm.
- T680 a horse chestnut *(Aesculus hippocastanum)* with a stem diameter of 1040 mm.
- T716 a goat willow *(Salix caprea)* with multiple stems with a diameter of 300, 250, 250, 250, 230, 230, 220, 220 and 200 mm.
- T723 a goat willow *(Salix caprea)* with multiple stems with a diameter of 450, 300, 300, 400, 250, 230 and 400 mm.
- T731 a common alder *(Alnus glutinosa)* with a stem diameter of 800 and 500 mm.

- T736 an ash *(Fraxinus excelsior)* with a stem diameter of 1280 mm.

4.2.6 The list above includes the larger, older specimens in an otherwise well-treed landscape. The town of Porthmadog and the surrounding landscape are interwoven with wetlands and lines of largely riparian tree species forming field boundaries, stream edges and small pockets of woodland. The trees and woodland are an important part of the natural character of this part of North Wales.

4.2.7 The most significant group and woodland features across the Site are the Ancient Woodlands, which are afforded a high level of protection under planning regulations. Across the survey area the following woodlands (see **Appendix A**) are recorded as ancient:

- W29 a Restored Ancient Woodland to the west of the Site.
- W167 an ancient semi natural woodland towards the centre of the Site.
- W217 and W223 areas of a larger Restored Ancient Woodland circa 15 m and 10 m north of the Site respectively.

4.2.8 Site photography is in **Appendix E**.

5. Arboricultural Impact Assessment

5.1 Purpose

5.1.1 This impact assessment sets out the likely principal direct and indirect impacts of the proposed works on the trees on or adjacent the Site and suitable mitigation measures to allow for the successful retention of significant trees or to compensate for trees to be removed, where appropriate.

5.1.2 A summary of trees to be removed, tree works and incursions related to the proposed works is detailed in **Table 5-1**.

Table 5-1 Summary of removals, incursions and pruning to facilitate the proposed works

Impact	Category A	Category B	Category C	Category U
Trees to be removed to facilitate the proposed works	T138; T750 & W73 in part	T62, T63, T68, T81, T83, T85, T100, T139, T140, T147, T149, T172, T244, T269, T492, T533, T541, T572, T581, T583, T745, G53, G56, G61, G141, G294, G797, G800 & G67, G101, G130, G155, G179, G293, G409, G746, G753, W43, W46, W96 in part	T75, T76, T82, T84, T86, T87, T90, T92, T93, T95, T97, T148, T152, T153, T154, T173, T174, T177, T185, T229, T231, T233, T234, T401, T449, T450, T490, T542, T546, T561, T568, T570, T582, T584, T589, T734, T774, T788, T789, T790, T792, T795, T798, T811, G98, G99, G145, G150, G151, G158, G159, G161, G171, G186, G218, G497, G547, G549, G550, G555, G557, G558, G592, G796, H543, H595, H786;	T170, T181, T590, T593, T776, T777, G143

Impact	Category A	Category B	Category C	Category U
			& G44, G78, G91, G136, G137, G180, G219, G299, G413, G491, G501, G534, G551, G554, G563, G565, G588, G596, G799, H125, H127, H536, H717, H719 in part	
Total	Two individual trees, one part woodland	21 individual trees, seven groups, nine part groups, three part woodlands	44 individual trees, 20 groups, 19 part groups, three hedgerows, five part hedgerows	Six individual trees, 1 group
Trees which may require some incursion into their construction exclusion zone to allow the proposed works.	T8, T17, T24, T26, T36, T40, T42, T45, T48, T226, T621, T625, T634, T640, T646, T647, T648, T656, T657, T658, T662, T664, T667, T672, T680, T681, T682, T683, T707, T720, T722, T731, T743, G22, G33, W32, W38, W64, W167	T13, T14, T19, T65, G70, T71 T237, T240, T256, T487, T495, T508, T559, T566, T573, T628, T637, T674, T675, T678, T687, T692, T703, T704, T712, T713, T718, T721, T725, T728, T741, T742, T754, T756, T766, T771, T773, G10, G12, G60, G236, G239, G241, G248, G252, G254, G259, G261, G284, G293, G690, W29, W43, H644	T20, T47, T72, T110, T224, T238, T631, T659, T679, T693, T696, T699, T702, T708, T727, G3, G34, G102, G103, G232, G243, G245, G257, G292, G298, G299, G537, G630, G643, G655, G684, H539, H649, H719	T247, T249, T250, T251, T253, T614, T619, T629, T663, T676, T685, T748
Total	34 individual trees, two groups, four woodlands	37 individual trees, 14 groups,	15 individual trees, 16 groups, 3 hedgerows	12 individual trees

Impact	Category A	Category B	Category C	Category U
		two woodlands, one hedgerow		
Trees to be pruned to facilitate the proposed works.	tbc	tbc	tbc	tbc

5.2 Trees to be Removed

5.2.1 In the Site, 73 individual trees, 56 groups, four woodlands and eight hedgerows are to be removed or partially removed to facilitate the proposed works: this includes two individual trees and one part woodland classed as high quality (Category A); 21 individual trees, seven groups, nine part groups and three part woodlands classed as moderate quality (Category B); 44 individual trees, 20 groups, 19 part groups, three hedgerows and five part hedgerows classed as low quality (Category C); and the remaining six individual trees and one group classified as unsuitable for retention (Category U).

5.2.2 All of the trees to be removed are in the red line application boundary. Prior to any tree removals or pruning works the ownership of the trees must be established and the consent of the tree owner obtained in writing.

5.2.3 The majority of the tree losses across the Site are associated directly with the installation of cabling due to excavation, easements, compound areas and access requirements. A small number of tree losses have been identified where temporary access and access widening for visibility splays are required for construction traffic There will be a further loss of tree cover due to the extension of the CSEC at Wern which will result in the loss of G53, G56 and partial removal of W43 and W46. Wherever possible the design of the proposed works has taken in to account the presence of trees to reduce impacts. Where trees, wooded areas and hedgerows require removal, their loss is unavoidable due to the requirements that are necessary for below ground installation of cabling, construction vehicle and machinery access, material storage, and direct conflict with the extension of existing electrical infrastructure, such as the CSEC at Wern.

5.2.4 One low quality tree (T795), which is identified for removal due to an open cut cable installation trench (as shown on the TPP sheet 4 Open Cut Option), may be feasible to retain if the cable installation is achieved using trenchless methods (e.g. HDD or equivalent). If this potential change was to be implemented, it would result in a reduction in the number of individual trees to be removed (from 74 to 73 individual trees). No other tree features would be impacted by this change. This potential change is illustrated in sheet 4 HDD Option of the TPP, which shows this tree as retained and fully protected with fencing.

5.2.5 Tree removals will be mitigated with a high quality scheme of new tree planting and associated landscaping works, which will be detailed in the Landscape Plan. This will represent an opportunity to enhance the quality, benefits and resilience of trees on the Site.

5.2.6 Where trees are being removed they will be replaced in accordance with the requirements outlined in the PPW (Ref 1.1) i.e. "*Replacement planting shall be at a ratio*

equivalent to the quality, environmental and ecological importance of the tree(s) lost and this must be preferably onsite, or immediately adjacent to the site, and at a minimum ratio of at least 3 trees of a similar type and compensatory size planted for every 1 lost. Where a woodland or a shelterbelt area is lost as part of a proposed scheme, the compensation planting must be at a scale, design and species mix reflective of that area lost. In such circumstances, the planting rate must be at a minimum of 1600 trees per hectare for broadleaves, and 2500 trees per hectare for conifers.

5.2.7 All of the remaining recorded trees can be retained and protected.

5.3 Tree Works

5.3.1 Tree pruning works will be confirmed on site by the Project Arboriculturist and contractor prior to commencement. Tree works needed for clearance over existing roads and tracks will be required regardless of the proposed works due to safety considerations or clearance requirements. All tree work is to follow the principles of *BS3998: 2010 Treework – Recommendations* (Ref 2.7) and must be carried out by suitably qualified and insured contractors. The Arboricultural Association provides a list of contractors who meet these requirements which can be found at www.trees.org.uk (Ref 5.1).

5.3.2 Should the requirement for additional tree works be identified, this will be discussed with an arboriculturist and no works will be undertaken without the consent of the Local Planning Authority (LPA).

5.4 Incursions in the RPA or Canopy Spread

5.4.1 The design has been developed to minimise loss or impacts to significant trees. Particular care has been given to ensure that ancient and veteran trees are avoided as fully as possible. An AMS will address RPA incursions and mitigations in detail and will be developed post consent. Wherever possible incursions will be further addressed in an AMS with the intention of avoiding or further reducing the impacts on retained trees wherever feasible.

5.4.2 Currently the proposed works will result in incursion of the RPA or canopies of 140 tree features. This includes seven veteran trees (T40, T48, T71, T614, T625, T680 and T731).

5.4.3 Where existing hard surfaced access routes are to be used during construction activity, they will not be subject to change where they transect RPAs of retained trees. This is therefore not considered to be a change in use or a new impact (such areas are shown as a pink hatch on the TPP).

5.4.4 **Table 5-2** provides a summary of the nature of the incursions in RPAs and canopies of ancient and veteran trees on Site.

Table 5-2 Veteran and ancient trees with incursions

Tree No	Location	Cause of Incursion	Mitigation Measures
T40	Near an existing track	Use of existing	No change in use. Access as per Construction Working Zone (CWZ) working procedures. Area beyond existing access route to be fenced off as an exclusion zone.
T48	Behind a partially collapsed dry stone wall	Use of existing	No change in use. Access as per CWZ working procedures. Area beyond existing access route to be fenced off as an exclusion zone.
T71	On northern side of Nant yr Afon-oer	Drain and outfall installation on southern bank of Nant yr Afon-oer is located within tree's notional RPA / buffer (on opposite bank of the river).	Micrositing of outfall to avoid RPA or locate as far from tree stem as possible. Tree protection will be temporarily set back to allow access for installation of the drainpipe and outfall. Hand digging will be undertaken with great care under the supervision of the Project Arboriculturist. Digging within the RPA will be undertaken with hand tools. Bark around the roots will be protected with damp, clean hessian. All roots greater than 25mm diameter will be preserved and worked around. Clumps of roots less than 25mm in diameter (including fibrous roots) will be retained without damage. If after consultation with the Project Arboriculturist severance is unavoidable, roots must be cut back using a sharp tool to leave the smallest wound.
T614	Elevated position near a private garden	Use of existing	No change in use. Access as per CWZ working procedures. Area beyond existing access route to be fenced off as an exclusion zone.

Tree No	Location	Cause of Incursion	Mitigation Measures
T625	Wooded area near a tarmac road	Use of existing	No change in use. Access as per CWZ working procedures. Area beyond existing access route to be fenced off as an exclusion zone.
T680	Raised island bed at entrance to Wern Manor	Use of existing	No change in use. Access as per CWZ working procedures. Area beyond existing access route to be fenced off as an exclusion zone.
T731	Woodland at lower elevation than a residential road	Use of existing	No change in use. Access as per CWZ working procedures. Area beyond existing access route to be fenced off as an exclusion zone.

5.4.5 One woodland and ten individual trees, confirmed as being subject to a TPO have incursions from the proposed works. They are W167, T226, T708, T713, T720, T721, T727, T728, T731, T742 and T743. **Table 5-3** provides a summary of the nature of the incursions in RPAs and canopies of TPOs on Site.

Table 5-3 Incursions of trees and woodland protected by TPO

Type	Tree No	Cause of Incursion	Mitigation measures
Woodland	W167	Use of existing	No change in use. Access as per CWZ working procedures
Individual Trees	T226, T708, T713, T720, T721, T727, T728, T731, T742, T743	Use of existing	No change in use. Access as per CWZ working procedures

5.4.6 Across the proposed works site, a further 77 individual trees, 29 groups, four woodlands and three hedges have incursions in their RPAs from excavation or construction or decommissioning works access. These works have the potential to negatively impact on the roots and rooting environment of the retained trees. The detailed measures for avoiding or mitigating any damage from these operations will be addressed in an AMS. The following working procedures will be followed where the works occur in the RPAs of retained trees. Where impacts to the RPA are unavoidable arboricultural supervision will be required to will be required to ensure works are implemented in accordance with the AMS, to assess any impacts and recommend appropriate remedial works.

5.5 Construction Working Zone (CWZ) Working Procedures

5.5.1 The following measures will be followed when working in RPAs and below canopies of retained trees to protect retained them from damage:

5.5.2 Wherever possible access should avoid RPAs of retained trees. Incursions into the RPA of retained trees may lead to decline in tree health or structural stability if working procedures are not followed.

5.5.3 Where access is unavoidable the implementation of specialist working methodologies, including no-dig techniques, temporary ground protection, and arboriculturist supervision, ensures compliance with BS5837 (Ref 1.3) and protects retained trees from damage associated with the proposed works.

Temporary hard surfacing in RPAs

5.5.4 Where temporary access is required in RPAs, measures will include:

5.5.5 Installation of temporary ground protection, such as track mats or load-spreading boards, designed to prevent compaction which meet the requirements detailed in **Appendix F**.

5.5.6 All works in RPAs must adhere to the principles stated in **Appendix F**. These works are not anticipated to result in a significant decline in tree health, or negatively impact the structural integrity of the tree where specialist, careful working methodologies can be utilised to protect tree roots and soil structure.

Excavation in RPAs

5.5.7 Excavation in RPAs of retained trees will be avoided wherever possible.

5.5.8 Where minor excavation is unavoidable, it will be kept to the minimum and undertaken using compressed air or hand tools under arboricultural supervision to minimise soil disturbance and root damage. Detailed methodologies will be covered in the AMS.

5.5.9 If significant woody roots are discovered during excavation, they must be retained undamaged. The Project Arboriculturist must approve the removal of any root larger than 2.5cm in diameter, large bundles of roots of smaller roots, as stipulated by BS5837, Section 7.2 (Ref 1.3). Roots smaller than this can be cut cleanly without prior permission where necessary to enable the proposed works.

Supervision and Tree Protection Measures

5.5.10 All sensitive works in RPAs must be supervised by the Project Arboriculturist, as outlined in BS5837, Section 6.3 (Ref 1.3). The mitigation measures detailed in **Appendix F** and in the locations in the TPP (**Appendix C**), including tree protection fencing and temporary ground protection, will ensure trees are adequately safeguarded.

Resurfacing

5.5.11 Where possible resurfacing should be applied on top of the existing surface. Where the wearing course of hard surfaced areas is required to be removed to allow resurfacing, care should be taken not to disturb tree roots that might be present beneath. Hand-held tools or appropriate machinery (such as excavators with untoothed buckets) should be

used (under arboricultural supervision) to remove the existing surface, working backwards over the area, so that the machine is not moving over the exposed ground. If a new hard surface is to be laid in RPAs of retained trees, the existing sub-base must be retained in situ and used as the basis of new surfacing. Where this cannot be achieved the resurfacing must be achieved using a no dig construction method as detailed below.

Permanent Hard Surfacing in RPAs

5.5.12 New permanent hard surfacing in unsurfaced areas in RPAs will:

- Use a 'no-dig' construction method to protect roots and soil structure with installation supervised by an arboriculturist.
- Where feasible hard surfacing in RPAS of retained trees should incorporate permeable materials (e.g., geotextile membranes and cellular confinement systems) specified to meet the maximum anticipated load and to maintain air and water flow to roots.
- Avoid compaction by spreading construction loads during installation.

Horizontal Directional Drilling

5.5.13 Where feasible, horizontal directional drilling (HDD) is being utilised, which will reduce or avoid the impacts of the cable installation on the tree features in those areas. The methodology for cable installation close to tree T795 is still to be determined and therefore two options are shown for this tree (shown as two versions of sheet 4 of the TPP); open cut (requiring tree removal) and HDD, which would allow the tree to be retained and fully protected.

5.5.14 HDD is a steerable trenchless method of installing underground pipes, conduits and cables. It is used to install cables under major crossings such as rivers and roads. A drill rig bores a hole in a shallow arc along a prescribed path. Entry and exit pits would be dug at either end of the HDD route and in the compound areas using an excavator.

5.5.15 The drill rig and drilling compound (including entry and exit pits) will be outside the RPAs of retained trees.

5.5.16 The installation of HDD will still require removal of vegetation including trees and shrubs where it passes beneath field ditches and streams.

5.5.17 All sensitive works in RPAs must be supervised by an arboriculturist. Further details are provided in **Section 6.3**.

5.6 The Future Impact of Retained Trees

5.6.1 Retained trees in the Site and beyond the boundary will not have a significant future impact on the future use of the Site. Where retained trees are close to the perimeter of permanent above-ground infrastructure, retained trees will require periodic inspection to assess their structural condition and safety. Occasional removal of dead wood or other remedial works to address significant defects may be required in areas of frequent access. Minimal clearance will be required from the perimeter of the CSEC. Once initiated this operation will be required cyclically and should not have a substantial negative impact on the health or amenity of retained trees. This is unlikely to be overly

onerous and will not represent a significant change from the current situation on the Site.

5.6.2 The Site contains a significant population of large trees in varying condition and will require ongoing maintenance and assessment by a competent person to ensure that any risks from tree failure are managed in accordance with best practice. All tree works recommended as a result of the preliminary tree survey of the Site which considered trees in the context of the current use of the Site should be actioned in the recommended timescales (these works are included as preliminary management recommendations in the Tree Schedule in **Appendix B** of this report).

5.7 Tree Protection

5.7.1 Retained trees are vulnerable to damage from construction activities which can include physical damage to stems and branches following impacts with plant. Root severance following trenching, root death or dysfunction following damage to soil structure (caused by the movement of people or machinery on unsurfaced ground) or via the spillage of materials toxic to tree health. The default position is that the RPA and canopy spread of trees to be retained will form an effective Construction Exclusion Zone, secured with robust fencing where no access will be permitted. Where access is necessary in this area special measures such as the use of ground protection and arboricultural supervision are generally required.

5.7.2 Outline tree protection measures are considered in **Appendix F** of this report. An AMS is often required as a condition of planning consent to set out the phasing of site operations, the finalised tree protection measures for the Site and to provide detail on how sensitive elements of work are to be achieved in proximity to retained trees. Issues to be addressed by the AMS are listed at the conclusion of this report.

5.8 Site Organisation, Storage and Use of Materials, Plant and Machinery.

5.8.1 All construction site facilities including site huts, staff and contractor parking and areas for storage will be outside the RPA or crown spread of retained trees, including those not specifically covered in this report. Space is likely to be constrained on the Site and will need to be carefully considered. The Construction Exclusion Zones identified on the TPP must be fully respected and their location and significance is to be highlighted to all site staff and contractors during the formal site briefing.

5.8.2 The use, mixing and washing of materials can lead to run off or inadvertent spillage into tree root zones. Many substances often used on construction sites can be toxic to tree roots (such as concrete, fuels, salts, builder’s sand and herbicides) and can result in the death of tree roots and beneficial soil organisms and can have a significant impact on the future health and appearance of the tree.

5.8.3 The storage of materials and arising’s can result in an effective raised soil level. This buries tree roots at depths where air and water are less available and can lead to the decline or death of the tree.

5.8.4 For these reasons the storage of materials and any washing, mixing or refuelling will take place in agreed allocated areas at least 5m from the edge of the RPA of retained trees.

5.8.5 Any slope effect must be taken into account and where there is a potential for run off, heavy duty polythene sheeting and sandbags must be in place as bunding to prevent toxic materials reaching RPAs.

5.8.6 Particular care is required where high sided vehicles, long reach machinery and plant with jibs, booms and counterweights are to operate with in proximity to retained trees. A banksman will be used where the movement of plant or long reach machinery occurs within 5m of any part of a retained tree to ensure no damage is sustained.

5.9 Tree Planting

5.9.1 Existing areas of unsurfaced ground must be protected during the demolition and construction phases if they are to be re-used for new plantings. Protection can be achieved using fit for purpose ground protection measures as set out in **Appendix F** and BS5837:2012 Section 6.2.3 (Ref 1.3) or by creating a fenced exclusion zone. Where protection is not feasible, soil amelioration or replacement works will be required to ensure suitable growing conditions for new trees to fully establish.

5.9.2 Where new trees are to be planted, the minimum planting distances detailed in Annexe A, Table A.1 of BS5837:2012 (Ref 1.3) must be adhered to, to prevent direct damage to services and structures from future tree growth.

5.9.3 New tree planting should be implemented in accordance with the guidance set out in BS8545:2014 Trees: from nursery to establishment in the landscape – Recommendations (Ref 5.2).

5.10 Services

Decommissioning

5.10.1 An assessment has been made of the redundant cabling to determine where it requires removal and where it is being left in situ. These locations are included in the TPP. The methods for the decommissioning of the cables are set out in section 2.5.17 of **Environmental Statement Volume 4: Glaslyn Cables**.

5.10.2 Where existing services become redundant in the RPA of a retained tree, the default position must be that they be decommissioned and left in situ. Where this is not feasible the following principles are to be observed:

5.10.3 Existing services are to be removed by winching out from an access or inspection chamber outside of an RPA. It may be acceptable to fill redundant pipe work with an inert material or undertake pipe bursting where necessary in the RPA of retained trees.

Installation

5.10.4 Excavation to install services has the potential to result in unacceptable root severance which could result in instability, dysfunction or the death of trees. Repeated incursions are particularly damaging and must be avoided by bundling services wherever possible.

5.10.5 The new cables are to be installed through a combination of open cut trenching and direct burial and HDD techniques. Cabling in RPAs will be installed via HDD or equivalent trenchless methodology. HDD in RPAs will be at a depth of 2 m or more with all insertion and retrieval pits outside of tree RPAs (which will be fenced exclusion zones)

5.10.6 The standard minimum cover depth of the cabling ducts is specified at 900 mm below the surface in agricultural land as detailed in section 2.5.5 of the ES **Volume 4: Glaslyn Cables Works**.

5.10.7 Tree roots are generally in the upper 2 m and most roots are in the upper 600 mm of the soil profile. Therefore, where trenchless installation methodologies are employed in the RPAs of retained tree, the minimum depth at which the installation is to be undertaken is 2 m below ground level.

5.10.8 Where services are routed below the RPA of retained trees this process will be subject to a detailed method statement with approval from the Planning Authority. The principles of the National Joint Utilities Group (NJUG) Volume 4 guidance (Ref 5.3) must be adhered to.

6. Conclusion

6.1.1 The survey area contains 810 tree features which vary in age from very young and newly planted trees to mature and veteran and ancient specimens. The Site includes small areas of plantation woodland, ancient woodlands and restored ancient semi-natural woodland.

6.1.2 The most significant tree features identified in or adjacent to the Site are the 18 veteran trees and ancient trees and the ancient woodlands.

6.1.3 Across the Site the trees and woodland contribute significantly to the character of the semi-rural landscape and although variable in their visibility from public vantages, together the tree population can be considered to have substantial amenity value.

6.1.4 The RLB stretches across the landscape from Wern to Garth CSEC taking in a significant number of tree and woodland features. The trees represent a significant spatial constraint to any potential development works.

6.1.5 73 individual trees, 56 groups, four woodlands and eight hedgerows are to be removed or partially removed to facilitate the proposed works: this includes two individual trees and one part woodland classed as high quality (Category A); 21 individual trees, seven groups, nine part groups and three part woodlands classed as moderate quality (Category B); 44 individual trees, 20 groups, 19 part groups, three hedgerows and five part hedgerows classed as low quality (Category C); and the remaining six individual trees and one group classified as unsuitable for retention (Category U).

6.1.6 All of the trees to be removed are in the red line application boundary. Prior to any tree removals or pruning works the ownership of the trees must be established and the consent of the tree owner obtained in writing.

6.1.7 Tree removals are required due to a direct conflict with the proposed works. The majority of the trees to be removed are in the agricultural fields where open-cut trenching is being utilised for the installation of the replacement cabling, where topsoil is being removed and where the joint bay compounds are being located. There are a small number of tree losses associated where access roads and access widening for visibility splays are required for construction traffic. Further loss of tree cover will be required due to the extension of the CSEC at Wern which will result in the loss of G53, G56 and partial removal of W43 and W46.

6.1.8 One low quality tree (T795) which is identified for removal due to an open cut cable installation trench (as shown on the TPP sheet 4 Open Cut Option) may be feasible to retain if the cable installation is achieved using trenchless methods (e.g. HDD or equivalent). If this potential change was to be implemented, it would result in a reduction in the number of individual trees to be removed (from 74 to 73 individual trees). No other tree features would be impacted by this change. This potential change is illustrated in sheet 4 HDD Option of the TPP which shows this tree as retained and fully protected with fencing.

6.1.9 The stockpile areas to be used for storage of excavated material will be located to avoid tree losses and to avoid the RPAs and canopies of retained trees.

6.1.10 The Site includes veteran and ancient trees and ancient woodland which are irreplaceable habitats, given a very high priority in the planning process. No ancient or

veteran trees will be removed to facilitate the development and no ancient woodland will be removed to facilitate the proposed works.

6.1.11 The proposed works will result in theoretical incursions of the RPAs of seven veteran trees (T40, T48, T71 T614, T625, T680 and T731). Six of those incursions occur on existing hard surfacing and represent no change of use where damage to roots, soil compaction or damage to above ground parts of the trees is not anticipated.

6.1.12 An incursion within the theoretical RPA of T71 as a result of trenching for the installation of a drainpipe and outfall. The impact is anticipated to be negligible due to the distance from the stem on the opposite bank of the adjacent river. Precautionary mitigation will be employed within the RPA including careful hand digging, root protection measures and arboricultural supervision.

6.1.13 The Site includes a number of features which are subject to statutory protection such as TPO's and Conservation Areas.

6.1.14 Four woodlands, seventeen individual trees and one hedgerow on Site are confirmed as being subject to a Tree Preservation Order. Of those trees, one woodland and ten individual trees, confirmed as being subject to a Tree Preservation Order, have theoretical RPA incursions from the proposed works. They are W167, T226, T708, T713, T720, T721, T727, T728, T731, T742, T743. The incursions for these trees are in the hard surfacing of existing roads and is not considered to be a change of use and is not anticipated to impact on roots or their rooting environment.

6.1.15 The following trees are in the Tremadog Conservation Area: T204, T206 and G207. They are not anticipated to be impacted by the proposed works.

6.1.16 The Site includes several areas which are on the list of the habitats of principal importance as defined under section 7 Environment Wales Act 2016 such as deciduous woodland and traditional orchards and shown in the TPP in **Appendix C**.

6.1.17 Where trees are owned by third parties, which is the case across much of the Site, prior consent must be in place before any tree works outside those permitted under established rights in common law are carried out and it is recommended that this is secured prior to the submission of any planning application.

6.1.18 Any pruning required for the proposed works should be determined with a site walkover with the contractor, bearing in mind the height and turning requirements of machinery and vehicles accessing the Site. The works should be completed prior to the commencement of works to ensure the trees not damaged.

6.1.19 Where it is not possible to completely avoid the area of constraint associated with significant trees special measures will be utilised to facilitate the works. Such measures are outlined in **Appendix F**. An AMS is often required as a condition of planning consent to detail how sensitive operations are to be achieved in proximity to retained trees. These elements are the minimum normally required for a planning application and are intended to ensure both a sustainable and harmonious relationship between trees and new development.

6.1.20 Any tree loss will be mitigated with a robust and high quality scheme of new tree planting. In line with the PPW, replacement planting will be at a ratio of three for every one lost and in the case of woodland area lost, should be at a stocking density of 1600 per hectare for broadleaf woodland and 2500 per hectare for conifer plantation. This will represent an opportunity to increase the quality, impact, diversity and resilience of the local tree stock.

6.1.21 Issues to be addressed by an AMS:

- Conditions of planning consent.
- Pre commencement meeting and site briefing.
- Order and phasing of operations.
- Movement of people, plant and materials.
- Site walk over.
- Tree works.
- Tree protection fencing.
- Ground protection.
- Site storage and facilities.
- Demolition.
- Enabling works.
- Installation of new surfacing.
- Installation of new structures.
- Installation of new services and/or diversion of existing services.
- Excavation within RPAs.
- Hard landscaping.
- Soft Landscaping.
- Removal of tree protection measures.

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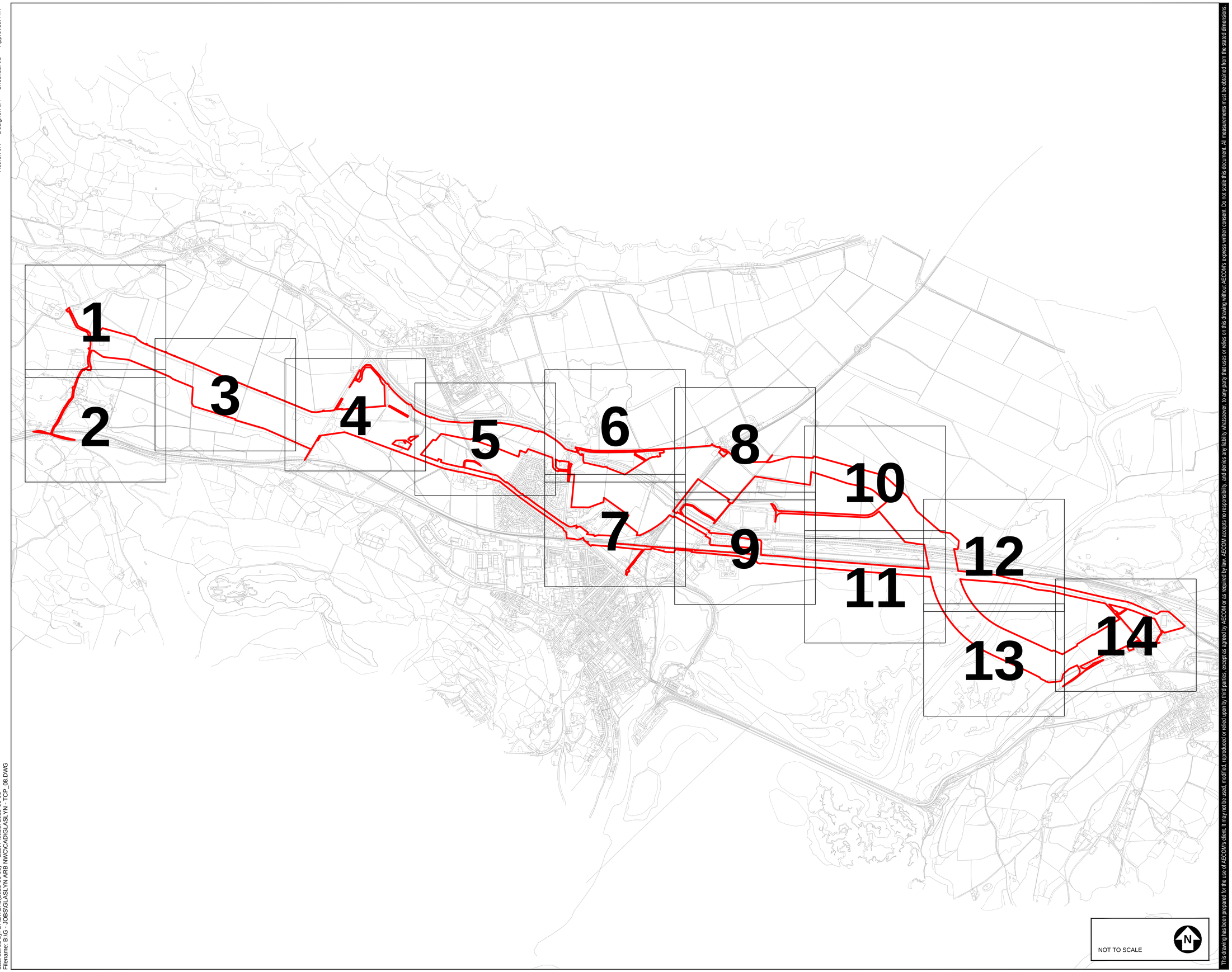
Appendix A Tree Constraints Plan



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ISSUE/REVISION

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P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE

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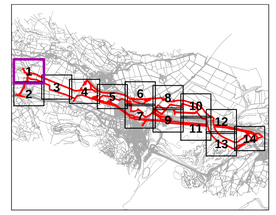

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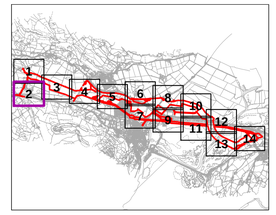

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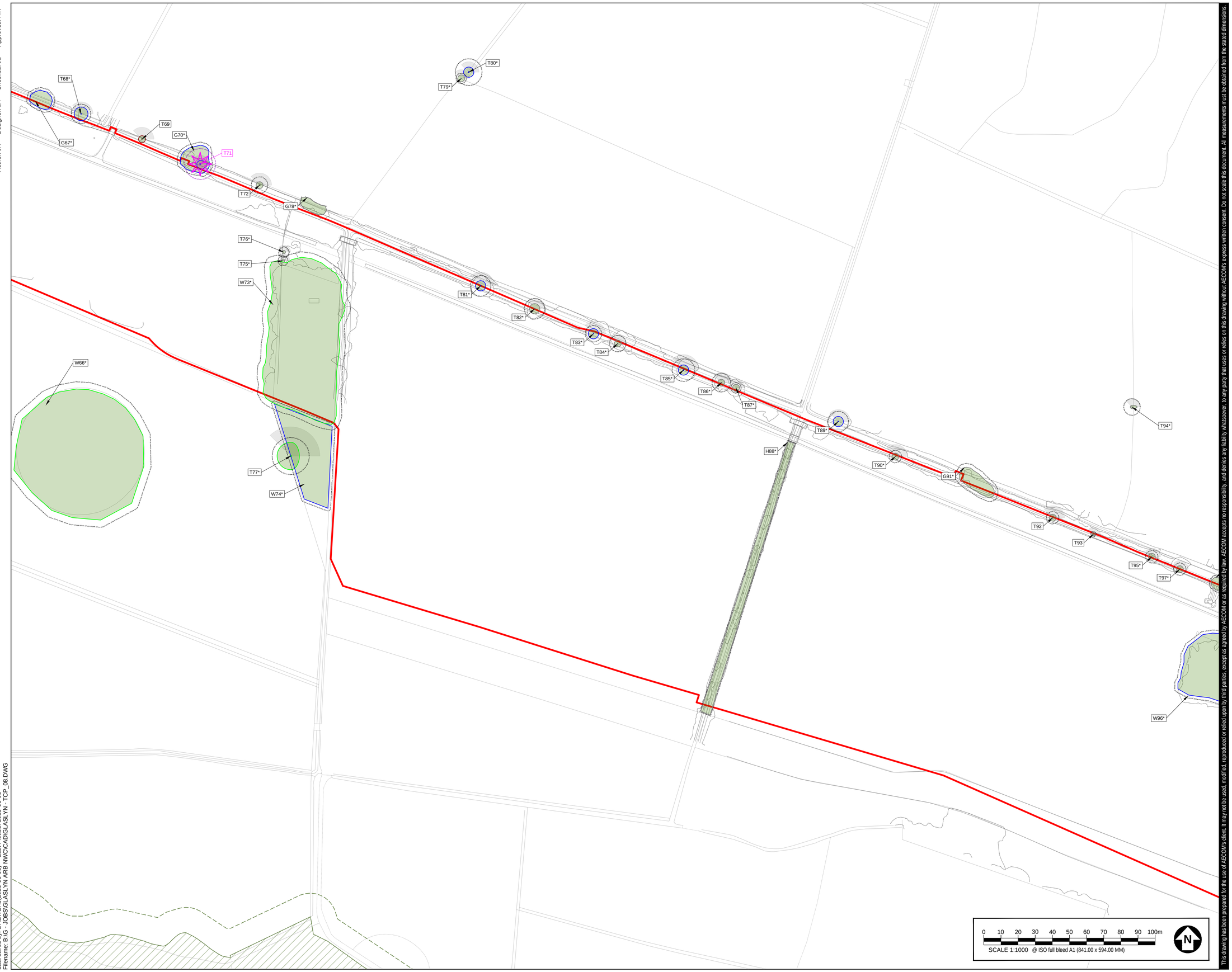
Author: JR Designer: LH Checked: JB Approved: AW



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PROJECT

Glaslyn Cables

CLIENT

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www.aecom.com

GENERAL NOTES

1. TREE CATEGORIES AS DEFINED BY BS 5837:2012
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4. PLANS SHOULD BE READ IN CONJUNCTION WITH THE AECOM ARBORICULTURAL REPORT.
5. THE ORIGINAL OF THIS DRAWING WAS PRODUCED IN COLOUR - A MONOCHROME COPY SHOULD NOT BE RELIED UPON.
6. DRAWING REFERENCES:
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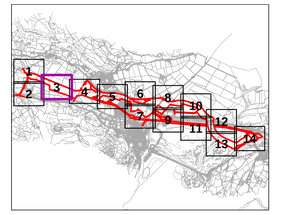
   LPA Searches_May 2024_v2_1.dwg
   GLAS-ARUP-ZZ-XX-M2-X-1111_MPNL Topography.dwg

KEY PLAN



KEY

- T# — **FEATURE ID TAGS** *(A PREFIX OF 'T' DENOTES A SINGLE TREE, 'G' A GROUP, 'H' A HEDGE, 'W' A WOODLAND)*
- **SITE BOUNDARY**
- **A CATEGORY TREE, GROUP, HEDGE, OR WOODLAND** *(HIGH QUALITY & VALUE)*
- **B CATEGORY TREE, GROUP, HEDGE, OR WOODLAND** *(MODERATE QUALITY & VALUE)*
- **C CATEGORY TREE, GROUP, HEDGE, OR WOODLAND** *(LOW QUALITY & VALUE)*
- **U CATEGORY TREE, GROUP, HEDGE, OR WOODLAND** *(UNSUITABLE FOR RETENTION)*
- **ROOT PROTECTION AREAS (RPA)** *(AS DEFINED BY BS 5837:2012)*
- **APPROXIMATE SHADING ARC** *(AS DEFINED BY BS 5837:2012)*
- T# — **SCHEDULED VETERAN TREE OR ANCIENT TREE** *(AS IDENTIFIED DURING SITE SURVEY)*
- **ANCIENT WOODLAND W/15M BUFFER** *(AREA CLASSIFIED AS AN ANCIENT WOODLAND)*
- **CONSERVATION AREA** *(AREA CLASSIFIED AS A CONSERVATION AREA)*
- **TREE PRESERVATION ORDER** *(AREA COVERED BY A TREE PRESERVATION ORDER [TPO])*
- **NATURE RESERVE** *(AREA CLASSIFIED AS A NATIONAL NATURE RESERVE)*
- **PRIORITY HABITAT** *(WOOD PASTURE, TRADITIONAL ORCHARD AND PARKLAND)*

ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

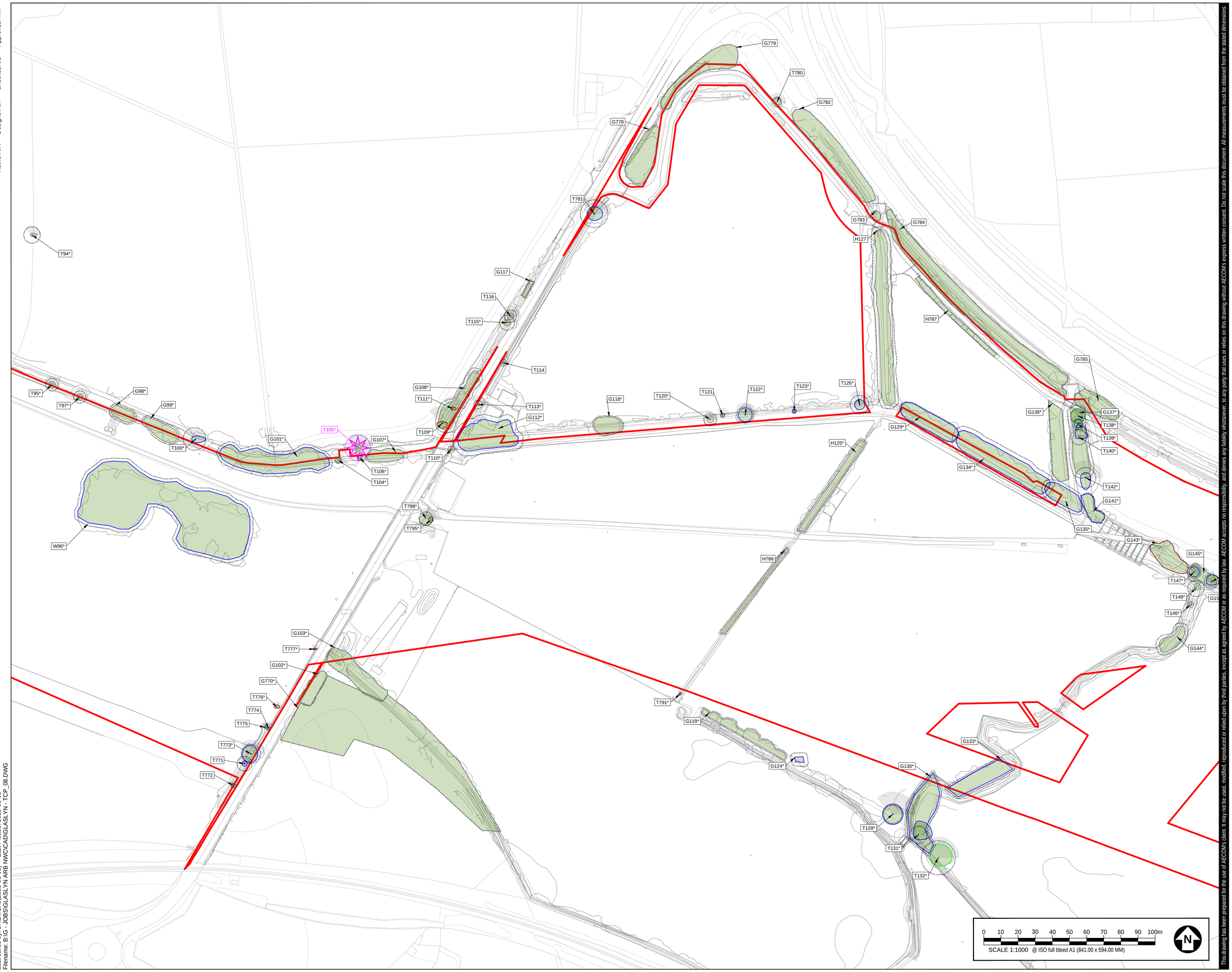
SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 03)

SHEET NUMBER / REV.

60686216-ACM-XX-XX-AB-TCP-003 P03

Author: JR Designer: LH Checked: JB Approved: AW



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6. DRAWING REFERENCES:
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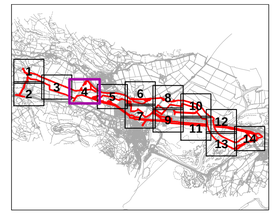
KEY PLAN



KEY

T#
FEATURE ID TAGS
(A PREFIX OF 'T' DENOTES A SINGLE TREE, 'G' A GROUP, 'H' A HEDGE, 'W' A WOODLAND)

SITE BOUNDARY

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(MODERATE QUALITY & VALUE)

C CATEGORY TREE, GROUP, HEDGE, OR WOODLAND
(LOW QUALITY & VALUE)

U CATEGORY TREE, GROUP, HEDGE, OR WOODLAND
(UNSUITABLE FOR RETENTION)

ROOT PROTECTION AREAS (RPA)
(AS DEFINED BY BS 5837:2012)

APPROXIMATE SHADING ARC
(AS DEFINED BY BS 5837:2012)

T#
SCHEDULED VETERAN TREE OR ANCIENT TREE
(AS IDENTIFIED DURING SITE SURVEY)

ANCIENT WOODLAND W/15M BUFFER
(AREA CLASSIFIED AS AN ANCIENT WOODLAND)

CONSERVATION AREA
(AREA CLASSIFIED AS A CONSERVATION AREA)

TREE PRESERVATION ORDER
(AREA COVERED BY A TREE PRESERVATION ORDER (TPO))

NATURE RESERVE
(AREA CLASSIFIED AS A NATIONAL NATURE RESERVE)

PRIORITY HABITAT
(WOOD PASTURE, TRADITIONAL ORCHARD AND PARKLAND)

ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 04)

SHEET NUMBER **REV.**

60686216-ACM-XX-XX-AB-TCP-004 P03

Last saved by: BREWERJ (2025-08-08) Last Plotted: 2025-08-08
Filename: B:\G - JOBS\GLASLYN ARB NWC\CAD\GLASLYN - TCP_08.DWG

Author: JR Designer: LH Checked: JB Approved: AW



0 10 20 30 40 50 60 70 80 90 100m

SCALE 1:1000 @ ISO full bleed A1 (841.00 x 594.00 MM)

N

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   LPA Searches_May 2024_v2_1.dwg
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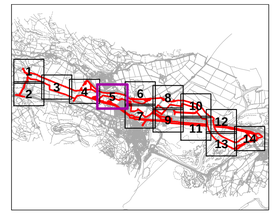
KEY PLAN



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- **APPROXIMATE SHADING ARC** *(AS DEFINED BY BS 5837:2012)*
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- **NATURE RESERVE** *(AREA CLASSIFIED AS A NATIONAL NATURE RESERVE)*
- **PRIORITY HABITAT** *(WOOD PASTURE, TRADITIONAL ORCHARD AND PARKLAND)*

ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 05)

SHEET NUMBER 60686216-ACM-XX-XX-AB-TCP-005

REV. P03

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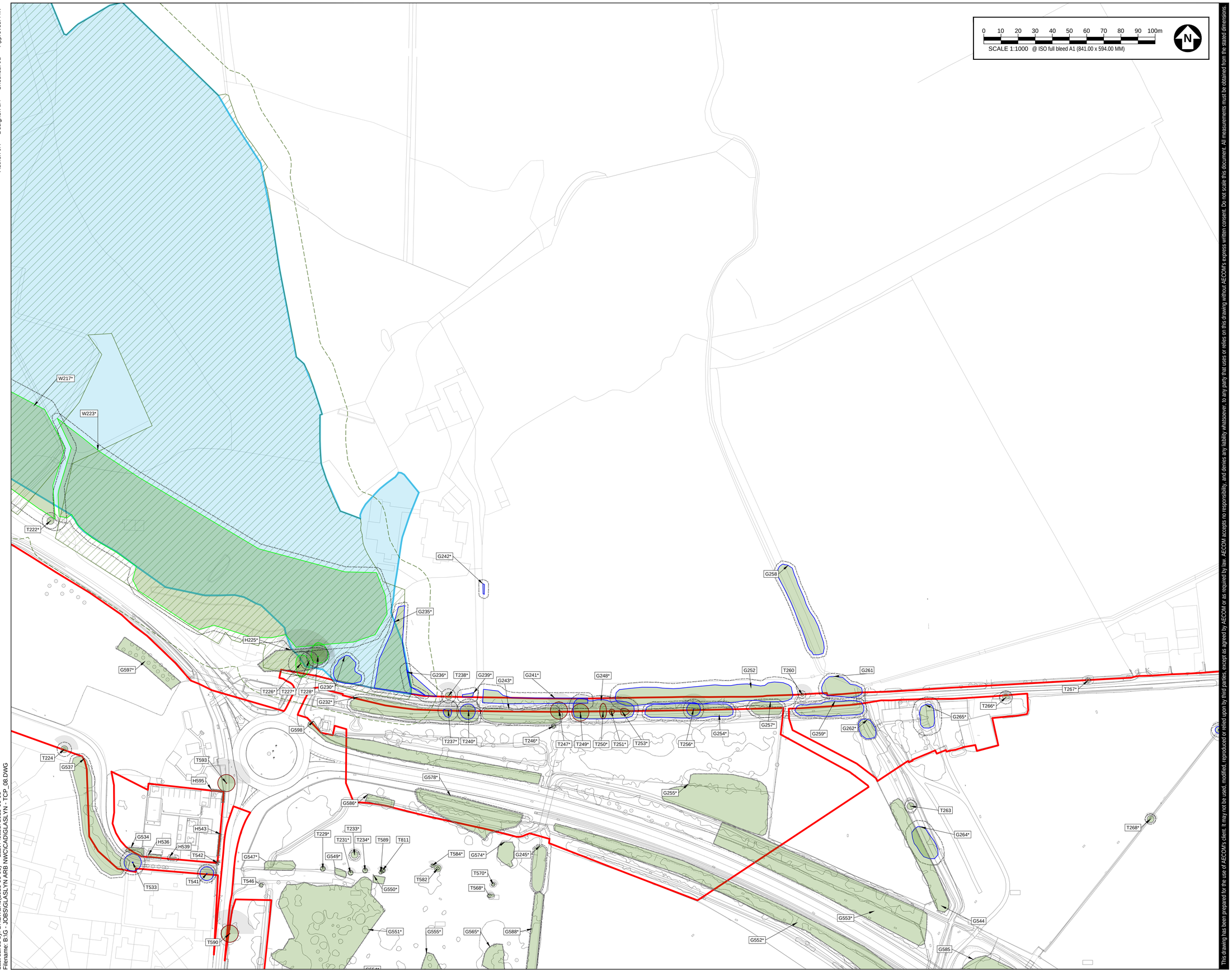
Author: JR Designer: LH Checked: JB Approved: AW



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6. DRAWING REFERENCES:
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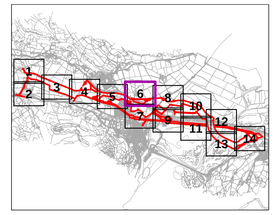
   LPA Searches_May 2024_v2_1.dwg
   GLAS-ARUP-ZZ-XX-M2-X-1111_MPNL Topography.dwg

KEY PLAN



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- **C CATEGORY TREE, GROUP, HEDGE, OR WOODLAND** *(LOW QUALITY & VALUE)*
- **U CATEGORY TREE, GROUP, HEDGE, OR WOODLAND** *(UNSUITABLE FOR RETENTION)*
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- **APPROXIMATE SHADING ARC** *(AS DEFINED BY BS 5837:2012)*
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- **TREE PRESERVATION ORDER** *(AREA COVERED BY A TREE PRESERVATION ORDER [TPO])*
- **NATURE RESERVE** *(AREA CLASSIFIED AS A NATIONAL NATURE RESERVE)*
- **PRIORITY HABITAT** *(WOOD PASTURE, TRADITIONAL ORCHARD AND PARKLAND)*

ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

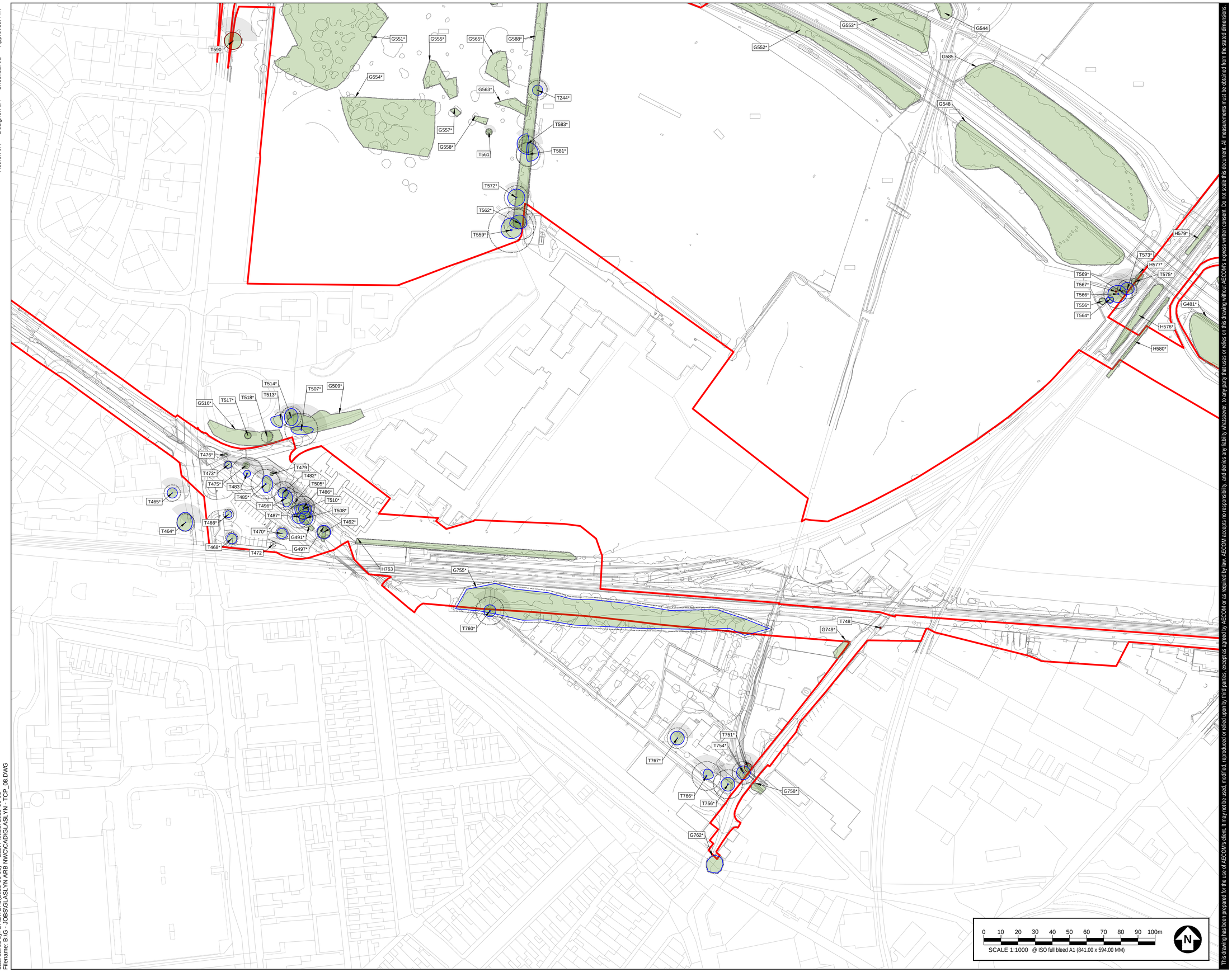
SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 06)

SHEET NUMBER **REV.**

60686216-ACM-XX-XX-AB-TCP-006 P03

Author: JR Designer: LH Checked: JB Approved: AW



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PROJECT

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6. DRAWING REFERENCES:
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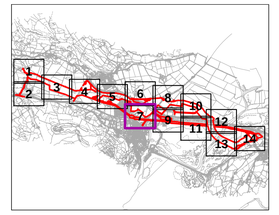
   GLAS-ARUP-ZZ-XX-M2-X-1111_MPNL Topography.dwg

KEY PLAN



KEY

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PRIORITY HABITAT
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ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

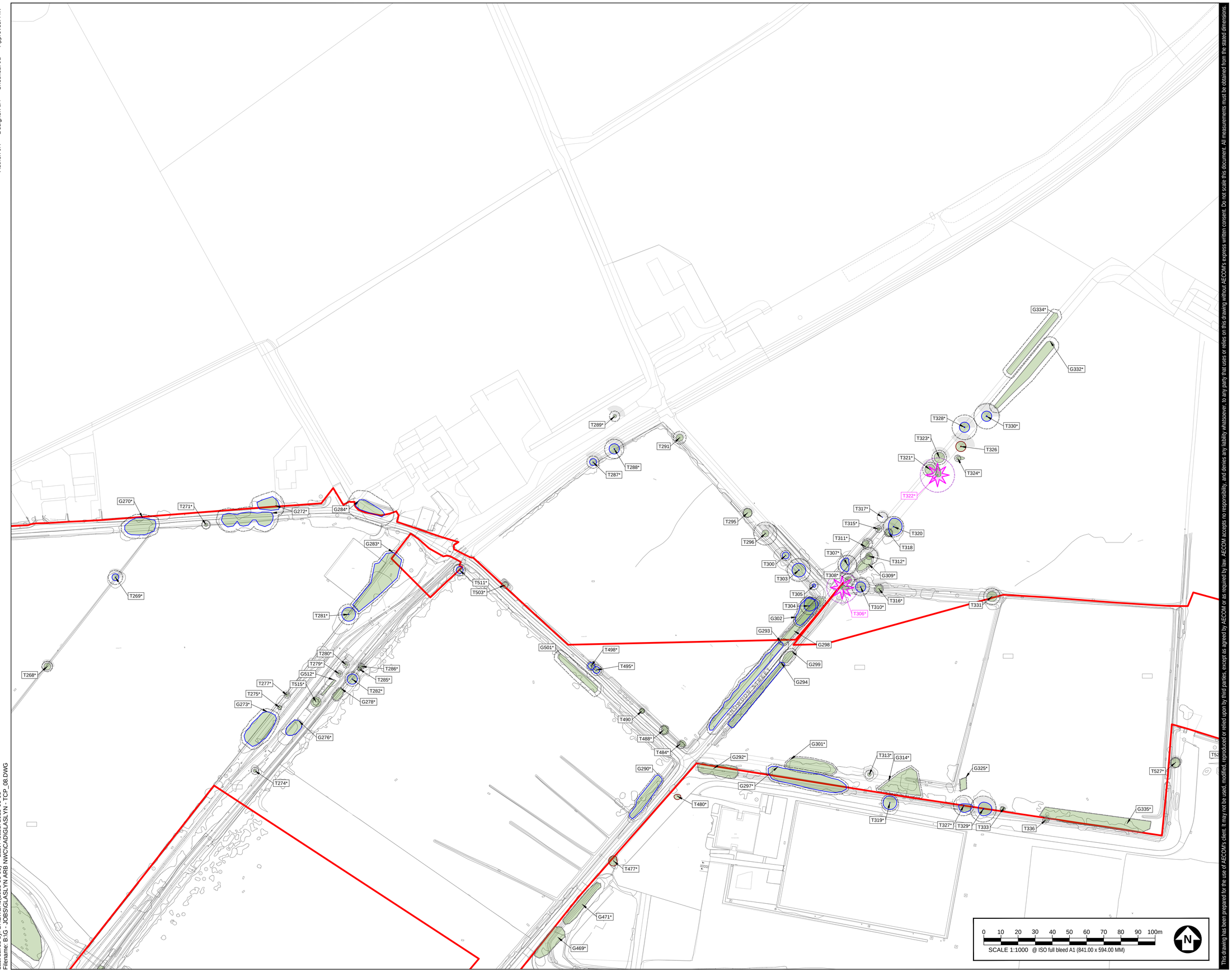
SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 07)

SHEET NUMBER REV.

60686216-ACM-XX-XX-AB-TCP-007 P03

Author: JR Designer: LH Checked: JB Approved: AW



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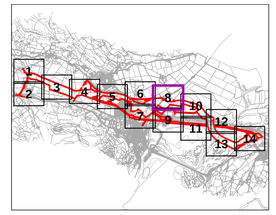
KEY PLAN



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ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

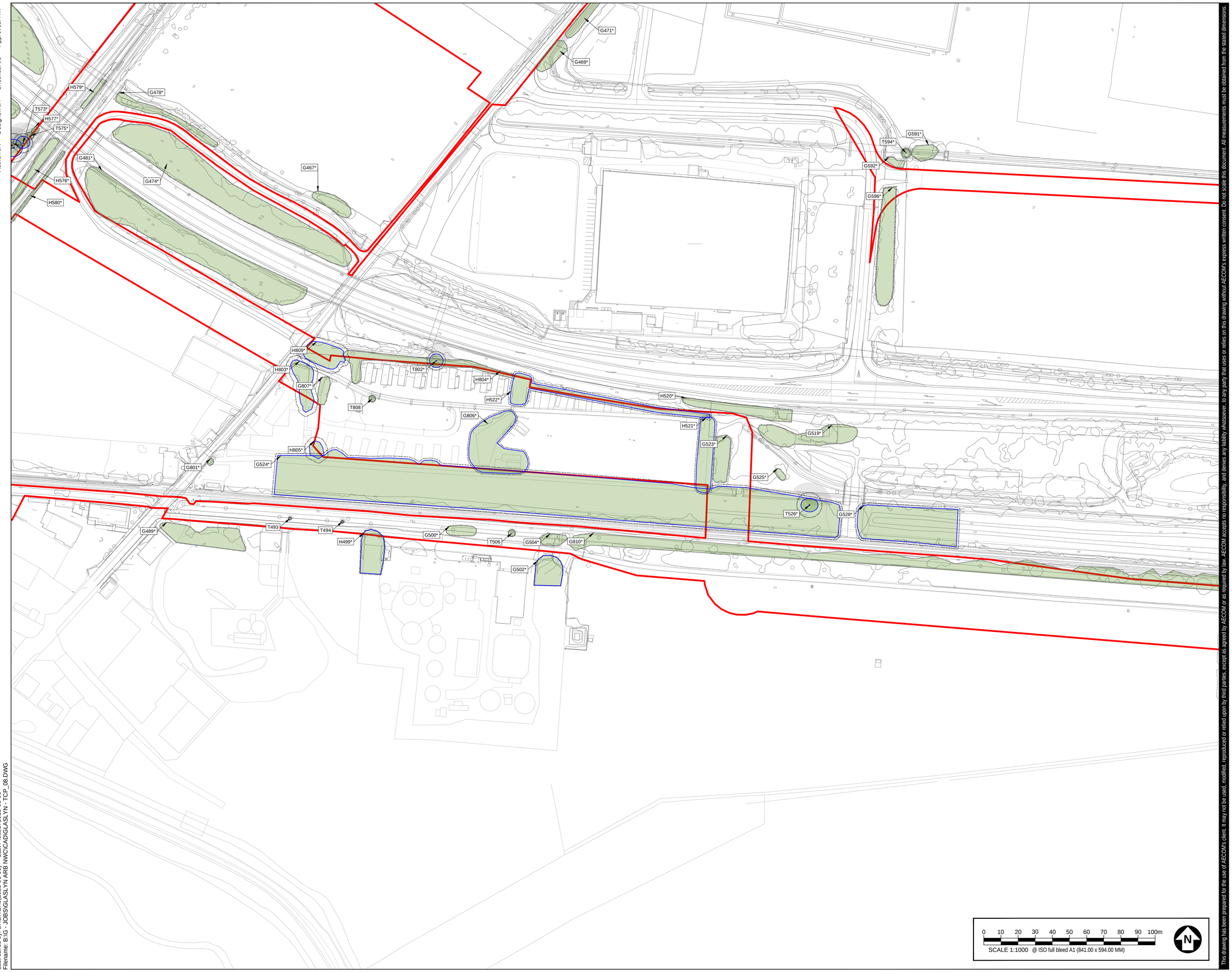
SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 08)

SHEET NUMBER / REV.

60686216-ACM-XX-XX-AB-TCP-008 P03

Author: JR Designer: LH Checked: JB Approved: AW



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PROJECT

Glaslyn Cables

CLIENT

National Grid

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GENERAL NOTES

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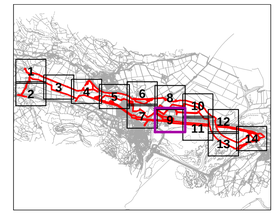
KEY PLAN



KEY

T#
FEATURE ID TAGS
(A PREFIX OF 'T' DENOTES A SINGLE TREE, 'G' A GROUP, 'H' A HEDGE, 'W' A WOODLAND)

SITE BOUNDARY

A CATEGORY TREE, GROUP, HEDGE, OR WOODLAND
(HIGH QUALITY & VALUE)

B CATEGORY TREE, GROUP, HEDGE, OR WOODLAND
(MODERATE QUALITY & VALUE)

C CATEGORY TREE, GROUP, HEDGE, OR WOODLAND
(LOW QUALITY & VALUE)

U CATEGORY TREE, GROUP, HEDGE, OR WOODLAND
(UNSUITABLE FOR RETENTION)

ROOT PROTECTION AREAS (RPA)
(AS DEFINED BY BS 5837:2012)

APPROXIMATE SHADING ARC
(AS DEFINED BY BS 5837:2012)

T#
SCHEDULED VETERAN TREE OR ANCIENT TREE
(AS IDENTIFIED DURING SITE SURVEY)

ANCIENT WOODLAND W/15M BUFFER
(AREA CLASSIFIED AS AN ANCIENT WOODLAND)

CONSERVATION AREA
(AREA CLASSIFIED AS A CONSERVATION AREA)

TREE PRESERVATION ORDER
(AREA COVERED BY A TREE PRESERVATION ORDER (TPO))

NATURE RESERVE
(AREA CLASSIFIED AS A NATIONAL NATURE RESERVE)

PRIORITY HABITAT
(WOOD PASTURE, TRADITIONAL ORCHARD AND PARKLAND)

ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 09)

SHEET NUMBER / REV.

60686216-ACM-XX-XX-AB-TCP-009 P03

Last saved by: BREWERJ(2025-09-09) Last Plotted: 2025-09-09
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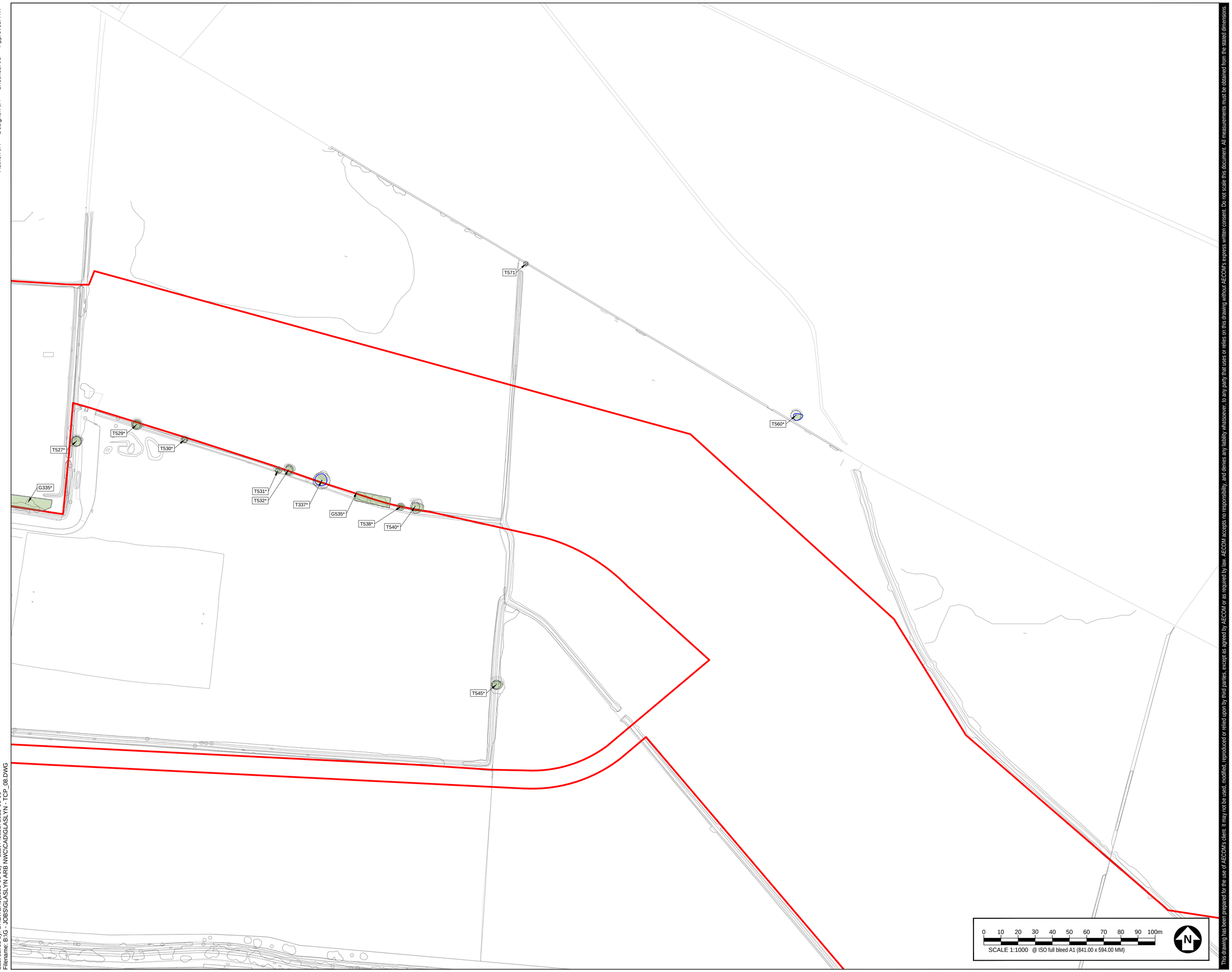
Author: JR Designer: LH Checked: JB Approved: AW



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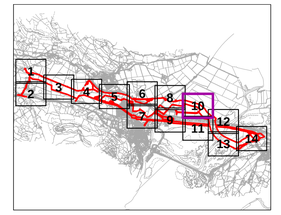

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(MODERATE QUALITY & VALUE)

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(LOW QUALITY & VALUE)

U CATEGORY TREE, GROUP, HEDGE, OR WOODLAND
(UNSUITABLE FOR RETENTION)

ROOT PROTECTION AREAS (RPA)
(AS DEFINED BY BS 5837:2012)

APPROXIMATE SHADING ARC
(AS DEFINED BY BS 5837:2012)

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(AREA CLASSIFIED AS AN ANCIENT WOODLAND)

CONSERVATION AREA
(AREA CLASSIFIED AS A CONSERVATION AREA)

TREE PRESERVATION ORDER
(AREA COVERED BY A TREE PRESERVATION ORDER [TPO])

NATURE RESERVE
(AREA CLASSIFIED AS A NATIONAL NATURE RESERVE)

PRIORITY HABITAT
(WOOD PASTURE, TRADITIONAL ORCHARD AND PARKLAND)

ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 10)

SHEET NUMBER REV.

60686216-ACM-XX-XX-AB-TCP-010 P03



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Author: JR Designer: LH Checked: JB Approved: AW

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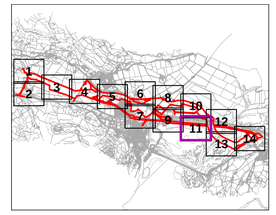

KEY

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- **SITE BOUNDARY**
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- **B CATEGORY TREE, GROUP, HEDGE, OR WOODLAND** *(MODERATE QUALITY & VALUE)*
- **C CATEGORY TREE, GROUP, HEDGE, OR WOODLAND** *(LOW QUALITY & VALUE)*
- **U CATEGORY TREE, GROUP, HEDGE, OR WOODLAND** *(UNSUITABLE FOR RETENTION)*
- **ROOT PROTECTION AREAS (RPA)** *(AS DEFINED BY BS 5837:2012)*
- **APPROXIMATE SHADING ARC** *(AS DEFINED BY BS 5837:2012)*
- T# — **SCHEDULED VETERAN TREE OR ANCIENT TREE** *(AS IDENTIFIED DURING SITE SURVEY)*
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- **CONSERVATION AREA** *(AREA CLASSIFIED AS A CONSERVATION AREA)*
- **TREE PRESERVATION ORDER** *(AREA COVERED BY A TREE PRESERVATION ORDER [TPO])*
- **NATURE RESERVE** *(AREA CLASSIFIED AS A NATIONAL NATURE RESERVE)*
- **PRIORITY HABITAT** *(WOOD PASTURE, TRADITIONAL ORCHARD AND PARKLAND)*

ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

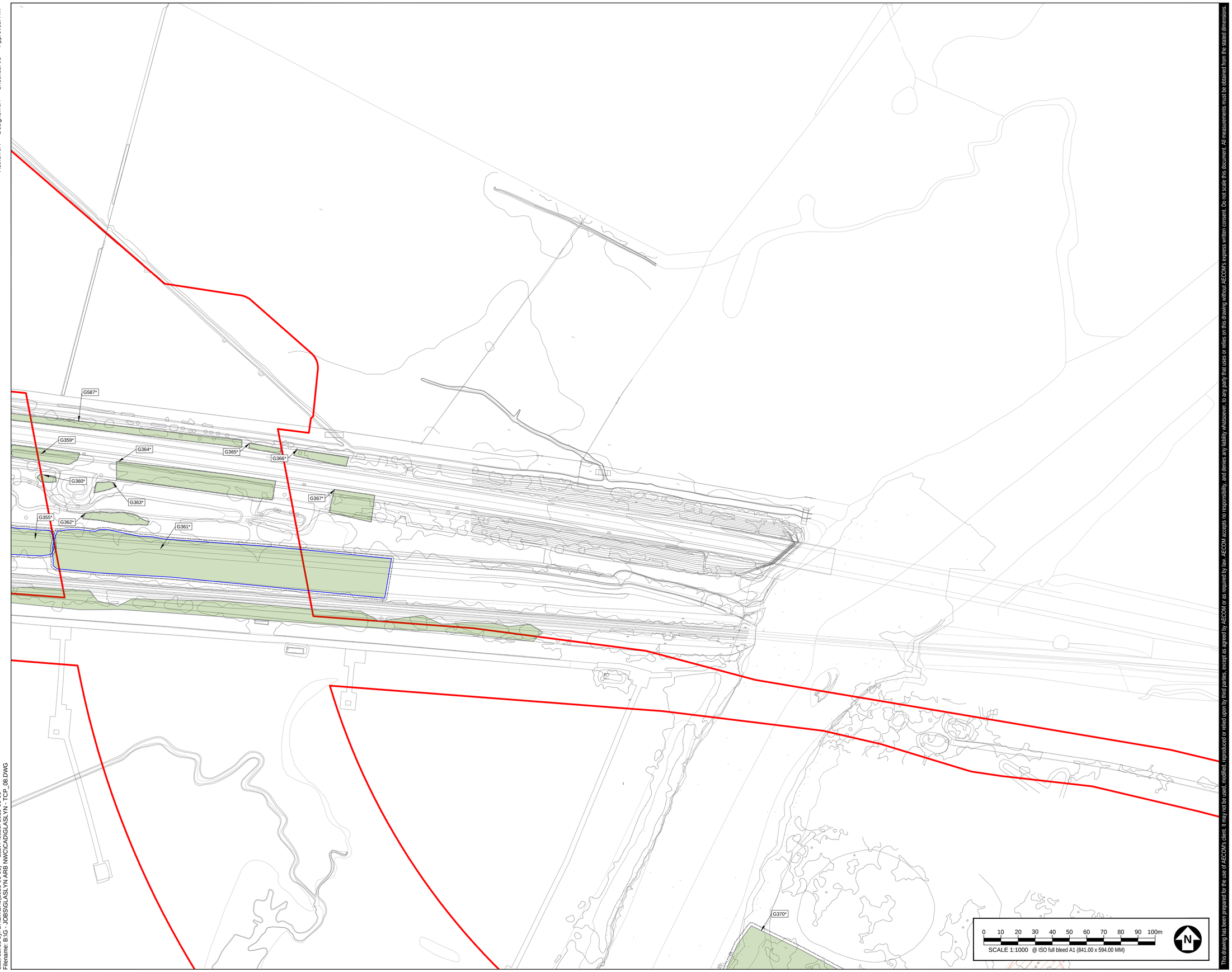
SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 11)

SHEET NUMBER **REV.**

60686216-ACM-XX-XX-AB-TCP-011 P03

Author: JR Designer: LH Checked: JB Approved: AW



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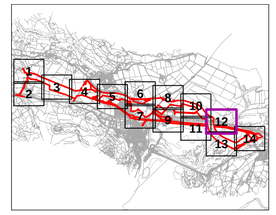
KEY PLAN



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APPROXIMATE SHADING ARC
(AS DEFINED BY BS 5837:2012)

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(AREA CLASSIFIED AS AN ANCIENT WOODLAND)

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(AREA CLASSIFIED AS A CONSERVATION AREA)

TREE PRESERVATION ORDER
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NATURE RESERVE
(AREA CLASSIFIED AS A NATIONAL NATURE RESERVE)

PRIORITY HABITAT
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ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 12)

SHEET NUMBER **REV.**

60686216-ACM-XX-XX-AB-TCP-012 P03

Author: JR Designer: LH Checked: JB Approved: AW



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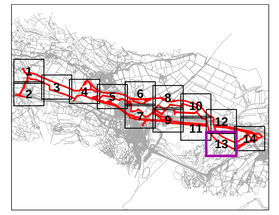
   GLAS-ARUP-ZZ-XX-M2-X-1111_MPNL Topography.dwg

KEY PLAN



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ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 13)

SHEET NUMBER / REV.

60686216-ACM-XX-XX-AB-TCP-013 P03

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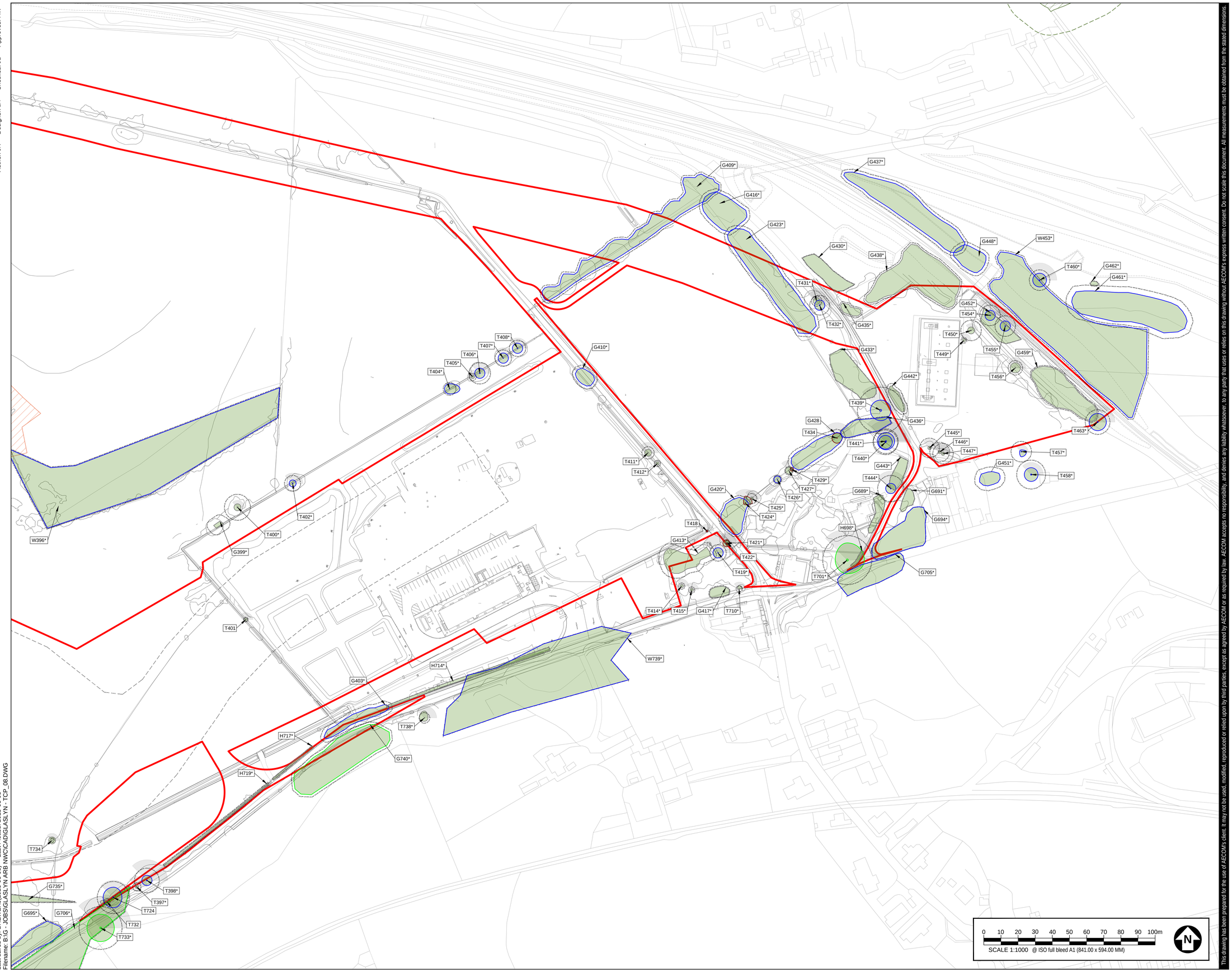
Author: JR Designer: LH Checked: JB Approved: AW



0 10 20 30 40 50 60 70 80 90 100m

SCALE 1:1000 @ ISO full bleed A1 (841.00 x 594.00 MM)

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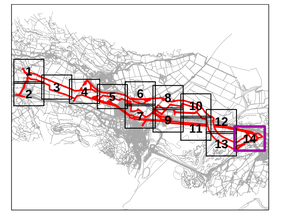
KEY PLAN



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ISSUE/REVISION

P03	11.04.25	RLB UPDATE
P02	19.11.24	TREE AMENDS TO MATCH TOPO SURVEY
P01	29.05.24	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 14)

SHEET NUMBER / REV.

60686216-ACM-XX-XX-AB-TCP-014 P03

Last saved by: BREWERJ (2025-08-08) Last Plotted: 2025-08-08
Filename: B:\G - JOBS\GLASLYN ARB NWC\CAD\GLASLYN - TCP_08.DWG

Appendix B Tree Survey Schedule

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T1	Sycamore (*Acer pseudoplatanus*)	12	600,400	4	4	4	4	2.0/N	2	Good	M	Fair		Sever ivy (< 12 months)		20+	B1
T2	Elder (*Sambucus nigra*)	4	150#	1	1	1	1	2.0/N	2	Poor	EM	Fair				10+	C1
G3	Elm (*Ulmus sp*), Hawthorn (*Crataegus monogyna*), Hazel (*Corylus avellana*), Beech (Fagus sylvatica), Cherry Laurel (Prunus laurocerasus)	8	250	2	2	2	2	n/a	0	Good - Poor	Y-SM	Good - Poor			Retained with incursion	10+	C2
G4	Sycamore (*Acer pseudoplatanus*)	10	400	3	3	3	3	n/a		Good	M	Fair				20+	B2
T5	Sycamore (*Acer pseudoplatanus*)	6	350	3	3	3	3	3.0/N	2	Fair	SM	Fair				10+	C1
T6	Elm (*Ulmus sp*)	10	490	5	5	6	5	1.0/S	2	Good	SM	Good	Dominant in thicket.			20+	B1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T7	*Common Oak (Quercus robur)*	4	200	2	2	2	2	3.0/N	2	Fair	SM	Fair				10+	C1
T8	Sycamore (*Acer pseudoplatanus*)	20	550#	5	5	5	2	2.0/N	5	Good	EM	Good	No access to base. Good amenity value to residential area north.		Retained with incursion	40+	A2
G9	Sycamore (*Acer pseudoplatanus*), Beech (*Fagus sylvatica*), Hazel (*Corylus avellana*)	12	400	3	3	3	3	n/a	1	Good - Fair	Y-EM	Good - Fair	Bamboo as understory.			20+	B1,2
G10	Sycamore (*Acer pseudoplatanus*)	14	<500#	4	4	4	4	n/a	4	Good	EM	Good	Two trees in immediate proximity.		Retained with incursion	20+	B1,2
T11	Sycamore (*Acer pseudoplatanus*)	4	100#	1	1	1	1	2.0/N	2	Fair	SM	Fair				10+	C1
G12	Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*)	14	350	2	2	2	2	n/a	0	Good - Fair	EM-M	Good - Fair			Retained with incursion	20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T13	Sycamore (*Acer pseudoplatanus*)	15	650	6	4	4	4	2.0/N	4	Fair	M	Fair	No access to base. Dieback of central crown apices, scaffold limb with potential bark stripping visible, if confirmed likely grey squirrels. Minor to moderate crown sparsity.		Retained with incursion	20+	B1
T14	Sycamore (*Acer pseudoplatanus*)	12	400	2	4	2	4	2.0/S	4	Fair	EM	Good	No access. Moderate basal epicormic development. Dense ivy beginning to shroud crown.	Sever ivy (< 12 months)	Retained with incursion	20+	B1
W15	Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*)	15	500	4	4	4	4	n/a		Good - Fair	EM-M	Good - Fair				20+	B2,3
T16	Ash (*Fraxinus excelsior*)	3	350#	3	3	3	3	3.0/N	2	Fair	EM	Fair	Topped at circa 2m.			10+	C1
T17	Sessile Oak (*Quercus petraea*)	20	1100#	4	8	1	8	2.0/S	4	Good	M	Fair	No access to base due to brambles, slope and barbed wire. Dense ivy across stem limiting		Retained with incursion	40+	A1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													visibility. Previous failure of second order stem south at circa 6m, vigorous regrowth, highly limited visibility. Similar failure likely at circa 3m north.				
T18	Ash (*Fraxinus excelsior*)	9	300	2	3	2	2	2.0/E	4	Fair	SM	Good				10+	C1
T19	Ash (*Fraxinus excelsior*)	8	400	3	3	6	3	2.0/E	4	Fair	M	Fair			Retained with incursion	20+	B1
T20	Common Oak (*Quercus robur*)	6	500	4	4	4	4	2.0/E	4	Fair	M	Fair	Storm damage lost leader		Retained with incursion	10+	C1
G21	Leyland Cypress (*X Cupressocyparis leylandii*)	5	150	2	2	2	2	n/a		Fair	EM	Fair				10+	C1
G22	Sycamore (*Acer pseudoplatanus*), Sweet Chestnut (*Castanea sativa*), Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*), Ash (*Fraxinus*	20	1000	5	5	5	5	n/a	0	Good	Y-M	Good - Fair			Retained with incursion	40+	A2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	excelsior), Lime (*Tilia sp*)																
T23	Sycamore (*Acer pseudoplatanus*)	4	100#	1	1	1	1	1.0/N	2	Fair	SM	Fair				10+	C1
T24	Common Oak (*Quercus robur*)	10	330,620	8	2	8	5	1.0/SE	4	Good	M	Good			Retained with incursion	40+	A2
T25	Sycamore (*Acer pseudoplatanus*)	7	280	2	2	2	2	2.0/N	2	Fair	SM	Fair				10+	C1
T26	Sessile Oak (*Quercus petraea*)	13	820	10	4	8	5	3.0/E	2	Good	M	Good	Ivy beginning to shroud crown.	Sever ivy (< 12 months)	Retained with incursion	40+	A1
T27	Sessile Oak (*Quercus petraea*)	4	1000#	2	8	2	2		0	Good	V	Good - Poor	Windthrow oak on ground. Phoenix growth throughout appears healthy. Large amount of deadwood and cavities throughout stem and major branches.			20+	B2,3
T28	Sessile Oak (*Quercus petraea*)	13	1410#	10	10	10	10	2.0/S	2	Fair	M	Good	Significant for species. Crown with significant gaps, retained limbs in upper crown with			40+	A1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													moderate to high bud density. Minor to moderate deadwood. Moderate lower crown development, potential crown retrenchment due to symptoms of lower stem and dysphotic zone epicormic development.				
W29	Willow (Salix sp), Ash (Fraxinus sp), Sessile Oak (*Quercus petraea*), Beech (*Fagus sylvatica*)	16	400	3	3	3	3	n/a	0	Good - Fair	Y-M	Good - Fair			Retained with incursion	20+	B2,3
T30	Hawthorn (*Crataegus monogyna*)	5	230,220#	2	2	2	2	2.0/N	2	Good	M	Good				20+	B1
T31	English Elm (*Ulmus procera*)	8	250	3	3	3	3	2.0/S	2	Fair	EM	Fair				10+	C1
W32	Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*), Elm (*Ulmus sp*), Sessile Oak (*Quercus petraea*), Holly (*Ilex aquifolium*)	20	750	6	6	6	6	n/a	0	Good - Fair	SM-M	Good - Fair	Laurel understory and low over track with preliminary management to crown lift. Some trees in group with cavities, low retaining wall of circa 600mm		Retained with incursion	40+	A2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													especially to south (meeting ground level as it extends north).				
G33	Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*), Corsican Pine (*Pinus nigra `maritima´*), Scots Pine (*Pinus sylvestris*), Holly (*Ilex aquifolium*), Yew (*Taxus baccata*), Douglas Fir (*Pseudotsuga menziesii*), Box (*Buxus sempervirens*)	20	500	4	4	4	4	n/a	0	Good - Fair	Y-M	Good - Fair	Pine dominant overstory. Rhododendron understory.		Retained with incursion	40+	A2
G34	Holly (*Ilex aquifolium*), Beech (*Fagus sylvatica*), Hazel (*Corylus avellana*), Yew (*Taxus baccata*)	10	250	2	2	2	2	n/a	0	Good - Fair	Y-SM	Good - Fair		Fell beech succeeding oak in mid canopy.	Retained with incursion	10+	C2
G35	Sycamore (*Acer pseudoplatanus*), Silver Birch (*Betula pendula*), Hawthorn (*Crataegus monogyna*), Sessile Oak (*Quercus petraea*), Holly (*Ilex aquifolium*), Ash (*Fraxinus excelsior*)	5	150	2	2	2	2	n/a	0	Good - Fair	Y-SM	Good - Fair				10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T36	Sycamore (*Acer pseudoplatanus*)	10	670,480,220	7	7	5	7	1.0/N	2	Good	M	Good			Retained with incursion	40+	A2
W38	Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*), Crack Willow (*Salix fragilis*), Norway Maple (*Acer platanoides*), Beech (*Fagus sylvatica*), Elm (*Ulmus sp*), Hazel (*Corylus avellana*)	8	350	2	2	2	2	n/a	0	Good - Fair	Y-EM	Good - Fair			Retained with incursion	40+	A2
T39	Common Oak (*Quercus robur*)	17	1080#	8	5	8	8	2.0/N	2	Good	V	Fair	Large volume of deadwood from collapsed branches scattered around base. Large tear out wound on east side at ca. 4 m. Hollowing visible. Old wound almost entirely occlude at ca. 6 m on central stem. Large buttressing roots suggests internal decay. Large amount of dead branch ends from apparent retrenchment.			40+	A1,3
T40	Sessile Oak (*Quercus petraea*)	17	1480	10	10	10	10	3.0/S	5	Fair	V	Good	Significant for species. Dieback of upper crown -	Suggest further inspection to ascertain the species of the	Retained with incursion	40+	A3

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													significant deviation in branching pattern with poor bud density. Extensive epicormic regeneration across entire branching structure, likely previous dysphotic zone now with increased light levels. Ferns across branching structure. Major deadwood extensive throughout crown. Numerous branch collars with cavities and significant adaptive swelling and Woundwood. Unidentified fungal brackets observed in lower dead branches southwest. Possible beefsteak fungus (*Fistulina hepatica) or* oak polypore (*Piptoporus quercinus*)	unidentified fungus. Fruiting occurs in July / August.			

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													which is listed on Schedule 8 of the Wildlife and Countryside Act 1981.				
T41	Sessile Oak (*Quercus petraea*)	18	1200	5	4	4	7	5.0/N	3	Good	M	Good	Lean north. Normal amount of deadwood for species and age.			40+	A2,3
T42	Beech (*Fagus sylvatica*)	20	1180	13	10	12	8	5.0/S	5	Good	M	Good	Dominant in canopy, significant for species.		Retained with incursion	40+	A1
W43	Hybrid black poplar (*Populus x canadensis*), Leyland Cypress (*X Cupressocyparis leylandii*), Crack Willow (*Salix fragilis*), Cherry Laurel (*Prunus laurocerasus*)	20	600	4	4	4	4	n/a	0	Good - Fair	SM-M	Good - Fair			Fell in part as per Tree Protection Plan, with RPA incursion	20+	B2,3
G44	Cherry Laurel (*Prunus laurocerasus*)	4	200	3	3	3	3	n/a		Fair	M	Fair			Fell in part as per TPP	10+	C2
T45	Sessile Oak (*Quercus petraea*)	15	1000#	5	6	10	2	2.0/N	1	Good	M	Good	Limited access to base. Subdominant with oak west. Major deadwood and bark scars/bark loss throughout crown. Central stem with dieback. Surrounding		Retained with incursion	40+	A1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													crown with normal vitality.				
W46	Goat Willow (*Salix caprea*), Hybrid black poplar (*Populus x canadensis*), Hawthorn (*Crataegus monogyna*), Common Alder (*Alnus glutinosa*), Sitka Spruce (*Picea sitchensis*), Sycamore (*Acer pseudoplatanus*), Grey willow (*Salix cinerea*), Western Red Cedar (*Thuja plicata*), Norway Maple (*Acer platanoides*), Elder (*Sambucus nigra*)	20	750	4	4	4	4	n/a	0	Good - Poor	Y-M	Good - Poor			Fell in part as per TPP	20+	B1,2
T47	Goat Willow (*Salix caprea*)	8	330#	2	2	2	2	2.0/W	3	Fair	M	Fair			Retained with incursion	10+	C1
T48	Sycamore (*Acer pseudoplatanus*)	7	940	3	2	2	3	2.0/W	3	Fair	V	Poor	Stem previously topped/failed at circa 3m, hollow cavity with multiple openings to ground level, stem almost entirely hollow, functional units likely west and north.	Halo thin laurel around crown and sever ivy. (< 3 months)	Retained with incursion	40+	A3

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													Kretzschmaria deusta at base west.				
T49	Sycamore (*Acer pseudoplatanus*)	15	850	5	6	8	2	2.0/SE	5	Good	M	Good	No access. Dominant in canopy. Failed tree hung up in mid crown north.			40+	A1
G50	Goat Willow (*Salix caprea*)	8	400	3	3	3	3	n/a		Fair	M	Fair - Poor				10+	C2
G51	Goat Willow (*Salix caprea*)	5	220	2	2	2	2	n/a		Fair	EM-M	Fair				10+	C2
G52	Common Oak (*Quercus robur*), Silver Birch (*Betula pendula*), Western Red Cedar (*Thuja plicata*)	15	600	5	5	5	5	n/a	0	Good - Fair	SM-M	Good - Fair				20+	B2,3
G53	Silver Birch (*Betula pendula*), Grey willow (*Salix cinerea*)	10	350	2	2	2	2	n/a	2	Good	SM-EM	Fair			Fell	20+	B2
G54	Silver Birch (*Betula pendula*), Common Alder (*Alnus glutinosa*)	9	400	3	3	3	3	n/a	1	Good - Fair	SM-M	Good - Fair				20+	B2
T55	Sycamore (*Acer pseudoplatanus*)	6	140	1	1	1	1	1.0/S	1	Fair	SM	Fair				10+	C1
G56	Goat Willow (*Salix caprea*), Ash (*Fraxinus excelsior*)	7	350	3	3	3	3	n/a	0	Good - Fair	EM-M	Good - Fair	Mostly young to mature willows with one ash		Fell	20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T57	Sycamore (*Acer pseudoplatanus*)	6	240	2	2	2	2	1.0/S	1	Fair	EM	Fair				10+	C1
T58	Sycamore (*Acer pseudoplatanus*)	6	240	2	2	2	2	1.0/S	1	Fair	EM	Fair				10+	C1
G59	Sycamore (*Acer pseudoplatanus*)	10	550	3	3	3	3	n/a		Good - Fair	M	Good - Fair				20+	B2
G60	Sycamore (*Acer pseudoplatanus*)	10	550	3	3	3	3	n/a		Good - Fair	M	Good - Fair			Retained with incursion	20+	B2
G61	Sycamore (*Acer pseudoplatanus*), Hawthorn (*Crataegus monogyna*), Common Alder (*Alnus glutinosa*)	10	500	3	3	3	3	n/a	3	Good - Dead	M	Good - Dead	One dead and one severely declining sycamore in the centre of group.		Fell	20+	B2
T62	Sycamore (*Acer pseudoplatanus*)	6	500#	1	5	4	4	2.0/E	2	Fair	EM	Fair - Poor	No access to the base due to flooded ground. Basal cavity visible north, Eiffel Tower buttressing. Cavity with throughline east to west. Visually extensive although unknown total extent. Co to subdominant in canopy north. Two dead third order limbs		Fell	20+	B3

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													south at circa 4m.				
T63	Sycamore (*Acer pseudoplatanus*)	10	550#	3	4	5	4		2	Good	EM	Fair	No access due to flooded ground. Cavity visible southeast, circa 150 mm x 150 mm. Visual depth of around 200 mm. Unlikely to be extensive.		Fell	20+	B3
W64	Sycamore (*Acer pseudoplatanus*), Silver Birch (*Betula pendula*), Beech (*Fagus sylvatica*), Common Oak (*Quercus robur*), Wild Cherry (*Prunus avium*)	15	<500#	3	3	3	3	n/a	0	Good - Dead	Y-M	Good - Poor	Beech and birch high forest, two snags within. Rhododendron field layer.		Retained with incursion	40+	A2
T65	Sycamore (*Acer pseudoplatanus*)	7	450	3	3	3	3	1.0/W	1	Fair	SM	Fair			Retained with incursion	20+	B1
W66	Sycamore (*Acer pseudoplatanus*), Silver Birch (*Betula pendula*), Scots Pine (*Pinus sylvestris*), Common Alder (*Alnus glutinosa*), Larch (*Larix sp*), Beech (*Fagus sylvatica*), Sessile Oak (*Quercus petraea*), Holly	15	600	3	3	3	3	n/a	0	Good - Fair	Y-M	Good - Fair	Irregular wood copse, alder dominant. Wetland habitat surrounding.			40+	A2

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	(*Ilex aquifolium*), Yew (*Taxus baccata*)																
G67	Common Alder (*Alnus glutinosa*)	8	300	2	2	2	2	n/a	0	Good	M	Fair			Fell in part as per TPP	20+	B2
T68	Common Alder (*Alnus glutinosa*)	7	350,250,200	4	4	4	4	3.0/N	2	Good	M	Good			Fell	20+	B2
T69	Sycamore (*Acer pseudoplatanus*)	7	150	2	2	2	2	1.0/N	2	Fair	SM	Fair	Dead			<10	U1
G70	Crack Willow (*Salix fragilis*), Common Alder (*Alnus glutinosa*)	6	400	3	3	3	3	n/a	0	Fair	M	Fair			Retained with incursion	20+	B2
T71	Crack Willow (*Salix fragilis*)	5	600#	2	3	4	2		0	Good	V	Fair - Poor	Large snapped branch from west. Cavity at base on stream side - unable to assess.		Retained with incursion	20+	B2,3
T72	Sycamore (*Acer pseudoplatanus*)	7	402	2	2	2	2	1.0/N	2	Fair	SM	Fair	5 stems ca 180 mm. Three stems failed and on ground with apparent butt rot.		Retained with incursion	10+	C1
W73	Beech (*Fagus sylvatica*), Sycamore (*Acer pseudoplatanus*)	18	600	4	4	4	4	n/a	1	Good - Fair	SM-M	Good - Fair	Regular structure high forest, no understory re-initiation.		Fell in part as per TPP	40+	A2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
W74	Sycamore (*Acer pseudoplatanus*), Silver Birch (*Betula pendula*), Elm (*Ulmus sp*), Elder (*Sambucus nigra*), Hawthorn (*Crataegus monogyna*), Grey willow (*Salix cinerea*), Common Alder (*Alnus glutinosa*), Scots Pine (*Pinus sylvestris*)	15	300	2	2	2	2	n/a	0	Good - Dead	Y-SM	Good - Poor	Bamboo present. One dead mature pine southwest, considered low target occupancy, low risk.	Reduce dead mature pine to circa 5m above ground level if risk exceeds risk tolerance.		20+	B2
T75	Hawthorn (*Crataegus monogyna*)	4	120	1	1	1	1	1.0/N	2	Fair	EM	Fair	7 stems 80 mm and one 120 240 dbh = 2.9 rpa		Fell	10+	C1
T76	Hawthorn (*Crataegus monogyna*)	4	252	1	1	1	1	1.0/N	2	Fair	EM	Fair	8 x 80 mm stem plus one 120		Fell	10+	C1
T77	Austrian Pine (*Pinus nigra*)	17	900#	8	8	5	8	8.0/W	10	Fair	M	Good	No access to base. Moderate leaf sparsity. Major deadwood in mid to lower crown, likely natural branch shedding.			40+	A1
G78	Sycamore (*Acer pseudoplatanus*)	5	170	2	2	2	2	n/a		Fair	SM	Fair			Fell in part as per TPP	10+	C2
T79	Goat Willow (*Salix caprea*)	5	250	2	2	2	2	1.0/N	2	Fair	M	Fair				10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T80	Common Oak (*Quercus robur*)	6	650	3	3	3	3	2.0/W	2	Good	M	Fair				20+	B1
T81	Common Alder (*Alnus glutinosa*)	8	500	3	3	3	3	1.0/E	2	Good	M	Fair			Fell	20+	B1
T82	Common Alder (*Alnus glutinosa*)	6	500	3	3	3	3	1.0/E	2	Good	M	Fair			Fell	10+	C1
T83	Common Oak (*Quercus robur*)	7	400	3	3	3	3	2.0/E	2	Good	M	Fair			Fell	20+	B1
T84	Goat Willow (*Salix caprea*)	5	400	2	2	2	2	1.0/E	2	Good	M	Fair			Fell	10+	C1
T85	Common Alder (*Alnus glutinosa*)	9	550	3	3	3	3	4.0/S	2	Good	M	Fair			Fell	20+	B1
T86	Common Alder (*Alnus glutinosa*)	6	450	2	2	2	2	1.0/W	2	Fair	M	Fair			Fell	10+	C1
T87	Common Oak (*Quercus robur*)	5	250	2	2	2	2	1.0/W	2	Good	M	Fair			Fell	10+	C1
H88	Hawthorn (*Crataegus monogyna*)	4	120	1	1	1	1	n/a		Fair - Poor	EM-M	Fair - Poor				10+	C1
T89	Common Oak (*Quercus robur*)	7	500	3	3	3	3	4.0/E	4	Good	M	Fair			Fell	20+	B1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T90	Common Alder (*Alnus glutinosa*)	7	300	2	2	2	2	2.0/E	2	Fair	M	Fair			Fell	10+	C1
G91	Common Alder (*Alnus glutinosa*)	5	350	2	2	2	2	n/a		Fair	EM-M	Fair			Fell	10+	C2
T92	Common Alder (*Alnus glutinosa*)	7	300	2	2	2	2	1.0/E	2	Fair	M	Fair			Fell	10+	C1
T93	Common Alder (*Alnus glutinosa*)	4	130	1	1	1	1	1.0/E	1	Fair	SM	Fair			Fell	10+	C1
T94	Common Oak (*Quercus robur*)	5	400	1	1	3	1	2.0/E	2	Poor	M	Fair				10+	C1
T95	Common Alder (*Alnus glutinosa*)	5	300	2	2	2	2	2.0/E	2	Poor	M	Fair			Fell	10+	C1
W96	Silver Birch (*Betula pendula*), Hawthorn (*Crataegus monogyna*), Beech (*Fagus sylvatica*)	15	400	3	3	3	3	n/a	2	Good - Dead	Y-M	Good - Dead			Fell in part as per TPP	20+	B1,2
T97	Common Alder (*Alnus glutinosa*)	5	300	2	2	2	2	2.0/E	2	Poor	M	Fair			Fell	10+	C1
G98	Common Alder (*Alnus glutinosa*)	5	250	2	2	2	2	n/a		Fair	M	Fair			Fell	10+	C2
G99	Common Alder (*Alnus glutinosa*), Goat Willow (*Salix caprea*)	5	250	2	2	2	2	n/a		Fair - Poor	M	Fair			Fell	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T100	Common Oak (*Quercus robur*)	6	550	2	2	6	2	2.0/E	2	Good	M	Fair			Fell	20+	B1
G101	Common Alder (*Alnus glutinosa*), Silver Birch (*Betula pendula*)	7	300	2	2	2	2	n/a		Good - Fair	EM-M	Good - Fair			Fell in part as per TPP	20+	B2
G102	Goat Willow (*Salix caprea*), Common Oak (*Quercus robur*)	4	150	2	2	2	2	n/a		Fair	SM-M	Fair			Retained with incursion	10+	C2
G103	Goat Willow (*Salix caprea*)	4	150	2	2	2	2	n/a		Fair	EM-M	Fair			Retained with incursion	10+	C2
T104	Common Oak (*Quercus robur*)	4	120	2	2	2	2	1.0/E	1	Good	SM	Fair				10+	C1
T105	Common Alder (*Alnus glutinosa*)	8	500#	2	2	2	2	2.0/S	2	Good	V	Fair - Poor	Previous failure of crown. Cavity to stem. Extensive cavity.			40+	A3
T106	Common Oak (*Quercus robur*)	4	120	1	1	1	1	1.0/E	1	Good	SM	Fair				10+	C1
G107	Common Alder (*Alnus glutinosa*), Ash (*Fraxinus excelsior*)	7	120	2	2	2	2	n/a		Fair	SM-EM	Fair				10+	C2
G108	Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*), Hawthorn (*Crataegus monogyna*)	6	300	2	2	2	2	n/a	0	Good - Fair	Y-SM	Good - Fair	Sparse sycamore overstory with sparse hawthorn and gorse understory.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T109	Ash (*Fraxinus excelsior*)	10	250,300,330	1	3	3	3	2.0/N	3	Poor	SM	Fair - Poor	No access. Significant dieback, mass of vertical epicormic shoots in previous likely dysphotic zone, severe symptoms of ash dieback.	Fell (< 3 months)		<10	U1
T110	Ash (*Fraxinus excelsior*)	4	160#	1	1	1	1	2.0/N	1	Fair	SM	Fair			Retained with incursion	10+	C1
T111	Ash (*Fraxinus excelsior*)	7	200#	1	1	2	1	3.0/E	4	Poor	SM	Fair - Poor	No access. Significant crown dieback, dense ivy across stem and second order limbs.	Fell (< 3 months)		<10	U1
G112	Common Alder (*Alnus glutinosa*), Ash (*Fraxinus excelsior*)	12	400	2	2	2	2	n/a	1	Good - Fair	SM-M	Good - Fair				20+	B1,2
T113	Sycamore (*Acer pseudoplatanus*)	5	210#	1	1	1	1	1.0/E	1	Good	SM	Good				10+	C1
T114	Common Oak (*Quercus robur*)	4	160#	1	1	1	1	1.0/N	1	Fair	SM	Good				10+	C1
T115	Sycamore (*Acer pseudoplatanus*)	6	250,150,100, 200#	2	2	2	2	2.0/S	1	Poor	SM	Poor				10+	C1
T116	Common Oak (*Quercus robur*)	6	300	2	2	2	2	1.0/N	1	Poor	M	Fair				10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G117	Sycamore (*Acer pseudoplatanus*), Hawthorn (*Crataegus monogyna*)	5	200	2	2	2	2	n/a	0	Good - Dead	EM	Good - Poor	Two dead young trees, low risk.	Fell dead young trees. (< 3 months)		10+	C2
G118	Common Alder (*Alnus glutinosa*), Sycamore (*Acer pseudoplatanus*)	7	391	4	4	4	4	n/a	1	Fair	M	Fair				10+	C2
G119	Hawthorn (*Crataegus monogyna*)	3	140	1	1	1	1	n/a		Fair	M	Fair				10+	C2
T120	Grey willow (*Salix cinerea*)	3	316	2	2	2	2		0	Good	SM	Good	Regenerating from stump 10 stems 100 mm			10+	C2
T121	Ash (*Fraxinus excelsior*)	4	110#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T122	Ash (*Fraxinus excelsior*)	7	400	4	4	4	4	1.0/N	1	Good	M	Good	Ivy clad.			20+	B1
T123	Hawthorn (*Crataegus monogyna*)	4	100	1	1	1	1	1.0/N	1	Fair	M	Fair				20+	B1
G124	Common Oak (*Quercus robur*)	9	450	3	3	3	3	n/a		Good	M	Fair				20+	B2
H125	Privet (Ligustrum ovalifolium), Hawthorn (*Crataegus monogyna*), Lawson Cypress (*Chamaecyparis lawsoniana*)	4	150	1	1	1	1	n/a	0	Fair	M	Fair			Fell in part as per TPP	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T126	Common Oak (*Quercus robur*)	8	450	3	3	3	3	2.0/S	1	Fair	M	Fair				20+	B1
H127	Grey willow (*Salix cinerea*), Hawthorn (*Crataegus monogyna*), Silver Birch (*Betula pendula*), Common Oak (*Quercus robur*), Crack Willow (*Salix fragilis*), Goat Willow (*Salix caprea*), Blackthorn (*Prunus spinosa*)	4	250	1	1	1	1	n/a	0	Good	SM-EM	Good - Fair	Trees predominantly topped beneath powerlines		Fell in part as per TPP	10+	C2
T128	Sessile Oak (*Quercus petraea*)	13	450#	6	6	6	6	3.0/N	2	Good	EM	Good				20+	B2
G129	Goat Willow (*Salix caprea*), Common Oak (*Quercus robur*), Common Alder (*Alnus glutinosa*)	8	550	2	2	2	2	n/a	2	Good - Poor	SM	Fair - Poor				20+	B2
G130	European Larch (Larix decidua), Silver Birch (*Betula pendula*), Lawson Cypress (*Chamaecyparis lawsoniana*), Holly (*Ilex aquifolium*), Sessile Oak (*Quercus petraea*), Grey willow (*Salix cinerea*), Hawthorn (*Crataegus*	9	250	2	2	2	2	n/a	0	Good	SM	Good - Fair	Lawson cypress dominant.		Fell in part as per TPP	20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	monogyna), Blackthorn (*Prunus spinosa*)																
T131	Sessile Oak (*Quercus petraea*)	7	420#	8	3	8	3	2.0/N	5	Fair	EM	Fair	Broad squat form, asymmetrical crown development with high bud density.			20+	B1
T132	Sessile Oak (*Quercus petraea*)	12	830	8	5	8	5	2.0/SE	2	Good	M	Good	Significant future potential.			40+	A1
G133	European Larch (Larix decidua), Silver Birch (*Betula pendula*), Lawson Cypress (*Chamaecyparis lawsoniana*)	9	250	2	2	2	2	n/a	0	Good	SM	Good - Fair	Lawson cypress dominant.			20+	B2
G134	Grey willow (*Salix cinerea*), Common Alder (*Alnus glutinosa*), Sessile Oak (*Quercus petraea*), Hawthorn (*Crataegus monogyna*)	10	450	3	3	3	3	n/a	0	Good	Y-SM	Good - Fair				20+	B1,2
G135	Grey willow (*Salix cinerea*), Sycamore (*Acer pseudoplatanus*), Common Alder (*Alnus glutinosa*)	7	300	2	2	2	2	n/a	2	Fair	EM-M	Fair				20+	B2
G136	Common Alder (*Alnus glutinosa*), Grey willow (*Salix cinerea*), Sessile Oak (*Quercus*	5	<80#	1	1	1	1	n/a	0	Good	Y	Good	Scrub / thicket.		Fell in part as per TPP	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	petraea), Silver Birch (*Betula pendula*)																
G137	Grey willow (*Salix cinerea*), Hawthorn (*Crataegus monogyna*), Hazel (*Corylus avellana*)	5	320	2	2	2	2	n/a	0	Fair	SM-M	Fair			Fell in part as per TPP	10+	C2
T138	Holly (*Ilex aquifolium*)	6	350#	4	4	4	4	2.0/SW	2	Good	M	Good			Fell	40+	A1
T139	Hawthorn (*Crataegus monogyna*)	5	250	3	2	3	2	2.0/N	1	Good	M	Good	No access. Ivy across main stem.		Fell	20+	B1
T140	Grey willow (*Salix cinerea*)	7	380	8	1	5	2	1.0/S	2	Good	M	Fair	Lean north, likely positive phototropism.		Fell	20+	B1
G141	Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Common Oak (*Quercus robur*)	4	120	1	1	1	1	n/a	0	Fair	Y-M	Fair			Fell	20+	B2
T142	Sessile Oak (*Quercus petraea*)	10	500	3	7	3	3	1.0/S	1	Fair	EM	Good	No access to base. Ivy across main stem and second order limbs. Moderate crown gaps, moderate retained bud density, overall branching			20+	B1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													pattern normal.				
G143	Goat Willow (*Salix caprea*), Common Alder (*Alnus glutinosa*)	6	350	3	3	3	3	n/a	0	Good - Fair	M	Fair	Willow failed. Alder has tip dieback.		Fell	<10	U2
G144	Common Oak (*Quercus robur*), Goat Willow (*Salix caprea*)	5	400	3	3	3	3	n/a		Fair - Poor	M	Fair				10+	C2
G145	Grey willow (*Salix cinerea*), Hawthorn (*Crataegus monogyna*)	4	100	2	2	2	2	n/a	0	Good	Y-SM	Good - Fair			Fell	10+	C2
T146	Goat Willow (*Salix caprea*)	4	150	1	1	1	1	1.0/S	1	Fair	SM	Fair				10+	C1
T147	Hawthorn (*Crataegus monogyna*)	5	250,200#	3	3	3	3	1.5/W	1	Good	SM	Good	No access. Dominant in group. Ivy beginning to shroud crown.	Sever ivy (< 12 months)	Fell	20+	B1
T148	Common Oak (*Quercus robur*)	5	400	3	1	3	1	1.0/S	1	Fair	EM	Fair			Fell	10+	C1
T149	Sessile Oak (*Quercus petraea*)	5	150,250,200#	4	2	5	3	1.0/W	1	Good	SM	Good	No access. Squat broad form.		Fell	20+	B1
G150	Common Alder (*Alnus glutinosa*), Hawthorn (*Crataegus monogyna*), Common Oak (*Quercus robur*)	6	250	2	2	2	2	n/a	0	Fair	M	Fair			Fell	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G151	Hawthorn (*Crataegus monogyna*)	4	150	2	2	2	2	n/a		Fair	M	Fair			Fell	10+	C2
T152	Holly (*Ilex aquifolium*)	4	220,220#	1	1	1	1	1.0/S	1	Good	SM	Good			Fell	10+	C1
T153	Common Oak (*Quercus robur*)	5	220#	2	2	2	2	1.0/E	1	Good	SM	Fair			Fell	10+	C1
T154	Common Alder (*Alnus glutinosa*)	4	340	2	2	2	2	1.0/S	1	Poor	M	Poor			Fell	10+	C1
G155	Common Alder (*Alnus glutinosa*), Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*)	6	<650#	3	3	3	3	n/a	0.5	Good - Fair	SM-M	Fair			Fell in part as per TPP	20+	B2
G156	Hawthorn (*Crataegus monogyna*), Willow (Salix sp)	4	100	1	1	1	1	n/a		Fair	Y-SM	Fair				10+	C2
G157	Hawthorn (*Crataegus monogyna*)	4	150	1	1	1	1	n/a		Fair	M	Fair				10+	C2
G158	Hawthorn (*Crataegus monogyna*), Common Alder (*Alnus glutinosa*)	5	200	2	2	2	2	n/a		Fair	SM-M	Fair			Fell	10+	C2
G159	Hawthorn (*Crataegus monogyna*), Sessile Oak (*Quercus petraea*), Goat Willow (*Salix*	6	200	2	2	2	2	n/a	0	Fair	Y-SM	Fair			Fell	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	caprea), Silver Birch (*Betula pendula*)																
G160	Hawthorn (*Crataegus monogyna*)	4	100	1	1	1	1	n/a		Fair	EM	Fair				10+	C2
G161	Hawthorn (*Crataegus monogyna*)	4	130	1	1	1	1	n/a	0	Good	Y-SM	Good			Fell	10+	C2
G162	Blackthorn (*Prunus spinosa*), Hawthorn (*Crataegus monogyna*)	4	120	1	1	1	1	n/a		Good - Fair	SM-M	Fair				10+	C2
G163	Common Oak (*Quercus robur*), Sycamore (*Acer pseudoplatanus*)	6	250	2	2	2	2	n/a		Good - Fair	EM-M	Good - Fair				20+	B2,3
T164	Ash (*Fraxinus excelsior*)	9	320,290,3#	3	3	3	3	3.0/N	1	Fair	M	Fair				10+	C1
T165	Hawthorn (*Crataegus monogyna*)	9	120#	1	1	1	1	1.0/S	1	Fair	M	Fair				10+	C1
G166	Blackthorn (*Prunus spinosa*), Hawthorn (*Crataegus monogyna*), Sycamore (*Acer pseudoplatanus*), Common Alder (*Alnus glutinosa*), Holly (*Ilex aquifolium*)	9	350	3	3	3	3	n/a	0	Good - Fair	Y-EM	Good - Fair				20+	B1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
W167	Beech (*Fagus sylvatica*), Ash (Fraxinus sp), Sycamore (*Acer pseudoplatanus*)	16	<400#	3	3	3	3	n/a	2	Good - Fair	SM-M	Good - Fair			Retained with incursion	40+	A2,3
G168	Elm (*Ulmus sp*), Ash (*Fraxinus excelsior*)	10	500	4	4	4	4	n/a		Good - Fair	EM-M	Good - Fair				20+	B2,3
G169	Common Alder (*Alnus glutinosa*), Common Oak (*Quercus robur*)	5	100	1	1	1	1	n/a		Fair	Y-SM	Fair				10+	C2
T170	Ash (*Fraxinus excelsior*)	6	100#	1	1	1	1	1.0/S	2	Poor	SM	Fair			Fell	<10	U1
G171	Hawthorn (*Crataegus monogyna*), Elder (*Sambucus nigra*)	4	150	1	1	1	1	n/a		Fair	M	Fair			Fell	10+	C2
T172	Ash (*Fraxinus excelsior*)	9	410#	3	3	3	3	2.0/S	2	Good	M	Fair			Fell	20+	B1
T173	Sycamore (*Acer pseudoplatanus*)	5	120#	1	1	1	1	1.0/S	2	Fair	SM	Fair			Fell	10+	C1
T174	Leyland Cypress (*X Cupressocyparis leylandii*)	5	150	1	1	1	1	1.0/S	2	Fair	SM	Fair			Fell	10+	C1
G175	Hawthorn (*Crataegus monogyna*), Common Oak (*Quercus robur*)	7	300	3	3	3	3	n/a		Good - Fair	Y-M	Good - Fair				20+	B2,3
G176	Hawthorn (*Crataegus monogyna*), Ash	4	130	1	1	1	1	n/a		Fair	EM-M	Fair				10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	(*Fraxinus excelsior*)																
T177	Elder (*Sambucus nigra*)	4	200	1	1	1	1	1.0/S	2	Poor	M	Poor			Fell	10+	C1
G178	Common Alder (*Alnus glutinosa*), Willow (*Salix sp*)	5	90	1	1	1	1	n/a		Fair	Y-SM	Fair				10+	C2
G179	Sycamore (*Acer pseudoplatanus*), Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*), Common Oak (*Quercus robur*)	8	500	2	2	2	2	n/a	2	Good - Fair	SM-M	Fair			Fell in part as per TPP	20+	B2,3
G180	Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*), Sycamore (*Acer pseudoplatanus*), Sessile Oak (*Quercus petraea*), Blackthorn (*Prunus spinosa*)	4	150	2	2	2	2	n/a	0	Good	SM-M	Good - Fair			Fell in part as per TPP	10+	C2
T181	Ash (*Fraxinus excelsior*)	6	100,100,90#	1	1	1	1	1.0/N	1	Poor	SM	Poor	Severe symptoms of ash dieback.		Fell	<10	U1
T182	Ash (*Fraxinus excelsior*)	7	250,250,250#	3	3	3	3	2.0/N	2	Poor	SM	Poor	Viewed from footway. Significant crown dieback.			<10	U1
G183	Hawthorn (*Crataegus monogyna*),	5	140	1	1	1	1	n/a		Fair	EM-M	Fair				10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	Blackthorn (*Prunus spinosa*)																
T184	Common Oak (*Quercus robur*)	8	500	3	3	3	3	2.0/N	2	Good	M	Fair				20+	B1
T185	Goat Willow (*Salix caprea*)	9	500	3	3	3	3	1.0/S	1	Fair	M	Fair			Fell	10+	C1
G186	Hawthorn (*Crataegus monogyna*), Grey willow (*Salix cinerea*), Holly (*Ilex aquifolium*)	4	220	2	2	2	2	n/a	0	Fair	M	Fair			Fell	10+	C2
G187	Hawthorn (*Crataegus monogyna*), Grey willow (*Salix cinerea*), Holly (*Ilex aquifolium*)	4	150	2	2	2	2	n/a	0	Fair	M	Fair				10+	C2
T188	Common Oak (*Quercus robur*)	8	450	3	3	3	3	2.0/N	2	Good	M	Fair				20+	B1
G189	Common Alder (*Alnus glutinosa*), Willow (*Salix sp*)	5	90	1	1	1	1	n/a		Fair	Y-SM	Fair				10+	C2
G190	Hawthorn (*Crataegus monogyna*), Ash (*Fraxinus excelsior*)	4	150	1	1	1	1	n/a		Fair	SM-M	Fair				10+	C2
T191	Ash (*Fraxinus excelsior*)	12	500,300,400	4	4	4	4	1.0/N	2	Poor	M	Fair	Severe symptoms of ash dieback.	Fell (< 3 months)		<10	U1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T192	Hawthorn (*Crataegus monogyna*)	5	120#	1	1	1	1	1.0/N	1	Fair	EM	Fair				10+	C1
G193	Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*)	6	120	1	1	1	1	n/a		Fair - Poor	EM-M	Fair				10+	C2
T194	Common Oak (*Quercus robur*)	10	400	3	3	3	3	2.0/S	2	Good	M	Fair				20+	B1
T195	Common Oak (*Quercus robur*)	10	440#	4	4	4	4	2.0/S	2	Good	M	Fair				20+	B1
G196	Ash (*Fraxinus excelsior*), Holly (*Ilex aquifolium*)	6	150	1	1	1	1	n/a		Fair	SM-EM	Fair				10+	C2
G197	Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*)	10	500	4	4	4	4	n/a		Good - Fair	EM-M	Good - Fair				20+	B2,3
T198	Hawthorn (*Crataegus monogyna*)	4	150	2	2	2	2	1.0/N	1	Fair	EM	Fair				10+	C1
T199	Willow (*Salix sp*)	4	150#	2	2	2	2	1.0/N	1	Fair	EM	Fair				10+	C1
G200	Hawthorn (*Crataegus monogyna*), Ash (*Fraxinus excelsior*)	6	180	2	2	2	2	n/a		Fair	SM-M	Fair				10+	C2
G201	Ash (*Fraxinus excelsior*), Goat Willow (*Salix caprea*)	5	150	2	2	2	2	n/a		Fair	EM	Fair				10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G202	Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*)	6	200	2	2	2	2	n/a		Fair - Poor	SM-M	Fair - Poor				10+	C2
T203	Pine (*Pinus sp*)	12	600	3	5	3	3	3.0/S	1	Fair	M	Fair				20+	B1
T204	Holly (*Ilex aquifolium*)	6	150#	1	1	1	1	1.0/N	1	Fair	EM	Fair				10+	C1
T205	Common Oak (*Quercus robur*)	11	200	3	3	3	3	2.0/S	2	Fair	M	Fair				10+	C1
T206	Ash (*Fraxinus excelsior*)	11	400	3	3	3	3	2.0/S	2	Fair	M	Fair				10+	C1
G207	Silver Birch (*Betula pendula*), Common Oak (*Quercus robur*)	10	600	3	3	3	3	n/a		Good - Poor	SM-M	Good - Poor				20+	B2,3
T208	Ash (*Fraxinus excelsior*)	4	140#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T209	Common Oak (*Quercus robur*)	3	90#	1	1	1	1	1.0/N	1	Fair	Y	Fair				10+	C1
T210	Common Oak (*Quercus robur*)	5	200#	2	2	2	2	1.0/N	1	Fair	SM	Fair				10+	C1
G211	Ash (*Fraxinus excelsior*), Holly (*Ilex aquifolium*)	4	100	1	1	1	1	n/a		Fair	SM-EM	Fair				10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T212	Holly (*Ilex aquifolium*)	3	160#	3	3	3	3	1.0/N	1	Fair	EM	Fair				10+	C1
T213	Sycamore (*Acer pseudoplatanus*)	6	270	2	2	2	2	1.0/N	1	Fair	EM	Fair				10+	C1
T214	Holly (*Ilex aquifolium*)	5	120	1	1	1	1	1.0/N	1	Poor	EM	Fair				10+	C1
G215	Spruce (Picea sp)	5	140	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
W216	Sycamore (*Acer pseudoplatanus*), Common Oak (*Quercus robur*)	10	600	4	4	4	4	n/a		Good - Fair	SM-M	Good - Fair				20+	B2,3
W217	Common Oak (*Quercus robur*), Beech (*Fagus sylvatica*), Holly (*Ilex aquifolium*), Hazel (*Corylus avellana*), Grey willow (*Salix cinerea*), Sycamore (*Acer pseudoplatanus*)	20	800	3	3	3	3	n/a	0	Good - Dead	Y-M	Good - Poor	Irregular structure.			40+	A2
G218	Holly (*Ilex aquifolium*), Grey willow (*Salix cinerea*), Hawthorn (*Crataegus monogyna*)	4	150	1	1	1	1	n/a	0	Good	SM-EM	Good - Fair			Fell	10+	C2
G219	Grey willow (*Salix cinerea*), Common Oak (*Quercus robur*), Common Alder	4	150	1	1	1	1	n/a	0	Good	SM-EM	Good - Fair			Fell in part as per TPP	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	(*Alnus glutinosa*), Blackthorn (*Prunus spinosa*), Holly (*Ilex aquifolium*)																
T220	Common Oak (*Quercus robur*)	6	300#	5	2	4	3	1.0/W	1	Good	SM	Good				20+	B1
T221	Ash (*Fraxinus excelsior*)	16	500#	5	5	5	5	6.0/SW	12	Dead	M	Poor		Create monolith at circa 5m. (< 3 months)		<10	U1
T222	Common Oak (*Quercus robur*)	4	400	2	2	2	2	2.0/N	2	Fair	M	Fair	Ivy			10+	C1
W223	Common Oak (*Quercus robur*), Beech (*Fagus sylvatica*), Scots Pine (*Pinus sylvestris*), Yew (*Taxus baccata*), Ash (*Fraxinus excelsior*), Holly (*Ilex aquifolium*)	10	500	3	3	3	3	n/a	0	Good - Fair	SM-OM	Good - Fair	Viewed from outside			40+	A2,3
T224	Ash (*Fraxinus excelsior*)	8	350	2	2	2	2	1.0/N	2	Fair	EM	Fair	Co dominant stems		Retained with incursion	10+	C1
H225	Ash (*Fraxinus excelsior*), Cherry Laurel (*Prunus laurocerasus*), Leyland Cypress (*X Cupressocyparis leylandii*), Holly (*Ilex aquifolium*), Sycamore (*Acer pseudoplatanus*)	6	<200#	2	2	2	2	n/a	0	Good	Y-SM	Good	Formal shrub / hedgerow boundary. Rhododendron.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T226	Scots Pine (*Pinus sylvestris*)	20	600#	5	8	5	3	5.0/S	3	Good	M	Good	No access. Significant landscape feature. Multiple pruning wounds to stem, likely to occlude.		Retained with incursion	40+	A1
T227	Sycamore (*Acer pseudoplatanus*)	10	450	5	3	5	1	2.0/S	1	Poor	EM	Fair	No access. Apical dieback of central crown, crown north and east with high sparsity. Epicormic growth from base typical of species.			10+	C1
T228	Beech (*Fagus sylvatica*)	10	550#	8	4	6	4	4.0/NW	3	Fair	M	Good	Codominant in canopy South. Minor apical dieback of central crown, surrounding crown with normal bud density and branching pattern.			40+	A2
T229	Grey willow (*Salix cinerea*)	3	100#	1.5	1.5	1.5	1.5		0	Good	Y	Good			Fell	10+	C2
G230	Ash (*Fraxinus excelsior*), Beech (*Fagus sylvatica*)	12	400	3	3	3	3	n/a	3	Good - Fair	SM-M	Good - Fair				20+	B2
T231	Grey willow (*Salix cinerea*)	3	100#	1.5	1.5	1.5	1.5		0	Good	Y	Good			Fell	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G232	Common Alder (*Alnus glutinosa*), Sycamore (*Acer pseudoplatanus*), Holly (*Ilex aquifolium*), Sessile Oak (*Quercus petraea*)	7	300	2	2	2	2	n/a	0	Good	Y-EM	Good - Fair			Retained with incursion	10+	C2
T233	Hawthorn (*Crataegus monogyna*)	4	130,120,138,100	2	2	2	2	1.0/N	1	Good	SM	Good			Fell	10+	C1
T234	Grey willow (*Salix cinerea*)	3	100#	1.5	1.5	1.5	1.5		0	Good	Y	Good			Fell	10+	C2
G235	Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*), Holly (*Ilex aquifolium*), Lawson Cypress (*Chamaecyparis lawsoniana*), Holm Oak (*Quercus ilex*), Spruce (Picea sp)	14	500	4	4	4	4	n/a	4	Good - Poor	M	Good - Fair				20+	B2
G236	Common Lime (*Tilia X europaea*)	18	<650#	4	4	4	4	n/a	0	Fair	M	Fair	Some tip dieback. substantial epicormic growth at base. multiple stems.		Retained with incursion	20+	B2
T237	Common Oak (*Quercus robur*)	6	500#	1	4	2	3	1.5/SW	2	Good	EM	Fair	Stem estimated from bole at circa 1 m over ivy. Crown likely previously topped at bole North.		Retained with incursion	20+	B1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													Vigorous short shoot epicormic regrowth.				
T238	Beech (*Fagus sylvatica*)	8	350	2	2	2	2	5.0/S	5	Fair	EM	Fair			Retained with incursion	10+	C1
G239	Common Alder (*Alnus glutinosa*), Silver Birch (*Betula pendula*), Lime (*Tilia sp*), Downy Birch (Betula pubescens), Sycamore (*Acer pseudoplatanus*), Hazel (*Corylus avellana*), Beech (*Fagus sylvatica*)	10	500	3	3	3	3	n/a	4	Good - Fair	M	Fair - Poor	Birch and alder have several cavities on stems by road and driveway entrance		Retained with incursion	20+	B2
T240	Whitebeam (*Sorbus aria*)	7	400,350,220	4	5	4	5	2.0/S	0	Good	M	Fair	Locally dominant, included bark unions of main stems from ground level, no obvious stools.		Retained with incursion	20+	B1
G241	Hawthorn (*Crataegus monogyna*), Beech (*Fagus sylvatica*), Silver Birch (*Betula pendula*)	8	510	3	3	3	3	n/a	4	Good - Fair	EM-M	Good - Fair			Retained with incursion	20+	B2
G242	Ash (*Fraxinus excelsior*)	12	450	3	3	3	3	n/a		Fair	M	Fair				20+	B2
G243	Hawthorn (*Crataegus monogyna*), Ash	8	250	2	2	2	2	n/a	0	Good - Fair	EM-M	Good - Fair			Retained with incursion	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	(*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*), Common Oak (*Quercus robur*), Grey willow (*Salix cinerea*)																
T244	Sessile Oak (*Quercus petraea*)	7	290,380#	3	3	3	3	2.0/W	1	Good	SM	Good			Fell	20+	B1
G245	Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Sessile Oak (*Quercus petraea*), Ash (*Fraxinus excelsior*), Holly (*Ilex aquifolium*)	3	140	1	1	1	1	n/a	0	Good - Fair	Y-SM	Good - Fair	Gorse. Scrub, stumps of previously felled trees present with epicormic regeneration.		Retained with incursion	10+	C2
T246	Silver Birch (*Betula pendula*)	4	110#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T247	Ash (*Fraxinus excelsior*)	10	470,380#	5	5	5	5	4.0/N	4	Poor	EM	Poor	Severe symptoms of ash dieback.	Fell (< 3 months)	Retained with incursion	<10	U1
G248	Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*), Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*)	10	450	3	3	3	3	n/a	0	Good - Fair	M	Good - Fair			Retained with incursion	20+	B2
T249	Ash (*Fraxinus excelsior*)	10	500#	5	5	5	5	2.5/W	3	Poor	EM	Poor	Severe symptoms of ash dieback.	Fell (< 3 months)	Retained with incursion	<10	U1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T250	Ash (*Fraxinus excelsior*)	10	350,350#	5	4	2	2	2.0/N	5	Poor	SM	Poor	Severe symptoms of ash dieback.	Fell (< 3 months)	Retained with incursion	<10	U1
T251	Ash (*Fraxinus excelsior*)	9	250#	1	2	2	1	2.0/E	3	Poor	SM	Poor	Severe symptoms of ash dieback.	Fell (< 3 months)	Retained with incursion	<10	U1
G252	Common Alder (*Alnus glutinosa*), Willow (*Salix sp*), Silver Birch (*Betula pendula*), Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*)	10	420	2	2	2	2	n/a	4	Good - Poor	EM-M	Good - Poor			Retained with incursion	20+	B2
T253	Ash (*Fraxinus excelsior*)	10	300,250#	2	2	4	1	3.0/E	1	Poor	SM	Poor	Severe symptoms of ash dieback.	Fell (< 3 months)	Retained with incursion	<10	U1
G254	Grey willow (*Salix cinerea*), Sycamore (*Acer pseudoplatanus*), Holly (*Ilex aquifolium*), Sessile Oak (*Quercus petraea*), Beech (*Fagus sylvatica*), Hawthorn (*Crataegus monogyna*)	9	300	2	2	2	2	n/a	0	Good - Fair	EM-M	Good - Fair			Retained with incursion	20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G255	Common Alder (*Alnus glutinosa*)	3	90	1	1	1	1	n/a		Fair	Y	Fair				10+	C2
T256	Common Oak (*Quercus robur*)	9	500	4	4	4	4	2.0/S	2	Good	M	Good			Retained with incursion	20+	B1
G257	Common Alder (*Alnus glutinosa*), Sycamore (*Acer pseudoplatanus*)	7	300	2	2	2	2	n/a	1	Good - Fair	M	Good - Fair			Retained with incursion	10+	C2
G258	Common Alder (*Alnus glutinosa*), Holly (*Ilex aquifolium*)	10	400	3	3	3	3	n/a	0	Good - Dead	SM-M	Good - Poor	One failed tree visible within group.			20+	B2
G259	Common Alder (*Alnus glutinosa*), Sycamore (*Acer pseudoplatanus*), Hawthorn (*Crataegus monogyna*)	10	300	2	2	2	2	n/a	0	Good	SM-EM	Good - Fair			Retained with incursion	20+	B2
T260	Sycamore (*Acer pseudoplatanus*)	6	180#	1	1	1	1	1.0/N	1	Fair	EM	Fair				10+	C1
G261	Common Alder (*Alnus glutinosa*), Willow (*Salix sp*)	10	400	3	3	3	3	n/a	3	Good - Fair	EM-M	Good - Fair			Retained with incursion	20+	B2
G262	Common Alder (*Alnus glutinosa*), Willow (*Salix sp*)	10	300	3	3	3	3	n/a	0	Fair	Y-EM	Fair				20+	B2
T263	Common Alder (*Alnus glutinosa*)	5	300	2	2	2	2	1.0/N	1	Fair	EM	Fair				10+	C1
G264	Common Alder (*Alnus glutinosa*),	8	550	3	3	3	3	n/a		Fair	EM-M	Fair				20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	Common Oak (*Quercus robur*)																
G265	Leyland Cypress (*X Cupressocyparis leylandii*)	10	600	3	3	3	3	n/a		Good	M	Fair				20+	B2
T266	Hawthorn (*Crataegus monogyna*)	4	180,120,140,180	2	1	2	2	1.0/N	1	Fair	EM	Fair	Significant ivy establishment.			10+	C1
T267	Common Oak (*Quercus robur*)	3	130	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T268	Hawthorn (*Crataegus monogyna*)	4	220,130#	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C2
T269	Common Oak (*Quercus robur*)	5	350	2	2	2	2	1.0/N	1	Fair	EM	Fair			Fell	20+	B1
G270	Ash (*Fraxinus excelsior*), Common Oak (*Quercus robur*)	10	500	4	4	4	4	n/a		Good	M	Fair		Crown lift to ca. 5m to enable vehicle access		20+	B2
T271	Hawthorn (*Crataegus monogyna*)	3	200	1	1	1	1	1.0/N	1	Fair	M	Fair				10+	C1
G272	Ash (*Fraxinus excelsior*), Common Oak (*Quercus robur*)	10	500	3	3	3	3	n/a		Good	M	Fair		Crown lift to ca. 5m to enable vehicle access		20+	B2
G273	Common Oak (*Quercus robur*)	6	400	3	3	3	3	n/a	3	Fair	M	Fair				20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T274	Lime (*Tilia sp*)	3	100,70,80,90#	1	1	1	1	1.0/NW	1	Good	SM	Fair	No access. Established on median strip. Multiple included bark unions.			10+	C1
T275	Silver Birch (*Betula pendula*)	3	100	1	1	1	1	1.0/N	1	Fair	Y	Fair				10+	C1
G276	Silver Birch (*Betula pendula*), Willow (*Salix sp*), Hornbeam (*Carpinus betulus*)	7	250	4	4	4	4	n/a	0	Good	SM-EM	Good - Fair	Purple willow. No access.			20+	B2
T277	Hawthorn (*Crataegus monogyna*)	3	140	1	1	1	1	1.0/N	1	Fair	M	Fair				10+	C1
G278	Silver Birch (*Betula pendula*)	4	120	1	1	1	1	n/a		Fair	Y	Fair				10+	C2
T279	Willow (*Salix sp*)	3	150	1	1	1	1	1.0/N	1	Fair	EM	Fair				10+	C1
T280	Silver Birch (*Betula pendula*)	5	150	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T281	Common Oak (*Quercus robur*)	5	500	4	4	4	4	1.0/S	2	Good	M	Good				20+	B1
T282	Common Oak (*Quercus robur*)	5	350#	3	3	3	3	1.0/N	2	Good	SM	Good				20+	B1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G283	Monterey Pine (Pinus radiata), Silver Birch (*Betula pendula*), Pine (Pinus sp), Sessile Oak (*Quercus petraea*)	8	350	3	3	3	3	n/a	0	Good - Poor	SM-EM	Good - Fair	Viewed from public footpath west. One semi mature pine to south with high crown sparsity.			20+	B1,2
G284	Common Alder (*Alnus glutinosa*)	10	696	3	3	3	3	n/a	4	Good	M	Fair	Group includes multi stem alder 10 stems at 220 dbh 696 dbh = 8.3 rpa	Crown lift to ca. 5m to enable vehicle access	Retained with incursion	20+	B2
T285	Silver Birch (*Betula pendula*)	4	90	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T286	Silver Birch (*Betula pendula*)	4	150	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T287	Common Oak (*Quercus robur*)	6	300	2	2	2	2	1.0/N	2	Good	EM	Good				20+	B1
T288	Common Oak (*Quercus robur*)	7	470	3	3	3	3	1.0/N	2	Good	M	Good				20+	B1
T289	Sycamore (*Acer pseudoplatanus*)	6	250	1	1	1	1	1.0/N	2	Good	EM	Fair				10+	C1
G290	Willow (*Salix sp*), Hawthorn (*Crataegus monogyna*)	5	150	1	1	1	1	n/a	0	Fair	EM	Fair				20+	B2
T291	Grey willow (*Salix cinerea*)	3	312	2	2	2	2		1	Fair	EM	Fair	3 stem ca 180 dbh vertical wound			10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													central stem with decay.				
G292	Willow (*Salix sp*), Hawthorn (*Crataegus monogyna*)	4	150	2	2	2	2	n/a		Fair	EM-M	Fair			Retained with incursion	10+	C2
G293	Willow (*Salix sp*), Hawthorn (*Crataegus monogyna*), Common Oak (*Quercus robur*)	7	350	2	2	2	2	n/a	0	Fair	EM-M	Fair			Fell in part as per TPP, with RPA incursion	20+	B2
G294	Willow (*Salix sp*), Hawthorn (*Crataegus monogyna*)	7	150	2	2	2	2	n/a	0	Fair	SM	Fair			Fell	20+	B2
T295	Willow (*Salix sp*)	4	220#	2.5	2.5	2.5	2.5	1.0/N	1	Fair	SM	Fair	Wind throw and regrown.			10+	C1
T296	Willow (*Salix sp*)	6	559	2	2	2	2	1.0/N	1	Fair	EM	Fair - Poor	5 x 250 mm stems. Several dead stems			10+	C1
G297	Sessile Oak (*Quercus petraea*), Hawthorn (*Crataegus monogyna*)	6	350	3	3	3	3	n/a	0	Good - Fair	SM-EM	Good - Fair				20+	B2
G298	Common Oak (*Quercus robur*), Grey willow (*Salix cinerea*)	7	150	1	1	1	1	n/a	0	Fair	Y	Fair			Retained with incursion	10+	C2
G299	Willow (*Salix sp*)	4	220	1	1	1	1	n/a	0	Fair	SM	Fair			Fell in part as per TPP, with RPA incursion	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T300	Willow (*Salix sp*)	5	250	2	2	2	2	1.0/N	1	Fair	EM	Fair				20+	B1
G301	Common Oak (*Quercus robur*), Hawthorn (*Crataegus monogyna*)	3	150	1	1	1	1	n/a		Good - Fair	EM-M	Good - Fair				10+	C2
G302	Common Oak (*Quercus robur*)	7	250	2	2	2	2	n/a	0	Fair	SM	Fair				20+	B2
T303	Willow (*Salix sp*)	7	559	4	4	4	4	1.0/N	1	Fair	M	Fair	250 mm dbh x 5 stems			20+	B1
T304	Goat Willow (*Salix caprea*)	8	300,300#	5	3	4	3		3	Good	EM	Good	Twin stems growing either side of powerline			20+	B2
T305	Willow (*Salix sp*)	4	200	1	1	1	1	1.0/N	1	Fair	EM	Fair				20+	B1
T306	Grey willow (*Salix cinerea*)	2	400	1	1	4	1	1.0/N	1	Good	V	Poor	Likely previous root heave east, failure of main stem at circa 1m, epicormic regrowth from failure point. Failed stem and crown likely with phoenix regeneration, tear out wound to stem exposing circa 1mx250mm.			40+	A3

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T307	Sessile Oak (*Quercus petraea*)	6	360,290#	4	4	1	4	1.0/S	2	Good	SM	Good	Crown apices in contact with overhead line.	Establish pollard at circa 4m, manage on a short rotation every circa 3 years. (When funds allow)		20+	B1
T308	Common Oak (*Quercus robur*)	6	320#	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
G309	Hawthorn (*Crataegus monogyna*)	2	150	1	1	1	1	n/a	2	Fair	EM	Fair				10+	C1
T310	Common Oak (*Quercus robur*)	6	430	3	3	3	3	1.0/N	1	Good	M	Fair				20+	B1
T311	Apple (*Malus sp*)	4	190,170	2	2	1	3	1.0/N	2	Good	SM	Fair	Twin stemmed, no obvious stool, minor contact wounds with peripheral woundwood.			10+	C1
T312	Hawthorn (*Crataegus monogyna*)	6	420	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T313	Common Oak (*Quercus robur*)	4	210#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
G314	Willow (*Salix sp*), Hawthorn (*Crataegus monogyna*)	3	250	2	2	2	2	n/a	1	Good - Fair	EM-M	Good - Fair				10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T315	Hawthorn (*Crataegus monogyna*)	4	160	1	1	1	1	1.0/N	2	Good	SM	Fair				10+	C1
T316	Common Oak (*Quercus robur*)	6	220	2	2	2	2	1.0/N	1	Fair	EM	Fair				10+	C1
T317	Grey willow (*Salix cinerea*)	4	250#	0	5	0	0	0.5/S	1	Fair	EM	Poor	Stem failed south, crown leaning on hawthorn with regrowth north. Extensive upper stem cavity circa 1.5 m x 250 mm.			20+	B3
T318	Sycamore (*Acer pseudoplatanus*)	6	200	2	2	2	2	1.0/N	1	Fair	SM	Fair				10+	C1
T319	Willow (*Salix sp*)	3	160,150,150,100,100,80,90,150,150,170#	4	4	4	4	1.0/N	1	Good	SM	Fair	Multistemmed willow within raised stone planter.			20+	B1
T320	Sessile Oak (*Quercus petraea*)	6	500	5	5	5	3	1.0/N	1	Good	EM	Good				20+	B1
T321	Willow (*Salix sp*)	6	350	3	3	3	3	1.0/N	2	Fair	M	Fair				10+	C1
T322	Grey willow (*Salix cinerea*)	2	330#	5	1	2	1	1.0/N	1	Good	V	Poor	Failed stem with extensive decay. Harping			40+	A3

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													regeneration of crown.				
T323	Willow (*Salix sp*)	6	350	3	3	3	3	1.0/N	2	Fair	M	Fair				10+	C1
T324	Willow (*Salix sp*)	2	120,90 #	1	1	4	1	1.0/N	1	Good	SM	Poor	Previously failed tree with harping of crown.			10+	C1
G325	Hawthorn (*Crataegus monogyna*)	3	<100#	1	1	1	1	n/a	1	Good	SM	Good	Two hawthorn.			10+	C2
T326	Ash (*Fraxinus excelsior*)	8	370,35 0#	3	3	3	3	1.0/N	2	Poor	EM	Fair	Severe symptoms of ash dieback.			<10	U1
T327	Grey willow (*Salix cinerea*)	4	350,35 0	1	4	5	3	1.0/E	1	Good	M	Fair				20+	B1
T328	Sycamore (*Acer pseudoplatanus*)	6	600	3	3	3	3	1.0/N	2	Good	M	Fair				20+	B1
T329	Common Oak (*Quercus robur*)	7	300,30 0,300, 300,20 0	4	4	5	3	1.5/SW	1	Good	EM	Fair	Multistemmed from ground level stool.			20+	B1
T330	Common Oak (*Quercus robur*)	8	440,43 0#	3	3	3	3	1.0/N	2	Good	M	Fair	Two stems in immediate proximity, no stool.			20+	B1
T331	Willow (*Salix sp*)	6	400	3	3	3	3	1.0/N	1	Fair	M	Fair				10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G332	Grey willow (*Salix cinerea*), Hawthorn (*Crataegus monogyna*)	5	300	1	1	1	1	n/a	0	Good - Fair	Y-M	Good - Poor	One failed mature grey willow.			10+	C2
T333	Hawthorn (*Crataegus monogyna*)	3	70,70	1	1	2	1	0.5/E	1	Good	Y	Good	No access, young tree.			10+	C1
G334	Willow (*Salix sp*)	5	250	1	1	1	1	n/a	2	Fair	EM-M	Fair				10+	C2
G335	Grey willow (*Salix cinerea*)	3	50	1	1	1	1	n/a	0	Good - Dead	Y-SM	Good - Fair	Predominantly gorse with intermittent willow. One young failed dead willow within group.			10+	C2
T336	Willow (*Salix sp*)	3	150	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T337	Grey willow (*Salix cinerea*)	4	120,250,250,100,120#	4	3	3	4	0.5/W	1	Good	SM	Fair	No access. North of agricultural ditch. Multistemmed, typical of species.			20+	B1
G338	Willow (*Salix sp*)	4	120	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
G339	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	8	350	3	3	3	3	n/a	0	Fair	M	Fair - Poor				20+	B2
G340	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*), Grey willow (*Salix*	4	100	1	1	1	1	n/a	0	Fair	SM	Fair				10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	cinerea), Hazel (*Corylus avellana*)																
G341	Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Common Oak (*Quercus robur*), Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*), Wild privet (Ligustrum vulgare), Common Alder (*Alnus glutinosa*)	3	<80#	1	1	1	1	n/a	0	Good	Y-SM	Good	Scrub			10+	C2
G342	Willow (*Salix sp*)	4	120	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
T343	Common Alder (*Alnus glutinosa*)	4	100#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T344	Common Alder (*Alnus glutinosa*)	4	100#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T345	Common Alder (*Alnus glutinosa*)	4	100#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T346	Common Alder (*Alnus glutinosa*)	4	100#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T347	Common Alder (*Alnus glutinosa*)	4	100#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G348	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	4	100	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
T349	Common Alder (*Alnus glutinosa*)	4	100#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T350	Common Alder (*Alnus glutinosa*)	4	100#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
G351	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	4	100	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
G352	Willow (*Salix sp*)	4	100	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
T353	Willow (*Salix sp*)	7	300	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C2
G354	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	4	100	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
G355	Willow (*Salix sp*)	8	350	3	3	3	3	n/a	0	Fair	M	Fair - Poor				20+	B2
G356	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	4	100	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
G357	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	4	100	1	1	1	1	n/a		Fair	SM	Fair				10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T358	Willow (*Salix sp*)	7	300	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C2
G359	Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Common Oak (*Quercus robur*), Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*), Wild privet (Ligustrum vulgare), Common Alder (*Alnus glutinosa*)	3	<80#	1	1	1	1	n/a	0	Good	Y-SM	Good	Scrub			10+	C2
G360	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	4	100	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
G361	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	10	350	3	3	3	3	n/a	0	Fair	Y-EM	Fair - Poor	Riparian/wetland group. Heterogeneous canopy cover from dense canopy to individual trees. Viewed from highway.			20+	B1,2
G362	Willow (*Salix sp*)	4	100	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
G363	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	4	100	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
G364	Hawthorn (*Crataegus monogyna*), Blackthorn	3	<80#	1	1	1	1	n/a	0	Good	Y-SM	Good	Scrub. Gorse, buddleja.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	(*Prunus spinosa*), Common Oak (*Quercus robur*), Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*), Elm (*Ulmus sp*), Common Alder (*Alnus glutinosa*)																
G365	Birch (Betula sp), Purging buckthorn (*Rhamnus catharticus*), Grey willow (*Salix cinerea*)	2	50	1	1	1	1	n/a	0	Good	Y	Good				10+	C2
G366	Birch (Betula sp), Purging buckthorn (*Rhamnus catharticus*), Grey willow (*Salix cinerea*), Common Alder (*Alnus glutinosa*)	2	50	1	1	1	1	n/a	0	Good	Y	Good				10+	C2
G367	Hawthorn (*Crataegus monogyna*), Blackthorn (*Prunus spinosa*), Common Oak (*Quercus robur*), Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*), Elm (*Ulmus sp*), Common Alder (*Alnus glutinosa*)	3	<80#	1	1	1	1	n/a	0	Good	Y-SM	Good	Scrub. Gorse, buddleja.			10+	C2
G368 *	Grey willow (Salix cinerea), Common Alder (Alnus glutinosa), Downy Birch	8	<400#	3	3	3	3	n/a	1	Good - Dead	Y-M	Good - Fair	Wetland habitat - riparian wood pasture. No access. Material			"20+	B2, 3

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	(Betula pubescens)												conservation value. Variable tree size and density. Few dead trees, good minor deadwood provision.				
G369	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	8	300	2	2	2	2	n/a		Fair - Dead	SM-M	Fair - Dead				10+	C2
G370	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	8	400	3	3	3	3	n/a		Poor - Dead	M	Poor - Dead				10+	C2
T371	Common Alder (*Alnus glutinosa*)	5	180#	1	1	1	1	1.0/N	1	Poor	EM	Poor				10+	C1
T372	Willow (*Salix sp*)	5	300	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T373	Willow (*Salix sp*)	3	270#	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T374	Willow (*Salix sp*)	3	300	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T375	Willow (*Salix sp*)	3	150	1	1	1	1	1.0/N	1	Fair	EM	Fair				10+	C1
T376	Willow (*Salix sp*)	3	300#	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T377	Willow (*Salix sp*)	3	200	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T378	Willow (*Salix sp*)	3	300	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T379	Willow (*Salix sp*)	3	200	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T380	Willow (*Salix sp*)	3	150	1	1	1	1	1.0/N	1	Fair	EM	Fair				10+	C1
T381	Willow (*Salix sp*)	5	300	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T382	Willow (*Salix sp*)	3	250	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T383	Willow (*Salix sp*)	3	350	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T384	Willow (*Salix sp*)	3	350	1	1	1	1	1.0/N	1	Fair	M	Fair				10+	C1
T385	Willow (*Salix sp*)	5	300	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T386	Willow (*Salix sp*)	3	300	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T387	Willow (*Salix sp*)	3	300	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T388	Willow (*Salix sp*)	3	370#	1	1	1	1	1.0/N	1	Fair	M	Fair				10+	C1
T389	Willow (*Salix sp*)	3	250	1	1	1	1	1.0/N	1	Fair	M	Fair				10+	C1
T390	Willow (*Salix sp*)	3	270#	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
G391	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	4	200	2	2	2	2	n/a		Fair - Dead	SM-M	Fair - Dead				10+	C2
T392	Willow (*Salix sp*)	3	350	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
T393	Silver Birch (*Betula pendula*)	5	210#	2	2	2	2	1.0/N	1	Fair	EM	Fair				10+	C1
T394	Silver Birch (*Betula pendula*)	5	280#	2	2	2	2	1.0/N	1	Fair	EM	Fair				10+	C1
T395	Willow (*Salix sp*)	4	350	2	2	2	2	1.0/N	1	Fair	M	Fair				10+	C1
W396	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	4	200	2	2	2	2	n/a	0	Good - Poor	Y-SM	Good				20+	B2
T397	Common Oak (*Quercus robur*)	6	200	1	1	1	1	2.0/N	2	Good	SM	Good				10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T398	Common Oak (*Quercus robur*)	12	600	3	3	3	3	2.0/N	2	Good	EM	Good				20+	B2
G399	Willow (*Salix sp*)	4	400	1	1	1	1	n/a	1	Fair	SM-M	Fair - Poor				10+	C2
T400	Common Alder (*Alnus glutinosa*)	4	632	2	2	2	2	1.0/N	1	Fair	M	Fair	10 stem copies			10+	C1
T401	Common Alder (*Alnus glutinosa*)	4	110#	1	1	1	1	1.0/N	1	Fair	SM	Fair			Fell	10+	C1
T402	Sessile Oak (*Quercus petraea*)	6	390#	2	2	2	2	1.0/N	1	Good	SM	Good				20+	B1
G403	Ash (*Fraxinus excelsior*), Sessile Oak (*Quercus petraea*)	6	250	1	1	1	1	n/a	3	Good	SM	Good				20+	B2
T404	Sessile Oak (*Quercus petraea*)	4	310#	3	3	6	3	2.0/W	2	Good	SM	Good				20+	B1
T405	Hawthorn (*Crataegus monogyna*)	4	100,100,100	1	1	1	1	1.0/W	0	Good	SM	Good	Stem diameters estimated from ground level.			10+	C1
T406	Sessile Oak (*Quercus petraea*)	6	370,370#	3	3	3	3	1.0/N	2	Good	M	Good				20+	B1
T407	Sessile Oak (*Quercus petraea*)	6	400#	3	3	3	3	2.0/N	2	Good	M	Good				20+	B1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T408	Sessile Oak (*Quercus petraea*)	6	250,310#	3	3	3	3	2.0/N	2	Good	M	Good				20+	B1
G409	Willow (*Salix sp*), Sessile Oak (*Quercus petraea*)	7	350	3	3	3	3	n/a	2	Good - Poor	EM-M	Good - Fair			Fell in part as per TPP	20+	B2
G410	Common Oak (*Quercus robur*)	5	400	3	3	3	3	n/a		Good	M	Good				20+	B2
T411	Common Oak (*Quercus robur*)	6	300#	2	2	2	2	2.0/N	2	Fair	EM	Good				10+	C1
T412	Hawthorn (*Crataegus monogyna*)	2	150	1	1	1	1	1.0/N	1	Fair	EM	Fair				10+	C1
G413	European Larch (*Larix decidua*), Ash (*Fraxinus excelsior*)	8	400	2	2	2	2	n/a	0	Fair	M	Fair			Fell in part as per TPP	10+	C2
T414	Willow (*Salix sp*)	4	150	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T415	Hawthorn (*Crataegus monogyna*)	4	150	1	1	1	1	1.0/N	1	Fair	M	Fair				10+	C1
G416	Grey willow (*Salix cinerea*), Sessile Oak (*Quercus petraea*), Downy Birch (*Betula pubescens*)	8	400	3	3	3	3	n/a	1	Good - Fair	SM-M	Good - Fair				20+	B2
G417	Ash (*Fraxinus excelsior*)	6	200	2	2	2	2	n/a		Fair	EM	Fair				10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T418	Willow (*Salix sp*)	4	350	0.5	0.5	0.5	0.5		1	Stump	M	Stump	Felled but regrowing from stump.			<10	U1
T419	Ash (Fraxinus sp)	10	400	3	3	3	3	2.0/N	2	Good	M	Fair				20+	B1
G420	Ash (*Fraxinus excelsior*), Common Oak (*Quercus robur*), Common Alder (*Alnus glutinosa*)	6	350	3	3	3	3	n/a	1	Good - Fair	M	Good - Fair				20+	B2
T421	Ash (Fraxinus sp)	6	300	2	2	2	2	2.0/N	2	Poor	EM	Fair	Significant crown dieback, internal crown dysphotic zone with vertical epicormic growth, symptom of ADB.			<10	U1
T422	Sycamore (*Acer pseudoplatanus*)	5	100	2	2	1	1	2.0/SE	2	Good	Y	Fair	Stem occluding metal railing east. Good succession to ash west.			10+	C1
G423	Grey willow (*Salix cinerea*), Sessile Oak (*Quercus petraea*)	8	400	3	3	3	3	n/a	2	Good - Fair	EM-M	Good - Poor				20+	B2
T424	Common Alder (*Alnus glutinosa*)	8	350	4	1	4	1	2.0/N	2	Poor	EM	Fair	No access to base - garden tree at boundary. Significant apical dieback, moderate density of retained live limbs in lower			<10	U1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													crown. Dense ivy across stem.				
T425	Common Oak (*Quercus robur*)	5	250	1	1	1	1	2.0/N	2	Good	SM	Fair				10+	C1
T426	Common Oak (*Quercus robur*)	3	200	2	2	2	2	1.0/N	2	Good	SM	Good				20+	B1
T427	Ash (*Fraxinus excelsior*)	6	200	2	2	2	2	1.0/N	2	Good	SM	Fair				10+	C1
G428	Ash (*Fraxinus excelsior*), Leyland Cypress (*X Cupressocyparis leylandii*), Hornbeam (*Carpinus betulus*)	10	400	3	3	3	3	n/a	2	Good - Fair	M	Good - Fair				20+	B2
T429	Ash (*Fraxinus excelsior*)	1	150	1	1	1	1	1.0/N	2	Fair	SM	Poor	1 m tall stump, minor epicormic regrowth.			<10	U1
G430	Common Alder (*Alnus glutinosa*), Willow (*Salix sp*)	6	100	1	1	1	1	n/a		Fair	Y	Fair				10+	C2
T431	Ash (*Fraxinus excelsior*)	6	250	2	2	2	2	2.0/N	2	Good	EM	Fair				10+	C1
T432	Sycamore (*Acer pseudoplatanus*)	10	480	3	3	3	3	2.0/N	2	Good	M	Fair				20+	B1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G433	Sycamore (*Acer pseudoplatanus*), Grey willow (*Salix cinerea*), Elm (*Ulmus sp*)	6	250	3	3	3	3	n/a	0	Fair	SM-M	Fair	Gorse and buddleja. Scrub, formation typical of marginal land.			10+	C2
T434	Atlantic Cedar (Blue) (*Cedrus libani atlantica`Glauca´*)	9	320#	3	3	3	3	2.0/N	2	Poor	SM	Fair	Circa 90% crown dieback.			<10	U1
G435	Common Oak (*Quercus robur*), Hawthorn (*Crataegus monogyna*)	3	150	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
G436	Leyland Cypress (*X Cupressocyparis leylandii*), Cypress (Chamaecyparis sp), Spruce (*Picea sp*)	12	200	2	2	2	2	n/a	1	Good - Fair	SM-M	Good - Fair				20+	B2
G437	Common Oak (*Quercus robur*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*)	8	300	2	2	2	2	n/a	0	Good - Fair	EM	Good - Fair				20+	B2
G438	Willow (*Salix sp*), Hawthorn (*Crataegus monogyna*)	4	250	2	2	2	2	n/a		Good - Fair	SM-M	Fair - Poor				10+	C2
T439	Sycamore (*Acer pseudoplatanus*)	15	1131	6	6	6	6	2.0/N	2	Good	M	Fair	400 x 8 stems			20+	B1
T440	Sycamore (*Acer pseudoplatanus*)	15	600	4	4	4	4	3.0/S	2	Good	M	Fair				20+	B1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T441	Common Oak (*Quercus robur*)	12	600	5	5	5	5	2.0/N	2	Good	M	Fair				20+	B1
G442	Sycamore (*Acer pseudoplatanus*)	6	200	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
G443	Hazel (*Corylus avellana*)	6	150	2	2	2	2	n/a		Fair	EM	Fair				10+	C2
T444	Sycamore (*Acer pseudoplatanus*)	10	450,450	3	3	3	3	1.0/N	1	Good	M	Fair				20+	B1
T445	Horse Chestnut (Aesculus hippocastanum)	5	160,450#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T446	Common Oak (*Quercus robur*)	5	160,450#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
T447	Alder (Alnus sp)	5	210,450#	1	1	1	1	1.0/N	1	Fair	SM	Fair				10+	C1
G448	Common Oak (*Quercus robur*)	10	400	3	3	3	3	n/a	2	Good	M	Fair				20+	B2
T449	Red Oak (*Quercus rubra*)	4	140#	1	1	1	1	1.0/N	1	Fair	M	Fair			Fell	10+	C1
T450	Willow (*Salix sp*)	4	500	2	2	2	2	1.0/N	1	Fair	M	Fair			Fell	10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G451	Apple (*Malus sp*)	4	400	2	2	2	2	n/a		Good	M	Fair				20+	B2
G452	Willow (*Salix sp*), Common Oak (*Quercus robur*)	12	150	2	2	2	2	n/a		Good - Fair	SM-M	Fair				10+	C2
W453	Willow (*Salix sp*), Common Oak (*Quercus robur*), Hazel (*Corylus avellana*)	8	250	2	2	2	2	n/a	2	Good - Fair	SM-M	Good - Poor				20+	B2
T454	Common Oak (*Quercus robur*)	10	500	3	3	3	3	2.0/N	2	Good	M	Fair				20+	B1
T455	Sycamore (*Acer pseudoplatanus*)	10	500	3	3	3	3	2.0/N	2	Good	M	Fair				20+	B1
T456	Willow (*Salix sp*)	6	350	3	3	3	3	1.0/N	1	Fair	M	Fair				10+	C1
T457	Apple (*Malus sp*)	4	500	1	3	3	1	1.0/N	1	Good	M	Fair				20+	B1
T458	Common Oak (*Quercus robur*)	7	540,450#	4	4	4	4	3.0/N	1	Good	M	Fair				20+	B1
G459	Willow (*Salix sp*), Common Oak (*Quercus robur*)	8	300	3	3	3	3	n/a		Fair	EM-M	Fair				10+	C2
T460	Common Oak (*Quercus robur*)	10	500	4	4	4	4	2.0/N	2	Good	M	Fair				20+	B1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G461	Common Oak (*Quercus robur*)	14	700	5	5	5	5	n/a		Good - Fair	M	Good - Fair				20+	B2,3
G462	Willow (*Salix sp*), Common Alder (*Alnus glutinosa*)	6	100	1	1	1	1	n/a		Fair	SM	Fair				10+	C2
T463	Common Oak (*Quercus robur*)	10	600	5	5	5	5	1.0/N	1	Good	M	Good				20+	B1
T464	Lime (*Tilia sp*)	11	430	6	5	4	5	2.0/N	2	Good	SM	Good	Adjacent to highway. Previously pruned back from streetlight, wounds sub 50mm diameter, good regrowth. Multiple minor included unions, genus with good structural durability.			20+	B1,2
T465	Lime (*Tilia sp*)	9	400	3	3	3	3	2.5/S	2	Good	SM	Good				20+	B2
T466	Whitebeam (*Sorbus aria*)	4	250#	2	2	2	2	2.0/N	2	Good	SM	Good	No access, viewed from highway. Normal branching pattern and bud density.			20+	B1,2
G467	Common Alder (*Alnus glutinosa*), Goat Willow (*Salix caprea*)	5	<110#	2	2	2	2	n/a	0	Good	Y	Good	No access to bases. Viewed from access track.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T468	Whitebeam (*Sorbus aria*)	5	300#	3	3	3	3	2.0/W	2	Good	EM	Good	No access, viewed from highway. Normal branching pattern and bud density.			20+	B1,2
G469	Goat Willow (*Salix caprea*), Hawthorn (*Crataegus monogyna*)	5	<50#	2	2	2	2	n/a	0	Good - Fair	Y-SM	Good - Fair	Roadside group with gorse			10+	C2
T470	Whitebeam (*Sorbus aria*)	5	300#	3	3	3	3	2.0/W	2	Good	EM	Good	No access, viewed from highway. Normal branching pattern and bud density.			20+	B1,2
G471	Goat Willow (*Salix caprea*)	7	<250#	3	3	3	3	n/a	1.5	Good - Fair	SM	Good - Fair	Roadside group beyond chain link fence.			10+	C2
T472	Other	4	130#	0.5	0.5	0.5	0.5	4.0/SE	4	Good	SM	Good	No access, feather palm, viewed from footway.			10+	C1
T473	Common Alder (*Alnus glutinosa*)	6	80,80, 90,70, 70#	2	2	2	2		0	Good	SM	Good	Coppiced stool growing from river bank below walkway. Likely repeatedly coppiced for river management and to prevent damage to bridge.			20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G474	Cherry (*Prunus sp*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*), Common Oak (*Quercus robur*)	8	<150#	3	3	3	3	n/a	0	Good - Dead	Y-SM	Good - Dead	No access to bases. Viewed from access track. Predominantly young group growing on embankment.			10+	C1,2
T475	Common Alder (*Alnus glutinosa*)	4	80#	2	2	2	2		1	Good	Y	Good				10+	C2
T476	Other	3	50,50#	1	0	1	1		0	Good	SM	Fair	Buddleja, likely self sown in marginal strip, in contact with metal railing. Previously pruned south. Stubs retained, minor regrowth.			10+	C1
T477	Goat Willow (*Salix caprea*)	3	100,100,60,60#	3	3	2	3	0.5/W	0	Good	SM	Fair	Partially obstructing entrance to car park and likely damage to chain link fence	Fell and poison stump (< 12 months)		<10	U1
G478	Goat Willow (*Salix caprea*), Crack Willow (*Salix fragilis*), Other	5	<90#	2	2	2	2	n/a	0	Good	Y-SM	Good	No access to bases. Viewed from access track. Spaced out clumps of predominantly gorse.			10+	C2
T479	Rowan (*Sorbus aucuparia*)	6	90#	1	1	1	1	1.5/S	1	Good	Y	Good	Likely planted, staked and tied. Contact wounding to base, likely			10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													mechanical Contact from grass cutting, peripheral woundwood.				
T480	Goat Willow (*Salix caprea*)	2	100#	1	2	2	2		0	Good	SM	Fair	Likely damage to chain link fence	Fell and poison stump (< 12 months)		<10	U1
G481	Cherry (*Prunus sp*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*), Common Oak (*Quercus robur*)	8	<150#	3	3	3	3	n/a	0	Good - Dead	Y-SM	Good - Dead	No access to bases. Viewed from access track. Predominantly young group growing on embankment.			10+	C1,2
T482	Wellingtonia (*Sequoiadendron giganteum*)	9	550#	3	3	3	3	2.0/S	2	Good	SM	Fair	No access, within tree belt dominated by alder. Likely planted.			20+	B1,2
T483	Common Alder (*Alnus glutinosa*)	10	400,400,400,250,250,250#	2	2	2	2	2.0/W	3	Good	M	Good	Overhead cables running through canopy.	Reinspect in 1 year Appears sound but no access on railway land. Assess base.		20+	B2
T484	Hawthorn (*Crataegus monogyna*)	3	120,80,80#	3	1	3	1	0.5/W	0	Good	EM	Fair	No access.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T485	Common Alder (*Alnus glutinosa*)	10	500,400,250,200#	5	5	4	2	2.0/W	3	Good	M	Good		Reinspect in 1 year Appears sound but no access on railway land. Assess base.		20+	B2
T486	Sessile Oak (*Quercus petraea*)	7	550	2	7	5	5		0	Fair	EM	Fair	No access to base. Second order limb at circa 0.2 m north likely fusing to main stem. Ivy across main stem limiting visibility. Moderate crown gaps. Overall branching pattern normal.			20+	B1,2
T487	Common Alder (*Alnus glutinosa*)	9	300,300,230,100,250#	2	4	4	4	2.0/W	4	Good	EM	Fair	No access. Established at ditch edge, species typical of riparian habitat.		Retained with incursion	20+	B1,2
T488	Hawthorn (*Crataegus monogyna*)	3	180,80#	3	3	3	1	0.5/S	0	Fair	EM	Fair	No access. Suppressed by ivy to South.			10+	C2
G489	Goat Willow (*Salix caprea*), Birch (*Betula sp*), Other	7	<100#	2	2	2	2	n/a	0	Good	Y-SM	Good	Buddleia, gorse. No access to bases. Predominantly gorse.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T490	Sycamore (*Acer pseudoplatanus*)	4	80,80#	1.5	1.5	1.5	1.5	1.0/W	1	Good	Y	Good	No access		Fell	10+	C2
G491	Willow (*Salix sp*)	4	<30#	1	1	1	1	n/a	0	Good	Y	Fair	No access, coppiced willow at ditch edge.		Fell in part as per TPP	10+	C2
T492	Common Alder (*Alnus glutinosa*)	6	300#	4	4	4	4	1.0/S	1	Fair	EM	Fair	No access. Significant second order limb south at circa 1.5 m topped, stub circa 500 mm x 150 mm, no regrowth, likely for pipe crossing access. Elder and willow growing through crown. Minor crown dieback south likely associated with previous pruning.		Fell	20+	B1,2
T493	Sessile Oak (*Quercus petraea*)	2	60	1	1	1	1	1.0/E	0	Good	Y	Good				10+	C1
T494	Sessile Oak (*Quercus petraea*)	2	50	1	1	1	1		0	Good	Y	Good				10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T495	Hawthorn (*Crataegus monogyna*)	4	150,150,150#	2	2	2	2	0.5/N	0	Good	M	Fair			Retained with incursion	20+	B2
T496	Common Alder (*Alnus glutinosa*)	10	250,250,250,200,200,200#	5	5	4	2	3.0/E ,	3	Good	M	Good		Reinspect in 1 year Appears sounds but no access on railway land. Assess base.		20+	B2
G497	Willow (*Salix sp*), Elder (*Sambucus nigra*)	4	<80#	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair	No access. Willow previously coppiced.		Fell	10+	C2
T498	Hawthorn (*Crataegus monogyna*)	4	150,100,80,100#	2	2	2	2	0.5/N	0	Good	M	Fair				20+	B2
H499	Leyland Cypress (*X Cupressocyparis leylandii*), Hawthorn (*Crataegus monogyna*)	12	<450#	5	5	5	5	n/a	0	Good	SM-EM	Good	No access to bases. Dense row of trees growing on top of mound. Bases of trees are circa 2 m above road level to the north.			20+	B2
G500	Sessile Oak (*Quercus petraea*), Other	3	<80#	2	2	2	2	n/a	0	Good	Y-SM	Good	Gorse. No access to bases.			10+	C2
G501	Hazel (*Corylus avellana*), Hawthorn (*Crataegus*	5	<300#	1.5	1.5	1.5	1.5	n/a	0	Good - Poor	SM-M	Good - Poor	Scattered line of hazel with occasional thorn, ivy and		Fell in part as per TPP	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	monogyna), Common Oak (*Quercus robur*)												bramble with gorse, one young central oak				
G502	White Willow (*Salix alba*), Silver Birch (*Betula pendula*)	10	<350#	4	4	4	4	n/a	0	Good - Dead	SM	Good - Dead	No access to bases, viewed from road to north west. Limited visibility of lower stems.			20+	B2
T503	Hawthorn (*Crataegus monogyna*)	2	90,90, 80,70#	1.5	1.5	1.5	1.5	0.5/W	0	Fair	EM	Fair	Ivy smothered			10+	C2
G504	Other	4	<80#	2	2	2	2	n/a	0	Good	Y	Good	Buddleia. No access to bases, viewed from road to west.			10+	C2
T505	Common Alder (*Alnus glutinosa*)	10	250,250,250, 200,200,200#	0	3	3	3	3.0/N	2	Fair - Poor	M	Poor	One dead stem. One lost top. No significant targets as stems are ca. 6 m.			10+	C2
T506	Sessile Oak (*Quercus petraea*)	3	80,90, 70,90#	2	2	2	2	1.6/E	0	Good	Y	Good	No access to base.			10+	C1
T507	Sessile Oak (*Quercus petraea*)	15	800#	2	3	7	6	1.0/S	5	Fair	M	Fair	No access. At base of exposed rockface. Previous significant pruning south back from BT line, wounds flush to limbs,			20+	B1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													up to circa 300 mm in diameter., no obvious woundwood visible, unlikely to occlude.				
T508	Common Alder (*Alnus glutinosa*)	10	250,250,200,200#	4	4	4	4	2.0/E	2	Good	M	Good			Retained with incursion	20+	B2
G509	Cherry Laurel (*Prunus laurocerasus*)	5	<100#	2	2	2	2	n/a	0	Good	Y-SM	Good - Fair	No access. Invasive species on and below rockface.			10+	C2
T510	Ash (*Fraxinus excelsior*)	6	350#	3	3	3	3		1	Good	SM	Good				20+	B2
T511	Sycamore (*Acer pseudoplatanus*)	6	120,100,100,100,100,100,100,90#	2	2	2	2		0	Good	SM	Fair	Likely coppice or pollard derived, on edge of embankment, ivy restricts visibility, inaccessible			20+	B2
G512	Rowan (*Sorbus aucuparia*)	2	50	1	1	1	1	n/a	0.5	Good - Fair	Y	Good - Fair	Line of small sorbus between tracks			10+	C2
T513	Sessile Oak (*Quercus petraea*)	6	350#	2	5	1	6	0.5/W	1	Good	SM	Fair	No access, established on area of exposed rock. Dense ivy, codominant in canopy, cherry laurel in understory.			20+	B1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T514	Sessile Oak (*Quercus petraea*)	8	500#	5	5	4	4	1.0/S	6	Good	EM	Fair	No access, established on area of exposed rock. Dense ivy, codominant in canopy, cherry laurel in understory.			20+	B1,2
T515	Lime (*Tilia sp*)	6	150#	3	3	3	3	0.5/E	0	Good	SM	Good				10+	C1
G516	Sessile Oak (*Quercus petraea*), Cherry Laurel (*Prunus laurocerasus*)	2	<50#	1	1	1	1	n/a	0	Good	Y	Good - Fair	Coppiced oak and gorse on rough rock or similar.			10+	C2
T517	Sessile Oak (*Quercus petraea*)	5	150#	2	2	2	2	2.0/NE	2	Good	Y	Fair	No access. Emergent in rockface coppice.			10+	C2
T518	Sessile Oak (*Quercus petraea*)	4	200,200#	3	3	3	0		6	Good	SM	Good				10+	C2
G519	Sessile Oak (*Quercus petraea*), Goat Willow (*Salix caprea*), Common Alder (*Alnus glutinosa*), Hazel (*Corylus avellana*), Elder (*Sambucus nigra*)	6	<110#	2	2	2	2	n/a	0	Good	Y	Good				10+	C1,2
H520	Hazel (*Corylus avellana*), Blackthorn (*Prunus spinosa*),	4	<80#	1	1	1	1	n/a	0	Good	Y	Good				10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	Elder (*Sambucus nigra*), Alder (*Alnus sp*)																
H521	Leyland Cypress (*X Cupressocyparis leylandii*)	11	<400#	4	4	4	4	n/a	0	Good	SM	Good				20+	B2
H522	Leyland Cypress (*X Cupressocyparis leylandii*)	8	<250#	2	2	2	2	n/a	0	Good	SM	Good	Managed hedge. Good screening from road. Viewed from land to east.			20+	B2
G523	Hazel (*Corylus avellana*), Common Alder (*Alnus glutinosa*)	6	<80#	1	1	1	1	n/a	0	Good	Y	Good				10+	C2
G524	Willow (*Salix sp*), Goat Willow (*Salix caprea*)	8	<350#	3	3	3	3	n/a	0	Good - Dead	SM	Good - Dead	No access to bases. Viewed from field to north.			20+	B2
G525	Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*), Elder (*Sambucus nigra*)	3	<60#	1	1	1	1	n/a	0	Good	Y	Good				10+	C2
T526	Crack Willow (*Salix fragilis*)	13	400,300,350#	4	4	5	5	2.0/W	2	Good	EM	Good	No access to base. Viewed from vantage point to north. Prominent in group.			20+	B2
T527	Goat Willow (*Salix caprea*)	4	100,100,100,100,70,70,70,70#	2.5	3	2.5	2.5	0.5/N	0	Good	SM	Fair	Growing to South of ditch			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G528	Willow (*Salix sp*), Goat Willow (*Salix caprea*), Blackthorn (*Prunus spinosa*), Common Oak (*Quercus robur*)	8	<350#	3	3	3	3	n/a	0	Good - Dead	SM	Good - Dead	No access to bases. Viewed from field to north.			20+	B2
T529	Goat Willow (*Salix caprea*)	4	100,70 ,70,70, 70,70#	3	3	3	3	0.5/N	0	Good	SM	Fair	Growing adjacent to ditch			10+	C2
T530	Goat Willow (*Salix caprea*)	3	60,60, 60,60, 50#	1.5	1.5	1.5	1.5		0	Good	SM	Fair	Growing adjacent to ditch			10+	C2
T531	Goat Willow (*Salix caprea*)	2	50,50, 40,40#	2	2	2	1.5		0	Good	SM	Fair	Growing adjacent to ditch			10+	C2
T532	Goat Willow (*Salix caprea*)	4	100,10 0,90,6 0,60,6 0#	3	3	3	1.5		0	Good	SM	Fair	Growing adjacent to ditch			10+	C2
T533	Horse Chestnut (*Aesculus hippocastanum*)	10	600	5	5	5	5	2.5/W	2	Good	EM	Fair	No access to base. Likely planted at edge of fire station. Codominant union from circa 1.8 m obscured by ivy, likely cup formation.		Fell	20+	B1,2
G534	Blackthorn (*Prunus spinosa*)	3	<50#	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair	Scrub, buddleja previously topped.		Fell in part as per TPP	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G535	Goat Willow (*Salix caprea*)	3	<150#	2.5	2.5	2.5	2.5	n/a	0	Good	SM	Good - Fair	Multi stemmed trees less than 3 X 90 mm, growing along edge of ditch			10+	C2
H536	Blackthorn (*Prunus spinosa*), Willow (*Salix sp*)	2	<80#	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair	Previously topped scrub with regrowth managed as hedgerow. Buddleja present. Willow likely Salix aurita.		Fell in part as per TPP	10+	C2
G537	Lawson Cypress (*Chamaecyparis lawsoniana*), Silver Birch (*Betula pendula*), Cherry (*Prunus sp*), Norway Spruce (*Picea abies*), Cedar of Lebanon (*Cedrus libani*)	6	300	2	2	2	2	n/a	0	Fair - Poor	SM	Fair - Poor	Group almost entirely topped		Retained with incursion	10+	C2
T538	Goat Willow (*Salix caprea*)	2	50,50, 50,40#	2	2	2	2		0	Good	SM	Fair	Growing adjacent to ditch			10+	C2
H539	Hawthorn (*Crataegus monogyna*)	2	<100#	0	0	0	0	n/a	0	Good	Y-SM	Fair	Small hedgerow feature, dense ivy.		Retained with incursion	10+	C2
T540	Goat Willow (*Salix caprea*)	5	100,80 ,90,80, 90,80, 60#	2	4	5	2	0.5/E	0	Good	SM	Fair	Growing adjacent to ditch, crown mostly			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													orientated east and south with corrected lean				
T541	Horse Chestnut (*Aesculus hippocastanum*)	7	450#	4	4	4	4		3	Good	SM	Good			Fell	20+	B2
T542	Hawthorn (*Crataegus monogyna*)	2	100#	0.5	0.5	0.5	0.5		0	Good	SM	Fair	Topped tree, regrowth managed as pseudo hedge.		Fell	10+	C1
H543	Hawthorn (*Crataegus monogyna*)	2	50	0.5	0.5	0.5	0.5	n/a	0	Good	Y-SM	Good - Fair	Hedgerow, managed.		Fell	10+	C2
G544	Alder (*Alnus sp*), Willow (*Salix sp*), Goat Willow (*Salix caprea*), Birch (*Betula sp*)	9	<150#	2	2	2	2	n/a	0	Good - Dead	Y	Good - Dead	No access to bases. West of ditch.			10+	C2
T545	Goat Willow (*Salix caprea*)	5	100,100,80,80,80,70#	2	3	3.5	3	0.5/E	0	Good	SM	Fair	Growing adjacent to ditch			10+	C2
T546	Grey willow (*Salix cinerea*)	4	100#	1	1	1	1		0	Fair	Y	Fair	Stem diameter average estimated due to mass proliferation of stems at circa 1.5 m agl.		Fell	10+	C2
G547	Grey willow (*Salix cinerea*)	3	100	2.5	2.5	2.5	2.5	n/a	0	Good	Y	Good			Fell	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G548	Cherry (*Prunus sp*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*), Common Oak (*Quercus robur*), Rowan (*Sorbus aucuparia*)	6	<100#	2	2	2	2	n/a	0	Good - Dead	Y	Good - Dead	No access to bases. Viewed from access track. Predominantly young group growing on embankment.			10+	C2
G549	Grey willow (*Salix cinerea*)	3	100	2.5	2.5	2.5	2.5	n/a	0	Good	Y	Good			Fell	10+	C2
G550	Grey willow (*Salix cinerea*)	3	100	2.5	2.5	2.5	2.5	n/a	0	Good	Y	Good			Fell	10+	C2
G551	Grey willow (*Salix cinerea*) eared willow (*Salix aureta*), Common Gorse (*Ulex europeus*)	5	<50	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair	Willow and gorse scrub. S. aurita likely present.		Fell in part as per TPP	10+	C2
G552	Cherry (*Prunus sp*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*), Common Oak (*Quercus robur*), Willow (*Salix sp*), Elder (*Sambucus nigra*)	7	<100#	2	2	2	2	n/a	0	Good - Dead	Y	Good - Dead	No access to bases. Viewed from access track. Predominantly young group growing on embankment.			10+	C2
G553	Cherry (*Prunus sp*), Hazel (*Corylus avellana*),	8	<100#	2	2	2	2	n/a	0	Good - Dead	Y	Good - Dead	No access to bases. Viewed from access track.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	Hawthorn (*Crataegus monogyna*), Common Oak (*Quercus robur*), Goat Willow (*Salix caprea*), Birch (*Betula sp*), Willow (*Salix sp*)												Predominantly young group growing on embankment.				
G554	Grey willow (*Salix cinerea*), eared willow (*Salix aureta*),	5	<50#	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair	Likely self sown, S. aurita likely present.		Fell in part as per TPP	10+	C2
G555	Grey willow (*Salix cinerea*), eared willow (*Salix aureta*),	6	<100#	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair	Likely self sown, gorse and S. aurita likely present.		Fell	10+	C2
T556	Willow (*Salix sp*)	6	150#	2	2	2	2		0	Good	SM	Good	No access to base of visibility of lower stem.			10+	C1
G557	Grey willow (*Salix cinerea*)	6	<100#	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair	Likely self sown.		Fell	10+	C2
G558	Grey willow (*Salix cinerea*)	6	<100#	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair	Likely self sown.		Fell	10+	C2
T559	Sessile Oak (*Quercus petraea*)	11	1100#	7	5	6	6		1	Good	M	Good			Retained with incursion	20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T560	Ash (*Fraxinus excelsior*)	4	250	1	3	4	1.5	2.0/E	2	Fair	SM	Poor	Cavity in main stem to east from 0.75-1.75 m, good woundwood, cavity underside of low limb to east fair woundwood, old collapsed nest in crown.			20+	B3
T561	Common Alder (*Alnus glutinosa*)	4	130#	2	2	2	2	0.5/N	0	Good	Y	Good	Likely self sown.		Fell	10+	C1
T5621	Sessile Oak (*Quercus petraea*)	9	780#	5	3	4	6		1	Good	EM	Good				20+	B2
G563	Grey willow (*Salix cinerea*), Common Oak (*Quercus robur*)	4	<30#	1	1	1	1	n/a	0	Good	Y	Good - Fair	Likely self sown, gorse and S. aurita likely present.		Fell in part as per TPP	10+	C2
T564	Norway Spruce (*Picea abies*)	7	160#	1	2.5	2	2.5		0	Good	SM	Good	No access to base. Dense ivy cover.			20+	B2
G565	Grey willow (*Salix cinerea*)	6	<100#	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair	Likely self sown.		Fell in part as per TPP	10+	C2
T566	Monterey Pine (*Pinus radiata*)	12	550,430#	5	5	5	6	0.6/S	0	Good	EM	Good	No access to base. Squat form.		Retained with incursion	20+	B1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T567	Unknown	7	90#	0.5	0.5	0.5	0.5		0	Dead	Y	Dead				<10	U1
T568	Other	3	80#	1	1	3	1		0	Good	Y	Fair	Likely thigmomorphogenesis east.		Fell	10+	C2
T569	Silver Birch (*Betula pendula*)	7	100#	1	1	1.5	0		2	Fair	Y	Fair	No access to base. Major form suppression from adjacent trees.			10+	C1
T570	Grey willow (*Salix cinerea*)	3	50,50, 30#	1	1	1	1		0	Good	Y	Fair	Stems estimated from ground level. Likely self sown.		Fell	10+	C1
T571	Hawthorn (*Crataegus monogyna*)	2	90,60#	0	1	1	0		1	Poor	EM	Poor	Mostly dead, live crown limited to east and south, used as fence post			10+	C2
T572	Sessile Oak (*Quercus petraea*)	9	580#	5	5	5	5		3	Good	SM	Good			Fell	20+	B2
T573	Monterey Pine (*Pinus radiata*)	12	470#	4	3	4	4	5.0/NE	0	Good	EM	Good	No access to base.		Retained with incursion	20+	B1
G574	Grey willow (*Salix cinerea*)	6	<100#	2	2	2	2	n/a	0	Good	Y-SM	Good - Fair	Likely self sown.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T575	Apple (*Malus sp*)	4	140,100#	2	2	2	2	1.6/W	0	Good	SM	Good	No access to base.			10+	C1
H576	Other	4	<100#	2	2	2	2	n/a	0	Good	SM	Good	Gorse			10+	C2
H577	Other	3	<80#	1	1	1	1	n/a	0	Good	SM	Good	Gorse and buddleia			10+	C2
G578	Grey willow (*Salix cinerea*), Common Oak (*Quercus robur*), Silver Birch (*Betula pendula*)	7	<130#	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair	No access, viewed from south, scrub with pioneer high forest trees.			10+	C2
H579	Other	2	<70#	1	1	1	1	n/a	0	Good	Y	Good	Gorse			10+	C2
H580	Other	3	<70#	1	1	1	1	n/a	0	Good	Y	Good	Gorse			10+	C2
T581	Sessile Oak (*Quercus petraea*)	9	580#	7	4	6	1		1	Good	M	Good			Fell	20+	B2
T582	Common Oak (*Quercus robur*)	3	70#	2	2	2	2		0	Good	Y	Good	Likely self sown.		Fell	10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T583	Sessile Oak (*Quercus petraea*)	9	400#	6	6	1	6		1	Good	M	Good			Fell	20+	B2
T584	Hawthorn (*Crataegus monogyna*)	3	80#	1	1	2	0.5	0.5/E	1	Fair - Poor	SM	Fair	Likely previous dieback with few second order limbs showing good bud density and branching pattern, likely to facilitate crown reiteration.		Fell	10+	C1
G585	Cherry (*Prunus sp*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*), Common Oak (*Quercus robur*), Alder (*Alnus sp*)	8	<150#	3	3	3	3	n/a	0	Good - Dead	Y-SM	Good - Dead	No access to bases. Viewed from access track. Predominantly young group growing on embankment.			10+	C1,2
G586	Grey willow (*Salix cinerea*)	5	<50	3	3	3	3	n/a	0	Good	Y-SM	Fair	Likely self sown, on ditch margin.			10+	C2
G587	Goat Willow (*Salix caprea*), Hawthorn (*Crataegus monogyna*)	5	150	2	2	2	2	n/a	0	Good - Fair	Y-SM	Good - Fair	Inaccessible scattered group on highway embankment.			10+	C2
G588	Sessile Oak (*Quercus petraea*), Hawthorn (*Crataegus monogyna*)	5	<200#	2	2	2	2	n/a	0	Good	Y	Good	Regen oak with semi mature hawthorn and gorse.		Fell in part as per TPP	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T589	Other	3	90#	1	1	1	1		0	Good	SM	Fair	Likely self sown. Stem diameter estimated from ground level due to mass proliferation of stems at circa 1.5 m agl.		Fell	10+	C1
T590	Ash (*Fraxinus excelsior*)	14	500#	5	5	5	5	2.0/E	1	Poor	EM	Fair - Poor	No access. Significant deviation in branching pattern, deadwood in crown, dense internal crown epicormic growth. Symptoms of ash dieback.		Fell	<10	U1
G591	Goat Willow (*Salix caprea*)	5	200	3	3	3	3	n/a	0	Good - Fair	Y-SM	Good - Fair	Inaccessible clump with bramble, up to 0.5m overhang into field			10+	C2
G592	Goat Willow (*Salix caprea*), Elder (*Sambucus nigra*)	4	100	1.5	1.5	1.5	1.5	n/a	0	Good - Fair	Y-SM	Good - Fair	Inaccessible clump with bramble, no overhang into field or track		Fell	10+	C2
T593	Ash (*Fraxinus excelsior*)	14	500#	5	5	5	5	2.0/E	1	Poor	EM	Fair - Poor	No access. Significant deviation in branching pattern, deadwood in crown, dense internal crown epicormic growth. Symptoms of ash dieback.		Fell	<10	U1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T594	Common Oak (*Quercus robur*)	4	140,130#	3	3	3	3	1.0/W	2	Good	Y	Fair	Twin stem from base on bank of ditch, max 1.25 m overhang into field			10+	C1,2
H595	Hawthorn (*Crataegus monogyna*), Hazel (*Corylus avellana*), Blackthorn (*Prunus spinosa*)	2	<30#	1	1	1	1	n/a	0	Good	Y-SM	Good	Managed hedgerow.		Fell	10+	C2
G596	Goat Willow (*Salix caprea*), Elm (*Ulmus sp*), Hawthorn (*Crataegus monogyna*)	6	200	2	2	2	2	n/a	0	Good - Fair	SM	Good - Fair	Planted linear group		Fell in part as per TPP	10+	C2
G597	Common Pear (*Pyrus communis*), Apple (*Malus sp*)	3	<30#	1	1	1	1	n/a	0	Good	Y	Good	Likely community orchard. Circa 4 m spacings, likely planted.			10+	C1
G598	Willow (*Salix sp*), Elder (*Sambucus nigra*), Common Alder (*Alnus glutinosa*)	6	<100#	2	2	2	2	n/a	0	Good	Y-SM	Good - Fair	Predominantly willow scrub.			10+	C2
G599	Common Oak (*Quercus robur*), Downy Birch (*Betula pubescens*), Common Alder (*Alnus glutinosa*), Holly (*Ilex aquifolium*)	13	<600#	6	6	6	6	n/a	0	Good	SM-M	Good	Limited access to bases. Growing down hill of access track. Up to circa 3-4 m below access track ground level.			40+	A2
T600	Common Oak (*Quercus robur*)	12	600,450#	3	6	5	7	4.0/W	0	Fair	M	Fair	No access to base. Downhill of access track. Base of tree is circa 3-			20+	B1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													4 m below access track ground level. Moderate upper crown dieback of western crown with moderate deadwood. Low traffic area.				
W601	Beech (*Fagus sylvatica*), Sycamore (*Acer pseudoplatanus*), Oak (*Quercus sp*)	23	<900#	9	9	9	9	n/a	3	Good	SM-M	Good - Fair	No access, viewed from highway. Regular structure (2 stories), stem exclusion stage, beech dominant circa 80% estimated distribution. Dense Rhododendron understory.			40+	A1,2
T602	Common Oak (*Quercus robur*)	17	1150#	7	8	8	10	2.5/E	3	Good	V	Fair	Set on edge of low rockface adj track, multiple failed scaffold limbs to north with large wounds exposing heartwood, good vitality, dense epicormic regrowth. large propped failed limb to north east with habitat features Inc cavities, hardcore track,	Crown lift to clear road by 5.2m (< 12 months)		40+	A1,2,3

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													Roots restricted by rock but some roots still likely below track to east and west of outcrop.				
G603	Willow (*Salix sp*), Downy Birch (*Betula pubescens*), White Willow (*Salix alba*), Hazel (*Corylus avellana*)	13	<250#	5	5	5	5	n/a	0	Good	SM-EM	Good - Poor	Limited access to bases. Numerous multi stem willow adjacent to stream.			10+	C1,2
G604	Monkey Puzzle (*Araucaria araucana*), Oak (*Quercus sp*), Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*), Sycamore (*Acer pseudoplatanus*)	15	<300#	3	3	3	3	n/a	0	Good	Y-M	Good - Fair	Rhododendron dominant edge to high forest. Pruned back from highway, edge to. highway forms thick pseudo-hedge.	Fell and treat stump of Rhododendron species. Replant with suitable semi natural native shrub mix. Reduce branches overhanging footpath and highway by pruning small diameter secondary and tertiary branches (up to 50mm) to allow for visibility from Wern junction. (< 12 months)		10+	C2
T605	Downy Birch (*Betula pubescens*)	12	460	3	4	4	4	2.0/W	1	Good	EM	Good	Previous loss of central leader. Three lateral branches forming central upper crown.			20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G606	Blackthorn (*Prunus spinosa*)	2	<80#	0.5	3	3	1	n/a	0	Good - Fair	SM	Fair	Leaning south east, located on 2 m rockface adj track, track overhung by 1 m with 2.5 m clearance	Crown lift to clear road by 5.2m (< 12 months)		10+	C2
T607	Beech (*Fagus sylvatica*)	23	900#	9	9	9	9	5.0/S	5	Good	M	Good	No access. Viewed from highway, limited visibility due to dense Rhododendron understory. Minor apical dieback with heterogeneous distribution in crown, overall bud density and branching pattern normal. Stem estimated around 6m setback from highway edge.			40+	A1,2
G608	Hazel (*Corylus avellana*), Downy Birch (*Betula pubescens*), Apple (*Malus sp*), Ash (*Fraxinus excelsior*), Goat Willow (*Salix caprea*), Holly (*Ilex aquifolium*), Beech (*Fagus sylvatica*)	12	<150#	3	3	3	3	n/a	0	Good - Dead	Y-SM	Good - Dead	Young likely self set group.			10+	C2
T609	Sycamore (*Acer pseudoplatanus*)	13	250,200,250#	2	6	4	2	3.0/S	2	Good	SM	Fair	No access, circa 4 m north of highway edge. Asymmetrical			20+	B1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													crown likely due to assumed recent canopy opening west. No visibility of base due to Rhododendron understory.				
T610	Hawthorn (*Crataegus monogyna*)	5	300#	2	4	3.5	3	1.0/W	2	Good	M	Good	Low over track, mature elder with dieback to north (150,100 mm diameter)	Crown lift to clear road by 5.2m (< 12 months)		20+	B1,2
T611	Unknown	2	800#	0	0	0	0		0	Stump	M	Stump	Dead 2.5 m tall stump.			<10	U1
T612	Silver Birch (*Betula pendula*)	12	300#	3	3	3	3	2.5/N	2	Good	SM	Good	No access to base. Downhill of access track, base of tree is circa 1 m below access track ground level.			20+	B1
T613	Sycamore (*Acer pseudoplatanus*)	9	350#	2	5	4	3	1.0/W	2	Good	SM	Good	North of highway edge by circa 2 m, emergent in Rhododendron .			20+	B1,2
T614	Beech (*Fagus sylvatica*)	20	600,500#	5	5	5	5		7	Good	V	Good - Poor	Layered mature beech in rock ledge by footpath. 2nd stem severe decay at branch stump ca. 3 m	Reduce or fell sycamore stems roadside. Reduce central stem with decay and *kretzschmaria* to ca. 3m stump. Gain access to garden	Retained with incursion	<10	U2,3

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													and tear out wound 5 m. *Kretzschmaria deusta* on root / stem interface of central stem with decay and tear out wound. *Kretzschmaria* also observed on lateral root growing toward road. Targets consist of footpath road and railway bridge.	behind to further assess. Consider reduction of largest stem or fell along with others. (Asap)			
T615	Ash (*Fraxinus excelsior*)	17	730	7	7	7	7	4.0/S	3	Good	EM	Poor	Stream to east of stem. Included bark union from 1-2 m, some adaptive swelling, located adjacent road and track, bark wounds to buttresses to south	Fell (< 3 months)		<10	U1
T616	Common Oak (*Quercus robur*)	17	1040	8	7	3	12	3.0/N	2	Good	M	Good	Limited access around base. Growing behind access track boundary wall at the top of a steep slope. Forms large canopy with two adjacent oak trees.			40+	A1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T617	Common Oak (*Quercus robur*)	17	960	11	7	11	2	4.0/NE	6	Good	M	Good	Limited access around base. Growing behind access track boundary wall at the top of a steep slope. Forms large canopy with two adjacent oak trees.			40+	A1,2
T618	White Willow (*Salix alba*)	6	260#	1	2	6	2	1.0/E	1	Good	EM	Fair	Lower stem cavities with good woundwood, low over track	Crown lift to clear road by 5.2m (< 12 months)		10+	C1,2
T619	Sycamore (*Acer pseudoplatanus*)	9	200	2	4	2	4		3	Fair	SM	Poor	Substantial decay. Growing next to beech surface roots with *Kretzschmaria*. Growing close to road and footpath. Decay possibly associated.	Fell	Retained with incursion	<10	U2
G620	Silver Birch (*Betula pendula*), Goat Willow (*Salix caprea*)	7	<250#	3	3	3	3	n/a	1	Good - Fair	Y-SM	Good - Fair	Group between road and track, small branches starting to obstruct track	Crown lift to clear road by 5.2m (< 12 months)		10+	C2
T621	Beech (*Fagus sylvatica*)	19	710#	3	7	2	7	2.5/E	2	Good	M	Fair	At edge of wall. to access road. Codominant in		Retained with incursion	40+	A1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													high forest canopy.				
T622	Common Oak (*Quercus robur*)	16	880	1	11	7	5	11.0/N	4	Good	M	Good	Limited access around base. Growing down steep slope with base of tree circa 3 m below access track ground level. Forms large canopy with two adjacent oak trees. Moderate form suppression.			40+	A2
T623	Hazel (*Corylus avellana*)	4	150#	1.5	1.5	1.5	1.5	1.0/W	2	Good	EM	Fair	Growing from rockface, set back 1.5 m from existing track. small thorn (50 mm) to west. low over track	Crown lift to clear road by 5.2 m (< 12 months)		10+	C2
G624	Oak (*Quercus sp*), Sycamore (*Acer pseudoplatanus*)	12	<350#	4	4	4	4	n/a	4	Fair	SM	Fair	Unable to inspect as on top of rock face.			20+	B2
T625	Beech (*Fagus sylvatica*)	25	730	6	8	3	4	3.0/NE	3	Good	V	Good - Fair	Codominant in high forest canopy. Cavity in main stem north at circa 1.5 m agl. Partially occluded rib from ground level to circa 2 m. Good columnar		Retained with incursion	40+	A1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													woundwood, remaining opening around 400 mm, probed to depth of circa 250 mm, opening likely a few cm. Hammer test, cavity audible in central circa metre of occlusion. Striae visible on woundwood.				
T626	Beech (*Fagus sylvatica*)	16	620	2	7	1	5	2.0/SE	1	Good	M	Good	Subdominant in high forest canopy.			40+	A1,2
T627	Beech (*Fagus sylvatica*)	23	770	6	5	6	1	7.0/E	3	Good	M	Good	Codominant in high forest canopy. Dense moss across stem.			40+	A1,2
T628	Beech (*Fagus sylvatica*)	20	900	4	4	4	4		3	Good	M	Fair	Decay at 1.5 m. Hollow sounded with mallet at base of sub dominant stem. Sapwood appears sound, normal callus formation.	Reinspect in 1 year	Retained with incursion	20+	B2
T629	Ash (*Fraxinus excelsior*)	9	250#	2	1	3	1	3.0/E	3	Poor	SM	Fair - Poor	Adjacent to access road, immediately adjacent to	Fell (When funds allow)	Retained with incursion	<10	U1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													wall. Significant symptoms of chalara ash dieback.				
G630	Hawthorn (*Crataegus monogyna*), Hazel (*Corylus avellana*), Sycamore (*Acer pseudoplatanus*), Holly (*Ilex aquifolium*), honeysuckle (*Lonicera nitida*).	7	<200#	0	0	0	0	n/a	0	Good	Y-SM	Good	Dense understory dominated by Rhododendron. Few likely Lonicera nitida.		Retained with incursion	10+	C2
T631	Beech (*Fagus sylvatica*)	6	120#	3	3	3	3		4	Fair	Y	Fair			Retained with incursion	10+	C2
G632	Hazel (*Corylus avellana*), Silver Birch (*Betula pendula*), Elder (*Sambucus nigra*)	11	<250#	3	3	3	3	n/a	0	Good	Y-SM	Good	Growing behind access track boundary wall down steep slope.			10+	C1,2
T633	Silver Birch (*Betula pendula*)	4	120#	1.5	1.5	1.5	1.5	1.0/N	2	Good	Y	Fair	Located on rockface, unlikely rooting below track	Crown lift to clear road by 5.2m (< 12 months)		10+	C1
T634	Sessile Oak (*Quercus petraea*)	15	1060	4	6	2	7	2.0/W	1	Good	M	Fair	Limited access to base. Dense ivy across main stem. Potential to limit crown reiteration processes. Asymmetrical crown likely	Sever ivy (< 12 months)	Retained with incursion	40+	A1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													due to previous stand competition, tree now removed, secondary crown formation from likely epicormic origin visible.				
T635	Silver Birch (*Betula pendula*)	12	300#	2	4	3	3	3.0/S	5	Good	EM	Good	No access to base. Growing down steep slope. Base is circa 3 m below access track ground level.			20+	B2
T636	Hawthorn (*Crataegus monogyna*)	4	50,50#	1	1	1	1	0.5/S	2	Good	Y	Fair	Growing on rockface, unlikely rooting below track	Crown lift to clear road by 5.2m (< 12 months)		10+	C2
T637	Sycamore (*Acer pseudoplatanus*)	16	700#	3	5	5	5		4	Fair	M	Fair	Ivy clad. Some branch end dieback.			20+	B2
T638	Common Oak (*Quercus robur*)	9	1030	1	3	3	1		0	Dead	M	Dead	Dead stem with significant internal stem decay.	Create monolith at 4m to retain standing deadwood.		<10	U1
T639	Douglas Fir (*Pseudotsuga menziesii*)	19	400	3	3	3	3		4	Good	SM	Fair				20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T640	Sessile Oak (*Quercus petraea*)	15	920	1	8	3	6	3.0/N	2	Good	M	Fair	Limited access to base. Circa two significant second order limbs in crown east under high forest canopy aborted providing major deadwood, circa 2 m x 350 mm and 7 m x 300 mm. Upper crown codominant in high forest canopy, epiphytes, moss and ivy throughout crown.		Retained with incursion	40+	A1,2
T641	Ash (*Fraxinus excelsior*)	12	360,280	5	6	1	7	3.0/S	2	Good	SM	Good	Two stems from ground level. Moderate form suppression from adjacent tree.			20+	B1
T642	Hawthorn (*Crataegus monogyna*)	4	140	2	2	2	1	0.8/N	0	Good	SM	Good	Growing on steep slope.			10+	C1
G643	Yew (*Taxus baccata*), Douglas Fir (*Pseudotsuga menziesii*), Sycamore (*Acer pseudoplatanus*)	16	250	3	3	3	3	n/a	0	Fair	Y-SM	Fair	Understory rhododendron		Retained with incursion	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
H644	Beech (*Fagus sylvatica*)	1	200	0.5	0.5	0.5	0.5	n/a	0	Good	Y-SM	Good			Retained with incursion	20+	B2
T645	Common Oak (*Quercus robur*)	13	880	6	11	6	6	2.0/N	2	Good	V	Fair	Multiple scaffold limb failures leaving large stubs, bark wounds and deadwood, located on edge of embankment set above track, overextended to south, ivy on stem and in crown, woodpecker hole 5.5 m to east on limb	Crown reduce overextended limb to south by circa 3-4m to reduce end weight (< 12 months) Sever ivy to promote epicormic growth on scaffold structure (< 12 months)		40+	A1,2,3
T646	Sessile Oak (*Quercus petraea*)	15	750#	7	1	6	6	2.0/W	1	Good	M	Fair	Limited access to base due to brambles. Secondary crown forming from likely epicormic origin in canopy gap. Dense ivy into upper crown.		Retained with incursion	40+	A1,2
T647	Common Oak (*Quercus robur*)	18	1300	11	8	8	10	2.0/N	1	Good	M	Good	Prominent tree. Numerous large sections of deadwood in southern lower crown.		Retained with incursion	40+	A1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T648	Sessile Oak (*Quercus petraea*)	10	650#	8	1	3	2	2.0/S	1	Good	EM	Fair	Limited access to base. Structurally suppressed by oak south. Positive phototropic growth north. Epiphytes throughout crown. High quality as dominant semi natural species, significant future potential.		Retained with incursion	40+	A2
H649	Common privet (*Ligustrum ovalifolium*)	1	50	0.5	0.5	0.5	0.5	n/a	0	Fair - Poor	Y	Good			Retained with incursion	10+	C2
H650	Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*), Sycamore (*Acer pseudoplatanus*)	1	<70#	1	1	1	1	n/a	0	Good	Y-SM	Good	Gappy managed hedge atop retaining wall circa 1.5 m above road level.			10+	C2
T651	Hawthorn (*Crataegus monogyna*)	3	100,70 #	1.5	1.5	1.5	1.5	1.0/S	1	Good	EM	Fair	Located adjacent stone wall, maintained at 2-3 m height.			10+	C1
G652	Cherry Laurel (*Prunus laurocerasus*)	4	<90#	2	2	2	2	n/a	0	Good	Y	Good				10+	C2

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G653	Common Oak (*Quercus robur*)	18	<1000 #	9	9	9	9	n/a	3.5	Good	M	Good	No access to bases. Located behind wall on opposite side of road. Viewed from south eastern field.			40+	A1,2
T654	Red Oak (*Quercus rubra*)	25	900#	12	12	12	12	5.0/S	8	Good	M	Good	No access, viewed from access track. Dominant in high forest. Significant dead second order limbs in lower crown, likely natural branch shedding.			40+	A1,2
G655	Cherry Laurel (*Prunus laurocerasus*), Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*), Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*), Yew (*Taxus baccata*)	10	<250#	0	0	0	0	n/a	0	Good	Y-SM	Good	Dense understory dominated by Rhododendron species and cherry laurel. Stream east separating group from main woodland stand. Low canopy over access track circa 3 m lowest clearance of cherry laurel.		Retained with incursion	10+	C2
T656	Sessile Oak (*Quercus petraea*)	7	850#	4	4	4	4		1	Good	M	Good	Some deadwood throughout. Ivy clad stem.		Retained with incursion	40+	A2

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T657	Larch (*Larix sp*)	16	820	3	6	5	3		4	Good - Fair	M	Good - Fair	Few failed limbs partially attached in crown, typical of species, dense ivy limiting visibility.		Retained with incursion	40+	A1
T658	Sycamore (*Acer pseudoplatanus*)	18	930	7	7	5	7	5.0/SW	2	Good	M	Good	Limited access to base. Prominent tree. Dense ivy cover 0-17 m.		Retained with incursion	40+	A1
T659	Douglas Fir (*Pseudotsuga menziesii*)	10	400	0	2	1	4	5.0/W	5	Poor	EM	Fair - Poor	Circa 2 m east of track edge, no access. Significant limb of ash hung up in crown, likely cause of significant wounding to crown resulting in significant loss. of crown structure/leaves.		Retained with incursion	10+	C1
G660	Elder (*Sambucus nigra*), Sycamore (*Acer pseudoplatanus*), Holly (*Ilex aquifolium*)	5	<90#	2	2	2	2	n/a	0	Good	Y-SM	Good	Growing directly adjacent to building.			10+	C2
T661	Ash (*Fraxinus excelsior*)	10	250,200,200,200#	4	4	4	4		3	Poor	SM	Fair	Severely dying back.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T662	Common Oak (*Quercus robur*)	16	850#	9	9	9	9	5.0/W	3	Good	M	Fair	Limb failure east at 6m leaving large wound, appears recent, no obvious decay, lower stem wound to east from base to 0.6 m, generally sounds normal/solid, deadwood over track	Remove dead wood where it presents a hazard to track (< 3 months)	Retained with incursion	40+	A1
T663	Unknown	0	800#	0	0	0	0		0	Stump	M	Stump			Retained with incursion	<10	U1
T664	Ash (*Fraxinus excelsior*)	17	1160#	7	14	12	7	3.5/S	5	Good - Fair	M	Good - Fair	Previous second order stem failures in crown. Dense ivy into upper crown. Moderate to minor bud sparsity, irregular branching pattern likely due to limb failures and subsequent crown regeneration reiteration.		Retained with incursion	40+	A1,2
G665	Elder (*Sambucus nigra*), Sycamore (*Acer pseudoplatanus*),	5	<100#	1	1	1	1	n/a	0	Fair - Dead	Y	Fair - Dead	Dying trees immediately adjacent to old building.	Fell (< 12 months)		<10	U2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	Goat Willow (*Salix caprea*)																
T666	Goat Willow (*Salix caprea*)	4	70,70#	1	1	1	1		0	Good	Y	Good				10+	C1
T667	Beech (*Fagus sylvatica*)	20	1050	9	9	9	9	6.0/N	5	Good	M	Fair	Fluted stem base, limited access, multiple branch failure stubs to South from 5-8 m, smaller than 150 mm.		Retained with incursion	40+	A1
G668	Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*)	7	<130#	3	3	3	3	n/a	0	Good - Fair	Y-SM	Good - Fair	Dense rose present. Previous major clearance pruning and coppicing of sycamore. Growing directly behind large wall.	Fell trees to reduce likelihood of damage to wall.		<10	U2
T669	Cedar (*Cedrus sp*)	16	1000	8	8	8	8		5	Dead	M	Dead		Create monolith at 5m		<10	U2
T670	Unknown	15	800#	5	5	5	5	5.0/W	2	Dead	M	Fair - Poor	No access, likely dead cypress species. Target of access road.	Monolith to 5m, retain deadwood as coarse woody debris around base. (< 3 months)		<10	U1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T671	Goat Willow (*Salix caprea*)	2	80#	1.5	1.5	1.5	1.5		0	Good	Y	Fair	Multi stemmed with 10 mm stems X circa 20. combined diameter estimated. Growing adjacent wall			<10	U1
T672	Horse Chestnut (*Aesculus hippocastanum*)	19	820,550,630,550,830	10	5	8	7	4.0/W	2	Good	M	Good	Circa 4 m clearance over access track. Five stems from 0.6-1.3 m. Good unions. Previous major crown lifting with large pruning wounds of up to 400 mm diameter. Predominantly left as stubs. Old pruning wound to west at 2.5 m. Unidentified fungal fruiting body present on wound. Likely saprophytic. Stem sound tested to circa 2 m with normal wood density.		Retained with incursion	40+	A1,2
T673	Western Red Cedar (*Thuja plicata*)	20	600,600#	3	3	3	3		3	Good - Fair	M	Good - Fair	No access, east of stream. Circa 11 m from track edge. Codominant stems from			40+	A1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													circa 1.5 m, no obvious inclusion visible. Multiple bifurcations in crown typical of species.				
T674	Common Oak (*Quercus robur*)	10	700#	4	6	5	5	3.0/S	7	Fair	M	Fair	Dense ivy, beyond 1.2 m retaining wall, potential previously reduced crown, deadwood and stubs to north and east,		Retained with incursion	20+	B1,2
T675	Common Oak (*Quercus robur*)	8	620#	6	6	3	7	2.5/S	2	Fair	M	Fair	Dense ivy, beyond 1.2 m retaining wall. deadwood and stubs to west, crown orientated west, ivy suppressed upper crown	Sever ivy (< 12 months) Crown lift to clear road by 5.2m (< 12 months)	Retained with incursion	20+	B1,2
T676	Oak (*Quercus sp*)	8	800#	0	3	0	0	5.0/S	1	Dead	M	Fair - Poor	Monolith at track edge. Fell and retain as coarse woody debris if outside risk tolerance.	Fell and retain as coarse woody debris if outside risk tolerance.	Retained with incursion	<10	U1
G677	Silver Birch (*Betula pendula*), Sycamore (*Acer pseudoplatanus*), Oak (*Quercus sp*)	7	<150#	3	3	3	3	n/a	3	Good - Fair	Y-SM	Good - Fair	Located beyond old building wall, larger trees set further back			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T678	Beech (*Fagus sylvatica*)	25	930#	8	8	8	8	8.0/N	3	Good	M	Fair	Decay/dysfunction to base south from ground level. - circa 1.4 m x 600 mm. Hammer test, wooden density in area of dysfunction very poor, hammer sinks into wood. Probed to depth of circa 350 mm. Wood density outside zone normal. Crown branching pattern and bud density normal. Downgraded due to nondurable heartwood of beech.		Retained with incursion	20+	B1
T679	Portugal Laurel (*Prunus lusitanica*)	7	260,250,230,220,100,100#	6	6	3	6	2.0/W	2	Good	M	Fair	Growth orientated to west, suppressed by tree no longer present, asbestos at base.		Retained with incursion	10+	C2
T680	Horse Chestnut (*Aesculus hippocastanum*)	25	1040	9	4	5	3	7.0/N	1	Good	V	Good	Dense ivy cover 0-17 m. Two stems from 3 m with good union. Eastern stem has previously failed and is circa 500 mm		Retained with incursion	40+	A1,2,3

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													diameter and 5 m long. Major cavities are present on failed stem with likely significant internal stem decay.				
T681	Beech (*Fagus sylvatica*)	25	860	9	4	6	11	8.0/W	5	Good	M	Fair	Two stems from 3.5 m with tight included union. Adaptive growth present with upright form and overlapping canopies.		Retained with incursion	40+	A1,2
T682	Beech (*Fagus sylvatica*)	18	640	5	7	7	7		1	Good	EM	Good			Retained with incursion	40+	A2
T683	Beech (*Fagus sylvatica*)	25	890	6	9	8	11	5.0/W	5	Good	M	Good	Good example of species.		Retained with incursion	40+	A1,2
G684	Cherry Laurel (*Prunus laurocerasus*), Portugal Laurel (*Prunus lusitanica*)	10	<300#	5	5	5	5	n/a	2	Good - Fair	Y-M	Good - Fair		Crown lift to clear road by 5.2 m (< 12 months)	Retained with incursion	10+	C2
T685	Portugal Laurel (*Prunus lusitanica*)	7	600,200,200,200	0	4	6	6		3	Good - Poor	OM	Good - Dead	Central stem collapsed away from road. Remaining stems appear		Retained with incursion	<10	U3

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													sound. Deadwood has potential for habitat.				
T686	Beech (*Fagus sylvatica*)	25	800	2	6	8	5	8.0/S	3	Good	M	Good	No access. Northeast of drainage channel/strea m. Normal branching pattern and bud density. Codominant in high forest canopy.			40+	A1,2
T687	Red Oak (*Quercus rubra*)	15	440	4	6	0	12	9.0/W	9	Good	EM	Fair	Significant lean west due to major form suppression from adjacent trees. Large section of deadwood over access track.	Remove dead wood (< 3 months)	Retained with incursion	20+	B2
G688	Grey willow (*Salix cinerea*), Sycamore (*Acer pseudoplatanus*)	6	<100#	3	3	3	3	n/a	0	Good	Y-SM	Fair	No access. Streamside establishment, likely self sown.			10+	C2
G689	Other	6	<100#	2	2	2	2	n/a	0	Good	Y-EM	Good	No access to bases. Various shrubs in residential garden.			10+	C1,2
G690	Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*), Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*)	8	<200#	2	2	2	2	n/a	3	Good - Fair	Y-SM	Good - Fair	Stems established behind boundary wall, at slightly lower elevation to road circa 300 mm.		Retained with incursion	20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													Individuals of low quality, collective value.				
G691	Sycamore (*Acer pseudoplatanus*)	8	<100#	3	3	3	3	n/a	0	Good	Y	Good	Buddleja. No access to bases.			10+	C1,2
T692	Ash (*Fraxinus excelsior*)	12	490	4	5	4	4		6	Fair	EM	Good	Thin canopy. Constraint on all sides by tarmac. Bulbous base but sounded with no sign of hollowing.		Retained with incursion	20+	B2
T693	Sycamore (*Acer pseudoplatanus*)	8	160	2	1	2	1	3.5/N	4	Good	Y	Good	Established north of boundary wall. Only tree north of wall highway side in area.		Retained with incursion	10+	C1
G694	Sycamore (*Acer pseudoplatanus*)	18	<500#	6	6	6	6	n/a	0	Good	SM-EM	Good	No access to bases. Circa 4 m clearance over road to west.			20+	B1,2
G695	Common Oak (*Quercus robur*), Goat Willow (*Salix caprea*), Hazel (*Corylus avellana*)	10	<550#	6	6	6	6	n/a	6	Good - Fair	SM-M	Good - Fair	Inaccessible roadside group, oaks immediately adj road edge, willow set back on wetter ground			20+	B2
T696	Sycamore (*Acer pseudoplatanus*)	7	350	3	3	3	3	2.0/E , 2.0/W	4	Fair	SM	Fair	Ivy clad		Retained with incursion	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G697	Sycamore (*Acer pseudoplatanus*)	9	<200#	4	4	4	4	n/a	4	Good	SM	Good - Fair	Established behind boundary wall slightly below highway level. Minor sub 50 mm diameter second order limbs circa 4 m and above over highway.			10+	C2
H698	Beech (*Fagus sylvatica*), Holly (*Ilex aquifolium*), Hawthorn (*Crataegus monogyna*)	3	<90#	1	1	1	1	n/a	0	Good	SM	Good	Managed hedge within residential garden.			10+	C2
T699	Sycamore (*Acer pseudoplatanus*)	7	300,300#	3	3	3	3	2.0/E , 2.0/W	4	Fair	SM	Fair	Ivy clad		Retained with incursion	10+	C2
G700	Sycamore (*Acer pseudoplatanus*), Sessile Oak (*Quercus petraea*)	8	<150#	2	2	2	2	n/a	2	Good	SM	Good - Fair	Established behind boundary wall at highway level. Minor sub 20 mm diameter second order limbs circa 4 m and above over highway. Likely previously topped or pollarded.			10+	C2
T701	Sycamore (*Acer pseudoplatanus*)	18	650,800,600#	10	8	10	7	6.0/S	4	Good	M	Good	No access to base. In residential garden. Three stems from ground level.			40+	A1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													Prominent tree. Circa 4 m clearance over road. Previous major crown lifting with pruning wounds up to 250 mm.				
T702	Sycamore (*Acer pseudoplatanus*)	7	350#	1	1	4	1	2.0/E , 2.0/W	4	Fair	SM	Fair	Ivy clad		Retained with incursion	10+	C2
T703	Ash (*Fraxinus excelsior*)	16	450	2	4	4	4	2.0/N	2	Good	EM	Good	No access to base, viewed from public footpath. Dense ivy ascending main stem. No limbs overhanging highway until circa 13 m.		Retained with incursion	20+	B1
T704	Sycamore (*Acer pseudoplatanus*)	14	800#	1	7	7	7	4.0/N	4	Good	EM	Good	Ivy clad		Retained with incursion	20+	B2
G705	Sycamore (*Acer pseudoplatanus*), Holly (*Ilex aquifolium*), Ash (*Fraxinus excelsior*), Red Horse Chestnut (*Aesculus carnea*), Cherry (*Prunus sp*), Common Oak (*Quercus robur*)	17	<500#	7	7	7	7	n/a	0	Good	Y-EM	Good - Fair	No access to bases. Circa 7 m clearance over road. Trees growing on slope >1 m above road level.			20+	B1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G706	Common Oak (*Quercus robur*), Hazel (*Corylus avellana*), Sycamore (*Acer pseudoplatanus*)	20	<700#	8	8	8	8	n/a	6	Good - Dead	SM-M	Good - Dead	Inaccessible roadside group, oaks majority with many likely coppice derived, woodland to west beyond 1.5-2 m wall, becoming line of field edge trees to east.			40+	A2
T707	Ash (*Fraxinus excelsior*)	20	900#	7	7	7	7	4.0/N	4	Good	M	Good	Ivy clad		Retained with incursion	40+	A2
T708	Ash (*Fraxinus excelsior*)	20	800#	6	6	2	8	5.0/N	15	Poor	M	Fair	No access to base, viewed from public footpath. Significant crown sparsity-major. deviation in branching pattern, high bud sparsity poor internal epicormic growth. Habitat hole, likely woodpecker hole at circa 8 m west. Circa 1 m from boundary wall.		Retained with incursion	10+	C1
T709	Sycamore (*Acer pseudoplatanus*)	7	400	7	2	2	2		4	Fair	SM	Fair	Ivy clad. Suppressed.			20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T710	Sycamore (*Acer pseudoplatanus*)	4	80,70, 70,70	2	0	2	1	0.3/N	0	Good	Y	Fair	Previous clearance pruning from road to south. Three stems from 0.3 m. Good unions.			10+	C1
T711	Goat Willow (*Salix caprea*)	7	250,25 0,200, 200#	5	5	5	5		0	Good	M	Fair	No access, viewed from road, assumed goat willow in wet ground.			20+	B2
T712	Sycamore (*Acer pseudoplatanus*)	7	400	1	2	1	1		4	Dead	SM	Dead	Ivy clad.	Fell (< 12 months)	Retained with incursion	20+	B2
T713	Ash (*Fraxinus excelsior*)	20	700#	6	6	8	10	7.0/NW	12	Fair	M	Fair	No access to base, viewed from public footpath. Moderate bud sparsity, few dead major limbs in crown, moderate crown gaps. Circa 500 mm from boundary wall.	Remove dead wood over access road if outside risk tolerance.	Retained with incursion	20+	B1,2
H714	Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*), Sessile Oak (*Quercus petraea*)	2	<80#	1	1	1	1	n/a	0	Good - Fair	Y	Good	Gappy managed hedge.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
W7151	Ash (*Fraxinus excelsior*), Holly (*Ilex aquifolium*), Sycamore (*Acer pseudoplatanus*), Beech (*Fagus sylvatica*)	12	<300#	4	4	4	4	n/a	4	Fair	Y-SM	Fair				10+	C2
T716	Goat Willow (*Salix caprea*)	8	300,250,250,250,230,230,220,220,200#	8	8	8	8	0	0	Good	A	Fair	Large circa 1.25 m diameter stool with multiple stems and limbs (circa 17), assumed 'stems' X 10 as more upright features, e.g. less than 45 degrees, no access, large for species,			40+	A1,2,3
H717	Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*), Sessile Oak (*Quercus petraea*)	2	<80#	1	1	1	1	n/a	0	Good - Fair	Y	Good	Gappy managed hedge.		Fell in part as per TPP	10+	C2
T718	Sycamore (*Acer pseudoplatanus*)	14	380#	4	7	4	4	4.0/N	4	Good	EM	Good			Retained with incursion	20+	B2
H719	Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*), Sessile Oak (*Quercus petraea*), Rowan (*Sorbus aucuparia*)	6	<120#	1	1	1	1	n/a	0	Good - Fair	Y	Good	Gappy managed hedge at 1.6 m. Occasional established tree in hedge.		Fell in part as per TPP, with RPA incursion	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T720	Sycamore (*Acer pseudoplatanus*)	20	700#	6	3	8	10	5.0/W	6	Good	EM	Good	No access to base, viewed from public footpath. Base circa 500 mm from boundary wall. Codominant in high forest canopy.		Retained with incursion	40+	A2
T721	Sycamore (*Acer pseudoplatanus*)	20	600,600#	2	6	1	10	5.5/W	7	Fair	M	Fair	No access to base, viewed from public footpath. Base within 500 mm of boundary wall. Included union at circa 1 m, adaptive growth visible, species with high structural durability. Upper crown with moderate bud sparsity.		Retained with incursion	20+	B1,2
T722	Ash (*Fraxinus excelsior*)	22	1000#	8	8	4	8		8	Good	M	Good			Retained with incursion	40+	A2
T723	Goat Willow (*Salix caprea*)	8	450,300,300,400,250,230,400#	8	8	8	8		0	Good	A	Fair	Large circa 1.5 m diameter stool with multiple stems (circa 8), no access, large for species, likely collapsing to east and west.			40+	A1,2,3

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T724	Sycamore (*Acer pseudoplatanus*)	10	600,500#	6	6	5	6	2.0/N	2	Good	EM	Good	Limited access to base. Dense ivy cover 0-9 m. Two stems from ground level. Base of tree is circa 1 m above the field level to the north-west.			20+	B1,2
T725	Beech (*Fagus sylvatica*)	12	300	4	4	4	4		5	Good	SM	Good			Retained with incursion	20+	B2
T726	Beech (*Fagus sylvatica*)	12	300	4	4	4	4		5	Good	SM	Good				20+	B2
T727	Elm (*Ulmus sp*)	10	230,140,270	0	4	6	8	3.0/S	2	Good	SM	Fair	Established west of path. Structurally suppressed, multistemmed from ground level.		Retained with incursion	10+	C1
T728	Ash (*Fraxinus excelsior*)	18	300	2	2	1	4	8.0/W	7	Good	SM	Fair	Codominant in canopy.		Retained with incursion	20+	B1
T729	Goat Willow (*Salix caprea*)	7	250,250,200,200#	5	5	5	5		0	Good	M	Fair	No access, viewed from road, assumed goat willow in wet ground.			20+	B2
T730	Goat Willow (*Salix caprea*)	7	250,250,250,250,250#	5	5	5	5		0	Good	M	Fair	No access, viewed from road, assumed			20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													goat willow in wet ground.				
T731	Common Alder (*Alnus glutinosa*)	14	800,500	3	8	4	8	2.5/S	4	Good	V	Fair - Poor	No access to base, viewed from public footpath. Significant open cavity to dominant stem south, likely previous union failure, limited visibility, extensive decay visible, unknown total extent, peripheral woundwood and adaptive swelling visible. Numerous small decay features throughout crown e.g. localised hollowing to branch collars. .		Retained with incursion	40+	A3
T732	Sycamore (*Acer pseudoplatanus*)	4	150	1	2	0	4	2.5/W	0	Good	Y	Fair	Significant form suppression with major lean west. Several large stem wounds present. Moderate wound wood development.			10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T733	Common Oak (*Quercus robur*)	18	650,650,350,350#	8	8	8	8	4.0/NE	5	Good	M	Good	likely past coppice, no access, growing on embankment			40+	A1
T734	Hawthorn (*Crataegus monogyna*)	4	100#	2	2	2	2		0	Good	Y	Good	No access to base. Viewed from road.		Fell	10+	C1
G735	Hawthorn (*Crataegus monogyna*)	3	<150#	1.5	1.5	1.5	1.5	n/a	0	Good - Dead	EM	Good - Dead	No access, 3 trees, tree to west likely dead/dying			10+	C2
T736	Ash (*Fraxinus excelsior*)	23	1280	8	8	8	8	6.0/SE	4	Fair	A	Fair	Likely historic lapsed pollard, significant second order limbs arising from circa 4 m. Deadwood in crown, moderate crown gaps. Bud density on retained limbs normal. At boundary.			40+	A3
T737	Beech (*Fagus sylvatica*)	12	300	4	4	4	4		5	Good	SM	Good				20+	B2
T738	Goat Willow (*Salix caprea*)	7	130,200,100#	4	2	2	3	2.5/W	2	Good	EM	Good	No access to base. Recent pruning of majority of stems to base. Three stems remaining.			10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
W739	Common Oak (*Quercus robur*), Silver Birch (*Betula pendula*), Fir (*Abies sp*), Ash (*Fraxinus excelsior*), Sycamore (*Acer pseudoplatanus*), Cider Gum (*Eucalyptus gunnii*), Larch (*Larix sp*)	18	<400#	5	5	5	5	n/a	5	Good - Fair	SM-EM	Good - Fair	Mixed woodland south of road, no access, larger trees set back into woodland			20+	B2
G740	Sessile Oak (*Quercus petraea*), Ash (*Fraxinus excelsior*), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*)	13	<700#	7	7	7	7	n/a	0	Good - Dead	Y-M	Good - Dead	No access to bases. Trees growing on steep slope.			40+	A1,2
T741	Sycamore (*Acer pseudoplatanus*)	14	350#	4	1	1	5	5.0/NW	5	Good	SM	Fair	No access to base, viewed from public footpath.		Retained with incursion	20+	B2
T742	Beech (*Fagus sylvatica*)	17	380	4	4	4	4		7	Good	SM	Good			Retained with incursion	20+	B2
T743	Sycamore (*Acer pseudoplatanus*)	22	650	8	8	8	8	2.0/N	5	Good	EM	Good	No access to base, viewed from public footpath. Locally dominant. Upper crown with few gaps, bud density normal on retained limbs.		Retained with incursion	40+	A1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
W744	Common Alder (*Alnus glutinosa*), Sycamore (*Acer pseudoplatanus*), Ash (*Fraxinus excelsior*)	20	<900#	8	8	8	8	n/a	1	Good - Dead	Y-M	Good - Poor	Wetland woodland. Viewed from public access road north and west only. Few trees visible in a poor to dead condition.	Inspect group and remove trees where risk exceeds risk tolerance. Retain deadwood in situ where possible and underpants with suitable high forest species.		40+	A2
T745	Sessile Oak (*Quercus petraea*)	8	520	2	6	7	4	1.5/W	2	Good	SM	Fair	At field boundary. Form indicates significant exposure from south-west.		Fell	20+	B1
G746	Sessile Oak (*Quercus petraea*), Willow (*Salix sp*)	8	<350#	5	5	5	5	n/a	1	Good	Y-SM	Good - Fair	Shelterbelt on agricultural boundary. Willow likely caprea or cinerea.		Fell in part as per TPP	20+	B1,2
T747	Sycamore (*Acer pseudoplatanus*)	5	200#	3	3	3	3		3	Fair	Y	Fair				10+	C2
T748	Unknown	2	300#	0.5	0.5	0.5	0.5		0	Stump	M	Stump	Stump with epicormic growth.		Retained with incursion	<10	U1
G749	Other	3	<80#	2	2	2	2	n/a	0	Good	Y	Good	buddleja			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T750	Sessile Oak (*Quercus petraea*)	10	600#	2	5	10	4	1.0/W	4	Good	EM	Fair	No access, viewed from access track. Firm indicative of exposure from west.		Fell	40+	A1
T751	Other	4	120#	2	3	2	2	1.0/E	0	Poor	M	Fair	No access to base. Dense ivy cover. Significant crown dieback.			<10	U1
G752	Holly (*Ilex aquifolium*)	5	<150#	2	2	2	2	n/a	0	Good	Y-SM	Good - Fair	Grove of holly, high live crown ratio.			10+	C2
G753	Sessile Oak (*Quercus petraea*), Hawthorn (*Crataegus monogyna*)	6	<220	2	2	2	2	n/a	2	Good	SM	Good			Fell in part as per TPP	20+	B2
T754	Cypress (*Chamaecyparis sp*)	12	550#	4	4	4	4		0	Good	M	Good	No access to. base. Viewed from road to Southeast.		Retained with incursion	20+	B1
G755	Silver Birch (*Betula pendula*), Lawson Cypress (*Chamaecyparis lawsoniana*), Pine (*Pinus sp*), Hawthorn (*Crataegus monogyna*)	12	<450#	4	4	4	4	n/a	0	Good - Fair	SM-EM	Good - Fair	Linear group along boundary of allotment, no access.			20+	B2
T756	Cypress (*Chamaecyparis sp*)	12	500,500#	4	4	4	4		1	Good	M	Good	No access to. base. Viewed from road to Southeast. Dense ivy cover.		Retained with incursion	20+	B1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T757	Ash (*Fraxinus excelsior*)	8	400#	4	4	4	4	2.0/SW	2	Fair - Poor	EM	Good	No access. Internal vertical epicormic shoots within likely dysphotic zone in crown, symptom of chalara ash dieback.			10+	C1
G758	Willow (*Salix sp*), Other	6	<100#	3	3	3	3	n/a	0	Good	Y-SM	Good	Buddleja. No access to bases. Adjacent to stream.			10+	C2
T759	Ash (*Fraxinus excelsior*)	7	490	6	6	6	6		4	Fair - Poor	SM	Fair	Thinning crown. Possible dieback.			10+	C2
T760	Lawson Cypress (*Chamaecyparis lawsoniana*)	12	550,300,280#	3.5	3.5	3.5	3.5	4.0/S	4	Good	EM	Fair	Crown lifted to south with stubs, soil disturbance near base			20+	B1
T761	Ash (*Fraxinus excelsior*)	12	360	0	1	1	4	6.0/W	7	Poor	SM	Fair	Apical dieback with dense vertical epicormic growth within crown, symptoms of chalara ash dieback.			<10	U1
G762	Fig (*Ficus carica*)	7	<450#	5	5	5	5	n/a	0	Good	M	Good - Fair	No access to bases. Several multi stemmed trees adjacent to stream.			20+	B1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
H763	Hawthorn (*Crataegus monogyna*)	4	<100#	1	1	1	1	n/a	0	Good - Fair	SM-EM	Good - Fair	Hedge managed at circa 3 m. no access, viewed from south			10+	C2
T764	Ash (*Fraxinus excelsior*)	15	600#	2	0	0	7	7.0/S	11	Fair - Poor	V	Fair - Poor	No access, viewed from footpath. Extensive cavity southeast, circa 2 m x 300 mm, total extent of depth unknown. Stem visually hung up in semi mature sycamore west, sign of previous structural failure, canopy continuity indicates stability. Moderate to high crown sparsity with dead apical limbs throughout, dense ivy.			40+	A3
T765	Beech (*Fagus sylvatica*)	20	670	5	2	5	5		7	Good	M	Good				40+	A2
T766	Lawson Cypress (*Chamaecyparis lawsoniana*)	12	700#	4	2	4	2	3.0/S	0	Good	M	Good	No access to base. Dense ivy cover. Viewed from access track to south.		Retained with incursion	20+	B1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													Previous major crown lifting over access track and power lines to south.				
T767	Western Red Cedar (*Thuja plicata*)	9	500#	4	4	4	4		0	Good	EM	Good	No access, some gaps in canopy			20+	B2
T768	Sycamore (*Acer pseudoplatanus*)	14	350#	1	1	1	1		7	Fair	SM	Fair				10+	C2
T769	Sycamore (*Acer pseudoplatanus*)	14	500#	6	6	6	2		4	Good	EM	Good				20+	B2
G770	Sessile Oak (*Quercus petraea*), Willow (*Salix sp*), Hawthorn (*Crataegus monogyna*)	6	250	3	3	3	3	n/a	0	Fair	Y-SM	Fair	Gorse			10+	C2
T771	Common Oak (*Quercus robur*)	4	360#	1.5	1.5	1.5	1.5	1.5/N	1	Fair	SM	Fair	Squat oak with apical dieback and small crown, no access beyond ditch adj road, deadwood		Retained with incursion	20+	B3
T772	Hawthorn (*Crataegus monogyna*)	3	70,40, 50#	1.5	1.5	1.5	1.5		0	Good	SM	Fair	No access beyond ditch adj road. 2 m ivy covered stump to south adj road edge circa 200 mm diameter.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T773	Common Oak (*Quercus robur*)	8	470#	5	5	4	5	1.0/N	1	Fair	EM	Fair	Squat oak with small crown, no access beyond ditch adj road, deadwood, stem cavity north at 1 m (upwards facing), bark wounds in crown to north		Retained with incursion	20+	B3
T774	Hawthorn (*Crataegus monogyna*)	3	50,50#	1	1	1	1		0	Good	Y	Good	Road edge		Fell	10+	C1
T775	Silver Birch (*Betula pendula*)	3	50#	0.5	0.5	0.5	0.5	1.0/E	1	Good	Y	Fair	Road edge torn out leader at 1.3 m			10+	C1
T776	Common Oak (*Quercus robur*)	3	60#	1.5	0.5	1.5	1.5		1	Good	Y	Good	Road edge, adj wall, very limited future.		Fell	<10	U1
T777	Common Oak (*Quercus robur*)	2	50#	0.5	0.5	1.5	1		0	Good	Y	Good	Road edge, adj wall, very limited future		Fell	<10	U1
G778	Goat Willow (*Salix caprea*), Common Alder (*Alnus glutinosa*), Hawthorn (*Crataegus monogyna*)	6	<160#	3	3	3	3	n/a	0	Good	Y	Good – Fair	No access to bases.			10+	C1,2
G779	Goat Willow (*Salix caprea*), Crack Willow (*Salix fragilis*),	6	<110#	2	2	2	2	n/a	0	Good	Y	Good	No access to bases.			10+	C1,2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	Elder (*Sambucus nigra*), Sessile Oak (*Quercus petraea*)												Predominantly willow.				
T780	Goat Willow (*Salix caprea*)	5	120,100,90,100,70#	2	2	2	2		0	Good	Y	Good	No access to base. Multiple stems from ground level. Previous poor pruning over access track to southwest. Circa 2.5 m clearance over access track.			10+	C1
T781	Common Oak (*Quercus robur*)	10	400,450,300#	4	4	5	4	1.0/E	1	Fair	EM	Fair	No access due to water, some dieback upper crown and deadwood and torn stubs over road, buttressing pronounced to east with possible soil erosion exposing roots, dense epicormic on scaffolds	Crown lift to clear road by 5.2m and remove deadwood over road (< 3 months)		20+	B1,2
G782	Goat Willow (*Salix caprea*), Common Alder (*Alnus glutinosa*), Hawthorn (*Crataegus monogyna*), Sessile Oak (*Quercus petraea*), Elder (*Sambucus nigra*), Crack Willow (*Salix fragilis*), Downy	5	<100#	2	2	2	2	n/a	0	Good	Y	Good	No access to bases. No trees overhanging access track.			10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	Birch (*Betula pubescens*)																
G783	Goat Willow (*Salix caprea*)	4	<70#	3	3	3	3	n/a	0	Good	Y	Good	No access to bases. Adjacent to ditch. Previous clearance pruning back from access track to south-west.			10+	C2
G784	Goat Willow (*Salix caprea*), Common Alder (*Alnus glutinosa*), Hawthorn (*Crataegus monogyna*), Sessile Oak (*Quercus petraea*), Elder (*Sambucus nigra*), Crack Willow (*Salix fragilis*), Downy Birch (*Betula pubescens*)	6	<130#	2	2	2	2	n/a	0	Good	Y	Good	No access to bases. Trees generally appear to be managed back from access track.			10+	C2
G785	Goat Willow (*Salix caprea*), Crack Willow (*Salix fragilis*), Sessile Oak (*Quercus petraea*), Alder (*Alnus sp*)	6	<130#	2	2	2	2	n/a	0	Good	Y	Good				10+	C2
H786	Hawthorn (*Crataegus monogyna*)	2	<100#	0.5	0.5	0.5	0.5	n/a	0	Good	SM	Fair	Circa 20 x 10 mm stems, estimated combined diameter. Regen from felled stumps		Fell	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
													circa 200 mm diameter at ground level, on bank between 2 fences, very intermittent				
H787	Goat Willow (*Salix caprea*), Willow (*Salix sp*)	4	<70#	2	2	2	2	n/a	0	Good	Y	Good	Gappy hedge along field boundary. Beginning to encroach access track.			10+	C2
T788	Willow (*Salix sp*)	2	100#	1	1	1	1	0.5/W	0	Good	SM	Good	No access. Likely self sown on ditch bank. Red buds with red apical growth, pubescent at apices likely S. aurita or S. cinerea.		Fell	10+	C1
T789	Willow (*Salix sp*)	2	100,100#	2	2	2	2	0.5/W	0	Good	SM	Good	No access. Likely self sown on ditch bank. Yellow small buds with pubescent apical growth, likely S. cinerea. Two trees in immediate proximity. Stem estimated from ground level due to mass proliferation of stems at circa 1.5 m agl.		Fell	10+	C1

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
T790	Willow (*Salix sp*)	2	100#	1	1	1	1	0.5/W	0	Good	SM	Good	No access. Likely self sown on ditch bank. Yellow small buds with pubescent apical growth, likely S. caprea. Stem estimated from ground level due to mass proliferation of stems at circa 1.5 m agl.		Fell	10+	C1
T791	Hawthorn (*Crataegus monogyna*)	2	60#	0.5	0.5	0.5	0.5		0	Good	SM	Fair	Regen from felled stump at circa 200 mm diameter, circa 10 stems of less than 10 mm diameter, on bank between fencing.			10+	C2
T792	Willow (*Salix sp*)	2	90#	1	1	1	1	0.5/W	0	Good	SM	Good	No access. Likely self sown on ditch bank. Yellow small buds with pubescent apical growth, likely S. caprea. Stem estimated from ground level due to mass proliferation of stems at circa 1.5 m agl.		Fell	10+	C1
G793	Ash (*Fraxinus excelsior*), Sessile Oak (*Quercus petraea*), Willow	4	<150#	1	1	1	1	n/a	0	Good	Y	Good				20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	(*Salix sp*), Alder (*Alnus sp*)																
G794	Willow (*Salix sp*)	3	<100#	1	1	1	1	n/a	0	Good	Y-SM	Good – Fair	Bankside willow group in rush-pasture, likely self sown. Three distinct localised clusters of regeneration. Likely S. cinerea.			10+	C2
T795	Silver Birch (*Betula pendula*)	6	110#	1.5	1.5	1.5	1.5		0	Good	SM	Good	Beyond fence, max 1 m overhang		Open Cut Option: Fell HDD Option: Retain	10+	C1
G796	Other	2	20	1	1	1	1	n/a	0	Good	Y-SM	Good	Cluster of gorse, likely self sown.		Fell	10+	C2
G797	Hawthorn (*Crataegus monogyna*), Willow (*Salix sp*)	4	250	2	2	2	2	n/a	0	Good	Y-EM	Good			Fell	20+	B2
T798	Goat Willow (*Salix caprea*)	6	150,150,150,100,120,130#	2	4	4	4		0	Good	EM	Fair	Coppice derived, in bramble clump beyond fence, 0.5 m overhang of site, stems cut back to north		Fell	10+	C2
G799	Hawthorn (*Crataegus monogyna*), Blackthorn	6	<90#	2	2	2	2	n/a	0	Good	Y-SM	Good – Fair	No access, streamside regeneration, thorn dominant.		Fell in part as per TPP	10+	C2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
	(*Prunus spinosa*), Willow (*Salix sp*)																
G800	Hawthorn (*Crataegus monogyna*)	4	200	1	1	1	1	n/a	3	Good	SM	Good			Fell	20+	B2
G801	Other	2	<50#	1	1	1	1	n/a	0	Good	Y	Good	Buddleia. No access to bases growing behind fence.			10+	C2
T802	Leyland Cypress (*X Cupressocyparis leylandii*)	10	450#	4	4	4	4	2.0/S	0	Good	EM	Good	No access to base. Viewed from land to north.			20+	B1,2
H803	Leyland Cypress (*X Cupressocyparis leylandii*)	9	<450#	3	3	3	3	n/a	0	Good	EM	Fair	Leyland cypress hedge with central gap for gateway, maintained below HV overhead lines, screening value			20+	B2
H804	Willow (*Salix sp*), Wild privet (*Ligustrum vulgare*), Leyland Cypress (*X Cupressocyparis leylandii*)	6	<150#	3	3	3	3	n/a	0	Good – Dead	SM	Good – Dead	No access to bases. Viewed from land to north.			10+	C1,2
H805	Leyland Cypress (*X Cupressocyparis leylandii*)	9	<450#	3	3	3	3	n/a	0	Good	EM	Fair	No access, estimated from road			20+	B2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Development Impact	Estimated Remaining Contribution (years)	Category
G806	Willow (*Salix sp*), Fir (*Abies sp*), Spruce (*Picea sp*), Cypress (*Chamaecyparis sp*)	12	<400#	4	4	4	4	n/a	0	Good	SM-EM	Good	No access to bases. Viewed from main road to west.			20+	B1,2
G807	Goat Willow (*Salix caprea*), Western Red Cedar (*Thuja plicata*)	7	<300#	4	4	4	4	n/a	0	Good – Fair	SM	Good – Fair	No access, viewed from road			10+	C2
T808	Cypress (*Chamaecyparis sp*)	4	150#	2	2	2	2		0	Good	SM	Good	No access to base. Viewed from main road to west.			10+	C1
H809	Leyland Cypress (*X Cupressocyparis leylandii*)	9	<450#	3	3	3	3	n/a	0	Good	EM	Fair	Leyland cypress hedge, screening value			20+	B2
G810	Other							n/a					Inaccessible. Plotted from aerial with no other information.			10+	C2
T811	Grey willow (*Salix cinerea*)	3	100#	1.5	1.5	1.5	1.5		0	Good	Y	Good			Fell	10+	C2

Key to Abbreviations Used in the Survey

Ref No	Specific identification number given to each tree or group. T=Tree/H=Hedge/G=Group/W=Woodland	
Species	Common name followed by botanical name shown in *italics*	
Ht	Estimated height of the tree above ground level	
RPA	Root Protection Area (As defined by BS5837)	
Stem diameter	Diameter of main stem, measured in millimetres at 1.5 m above ground level. (MS = Multi-stem tree measured in accordance with BS5837 Annexe C)	Av / Average: indicates an average representative measured dimension for the group or feature
Spread	The width and breadth of the crown. Estimated on the four compass points in metres.	
Crown clearance	The estimated height (in metres) above ground level of the lowest significant branch attachments.	
#	Estimated dimensions	
	Indicates estimated position of tree (not indicated on topographical survey).	
Cat / Category	Categorisation of the quality and benefits of trees on Site as per Table 1 and 2 of BS5837:2012. 1=Arboricultural quality/value 2=Landscape quality/value 3=Cultural quality/value (including conservation)	
	A=High quality/value 40yrs+ (light green). B=Moderate quality/value 20yrs+ (mid blue) C=Low quality/value min 10yrs/stem diameter less than 150mm (grey). U=Unsuitable for retention (dark red).	
Life stage	**Young (Y):** Newly planted tree 0-10 years. **Semi-Mature (SM):** Tree in the first third of its normal life expectancy for the species (significant potential for future growth in size). **Early Mature (EM):** Tree in the second third of its normal life expectancy for the species (some potential for future growth in size) **Mature (M):** Tree in the final third of its normal life expectancy for the species (having typically reached its approximate ultimate size). **Over Mature (OM):** Tree beyond the normal life expectancy for the species. **Veteran (V):** Tree which is of interest biologically, aesthetically or culturally because of its condition, size or age.	

	Ancient (A): Tree which has additional value one that has reached a great age compared to other trees of the same species, typically in the final third of its expected lifespan.
Structural condition	**Good:** No significant structural defects **Fair:** Structural defects which can be resolved via remedial works. **Poor:** Structural defects which cannot be resolved via remedial works. **Dead:** Dead.
Physiological condition	**Good:** Normal vitality including leaf size, bud growth, density of crown and wound wood development. **Fair:** Lower than normal vitality, reduced bud development, reduced crown density, reduced response to wounds. **Poor:** Low vitality, low development and distribution of buds, discoloured leaves, low crown density, little extension growth for the species. **Dead:** Dead **Fair/Good** = Indicates an intermediate condition **Fair – Good** = Indicates a range of conditions (e.g. within a group)
Preliminary management recommendations	Works identified during the tree survey as part of sound arboricultural management, based on the current context of the Site (where relevant reference has been made to tree management based on the potential future context of the site).

Appendix C Tree Protection Plan

Author: JR Designer: LH Checked: JB Approved: AW



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GENERAL NOTES

1. TREE CATEGORIES AS DEFINED BY BS 5837:2012
2. TREE LOCATIONS ARE BASED ON THE TOPOGRAPHICAL SURVEY, AERIAL IMAGERY, AND GPS CO-ORDINATES FROM ON SITE WALKOVER.
3. * INDICATES A TREE / GROUP WHOSE POSITION IS APPROXIMATE AS BASED UPON AERIAL PHOTOGRAPHY AND ON SITE OBSERVATIONS.
4. PLANS SHOULD BE READ IN CONJUNCTION WITH THE AECOM ARBORICULTURAL REPORT.
5. THE ORIGINAL OF THIS DRAWING WAS PRODUCED IN COLOUR - A MONOCHROME COPY SHOULD NOT BE RELIED UPON.
6. DRAWING REFERENCES:
   OS_MasterMap_Topography_Layer_935289_1197202_OS_Mastermap.dwg
   LPA Searches_May 2024.dwg
   GLAS-ARUP-ZZ-XX-M2-X-1111_MPNL Topography.dwg
   PTNOPTC1-JMS-ENG-DWG-0016-Access Roads.dwg
   GLAS-ARUP-70-XX-M2-X-1011_Cable Route Plan_A498 open cut V4.dwg
   PTNOPTC1-JMS-ENG-DWG-0017-Construction Compounds and Work Areas.dwg
   PTNOPTC1-JMS-ENG-DWG-0018-Stockpiles.dwg
   PTNOPTC1-JMS-ENG-DWG-0019-Construction Compounds and Work Areas Buildups.dwg
   PTNOPTC1-JMS-ENG-DWG-0020-Temp Compounds and Joint Bays.dwg
   PTNOPTC1-JMS-ENG-DWG-0021-Wern Access Road Permanent Junction.dwg
   PTNOPTC1-JMS-ENG-DWG-0022-Civils Fencing Layout .dwg
   PTNOPTC1-JMS-ENG-DWG-0023-Wern CSEC Proposed Layout.dwg
   PTNOPTC1-JMS-ENG-DWG-0024-Mmffordd CSEC Proposed Layout.dwg
   GLAS-ARUP-70-XX-M2-X-0300_Site Clearance.dwg
   GLAS-ARUP-70-XX-M2-X-2201_Temporary Drainage.dwg
   GLAS-ARUP-70-XX-M2-X-9011 Decommissioning.dwg
   PTNOPTC1-JMS-ENG-DWG-0015-Cable Route Plan.dwg
   GLAS-ARUP-11-XX-M2-X-0005_Red Line Boundary.dwg
   GLAS-ARUP-70-XX-M2-X-6102_Wern Access Road - Drainage Permanent.dwg
   GLAS-ARUP-71-XX-M2-X-7301_Mmffordd CSEC Drainage Permanent.dwg

KEY

- **FEATURE ID TAGS** *(A PREFIX OF 'T' DENOTES A SINGLE TREE, 'G' A GROUP, 'H' A HEDGE, 'W' A WOODLAND, AND AN ASTERISK SUFFIX '*' MEANS THE FEATURE WAS PLOTTED INDICATIVELY)*
- **SITE BOUNDARY**
- **EXISTING TREE, GROUP, WOODLAND, OR HEDGE TO BE RETAINED**
- **EXISTING TREE, GROUP, WOODLAND, OR HEDGE TO BE REMOVED**
- **ROOT PROTECTION AREA OF RETAINED TREES** *(AS DEFINED BY BS 5837:2012)*
- **ANCIENT/VETERAN TREE MARKER** *(INDICATES POSITION OF TREE OF VETERAN OR ANCIENT STATUS)*
- **TREE PROTECTION FENCING**
- **CONSTRUCTION EXCLUSION ZONE** *(TRACKING OF PLANT, MATERIALS STORAGE, EXCAVATION AND ALL OTHER CONSTRUCTION ACTIVITIES ARE EXCLUDED WITHIN THESE AREAS FOR THE PURPOSES OF PROTECTING TREE HEALTH)*
- **CONSTRUCTION WORKING ZONE** *(MANAGED CONSTRUCTION PROCESSES PERMITTED IN ACCORDANCE WITH THE PRINCIPLES SET OUT WITHIN THE ARBORICULTURAL IMPACT ASSESSMENT)*
- **ANCIENT WOODLAND W/15M BUFFER** *(AREA CLASSIFIED AS AN ANCIENT WOODLAND)*
- **CONSERVATION AREA** *(AREA CLASSIFIED AS A CONSERVATION AREA)*
- **TREE PRESERVATION ORDER** *(AREA COVERED BY A TREE PRESERVATION ORDER (TPO))*
- **PRIORITY HABITAT** *(WOOD PASTURE, TRADITIONAL ORCHARD, PARKLAND, YEW AND BROADLEAVED WOODLAND)*
- **NATIONAL FOREST INVENTORY**
- **SITE OF SPECIAL SCIENTIFIC INTEREST** *(AREA CLASSED AS A SSSI)*

ISSUE/REVISION

P04	28.07.25	RLB AND DRAINAGE UPDATE
P03	20.05.25	EASEMENT UPDATES
P02	11.04.25	RLB UPDATE
P01	26.03.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE PROTECTION PLAN (SHEET 00)

DRAWING NUMBER PTNO/PTC1-AEC-ENV-DWG-0014

REV. P04

Author: JR Designer: LH Checked: JB Approved: AW

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PROPOSALS KEY

- PROPOSED UNDERGROUND CABLE ROUTE AND TRENCHES
- PROPOSED JOINT BAY
- PROPOSED LINK PILLAR AND F/O JOINT PIT COMPOUND
- PROPOSED CSEC LAYOUT
- TEMPORARY ACCESS ROAD AND EMBANKMENT
- PERMANENT ACCESS ROAD AND EMBANKMENT
- PROPOSED PERMANENT DRAINAGE
- PROPOSED FILTER DRAINAGE
- TOPSOIL CLEARANCE 100mm
- TOPSOIL CLEARANCE 150mm
- TOPSOIL CLEARANCE 225mm
- TOPSOIL CLEARANCE 250mm
- TOPSOIL CLEARANCE 275mm
- TOPSOIL CLEARANCE 300mm
- TOPSOIL CLEARANCE 325mm
- TOPSOIL CLEARANCE 350mm
- TOPSOIL CLEARANCE 375mm
- TOPSOIL CLEARANCE 400mm
- TOPSOIL CLEARANCE 450mm
- PROPOSED STOCKPILE
- PROPOSED STOCKPILE AREA
- EXISTING 400kV NG CABLES TO BE REMOVED
- EXISTING 400kV NG CABLES TO BE LEFT REDUNDANT
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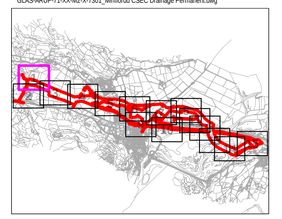
   GLAS-ARUP-71-XX-M2-X-7102_Wern Access Road - Drainage Permanent.dwg
   GLAS-ARUP-71-XX-M2-X-7301_Minffordd CSEC Drainage Permanent.dwg

KEY PLAN



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ISSUE/REVISION

P04	28.07.25	RLB AND DRAINAGE UPDATE
P03	20.05.25	EASEMENT UPDATES
P02	11.04.25	RLB UPDATE
P01	26.03.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE PROTECTION PLAN (SHEET 01)

DRAWING NUMBER REV.

PTNO/PTC1-AEC-ENV-DWG-0014 P04

Author: JR Designer: LH Checked: JB Approved: AW

Existing hard surface. No change of use.

Existing hard surface. No change of use.

Existing hard surface. No change of use.

W66*

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Filename: B:\G - JOBS\GLASLYN ARB NWC\CAD\GLASLYN- TPP_14.DWG

PROPOSALS KEY

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0 10 20 30 40 50 60 70 80 90 100m

SCALE 1:1000 @ ISO full bleed A1 (841.00 x 594.00 MM)

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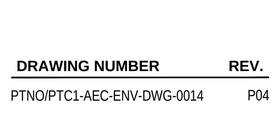
   GLAS-ARUP-71-XX-M2-X-7102_Wern Access Road - Drainage Permanent.dwg
   GLAS-ARUP-71-XX-M2-X-7201_Minffordd CSEC Drainage Permanent.dwg

KEY PLAN



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ISSUE/REVISION

P04	28.07.25	RLB AND DRAINAGE UPDATE
P03	20.05.25	EASEMENT UPDATES
P02	11.04.25	RLB UPDATE
P01	26.03.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE PROTECTION PLAN (SHEET 02)

DRAWING NUMBER **REV.**

PTNO/PTC1-AEC-ENV-DWG-0014 P04

Author: JR Designer: LH Checked: JB Approved: AW



PROPOSALS KEY

- PROPOSED UNDERGROUND CABLE ROUTE AND TRENCHES
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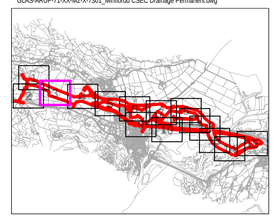
KEY PLAN



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P04	28.07.25	RLB AND DRAINAGE UPDATE
P03	20.05.25	EASEMENT UPDATES
P02	11.04.25	RLB UPDATE
P01	26.03.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE PROTECTION PLAN (SHEET 03)

DRAWING NUMBER **REV.**

PTNO/PTC1-AEC-ENV-DWG-0014 P04

Author: JR Designer: LH Checked: JB Approved: AW

All clearance to be worked around the existing bridge

Existing hard surface. No change of use.

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PROPOSALS KEY

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0 10 20 30 40 50 60 70 80 90 100m

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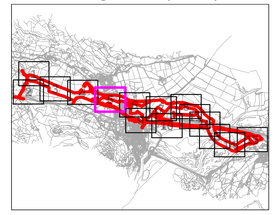
KEY PLAN



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ISSUE/REVISION

P04	28.07.25	RLB AND DRAINAGE UPDATE
P03	20.05.25	EASEMENT UPDATES
P02	11.04.25	RLB UPDATE
P01	26.03.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

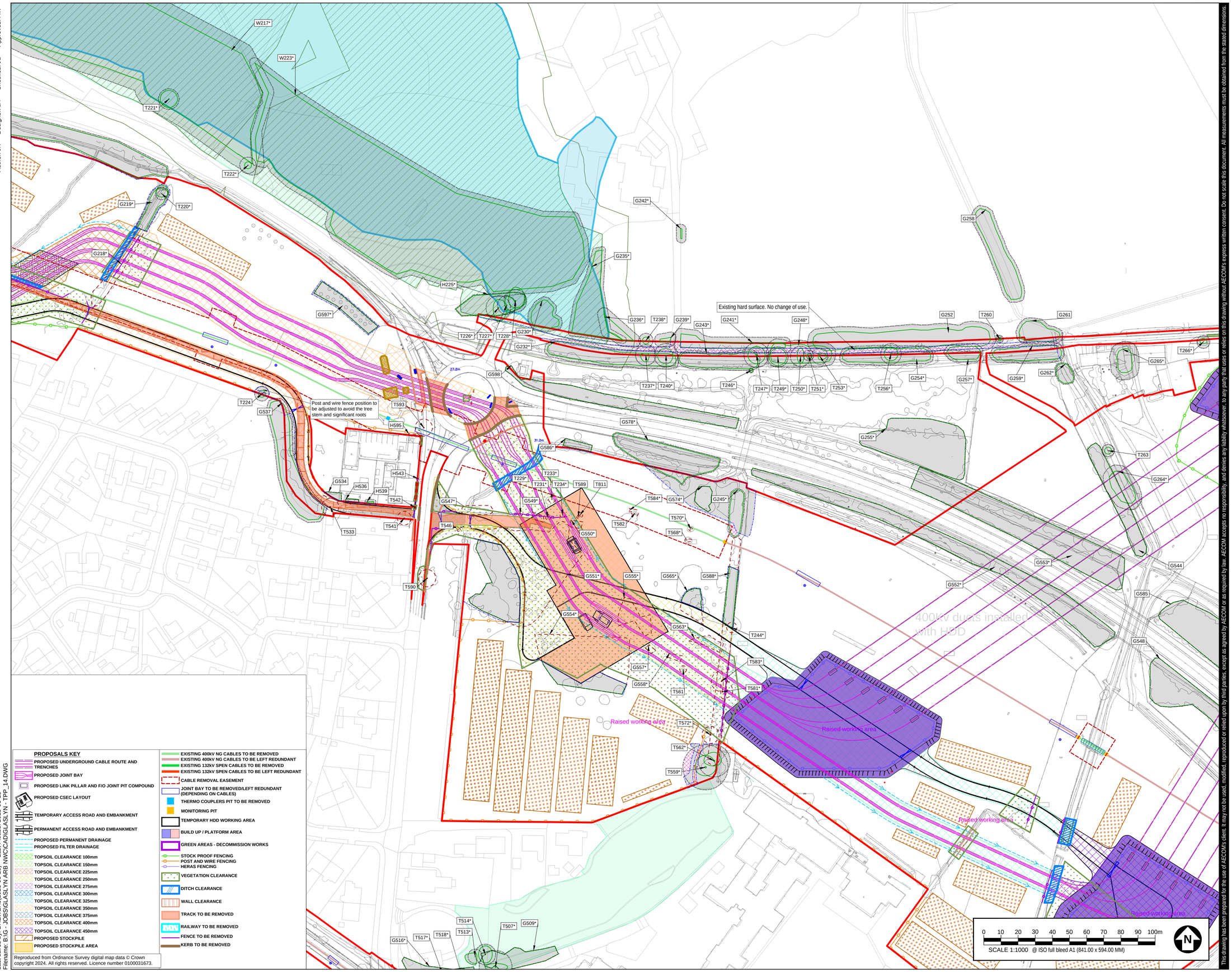
SHEET TITLE

TREE PROTECTION PLAN (SHEET 05)

DRAWING NUMBER REV.

PTNO/PTC1-AEC-ENV-DWG-0014 P04

Author: JR Designer: LH Checked: JB Approved: AW



PROPOSALS KEY

- PROPOSED UNDERGROUND CABLE ROUTE AND TRENCHES
- PROPOSED JOINT BAY
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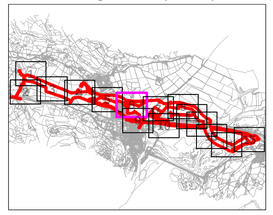

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P01	26.03.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE PROTECTION PLAN (SHEET 06)

DRAWING NUMBER **REV.**

PTNO/PTC1-AEC-ENV-DWG-0014 P04

Author: JR Designer: LH Checked: JB Approved: AW

Tree height and spread to be assessed on site for encroachment into visibility splay. Appropriate pruning or cutback to be agreed with an arborist,with full removal if required.

Existing hard surface. No change of use.

Compound

400kV ducts installed with HDD

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0 10 20 30 40 50 60 70 80 90 100m

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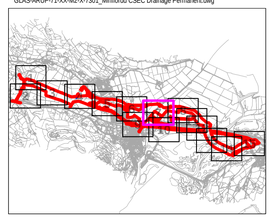
KEY PLAN



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DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

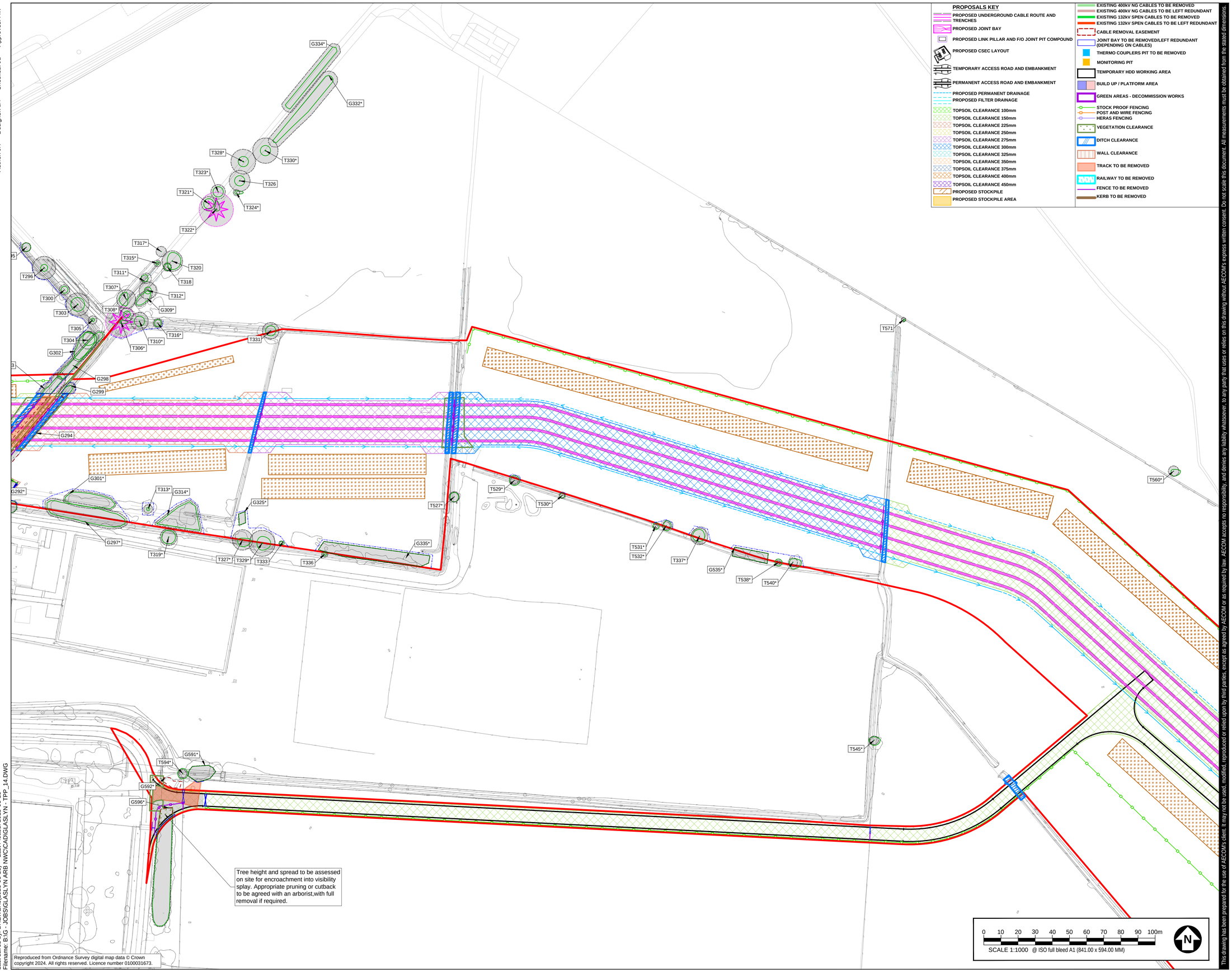
SHEET TITLE

TREE PROTECTION PLAN (SHEET 07)

DRAWING NUMBER **REV.**

PTNO/PTC1-AEC-ENV-DWG-0014 P04

Author: JR Designer: LH Checked: JB Approved: AW



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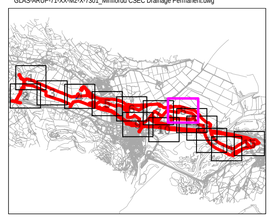

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ISSUE/REVISION

P04	28.07.25	RLB AND DRAINAGE UPDATE
P03	20.05.25	EASEMENT UPDATES
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P01	26.03.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

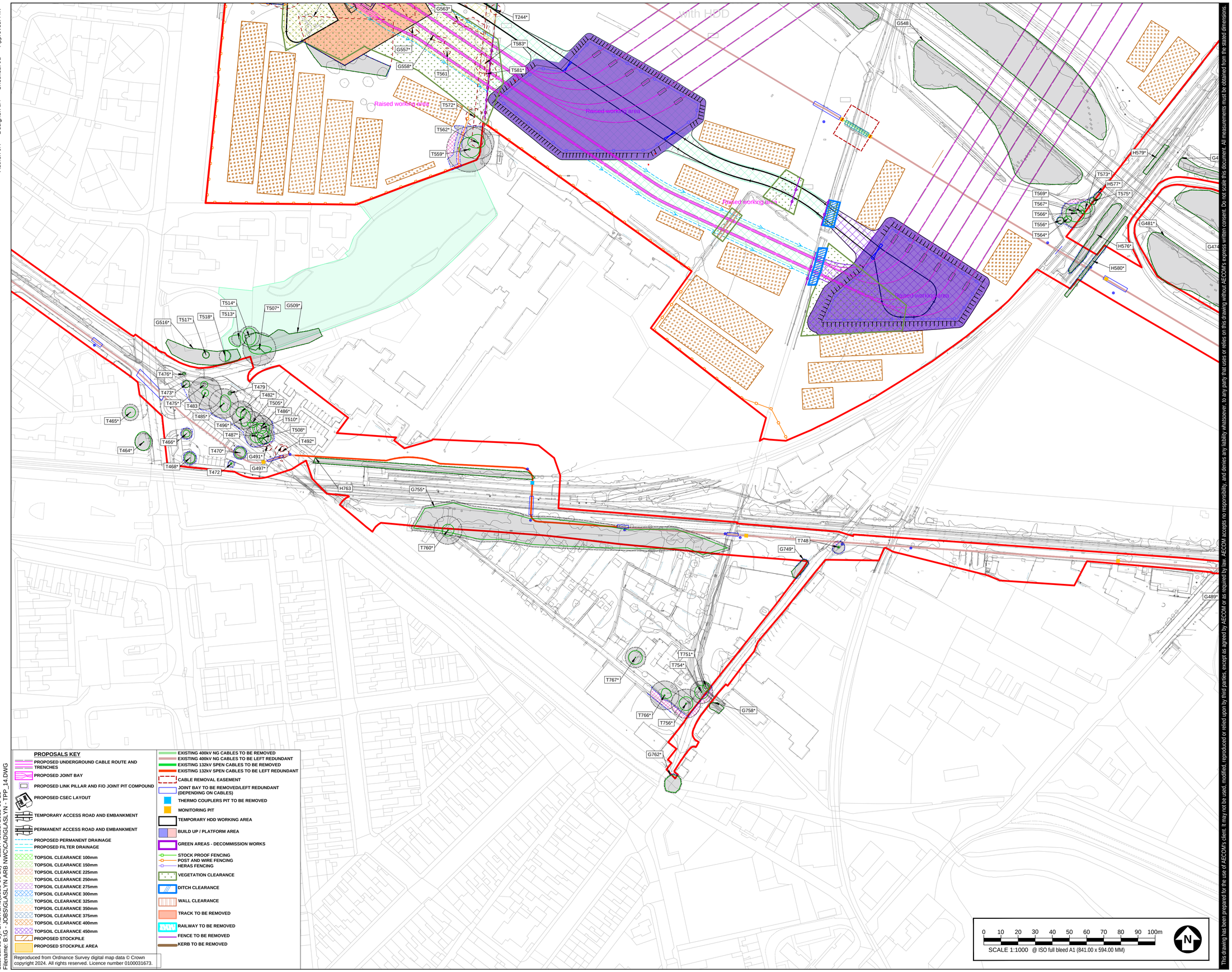
SHEET TITLE

TREE PROTECTION PLAN (SHEET 08)

DRAWING NUMBER PTNO/PTC1-AEC-ENV-DWG-0014

REV. P04

Author: JR Designer: LH Checked: JB Approved: AW



PROPOSALS KEY

- PROPOSED UNDERGROUND CABLE ROUTE AND TRENCHES
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0 10 20 30 40 50 60 70 80 90 100m

SCALE 1:1000 @ ISO full bleed A1 (841.00 x 594.00 MM)

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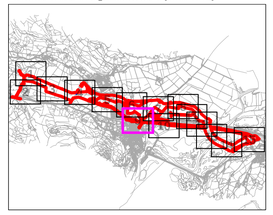
KEY PLAN



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DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

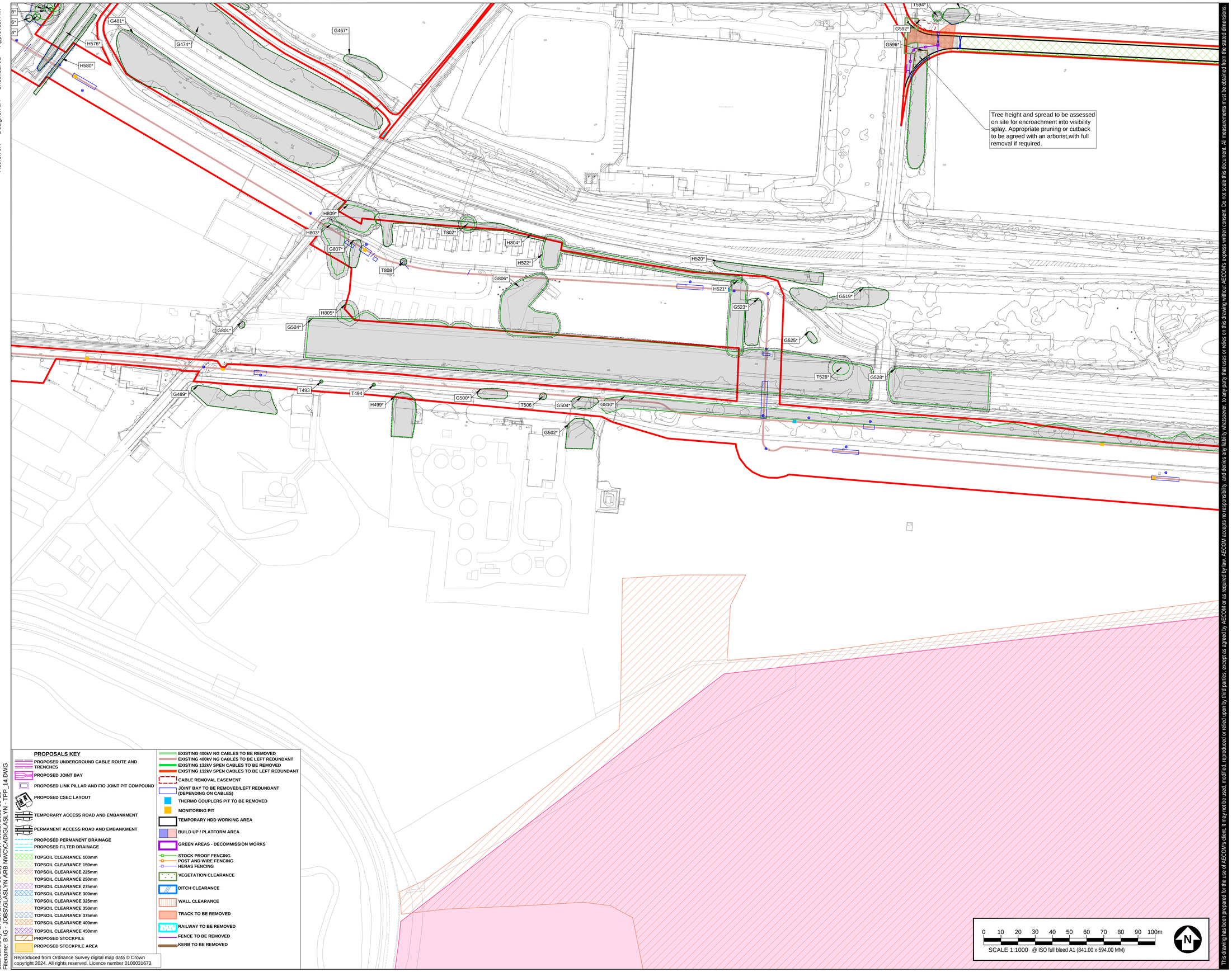
SHEET TITLE

TREE PROTECTION PLAN (SHEET 09)

DRAWING NUMBER PTNO/PTC1-AEC-ENV-DWG-0014

REV. P04

Author: JR Designer: LH Checked: JB Approved: AW



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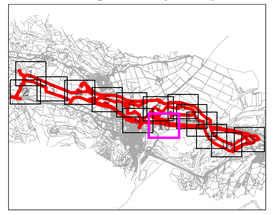
KEY PLAN



KEY

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P01	26.03.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

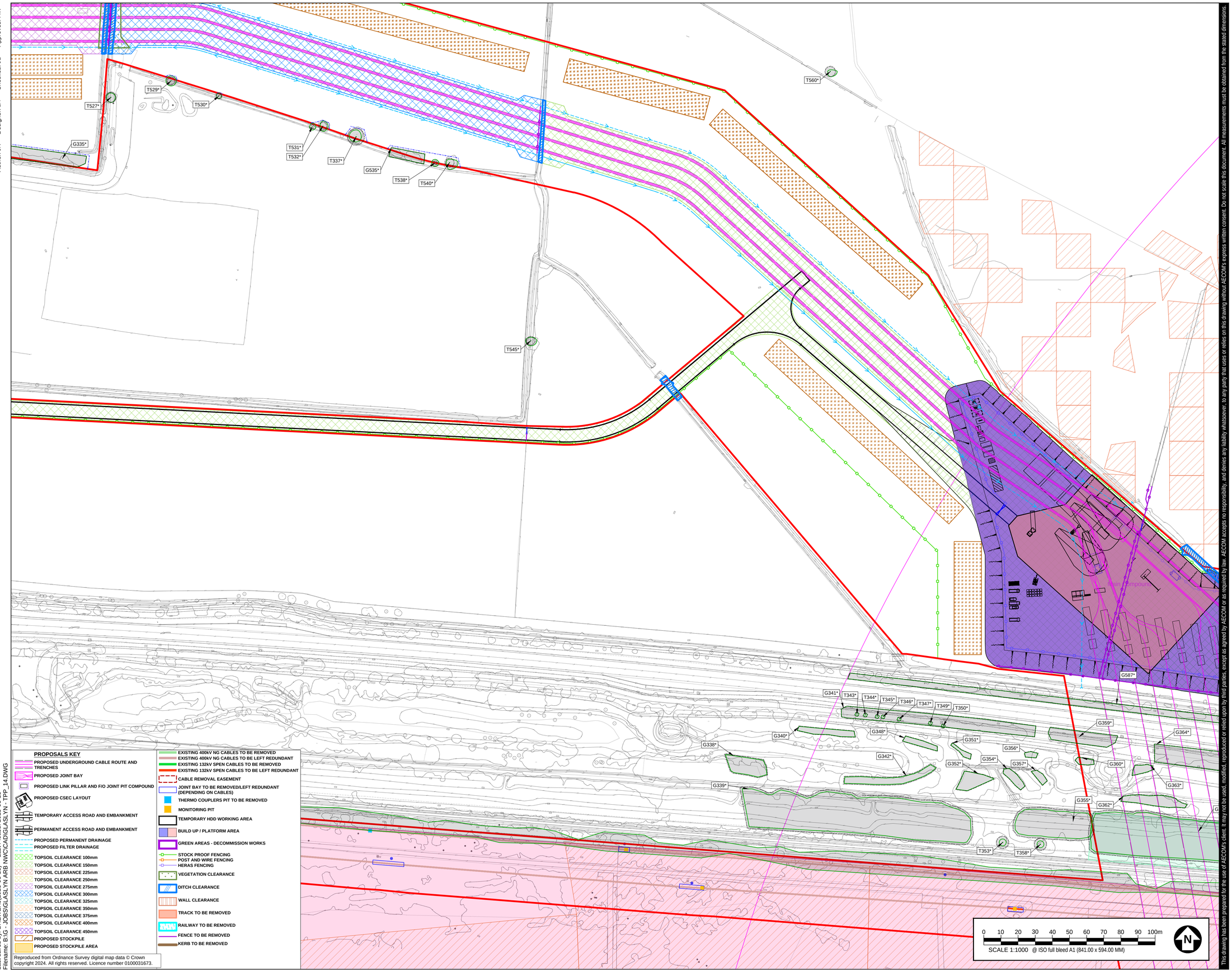
SHEET TITLE

TREE PROTECTION PLAN (SHEET 10)

DRAWING NUMBER / REV.

PTNO/PTC1-AEC-ENV-DWG-0014 P04

Author: JR Designer: LH Checked: JB Approved: AW



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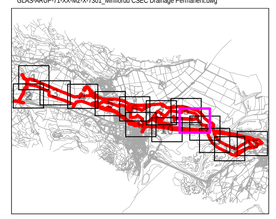

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DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

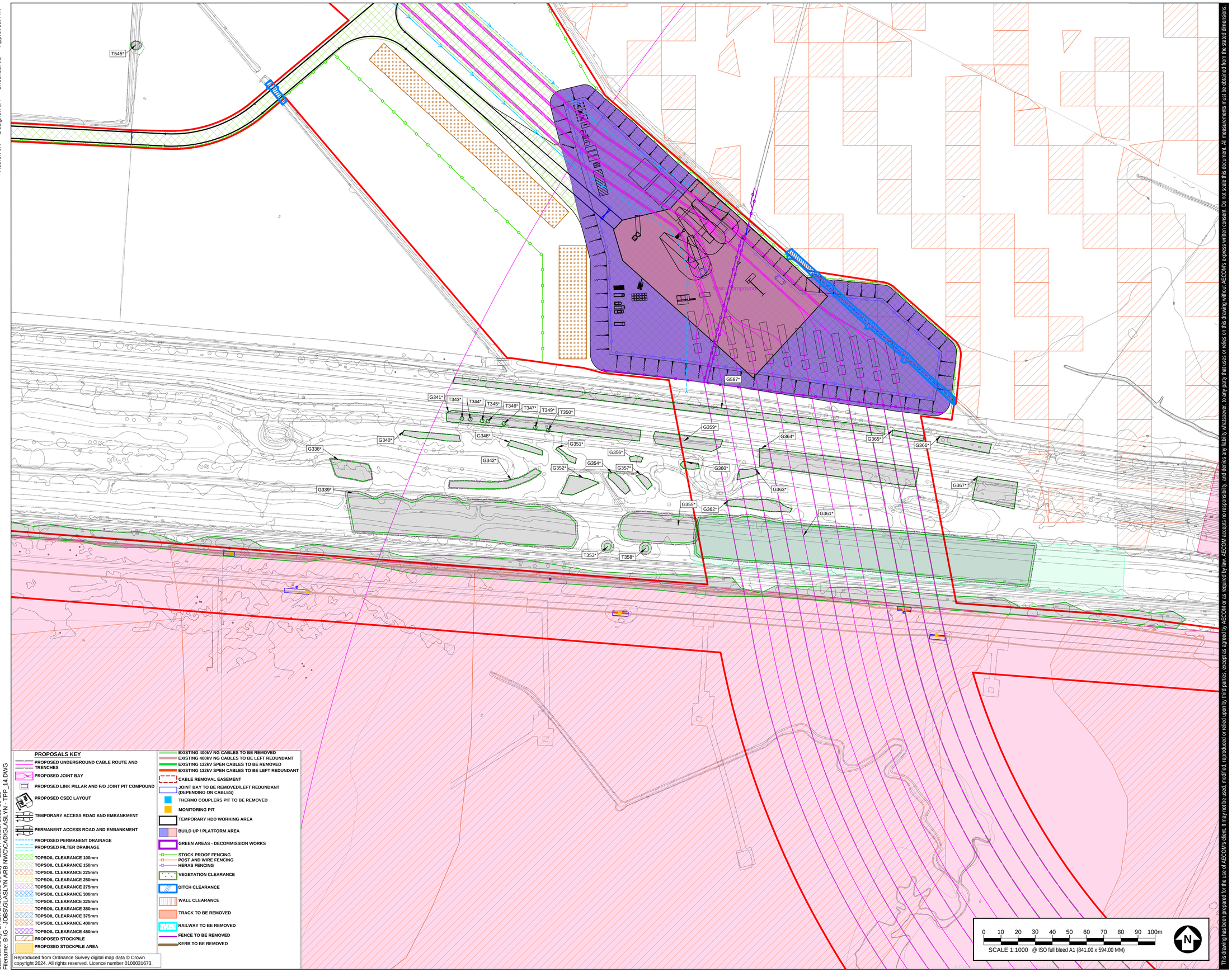
SHEET TITLE

TREE PROTECTION PLAN (SHEET 11)

DRAWING NUMBER **REV.**

PTNO/PTC1-AEC-ENV-DWG-0014 P04

Author: JR Designer: LH Checked: JB Approved: AW



PROPOSALS KEY

- PROPOSED UNDERGROUND CABLE ROUTE AND TRENCHES
- PROPOSED JOINT BAY
- PROPOSED LINK PILLAR AND F/O JOINT PIT COMPOUND
- PROPOSED CSEC LAYOUT
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- TRACK TO BE REMOVED
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   GLAS-ARUP-70-XX-M2-X-0005_Red Line Boundary.dwg
   GLAS-ARUP-70-XX-M2-X-2202_Wern Access Road - Drainage Permanent.dwg
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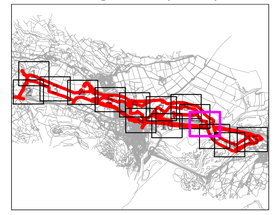
KEY PLAN



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P03	20.05.25	EASEMENT UPDATES
P02	11.04.25	RLB UPDATE
P01	26.03.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

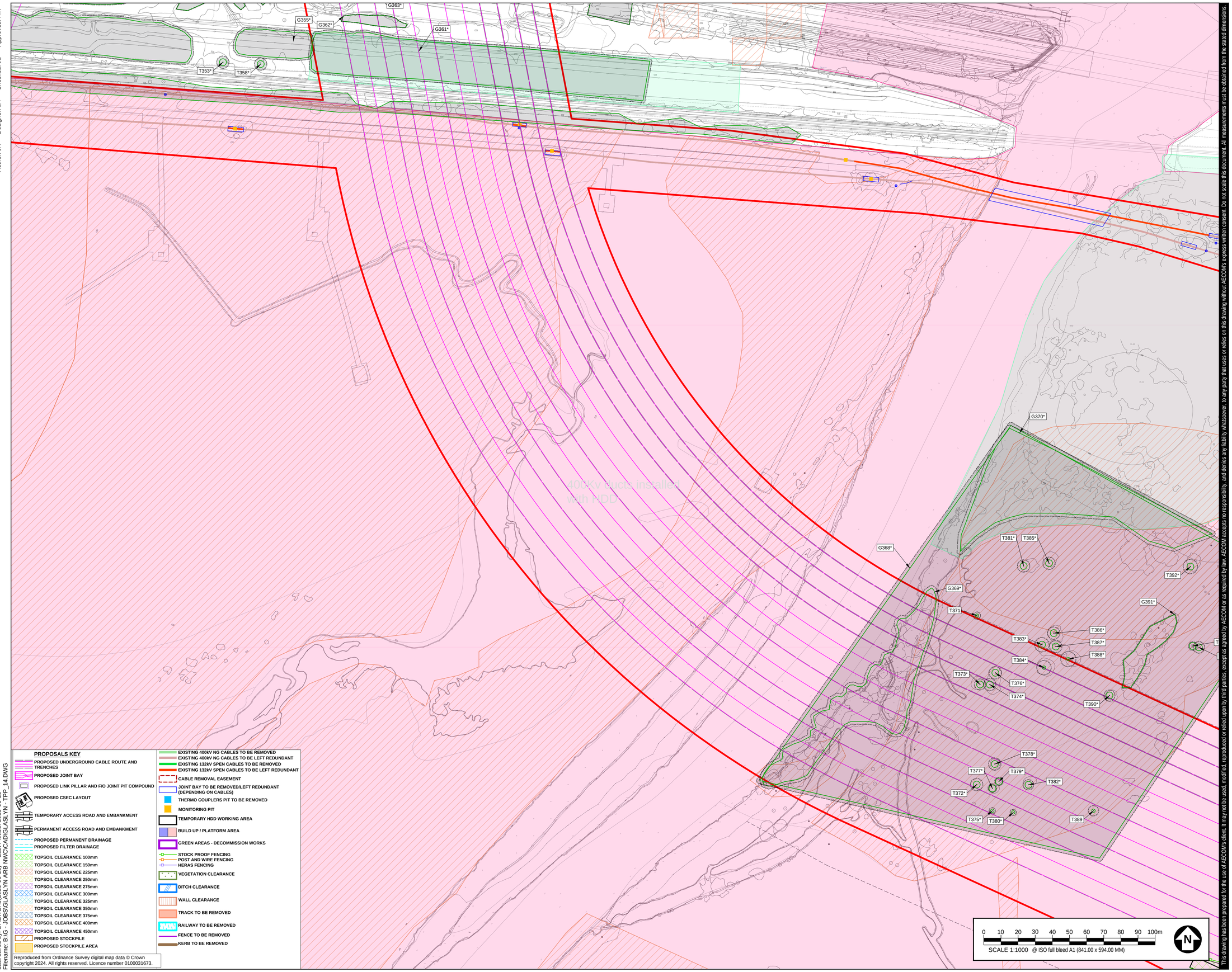
SHEET TITLE

TREE PROTECTION PLAN (SHEET 12)

DRAWING NUMBER **REV.**

PTNO/PTC1-AEC-ENV-DWG-0014 P04

Author: JR Designer: LH Checked: JB Approved: AW



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   GLAS-ARUP-70-XX-M2-X-0005_Red Line Boundary.dwg
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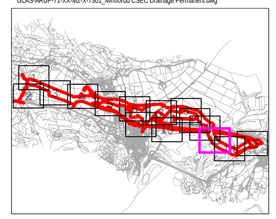
   GLAS-ARUP-71-XX-M2-X-7301_Minffordd CSEC Drainage Permanent.dwg

KEY PLAN



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P04	28.07.25	RLB AND DRAINAGE UPDATE
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P02	11.04.25	RLB UPDATE
P01	26.03.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

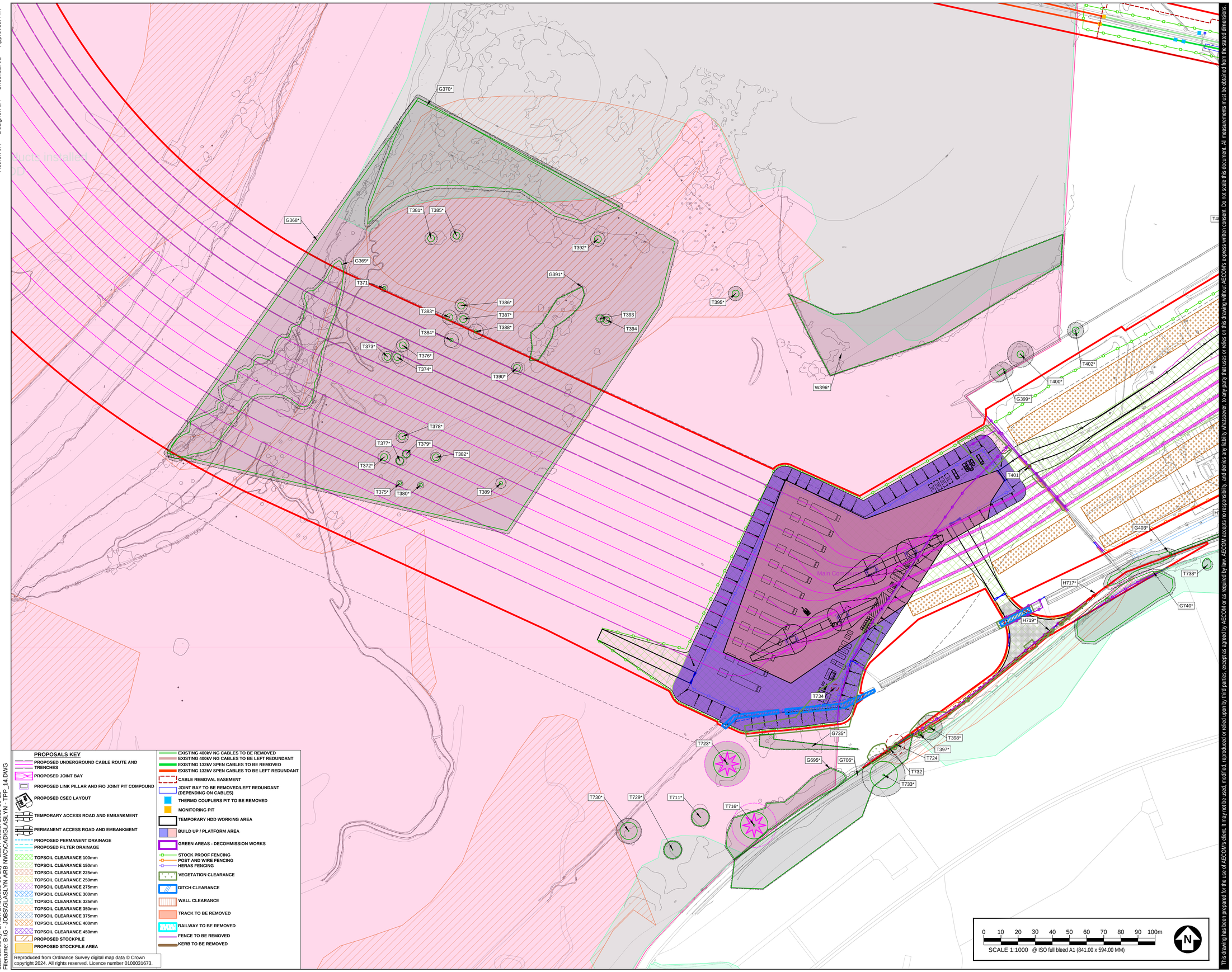
SHEET TITLE

TREE PROTECTION PLAN (SHEET 13)

DRAWING NUMBER **REV.**

PTNO/PTC1-AEC-ENV-DWG-0014 P04

Author: JR Designer: LH Checked: JB Approved: AW



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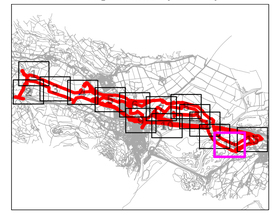

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DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

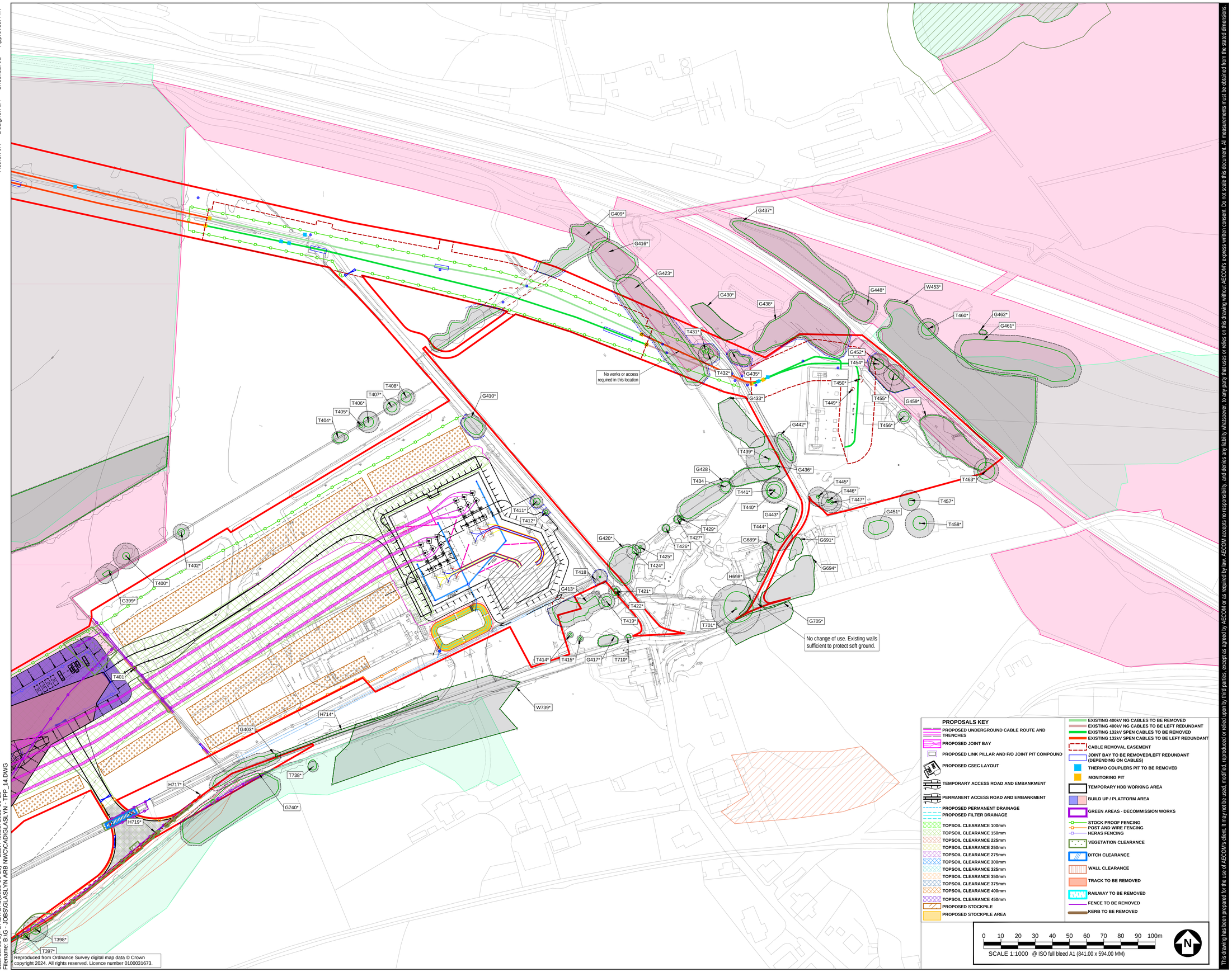
SHEET TITLE

TREE PROTECTION PLAN (SHEET 14)

DRAWING NUMBER **REV.**

PTNO/PTC1-AEC-ENV-DWG-0014 P04

Author: JR Designer: LH Checked: JB Approved: AW



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- CABLE REMOVAL EASEMENT
- JOINT BAY TO BE REMOVED/LEFT REDUNDANT (DEPENDING ON CABLES)
- THERMO COUPLERS PIT TO BE REMOVED
- MONITORING PIT
- TEMPORARY HDD WORKING AREA
- BUILD UP / PLATFORM AREA
- GREEN AREAS - DECOMMISSION WORKS
- STOCK PROOF FENCING
- POST AND WIRE FENCING
- HERAS FENCING
- VEGETATION CLEARANCE
- DITCH CLEARANCE
- WALL CLEARANCE
- TRACK TO BE REMOVED
- RAILWAY TO BE REMOVED
- FENCE TO BE REMOVED
- KERB TO BE REMOVED

0 10 20 30 40 50 60 70 80 90 100m

SCALE 1:1000 @ ISO full bleed A1 (841.00 x 594.00 MM)

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GENERAL NOTES

1. TREE CATEGORIES AS DEFINED BY BS 5837:2012
2. TREE LOCATIONS ARE BASED ON THE TOPOGRAPHICAL SURVEY, AERIAL IMAGERY, AND GPS CO-ORDINATES FROM ON SITE WALKOVER.
3. * INDICATES A TREE / GROUP WHOSE POSITION IS APPROXIMATE AS BASED UPON AERIAL PHOTOGRAPHY AND ON SITE OBSERVATIONS.
4. PLANS SHOULD BE READ IN CONJUNCTION WITH THE AECOM ARBORICULTURAL REPORT.
5. THE ORIGINAL OF THIS DRAWING WAS PRODUCED IN COLOUR - A MONOCHROME COPY SHOULD NOT BE RELIED UPON.
6. DRAWING REFERENCES:
   OS_MasterMap_ Topography_Layer_935289_1197202_OS_Mastermap.dwg
   LPA Searches_May 2024.dwg
   GLAS-ARUP-ZZ-XX-M2-X-1111_MPNL Topography.dwg
   PTNOPTC1-JMS-ENG-DWG-0016-Access Roads.dwg
   GLAS-ARUP-70-XX-M2-X-1011_Cable Route Plan_A498 open cut V4.dwg
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   PTNOPTC1-JMS-ENG-DWG-0018-Stockpiles.dwg
   PTNOPTC1-JMS-ENG-DWG-0019-Construction Compounds and Work Areas Buildups.dwg
   PTNOPTC1-JMS-ENG-DWG-0020-Temp Compounds and Joint Bays.dwg
   PTNOPTC1-JMS-ENG-DWG-0021-Wern Access Road Permanent Junction.dwg
   PTNOPTC1-JMS-ENG-DWG-0022-Civils Fencing Layout .dwg
   PTNOPTC1-JMS-ENG-DWG-0023-Wern CSEC Proposed Layout.dwg
   PTNOPTC1-JMS-ENG-DWG-0024-Minffordd CSEC Proposed Layout.dwg
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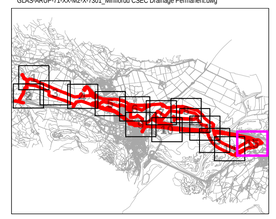
   GLAS-ARUP-70-XX-M2-X-2201_Temporary Drainage.dwg
   GLAS-ARUP-70-XX-M2-X-9011 Decommissioning.dwg
   PTNOPTC1-JMS-ENG-DWG-0015-Cable Route Plan.dwg
   GLAS-ARUP-70-XX-M2-X-0005_Red Line Boundary.dwg
   GLAS-ARUP-71-XX-M2-X-7102_Wern Access Road - Drainage Permanent.dwg
   GLAS-ARUP-71-XX-M2-X-7301_Minffordd CSEC Drainage Permanent.dwg

KEY PLAN



KEY

- FEATURE ID TAGS *(A PREFIX OF 'T' DENOTES A SINGLE TREE, 'G' A GROUP, 'H' A HEDGE, 'W' A WOODLAND, AND AN ASTERISK SUFFIX '*' MEANS THE FEATURE WAS PLOTTED INDICATIVELY)*
- SITE BOUNDARY
- EXISTING TREE, GROUP, WOODLAND, OR HEDGE TO BE RETAINED
- EXISTING TREE, GROUP, WOODLAND, OR HEDGE TO BE REMOVED
- ROOT PROTECTION AREA OF RETAINED TREES *(AS DEFINED BY BS 5837:2012)*
- ANCIENT/VETERAN TREE MARKER *(INDICATES POSITION OF TREE OF VETERAN OR ANCIENT STATUS)*
- TREE PROTECTION FENCING
- CONSTRUCTION EXCLUSION ZONE *(TRACKING OF PLANT, MATERIALS STORAGE, EXCAVATION AND ALL OTHER CONSTRUCTION ACTIVITIES ARE EXCLUDED WITHIN THESE AREAS FOR THE PURPOSES OF PROTECTING TREE HEALTH)*
- CONSTRUCTION WORKING ZONE *(MANAGED CONSTRUCTION PROCESSES PERMITTED IN ACCORDANCE WITH THE PRINCIPLES SET OUT WITHIN THE ARBORICULTURAL IMPACT ASSESSMENT)*
- ANCIENT WOODLAND W/15M BUFFER *(AREA CLASSIFIED AS AN ANCIENT WOODLAND)*
- CONSERVATION AREA *(AREA CLASSIFIED AS A CONSERVATION AREA)*
- TREE PRESERVATION ORDER *(AREA COVERED BY A TREE PRESERVATION ORDER [TPO])*
- PRIORITY HABITAT *(WOOD PASTURE, TRADITIONAL ORCHARD, PARKLAND, YEW AND BROADLEAVED WOODLAND)*
- NATIONAL FOREST INVENTORY
- SITE OF SPECIAL SCIENTIFIC INTEREST *(AREA CLASSED AS A SSSI)*

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P04	28.07.25	RLB AND DRAINAGE UPDATE
P03	20.05.25	EASEMENT UPDATES
P02	11.04.25	RLB UPDATE
P01	26.03.25	FIRST ISSUE

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE PROTECTION PLAN (SHEET 15)

DRAWING NUMBER PTNO/PTC1-AEC-ENV-DWG-0014

REV. P04

Last saved by: BREWER.J (2025-08-18) Last Plotted: 2025-08-18
Filename: B:\G - JOBS\GLASLYN ARB NWC\CAD\GLASLYN - TPP_14.DWG

Appendix D Planning Policy Extracts

D.1 Planning Policy Wales

Planning Policy Wales (PPW) (Edition 12, 2024) seeks to ensure that new development is sustainable and underlines the importance of Green Infrastructure, of which trees form an integral part. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well being of Wales.

PPW contains specific policies in relation to trees, woodlands and hedgerows and these are set out below:

6.4.37 Trees, hedgerows, groups of trees and areas of woodland are of great importance for biodiversity. They are important connecting habitats for resilient ecological networks and make an essential wider contribution to landscape character, culture, heritage and sense of place, air quality, recreation and local climate moderation. They also play a vital role in tackling the climate emergency by locking up carbon, and can provide shade, shelter and foraging opportunities, wider landscape benefits such as air and diffuse pollution interception, natural flood management, and building materials. The importance of trees, in particular urban trees, in creating distinctive and natural places which deliver health and well being benefits to communities, now and in the future should be promoted as part of plan making and decision taking.

Planning authorities must promote the planting of new trees, hedgerows, groups of trees and areas of woodland as part of new development.

6.4.38 Welsh native tree and hedge species, characteristic of the local area, provide a strong ecosystem resilience function, and they provide resources for local wildlife, particularly other native plants and species. Native tree and hedge species can also complement opportunities for natural regeneration. Alongside broader woodland habitat types, such as wood pasture, parkland and traditional orchards, native tree and hedge species help to define our cultural heritage and landscape, creating a strong sense of place and connection to the past.

6.4.39 Planning authorities must protect trees, hedgerows, groups of trees and areas of woodland where they have ecological value, contribute to the character or amenity of a particular locality, or perform a beneficial green infrastructure function. Planning authorities should consider the importance of trees and woodland, particularly native woodland and valued trees, and should have regard to local authority tree strategies or SPG and the Green Infrastructure Assessment. Planning authorities should adopt appropriate, locally relevant, time sensitive, minimum tree canopy cover targets for their authority area to guide the protection and where appropriate the expansion of canopy cover. The Green Infrastructure Assessment and tools such as NRW's Tree Cover in Wales' Towns and Cities study and Forest Research's i Tree Eco tool will help establish a baseline of canopy cover and guide the identification of appropriate and measurable canopy targets.

6.4.40 Where trees, woodland and hedgerows are present, their retention, protection and integration should be identified within planning applications. Where surveys identify trees, hedgerows, groups of trees and areas of woodland capable of making a significant contribution to the area, these trees should be retained and protected. The provision of services and utilities infrastructure to the application site should also avoid the loss of trees, woodlands or hedges and must be considered as part of the development proposal; where such trees are lost, they will be subject to the replacement planting ratios set out below.

6.4.41 Whilst most focus within the planning system is targeted at urban trees, planning authorities should recognise the importance of trees within the countryside, either as woodlands, within hedgerows and hedgebanks, or free standing trees in fields, or as wood pasture. This is particularly important as the effects of climate change are leading towards pests and diseases that are damaging many of our native species in the rural landscape. Positive mechanisms of rural tree retention should be considered, and measures taken to replace them in an effective and economic manner, either with new planting or by allowing them to grow to their full potential.

6.4.42 Permanent removal of trees, woodland and hedgerows will only be permitted where it would achieve significant and clearly defined public benefits. Where individual or groups of trees and hedgerows are removed as part of a proposed scheme, planning authorities must first follow the step wise approach as set out in paragraph 6.4.15. Where loss is unavoidable developers will be required to provide compensatory planting (which is proportionate to the proposed loss as identified through an assessment of green infrastructure value including biodiversity, landscape value and carbon capture). Replacement planting shall be at a ratio equivalent to the quality, environmental and ecological importance of the tree(s) lost and this must be preferably onsite, or immediately adjacent to the site, and at a minimum ratio of at least 3 trees of a similar type and compensatory size planted for every 1 lost. Where a woodland or a shelterbelt area is lost as part of a proposed scheme, the compensation planting must be at a scale, design and species mix reflective of that area lost. In such circumstances, the planting rate must be at a minimum of 1600 trees per hectare for broadleaves, and 2500 trees per hectare for conifers. The planting position for each replacement tree shall be fit to support its establishment and health, and ensure its unconstrained long term growth to optimise the environmental and ecological benefits it affords.

6.4.43 Ancient woodland, semi natural woodlands, individual ancient, veteran and heritage trees and ancient hedgerows are irreplaceable natural resources, and have significant landscape, biodiversity and cultural value. Such trees, woodlands and hedgerows are to be afforded protection from development which would result in their loss or deterioration unless very exceptionally there are significant and clearly defined public benefits; this protection must prevent potentially damaging operations and their unnecessary loss. In the case of a site recorded on the Ancient Woodland Inventory, authorities should consider the advice of NRW. Planning authorities should also have regard to the Ancient Tree Inventory, work to improve its completeness and use it to ensure the protection of trees and woodland and identify opportunities for more planting as part of the Green Infrastructure Assessment, particularly in terms of canopy cover.

6.4.44 The protection and planting of trees and hedgerows should be delivered, where appropriate, through locally specific strategies and policies, through imposing conditions when granting planning permission, and/or by making Tree Preservation Orders (TPOs). They should also be incorporated into Green Infrastructure Assessments and plans.

D.2 Local Policy Context

Local Planning Authorities (LPA) in the UK have a statutory duty to consider both the protection and planting of trees when considering planning applications. The potential impact of development on all trees (including those not protected by a TPO or other statutory designation) is a material consideration. The survey area is within Gwynedd Council.

The Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026,[2] adopted 31 July 2017, illustrates how important trees, woodland and hedgerows are to the character of the area

[2] Current Joint Local Development Plan (gov.wales)

and outlines the policies of the two local authorities (outside of Eryri) with regards to the protection of trees:

Strategic Policy PS 19: Conserving and Where Appropriate Enhancing The Natural Environment

6.5.3 There are valuable biodiversity assets to be found in both the rural and urban settings of the Plan area, which are outside the formally designated areas. Vacant brownfield land can provide an ideal habitat in which wildlife can thrive. Parks, green spaces, roadside verges and rivers are examples that can cumulatively create a green/blue infrastructure network of biodiversity sites and 'corridors'/stepping stones in which wildlife can both reside and travel through. Therefore, there is a need to ensure that development within both rural and urban areas does not damage valuable habitats or encroach upon land forming part of the wider network of wildlife corridors. Trees, woodland, copses, hedgerows and traditional field boundaries such as cloddiau are important wildlife habitats as well as contributing to the character and beauty of the landscape.

Policy AMG 3: Protecting and Enhancing Features and Qualities That Are Distinctive To The Local Landscape Character

Proposals that would have significant adverse impact upon landscape character as defined by the Landscape Character Areas included within the current Landscape Strategy for the relevant authority, must demonstrate through a landscape assessment how landscape character has influenced the design, scale, nature and site selection of the development. A proposal will be granted provided it doesn't have significant adverse impact upon features and qualities which are unique to the local landscape in terms of visual, historic, geological, ecological or cultural aspects. Measures should be taken to ensure that the development does not: 1. Cause significant adverse impact to the character of the built or natural landscape; 2. Fail to harmonise with, or enhance the landform and landscape; 3. Lose or fails to incorporate traditional features, patterns, structures and layout of settlements and landscape of both the built and natural environment. Particular emphasis will be given to the landscapes identified by the Landscape Character Areas as being of high and outstanding quality because of a certain landscape quality or a combination of qualities. Additional consideration will also be given to development that directly affect the landscape character and setting of the AONBs or the National Park.

6.5.13 Protecting, conserving and enhancing the unique landscape features and character of the Plan Area are essential for maintaining the unique scenery and sense of place. Although protection is afforded to some of the features in question (e.g. trees and hedgerows, through Tree Preservation Orders and the Hedgerows Regulations), some of the other features that are not afforded protection have features that are unique to the local landscape. These contribute to local distinctiveness, and where appropriate should be protected.

Appendix E Site Photography



Plate E-1: T39 a veteran oak to the west of the Site.



Plate E-2: G143 a declining alder on a field border close to a tributary river.

:



Plate E-3 T226 a Scots pine



Plate E-4 T48 a veteran sycamore



Plate E-5 Unidentified fungal fruiting body on T40



Plate E-6 Magnified image of the fungal fruiting body on deadwood of T40

Appendix F Outline Tree Protection Measures

F.1 Outline Tree Protection Measures

The default position as set out by BS 5837:2012 is that retained trees must be protected from construction operations with the erection of robust protective fencing positioned on the outer edge of the RPA or crown spread (whichever is greatest). All site operations will be restricted to the area outside of tree protection fencing and this area will form a Construction Exclusion Zone (CEZ) unless agreed otherwise. Protection measures will be installed as set out in the TPP included as **Appendix C** of this report.

The area inside the fence and any additional tree protection measures will be sacrosanct and must not be removed or altered without the prior approval of the LPA Tree Officer. Any damage to tree protection measures must be reported immediately.

Fencing shall be constructed with robust vertical and horizontal scaffold framework with weldmesh panels firmly attached as per BS 5837:2012 Figure 2 (included below as **Plate F-1**). Vertical support poles and bracing poles must be located with care to avoid underground utility services and will be sited to avoid the structural roots of retained trees.

Alternative equivalent robust and immovable fencing specification including site hoarding will also be appropriate.

Suitable all weather signage will be fixed to fencing to notify site staff and visitors of the construction exclusion zone and its purpose (example included as **Appendix G**).

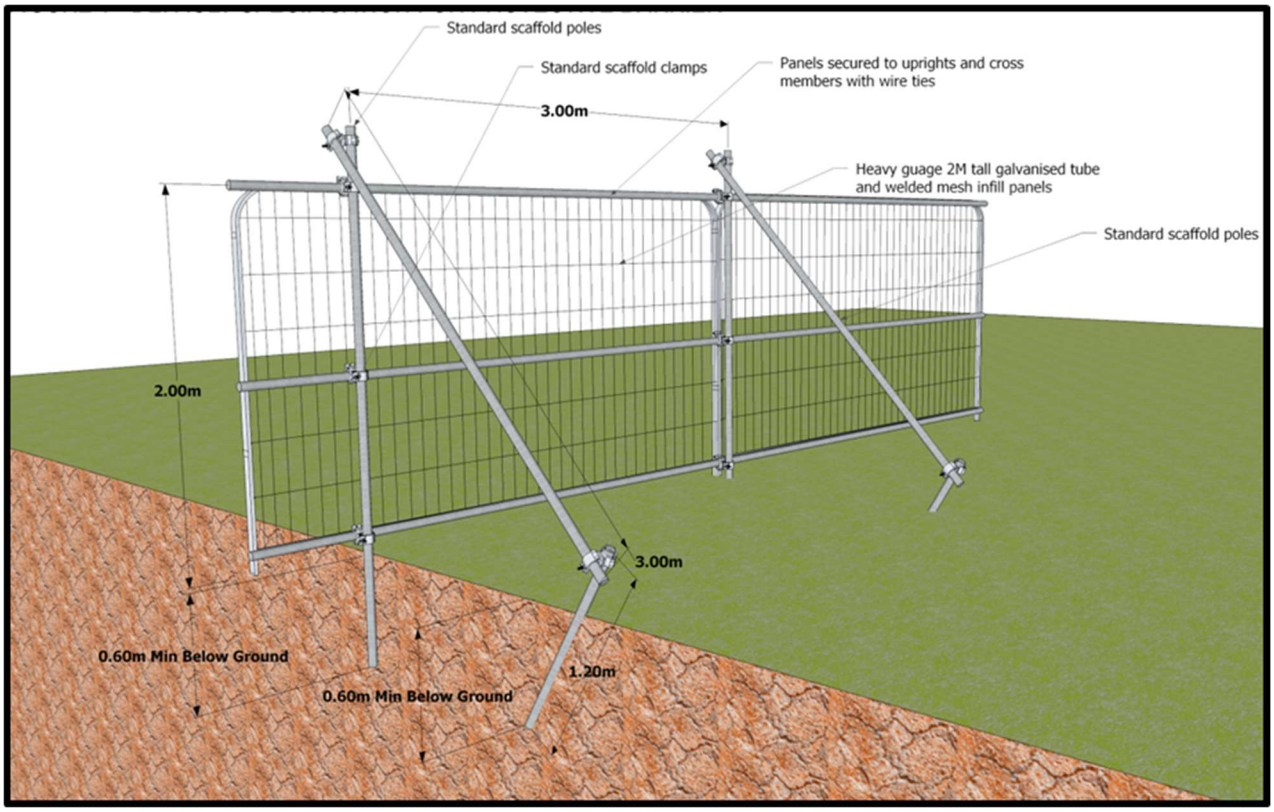


Plate F-1 Default specification for protective barrier

When entering and exiting the Site the fencing contractor must avoid the production of ruts on the unprotected surface of the ground.

Protective fencing and ground protection shall stay in place until all development operations have been completed and the prior consent of the LPA Tree Officer and/or an arboriculturist has been obtained.

F.2 Ground Protection

Should access be unavoidable within the RPA of a retained tree, fit for purpose ground protection must be in place which is sufficient to protect the structure of the soil from damage based on the heaviest anticipated load.

As set out in section 6.2.3.3 of BS5837:2012 the following ground protection measures will be appropriate:

Suitable ground protection for pedestrian only access will comprise a single thickness of scaffold boards set on a compressible layer of 100mm of woodchip on a geotextile separation layer.

Pedestrian operated plant up to two tonnes in weight would require the use of a proprietary ground protection system (such as Ground Guards or Eve Trakway or equivalent) set on a minimum depth of 150mm woodchip or sharp sand.

Heavier loads will require ground protection to an engineering specification in conjunction with arboricultural advice.

As a guide the threshold beyond which root development is significantly affected is a bulk density ranging from 1.4 grams per cubic centimetre (g per cm^3) for clay soils, to 1.75 g per cm^3 for sandy soils.

Tree protective measures shall stay in place until all construction operations are completed and removal is agreed with the Site arboriculturist and/or the Local Authority Tree Officer as appropriate.

F.3 General guidance for the management of exposed roots

Excavation must only take place within the RPA of a retained tree with the prior agreement of an arboriculturist and the Local Authority Tree Officer. All excavation must be undertaken using hand tools or compressed air (such as an air spade).

The following general principles will apply:

- Individual or small groups of roots less than 25 mm in diameter will be retained where possible but can be severed with a sharp tool such as secateurs or pruning saws to leave a clean cut end (ideally 100 mm back from the face of the excavation to account for future regrowth) where they pose an obstruction.
- Where roots are encountered which are larger than 25 mm in diameter or where significant groups of smaller roots are found, the advice of an arboriculturist must be sought to decide an appropriate course of action (following consultation with the Local Authority Tree Officer where appropriate).

- Roots must only be exposed for the minimum period possible. In the interim period any exposed roots must be completely covered with dampened hessian sacking (which may require ongoing re wetting) to avoid drying out and exposure to light (which can result in the death of roots). Backfill for excavations should utilise the parent material and must not be significantly compacted.

F.4 Storage, use and mixing of materials

The use, mixing and washing of materials can lead to run off or inadvertent spillage into tree root zones. Many substances often used on construction sites can be toxic to tree roots (such as concrete, fuels, salts, builders sand and herbicides), can result in the death of tree roots and beneficial soil organisms; and have a significant impact on the future health and appearance of trees.

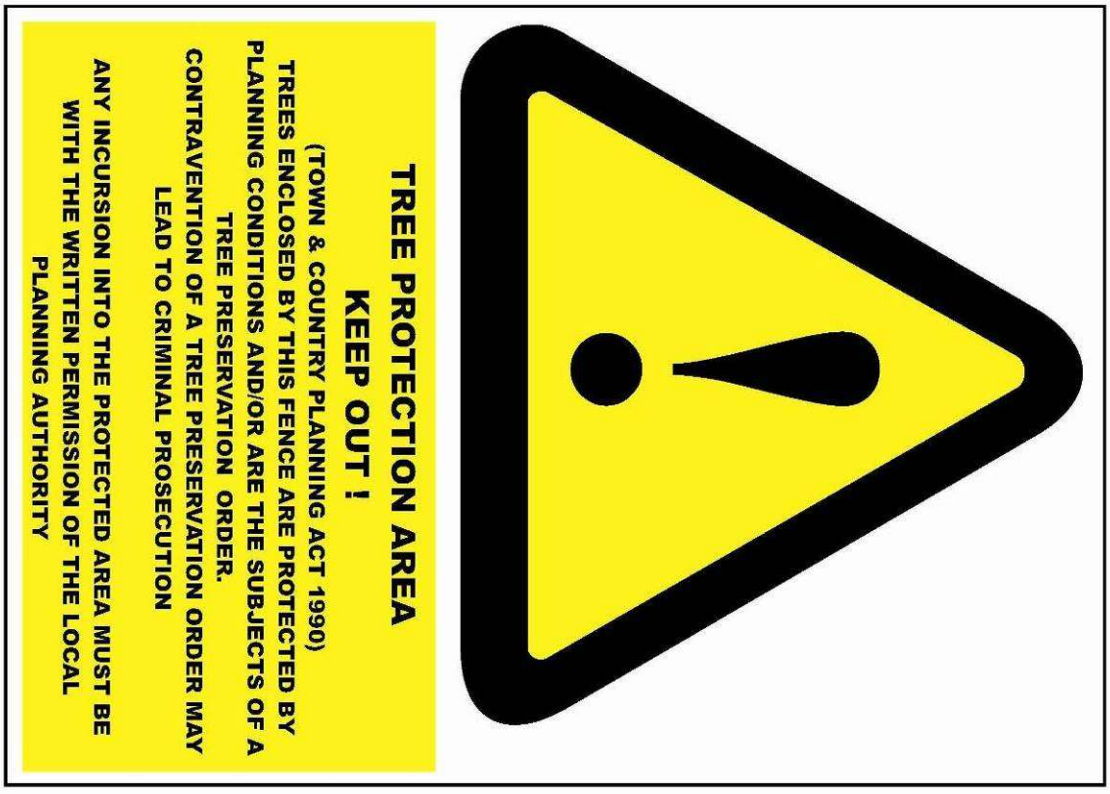
The storage of materials can result in an effective raised soil level. This buries tree roots at depths where air and water are less available and can lead to the decline or death of the tree.

For these reasons the storage of materials and any washing, mixing or refuelling must take place in agreed allocated areas at least 10m from the edge of the RPA of retained trees.

Any slope effect must be taken into account and where there is a potential for run off, heavy duty polythene sheeting and sandbags must be in place as bunding to prevent toxic materials reaching RPAs.

Appendix G Tree Protection Signage





4.5.L Net Benefit for Biodiversity and Green Infrastructure Statement

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1. Introduction

1.1 Introduction

1.1.1 This document has been prepared on behalf of National Grid Electricity Transmission (plc) (NGET) to present a Net Benefit for Biodiversity (NBB) assessment and Green Infrastructure (GI) Statement to support the application for full planning permission for the replacement and permanent works to the existing 400 kilovolt (kV) and 132 kV cables (Glaslyn Cables) and associated infrastructure ('the proposed works') For a full description of the proposed works Environmental Statement (ES) **Volume 4, Chapter 2 Glaslyn Cables Works**. This planning application is required for development and wider works for the Glaslyn cables to support the wider Pentir to Trawsfynydd Reinforcement Project ('the Project'). Further details on the need case for the proposed works and the Project, refer to **Glaslyn Cables Works Planning Statement.**

1.1.2 This NBB assessment and GI Statement supports the application for the proposed works.

1.1.3 This report combines both the NBB assessment and GI Statement outputs into one document.

1.2 Proposed Works

1.2.1 The proposed works covers an area approximately 106.4 hectares (ha), 6 kilometres (km) of works, residing between the existing Wern cable sealing end compound and the existing Garth cable sealing end compound, Porthmadog, in the administrative boundary of Gwynedd Council. The proposed works would take place between the existing Wern cable sealing end compound (CSEC) (National Grid Reference (NGR): SH 543401) and the existing Garth CSEC (NGR: SH 595387) ('the Glaslyn works site'). All works to occur within the Glaslyn works site are 'on-site' works.

1.2.2 The proposed works compromise a mixture of permanent and temporary land take to support the replacement of the existing 400 kV and 132 kV cables. The proposed works include new proposed infrastructure, construction, permanent access roads, removing some redundant infrastructure, measures to retain other redundant infrastructure and operation details. The proposed works will include the following components:

- Replacement of existing 400 kV cables.
- Replacement of existing 132 kV cables with 400 kV cables.
- Open cut or trenchless crossing techniques.
- Modification of the existing Wern CSEC.
- Construction of a new CSEC and an updated design to the previously consented Tunnel Head House (THH) at Minffordd (see details in **paragraph 1.2.3**).
- Decommissioning of the existing 132 kV and 400 kV cable circuits, including the Garth CSEC.

1.2.3 A portion of the proposed works will connect to the Eryri Visual Impact Provision (EVIP) Project. A previous planning application was approved by Gwynedd Council for the Minffordd Tunnel Head House (THH) and its access road in December 2020 (Permission Reference C20/0244/08/LL). The replacement of the Glaslyn Cables will connect to the EVIP underground cables via a new CSEC and an amended THH, at approximate location NGR SH 593387.

1.2.4 The proposed Minffordd CSEC will be constructed on part of the land previously designated for landscape works, located to the north of the consented EVIP Minffordd THH. These landscape works formed part of the NBB and GI commitments associated with the consented EVIP Minffordd THH planning application but which will no longer be delivered as part of the proposed works.

1.2.5 **The Glaslyn Cables Landscape Plan** includes an area that formed part of the EVIP landscape proposals. The landscaping presented in the EVIP consent will no longer be delivered, as the sequence of project delivery has changed. The land that formed part of the EVIP project is now required for the Glaslyn Cables project, making implementation of the EVIP landscaping unfeasible. To ensure that the biodiversity benefits anticipated from the EVIP landscaping are not lost, the Glaslyn Cables Landscape Plan assumed the EVIP landscaping to be as built in accordance with the previous consent and therefore part of the baseline for the Glaslyn Cables Landscape Plan. The Glaslyn Cables Landscape Plan sets out a revised landscaping approach for this location. This approach is designed to compensate for the EVIP plan not being delivered, maintaining ecological value and alignment with NBB. To identify suitable compensation requirements, this NBB assessment has taken the EVIP landscape proposals to be the baseline conditions in this location. Further details on the assumptions and exclusions relating to the EVIP's influence on this NBB and GI assessment are provided in **Section 3**.

1.2.6 For further details on the permanent proposed works at Glaslyn, refer to the ES **Volume 4, Chapter 2 Glaslyn Cables Works.** For further details on the permanent proposed works at Glaslyn, refer to the ES **Volume 4, Chapter 2 Glaslyn Cables Works.**

1.3 Rationale and Objectives

1.3.1 The following NBB Assessment and GI Statement has been produced in response to the approach to delivering NBB and GI in Wales, produced by the Welsh Government. The following legislative frameworks collectively ensure that developments in Wales must demonstrate they have maintained, and enhanced biodiversity and created resilient ecological networks:

- Environment (Wales) Act 2016 (Ref 1.1).
- Well-Being of Future Generations (Wales) Act 2015 (Ref 1.2).
- Planning Policy Wales (PPW). Edition 12 (2024) (Ref 1.3).
- Future Wales. The National Plan 2040 (2021) (Ref 1.4).

1.3.2 This combined NBB Assessment and GI Statement demonstrates how the proposed works have:

- Applied the stepwise approach.
- Utilised the DECCA (diversity, extent, condition, connectivity and aspects of ecosystem resilience) framework to promote ecosystem resilience with regards to green infrastructure.

- Achieved an NBB, including through the provision of biodiversity mitigation or restoration, enhancement, and or creation.
- Demonstrated that a proportional management and monitoring plan is to be achieved for any net benefit.

1.3.3 The objectives of this GI Statement are to demonstrate how the proposed works have:

- Identified priorities of green infrastructure, and
- Considered how significant benefits can be delivered through green infrastructure, paying due regard to the building with nature standard framework (BwNSF) (BwNSF) (Ref 1.5)

1.3.4 National Grid is committed to delivering a NBB and GI Statement across all new developments in Wales, in line with PPW 12 (Ref 1.3).

1.3.5 National Grid aims to deliver NBB and GI on-site following the stepwise approach, with any biodiversity or ecological creation or enhancement following the DECCA framework.

1.3.6 National Grid aims to deliver on-site biodiversity enhancements in a coordinated and strategic manner. Where feasible, NBB will be provided on-site (within the Glaslyn works site) where:

- It is on land within National Grid ownership, ensuring they do not conflict with the siting or future expansion of electricity infrastructure.
- It is in locations where it can also meet requirements for environmental mitigation, such as landscape screening.
- The location of any on-site NBB would not prejudice future site expansion needs or customer connections into the site.

1.3.7 This approach is both environmentally responsible and operationally efficient, as it allows landscape screening and other environmental mitigation to contribute directly to biodiversity outcomes. It also ensures that biodiversity enhancements are safeguarded for the long term and integrated into wider site planning.

1.3.8 Where on-site NBB and GI additions are not possible, National Grid aims to deliver NBB off-site. Any NBB proposed on third party land is to be secured by voluntary agreement. .

1.3.9 NBB delivered off-site will generally be delivered through collaboration with expert partners. This approach means that, for the most part, responsibility for implementation, management and monitoring of NBB rests with experienced nature conservation organisations and land managers for which this is their area of expertise and core business.

1.3.10 Where NBB and GI are delivered within National Grid's land ownership, a proportionate management and monitoring commitment will be applied, and determined on a case-by-case basis.

2. Policy Context

2.1 National Planning Policy

Environment (Wales) Act 2016 (Ref 1.1)

2.1.1 The Environment (Wales) Act 2016 (Ref 1.1) provides legislation to plan and manage Wales's natural resources. It delivers against the Welsh Government's Programme for Government commitment to introduce new legislation for the environment (Ref 2.7). This positions Wales as a low-carbon, green economy, ready to adapt to the impacts of climate change. Section 6 of Part 1 of the Environment (Wales) Act 2016 (Ref 1.1) introduced an enhanced duty (the S6 duty) for public authorities in the exercise of functions in relation to Wales. The S6 duty requires that public authorities *'must seek to maintain and enhance biodiversity… and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of their functions'.* This will apply to the Local Planning Authority responsible for the determining planning application (Ref 1.1).

The Well-Being of Future Generations (Wales) Act 2015 (Ref 1.2)

2.1.2 The Well-being of Future Generations (Wales) Act 2015 aims to improve the social, economic, environmental, and cultural well-being of Wales (Ref 1.2). The Act emphasises the importance of maintaining and enhancing biodiversity to ensure ecosystem resilience and sustainability for future generations.

Planning Policy Wales. Edition 12 (2024)

2.1.3 PPW 12 (Ref 1.3) sets out the land use planning policies of Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs) (Ref 2.8), Welsh Government Circulars, and policy clarification letters, which together with PPW (Ref 1.3) provide the national planning policy framework for Wales. PPW 12 (Ref 1.3) sets out the importance of delivery of NBB and GI, aligning with Section 6 under the Environment Act (Wales) 2016. The following statements should be considered within the planning process in Wales:

- Paragraph 6.2.1 states that '*Green Infrastructure is the network of natural and semi-natural features, green spaces, rivers and lakes that intersperse and connect places. Green Infrastructure can function at a range of different scales; from entire ecosystems such as wetlands and rivers to parks, fields and gardens at the local scale and street trees, hedgerows, roadside verges, and green roofs/walls at the micro scale*'.
- Paragraph 6.2.5 states that '*planning authorities must, as part of adopting a strategic and proactive approach to green infrastructure, biodiversity and ecosystems resilience, produce up to date inventories and maps of*

existing green infrastructure and ecological assets and networks'. Green Infrastructure Assessments provide key evidence to support the preparation of development plans and where authorities are not already actively undertaking assessments, they should be undertaken as part of development plan preparation.

- Paragraph 6.4.5 states that '*Planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means development should not cause any significant loss of habitats or populations of species (not including non-native invasive species), locally or nationally and must work alongside nature and it must provide a net benefit for biodiversity and improve, or enable the improvement, of the resilience of ecosystems. A net benefit for biodiversity is the concept that development should leave biodiversity and the resilience of ecosystems in a significantly better state than before, through securing immediate and long-term, measurable and demonstrable benefit, primarily on or immediately adjacent to the site*'. The Stepwise approach and DECCA Framework should be used as methods to deliver a Net Benefit for any development.
- Paragraph 6.2.12 states that '*A green infrastructure statement should be submitted with all planning applications. This will be proportionate to the scale and nature of the development proposed and will describe how green infrastructure has been incorporated into the proposal*.'

Future Wales. The National Plan (2040) (Ref 1.4)

2.1.4 Future Wales: The National Plan 2040 ('Future Wales') (Ref 1.4) is the National Development Framework for Wales. Future Wales: The National Plan 2040 ('Future Wales') (Ref 1.4) is the National Development Framework for Wales. Future Wales sets out the spatial strategy for growth and development in Wales. Green Infrastructure is set out as a 'Strategic Placemaking Principle' in which *''Through Green Infrastructure Assessments, specific opportunities should be identified to ensure that green infrastructure is fully integrated."*

2.1.5 'Policy 9 - Resilient Ecological Networks and Green Infrastructure states:

'To ensure the enhancement of biodiversity, the resilience of ecosystems and the provision of green infrastructure, the Welsh Government will work with key partners to:

- *identify areas which should be safeguarded and created as ecological networks for their importance for adaptation to climate change, for habitat protection, restoration or creation, to protect species, or which provide key ecosystems services, to ensure they are not unduly compromised by future development; and*
- *identify opportunities where existing and potential green infrastructure could be maximised as part of placemaking, requiring the use of nature-based solutions as a key mechanism for securing sustainable growth, ecological connectivity, social equality and well-being.*

Planning authorities should include these areas and/or opportunities in their development plan strategies and policies in order to promote and safeguard the functions and opportunities they provide. In all cases,

action towards securing the maintenance and enhancement of biodiversity (to provide a net benefit), the resilience of ecosystems and green infrastructure assets must be demonstrated as part of development proposals through innovative, naturebased approaches to site planning and the design of the built environment.'

2.1.6 A summary of these relevant local and national planning policies as well as legislation is provided in **Appendix B**.

2.1.7 For the precise wording of each specific policy refer to the source document. The proposed works and landscape plan has been considered when assessing potential ecological constraints and opportunities identified by the desk study and field surveys; and when assessing requirements for design options and ecological mitigation.

2.2 Area Statements

2.2.1 Area statements have been produced by Natural Resource Wales (NRW), under Section 11 of the Environment (Wales) Act 2016 (Ref 1.1). Area Statements are published for the seven regions of Wales to facilitate the implementation of the national natural resources policy (2017) (Ref 2.5). Each Area Statement outlines the key challenges facing particular localities and provides guidance on what can be done to meet those challenges and how we can better manage our natural resources. Area statements should be used as an important source of information for planning of green infrastructure and net benefit (Ref 1.3).

2.2.2 Glaslyn works site is located within the North West Wales Area Statement (Ref 2.6). The five key themes highlighted within the North West Wales Area Statement are as follows:

- Climate and Environment Emergency.
- Encouraging a Sustainable Economy.
- Reconnecting People with Nature.
- Opportunities for a Resilient Ecosystem.
- Supporting sustainable land management.

2.2.3 GI is mentioned throughout the themes within the Area Statement including sustainable management of natural resources and opportunities for a resilient ecosystem. Opportunities for North West Wales which were identified within the statement include restoration of habitat, creation of green corridors, improving connectivity of existing habitat, strategic planning and creation of habitat.

2.3 Local Planning Policy

2.3.1 Relevant local planning policies and supplementary guidance for Gwynedd are currently covered by the Anglesey and Gwynedd Joint Local Development Plan until the new Local Development Plan for the Gwynedd Planning Authority is adopted. The adopted Anglesey and Gwynedd Joint Local Development Plan (2012) (Ref 2.1) does not mention green infrastructure assessment however the Review Report (2022) (Ref 2.2)

refers to green infrastructure implementation essential to comply with National Plan.

2.3.2 Nature Gwynedd (Ref 2.3) produced a series of Local Biodiversity Action Plans (LBAP) and Topic Action Plans (TAP) alongside Supplementary Planning Guidance (Ref 2.4). The action plans do not explicitly detail green infrastructure; however, they do explain how habitats contribute to green infrastructure networks.

2.3.3 Gwynedd Council has not produced a Green Infrastructure Assessment. In the absence of a document outlining the Gwynedd green infrastructure aims, relevant policy within the Anglesey and Gwynedd Joint Local Development Plan (Strategic Policy PS19) has been used. Strategic Policy PS19 states:

'The Councils will manage development so as to conserve and where appropriate enhance the Plan area's distinctive natural environment, countryside and coastline, and proposals that have a significant adverse effect on them will be refused unless the need for and benefits of the development in that location clearly outweighs the value of the site or area and national policy protection for that site and area in question'.

2.3.4 The Supplementary Planning Guidance for 'Maintain and Creating Distinctive and Sustainable Communities' (Ref 2.4) supports the implementation of the Joint Local Development Plan. It provides planning advice on a number of areas relating to sustainable design, construction and climate change. The green infrastructure approach combines all these elements to achieve a more joined-up approach to the environment. The supplementary planning guidance states:

'An important element of planning for sustainable development is to contribute towards tackling climate change by reducing carbon emissions. In order for a development to be genuinely sustainable, it must be designed and built with the aim of tackling the threat deriving from climate change. Development proposals in the area can help achieve this aim by avoiding areas presently at risk from flooding now, or areas that are anticipated to be at risk in future, and by building sustainable drainage systems (SUDS), and by connecting and improving the green infrastructure network in the area to help wildlife and help it adapt to a changing climate'.

3. Limitations and Assumptions

3.1 General assumptions and Limitations

3.1.1 The assumptions and limitations reflect the information obtained and evaluated at the time of reporting (August 2025). The following assumptions and limitations have been applied to this assessment:

Baseline Assumptions and Limitations

3.1.2 For general ecology assumptions and limitations in reference to survey findings see ES **Volume 4, Chapter 5 Ecology and Nature Conservation**. Specific assumptions and limitations relevant to each survey, including how any limitations have been overcome, are included in the relevant technical reports presented in **Volume 8 Appendices, 4.5.A – 4.5.K**. There are no survey-specific constraints that represent a significant limitation or data gap and the baseline that has been established is suitably robust.

3.1.3 Habitats indicated within the baseline have been recorded using Phase 1 habitat survey methodology. In certain areas, baseline data has been inferred using desk-based evidence due to land access restrictions on-site. All on-site habitat was identified through on-site field observation surveys, where possible, see ES **Volume 8, Appendix 4.5.A Habitat Survey Report.** For general ecology assumptions and limitation in reference to survey findings see ES **Volume 4, Chapter 5 Ecology and Nature Conservation** and in relevant **Appendices 4.5.A to 4.5.K (Volume 8).**

3.1.4 The Phase 1 Habitat Survey records habitats based on their physical form and location. Area habitats are mapped as polygons and include features like woodland, grassland, and scrub. Linear habitats are mapped as lines and include features such as hedgerows, streams, and ditches. Point features are mapped as individual points and include items like mature trees or ponds.

3.1.5 Habitats of Principal Importance (HoPI) and Section 7 Priority Habitats were identified by Cofnod biological records centre (Ref 3.1) and DataMap Wales (Ref 3.2) and confirmed by on-site field observations. During this assessment the WOM21 Priority Habitat -High Sensitivity layer on DataMap Wales was undergoing updates. An area identified as Priority Habitat Coastal and Floodplain Grazing Marsh (CFGM), to the far east of the Glaslyn works site, falls within a Special Area of Conservation (SAC), Special Protection Area (SPA) and Sites of Special Scientific Interest (SSSI. This area is currently identified as Purple Moor Grass and Rush pasture on DataMap Wales. For this assessment the area has been assumed as CFGM in-line with results of the field surveys.

3.1.6 Tree Preservation order (TPO) data was received from Gwynedd Council in January 2024. This data has been used in this assessment and is assumed up to date.

3.1.7 Ancient and Veteran trees have been identified using Data Map Wales Ancient Woodland Inventory. Additional Veteran status has been determined

by on-site field observations, exhibiting features associated with veteran status such as hollowing and deadwood habitat and meeting the stem girth diameter associated with Veteran Trees (Ref 3.3). For further information on the categorisation of Veteran Trees refer to ES **Volume 8, Appendix 4.5.K Glaslyn Arboricultural Impact Assessment.**

3.1.8 Baseline data of individual trees and groups of trees have been taken from the Arboriculture Impact Assessment (AIA), and cross referenced with the Phase 1 habitat survey data. Arboriculture surveys were conducted in accordance with the requirements of British Standard (BS) 5837:2012 Trees in relation to design, demolition and construction - Recommendations (BS5837) (Ref 3.4). For general Arboricultural assumptions and limitations in reference to survey findings and methodology used see ES **Volume 8, Appendix 4.5.K Glaslyn Arboricultural Impact Assessment.**

3.1.9 Several habitats have been classified as S7 Priority Habitat. To meet the definition of S7 Priority Habitat, the UK Biodiversity Action Plan criteria (Ref 3.5) has been used to assess the habitats listed in **Section 4.**

3.1.10 River habitat surveys were not conducted as part of this assessment. Aquatic habitat surveys were undertaken on 14 locations across the Glaslyn works site. For further information in relation to Aquatic habitat survey methodology, general assumptions and limitations refer to **Volume 8, Appendix 4.5.C: Aquatic Survey Report.**

3.1.11 The proposed Minffordd CSEC will be constructed on land previously designated for landscape works, located to the north of the consented EVIP Minffordd THH. For this assessment this area has been assumed as built, with landscaped habitats incorporated into our Phase 1 baseline (see **Appendix A – Figure 4.5.L.1**). Phase 1 baseline within this area has been assumed from EVIP planning documents, including Eryri (Snowdonia) Visual Impact Provision Project- Habitat Management Plan – Garth (2022). The NBB provided for as part of the consented EVIP Minffordd THH, but which will no longer be delivered as part of the EVIP project, will be compensated for within this assessment.

Post-Works Assumptions and Limitations

3.1.12 Areas of permanent and temporary habitat loss and retainment of habitats have been determined using the ES **Volume 4, Chapter 2 Glaslyn Cables Works** alongside the **Glaslyn Cables Landscape Plan**. The following assumptions have been applied for this NBB and GI assessment:

- All habitats classified as temporary loss will be reinstated after a three-year construction period. Should the construction programme be extended this will not change the assessment with respect to low distinctiveness habitat types, as the impact is not affected by the duration of activity rather the change or loss of any habitat type.
- Permanent hardstanding land-take associated with the EVIP works has been excluded from the post-works calculation in this assessment, as its NBB and GI) contributions were assessed under the EVIP planning permission (C20/0244/08/LL). The landscaping areas delivered through that permission, including those contributing to NBB and GI are considered part of the baseline for this assessment. It is assumed that all features of the EVIP landscaping area have been implemented in

accordance with the revised design and are maturing toward their intended biodiversity outcomes over time. This assessment therefore builds upon those baseline benefits, stacking additional enhancements attributable to the Glaslyn Cables project, while also addressing any temporary or permanent habitat losses resulting from the CSEC works.

- An area previously designated as acid grassland under the EVIP NBB strategy has been reassessed and found unsuitable to successfully reinstate to this grassland type due to the local soil substrate. As a result, it has been reclassified and retained as species-rich grassland for this assessment.
- Where habitats intersect with trenchless crossing methods, including horizontal directional drilling (HDD), habitats are classified as retained.
- Where habitats intersect with entry and exit points of trenchless crossing methods, these habitats are classified as temporarily, and reinstated.
- Where habitats intersect with open cut crossing methods, including exit and entry points, habitats are classified as temporarily lost, and reinstated.
- Where habitats intersect with temporary access tracks, habitats are classified as temporarily lost, and reinstated.
- Where habitats intersect with compound areas, habitats are classified as permanently lost, and reinstated.
- Seven main rivers and four ditches crossed by the proposed works, will be crossed using HDD (refer to ES **Volume 4 Figure 4.2.2** for locations of HDD works).
- Six ditches crossed by the proposed works, will be crossed using open cut methods. A small area of the riparian zone will be temporarily impacted. These habitats will be classified as temporarily lost, and reinstated. Water flow will be maintained through either fluming or pumping, with water quality elements controlled through standard mitigation measures.
- Where construction works require vegetation removal, habitats are classified as permanently lost, and reinstated.
- Where trees and groups of trees intersect with the installation of cables, cable easement, compound areas and access routes, habitats are classified as permanently lost. Trees cannot be reinstated or created within the cable easement. Alternative habitat will be created within the cable easement post-works. Trees will be planted, on-site, outside of the cable easement.
- Where trees and groups of trees intersect with temporary works, and do not require removal, root protection areas will be adhered to see ES **Volume 8, Appendix 4.5.K Glaslyn Arboricultural Impact Assessment.**
- Habitats are classified as retained.
- Where ancient and veteran trees have been identified and crossed by the proposed works a 15 meter (m) buffer will be applied to prevent loss of ancient and veteran trees. These habitats will be classified as retained.

- An area of ancient woodland at the A497 junction will be required to undergo routine maintenance trimming. These habitats will be classified as retained, with suitable mitigation measures applied (see Section 7). See ES **Volume 4 Glaslyn Cables** for further details.
- Where statutory designated habitat (Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC) has been identified, and intersects with the proposed works, cables will be left in situ. Minor scrub removal is required in these areas. These habitats will be classified as permanently lost and created**.** Due to the nature of oil-filled cables, additional infrastructure may be required to accommodate cable joints and facilitate ongoing maintenance, including measures to prevent or respond to potential oil leaks. As such, the planting design within the cable easement has been developed to reflect and support the operational requirements of the infrastructure**.** See ES **Volume 4, Chapter 2 Glaslyn Cables** for further details.
- A small area of the Glaslyn works site of Special Scientific Interest (SSSI) (approximately 1.6 ha) will be directly impacted, temporarily to accommodate an HDD compound at the edge of the SSSI. This habitat will be classified as permanently lost due to the difficulty of reinstating SSSI habitat. Further construction information is required to assess the permanent impact to this area of the Glaslyn SSSI. See ES **Volume 4 Glaslyn Cables** for further details.
- Four link boxes will be constructed on the Glaslyn SSSI post-construction. The link boxes will be on raised bunds, which will require the permanent loss of approximately 96.8 cubic metres (m^2) of habitat. Permanent loss will likely occur to a further 31 m^2 of surrounding habitat to accommodate the raised bunds and slopes. These construction details have been assumed as a worst-case scenario. Further confirmation is required to assess the permanent impact to this area of the Glaslyn SSI. ES **Volume 4 Glaslyn Cables** for further details.
- All species and habitat mitigation recommended to support the delivery of NBB and GI will be captured within a Landscape Environmental Management Plan (LEMP) (**Appendix 4.4.C**). The LEMP is an iterative document that will be updated to reflect any relevant changes to the proposed works as it progresses. The Glaslyn Cables LEMP therefore builds upon this baseline, ensuring that mitigation and enhancement measures are appropriate to the final design and operational requirements. All habitat and species mitigation will be subject to management and monitoring for five years post-construction.

4. Baseline Site Assessment

4.1.1 The identification of existing GI assets and networks and understanding of existing biodiversity assets forms an essential step in the NBB assessment and GI Statement. The baseline conditions for the Glaslyn works site are detailed in the following datasets and reports, and have been considered in this assessment:

4.1.2 Datasets:

- LANDMAP Landscape Habitats (Ref 4.1);
- Urban Tree Canopy Cover (Ref 4.2);
- Habitat Networks (Ref 4.3).

4.1.3 Supporting Planning Documents:

- ES **Volume 4, Glaslyn Cables.**
- ES **Volume 8, Appendix 4.5.K Glaslyn Arboricultural Impact Assessment**.
- ES **Volume 4, Appendix 4.5.C: Aquatic Survey Report.**
- Eryri (Snowdonia) Visual Impact Provision Project (EVIP) - Habitat Management Plan – Garth (2022).
- Glaslyn Cables Landscape Plan.

4.2 Designated Sites

4.2.1 Designated sites (as defined in PPW 12) (Ref 1.3):

''must be protected from damage and deterioration, with their important features conserved and enhanced by appropriate management. The contribution of the designated site to wider resilient ecological networks should be recognised and captured as part of a strategic approach to planning policy and decision making''.

'Development in a SSSI which is not necessary for the management of the site must be avoided', where impact cannot be avoided *'statutorily designated sites should be protected from damage and deterioration, with their important features conserved and enhanced and the capacity for restoration demonstrated by and through appropriate management'.*

4.2.2 The following designated sites lie within the Glaslyn works site:

- Coedydd Der a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites Special Area of Conservation (SAC)
- Ysbyty Bron y Garth (SSSI)
- Glaslyn SSSI

4.2.3 The Afon Glaslyn is of National (High) importance, forming a component of the Glaslyn SSSI and the WFD water body Glaslyn - tidal to Afon Croesor (GB110065053860). The Afon Glaslyn falls directly within Glaslyn works site.

4.2.4 Drains (smaller watercourses and ditches) are of local (Low) importance only.

4.2.5 For full details of designated sites within 10 km of the Glaslyn works site, and within 5 km for other statutory designated sites of nature conservation value refer to ES **Volume 8, Appendix 4.5.J: Statutory Designated Site Citations.** For the distribution of these designated sites, please refer to ES **Volume 4, Figure 4.5.1 and Figure 4.5.2.**

4.2.6 AECOM received information on the location of TPOs and Conservation Areas from Gwynedd Council in January 2024. Individual Trees, Woodland and Tree Groups covered by TPO are detailed in ES **Volume 8, Appendix 4.5.K: Arboricultural Impact Assessment.**

4.3 Irreplaceable Habitat

4.3.1 Irreplaceable habitats (as defined in PPW 12) (Ref 1.3) are:

'habitats, including the natural resources which underpin them, which would be technically very difficult (or take a very significant time) to restore, recreate or replace once destroyed, considering their age, uniqueness, species diversity or rarity. Examples include, ancient woodland and veteran trees, ancient hedgerows, wet woodlands, sand dunes, peatland, species-rich grassland, long undisturbed soils, blanket bog, salt marsh and lowland fen'.

4.3.2 A total of thirteen (13) features were recorded as ancient or veteran ES **Volume 8, Appendix 4.5.K: Arboricultural Impact Assessment**. These 13 features have been identified as Irreplaceable habitat defined by PPW 12 (Ref 1.3) within the Glaslyn works site.

4.4 Priority Habits

4.4.1 Section 7 lists Priority Habitats (as defined by Environment Act (Wales) 2016) (Ref 1.1) that are of principal importance for the purpose of maintaining and enhancing biodiversity in Wales. Developers are required to take all reasonable steps to maintain and enhance habitats included in Section 7 list (Ref 4.4).

4.4.2 The following Priority Habitats have been identified within the Glaslyn works site; their associate Phase 1 habitat types are detailed in brackets.

- Improved Grassland (B4) - Coastal and floodplain grazing marsh
- Saltmarsh (H2.6)
- Lowland dry acid grassland (B1.2)
- Fens, marsh and swamp (F1) (B5) – Lowland fens, reedbeds, purple moor grass and rush pasture
- Rivers and streams (G2)

- Hedgerows (J2.1.1)
- Lowland mixed deciduous woodland (A1.1.1)

4.4.3 An area of lowland dry acid grassland is created as part of the EVIP landscaping works. This area of habitat is taken to be within the baseline. See detailed assumptions on the EVIP landscaping works in **Section 3**.

4.4.4 Baseline data was collected using Phase 1 survey methodology (for further details refer to ES **Volume 4, Chapter 5: Ecology and Nature Conservation**. The following habitats with their Phase 1 habitat codes are present within the proposed works boundary:

- A1.1.1 Broadleaved woodland semi-natural
- A1.1.2 Broadleaved woodland – plantation
- A1.3.1 Mixed woodland -semi-natural
- A2.1 Scrub- dense/continuous
- A2.2 Scrub – scattered
- A3.1 Broadleaved parkland/scattered tree
- B4 Improved grassland
- B5 Marsh/marshy grassland
- B6 Poor semi-improved grassland
- C3.1 Other tall herb and fern-ruderal
- F2.1 Marginal and inundation -marginal vegetation
- G2 Running water
- G2.2 Mesotrophic
- J1.1 Cultivated/disturbed land -arable
- J1.2 Cultivated/disturbed land-amenity grassland
- J1.4 Introduced shrub
- J2.1.1 Intact hedge – native species-rich
- J2.1.1 Intact hedge – species-poor
- J2.2.1 Defunct hedge – native species-rich
- J2.2.2 Defunct hedge – species-poor
- J2.3.1 Hedgerow with trees – native species- species rich
- J2.3.2 Hedgerow with trees- species-poor
- J2.4 Fence
- J2.5 Wall
- J2.6 Dry ditch
- J3.6 Buildings
- J4 Bare ground

- J5 Other habitat
- Hardstanding

4.4.5 The following habitats with their Phase 1 habitat codes are present within the EVIP landscaping area:

- G2 Running water
- B6 Poor semi-improved grassland
- B1.2 Acid grassland – semi-improved
- A2.1 Scrub- dense/continuous
- A1.1.2 Broadleaved woodland – plantation
- J2.1.1 Intact hedge – native species-rich
- J2.1.1 Intact hedge – species-poor
- A3.1 Broadleaved parkland/scattered tree
- Hardstanding

4.4.6 Detailed descriptions of baseline habitat are presented within the ES **Volume 4, Chapter 5: Ecology and Nature Conservation.**

4.5 Species

4.5.1 As stated in PPW12 (Ref 1.3) *'Ecological surveys must establish a detailed baseline: species presence/abundance, habitat condition, ecosystem connectivity, adaptability and extent'*. For detailed ecological survey findings refer to the relevant technical reports presented in **Volume 8, Appendices 4.5.A – 4.5.K.** For full details on aquatic species present, or potentially presented, within the Glaslyn works site, please refer to **Volume 8 – Appendix 4.5.C Aquatic Survey Report.**

4.5.2 Species present on-site have been considered as part of the NBB and GI assessment. This ensures that habitat enhancement and creation measures contribute to the overall ecological value of the site and deliver tangible benefits for local biodiversity. The following species have been recorded within the Glaslyn works site:

- Aquatic macroinvertebrates
- Fish
- Bats
- Breeding Birds
- Badger
- Otter
- Invasive Non-Native Plant Species (INNPS)
- Reptiles
- Amphibians

4.6 Public Rights of Way

4.6.1 There are six public rights of way (PRoW) within the Glaslyn works site.

4.6.2 For full details on public rights of way being impacted by the proposed works refer to ES **Volume 4, Chapter 4 Landscape and Visual Amenity.**

4.7 Water

4.7.1 5.33 km of rivers and streams were identified within the Glaslyn works site and are classified as a Section 7 Priority Habitat.

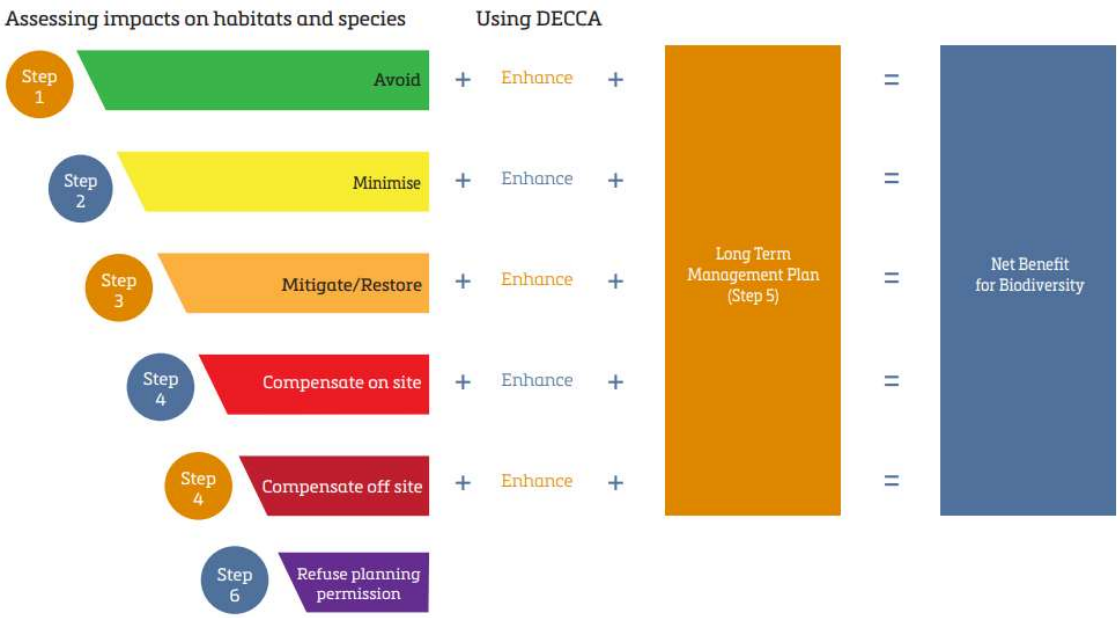
4.7.2 1.23 km of dry ditch passes directly through the Glaslyn works site.

5. Methodology

5.1 Stepwise Approach

5.1.1 The proposed works has been designed in accordance with the stepwise approach (see **Section 7**). Biodiversity restoration, enhancements or creation that achieve NBB must be delivered following the implementation of the stepwise approach.

5.1.2 The stepwise approach sets out the steps in order of priority (see **Plate 5-1**) to ensure that adverse effects on biodiversity are reduced. The measures undertaken at each step must be incorporated with enhancement measures and the principles of the DECCA Framework to ensure a net benefit for biodiversity is achieved.



(Source: Planning Policy Wales)

Plate 5-1:Stepwise Approach

5.1.3 The proposed works must adhere to the following steps highlighted within the stepwise approach:

- The first priority is the avoidance of impacts on biodiversity.
- If avoidance is not possible, adverse impacts to biodiversity must be minimised, by reducing the size of the proposed works and maintaining the connectivity of habitats. Impacts must also be minimised for Section 7 habitats and features used by Section 7 species to ensure their populations are maintained.
- If impacts cannot be avoided or sufficiently minimised then adverse effects to biodiversity must be mitigated against, and/or habitats and

features for species restored. The mitigation and restoration must target the specific adverse effects of the proposed works, seek to restore in excess of like-to-like, and account for factors like time lags in recovery of habitats and species populations.

- When these first three steps have been exhausted, compensation on-Site (4a), or off-Site (4b) if not otherwise feasible, is required. Compensation must always be a last resort and must be of significant magnitude to fully compensate for any loss, be place based, and take account of the Section 6 Duty, the DECCA framework and appropriate ecological advice from the local authority Ecologist, NRW or a suitably qualified ecologist.
- A Long-Term Management Plan should be produced setting out the management of the site and future monitoring arrangements for all secured measures. The management plan must identify the funding mechanisms in place to meet the management plan objectives and the achievement of net benefits for biodiversity.
- Failure to action any of these steps will result in a planning application being refused.

5.2 DECCA Framework

5.2.1 PPW 12 (Ref 1.3) defines Ecosystem resilience as

'the capacity of ecosystems to deal with disturbances, either by resisting them, recovering from them, or adapting to them, whilst retaining their ability to deliver services and benefits now and in the future' (Disturbances are interpreted to mean pressures and demands on the ecosystem)' (Ref 1.3).

5.2.2 NRW has developed a framework for evaluating ecosystem resilience based on five attributes and properties specified in the Environment (Wales) Act 2016 (Ref 1.1), referred to as the DECCA Framework (see Plate 5-2). The DECCA framework comprises the following objectives:

- **diversity** at all scales including genetic, species, habitat and ecosystems or landscape scale;
- **extent** of ecosystems and habitats;
- **condition** of ecosystems and biodiversity, including their structure and functioning;
- **connectivity** between and within ecosystems and habitats; and
- **Adaptability to change** of strengthening ecosystems to withstand and recover from environmental or anthropogenic pressures.

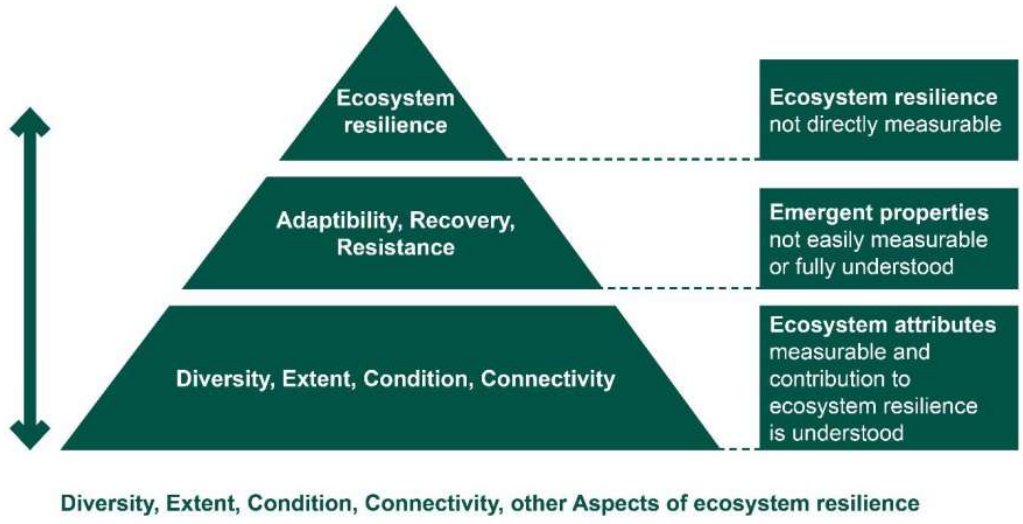


Plate 5-2: DECCA Framework (Ref 5.1)

5.3 Building with nature standards

5.3.1 PPW 12 (Ref 1.3) requires the submission of a proportionate GI Statement, signposting the BwNSF 2.0 (Ref 1.5). The twelve (12) Standards provide a pathway for and recognition of early and sustained engagement in the design, implementation and long-term stewardship of high-quality GI. The standards focus on the opportunities to put existing and planned-for habitat and wildlife at the heart of development for the benefit of people and nature. Each Standard is defined by its purpose and key characteristics, which are presented in the form of questions. These questions have been used to inform how the proposed works meets each Standard. **Table 5-1** Building with Nature Standards Framework highlights the BwNSF 2.0 (Ref 1.5) that will be used to inform the GI Statement.

Table 5-1 Building with Nature Standards Framework themes

Building with Nature Standard Framework theme	Description of theme
Standard 1: Optimises Multifunctionality and Connectivity	*The green infrastructure optimises multifunctionality and connectivity within the boundary of the project and links with existing and planned for green infrastructure in the surrounding area.*
Standard 2: Positively Responds to the Climate Emergency	*The green infrastructure is designed to be climate resilient by incorporating mitigation and adaptations that respond to the impacts of climate change. The green infrastructure is designed to promote low carbon behaviours and contributes to achieving zero carbon development by optimising carbon sequestration and demonstrating low carbon approaches to design, construction and long-term maintenance.*
Standard 3: Maximises Environmental Net Gains	*The green infrastructure is designed to actively mitigate any unavoidable harmful environmental impacts of development on soil and air quality and to minimise light and noise pollution. In addition, it delivers environmental net gains, including improving air and water quality and wherever possible includes quiet spaces for people and wildlife.*
Standard 4: Champions a Context Driven Approach	*The green infrastructure positively responds to the local context, including the physical environment, such as landscape and urban character and social, economic and environmental priorities, including the evidenced needs and strengths of existing and future local communities.*
Standard 5: Creates Distinctive Place	*The green infrastructure is integral to the project and is designed to reinforce local distinctiveness and/or create a distinctive sense of place.*

Building with Nature Standard Framework theme	Description of theme
Standard 6: Secures Effective Place-Keeping	*The green infrastructure is subject to management arrangements that demonstrate a commitment to effectively implement, establish and maintain features at all stages of the development process. This should include details of funding, governance, maintenance, monitoring, remediation and, where appropriate, community involvement and stewardship.*
Standard 7: Brings Nature Closer to People	*The green infrastructure is close to where people live, work, learn, play and/or visit and is designed to optimise use and enjoyment for everyone across the year, to maximise health and wellbeing outcomes and to promote active living for existing and future communities.*
Standard 8: Supports Equitable and Inclusive Places	*The green infrastructure is designed to encourage and enable everyone, including those from vulnerable or excluded groups, to use and enjoy it, to help reduce health inequalities and to build a shared sense of community and belonging.*
Standard 9: Delivers Climate Resilient Water Management	*The green infrastructure is integral to sustainable drainage using above ground features to manage flood risk, maintain the natural water cycle and improve water quality within the boundary of the project and at a catchment scale. The green infrastructure is designed to be drought resistant and wherever possible, includes measures for the retention and reuse of rainwater*
Standard 10: Brings Water Close to People	*The green infrastructure is designed to integrate water, including areas of standing water, flowing water, seasonal and ephemeral features, to bring additional amenity and wildlife benefits.*
Standard 11 Delivers Wildlife Enhancement	*The green infrastructure optimises long term and climate resilient net benefits for nature, by retaining and enhancing existing ecological assets and creating locally relevant new habitats within the boundary of the project. Wildlife measures are secured at all stages of implementation and where applicable, across multiple phases of development.*

Building with Nature Standard Framework theme	Description of theme
Standard 12 Underpins Nature's Recovery	*The green infrastructure creates effective links with existing and planned for ecological features and networks beyond the boundary of the project to support the creation and restoration of resilient ecological networks in the wider landscape.*

6. Review of Habitat Change

6.1.1 The Glaslyn works site falls predominantly within marshy grassland (coastal floodplain grazing marsh) and improved grassland (see **Appendix A – Baseline Constraints Plan**). The majority of work will result in temporary loss of habitat, with habitats impacted being reinstated to their original condition post-construction or enhanced/created to facilitate a net benefit and maintain the proposed works GI.

6.1.2 Habitats presented within **Appendix A – Table A1** will be either retained, temporarily lost (reinstated), permanently lost, created or enhanced as part of the proposed works. Off-site habitat creation and enhancement has not been included within this table. This section considers changes in habitat in relation to designated sites, irreplaceable habitat and wider habitat types.

6.2 Designated Sites

6.2.1 The design of the proposed works has evolved to avoid statutorily designated sites as much as possible.

6.2.2 The need for works in Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC has been minimised, by retaining the existing cables which pass through the site, and decommissioning them *in situ*, rather than removing them. This section of cables will be capped at each end and left in place, with only minor works required in the SAC at the existing kiosks. An existing road will be used for access and will not require any modifications or vegetation clearance. Works will be restricted to the existing kiosk locations and will comprise minor scrub removal in the immediate vicinity of each kiosk, and no tree removal or excavation. The above ground element of the kiosk will be removed, and works will be carried out in the existing cable box beneath, before fixing a new cover.

6.2.3 Permanent habitat loss will occur within the Glaslyn SSSI. Four new link boxes will be constructed on raised bunds which will require the permanent loss of approximately 96.8 m^2 of CFGM habitat (four x 24.2 m^2 link box and associated plinths). Permanent change will likely occur to a further 312 m^2 (approximately) of CFGM, within the Glaslyn SSSI to accommodate the raised bunds and slopes (four x 78 m^2) (taken as a worst-case construction footprint scenario).The total habitat loss of 408.8 m^2 (0.04 ha) would not have an adverse effect on structure, function or conservation status of the site as it would affect less than 0.01% of the overall SSSI. For further details refer to ES **Volume 4, Chapter 5: Ecology and Nature Conservation and Volume 8, Appendix 7.1.B. Report to Inform Habitats Regulation Assessment.**

6.2.4 1.6 ha of the Glaslyn SSSI will be directly impacted, temporarily to accommodate an HDD compound at the edge of the SSSI. This habitat has been classified as permanently lost due to the difficulty of reinstating SSSI habitat. Complete avoidance was not feasible due to the technical limitations of the HDD length. Nevertheless, the design avoids the need for two

separate HDD sections, which would have required additional infrastructure such as re-entry compounds within the SSSI.

6.2.5 Works within the remainder of Glaslyn SSSI will likewise be minimised, with the existing cables retained and decommissioned in situ. Small scale works will be required at 500 m intervals to create monitoring pits to enable the cables to remain safely in place, however these works will be localised, temporary and approximately 24 m x 10 m in area (240 m^2). The localised and temporary nature of these works will allow for habitat to naturally reinstate back to its baseline habitat and condition, as the working area is small scale it is considered that this impact is not significant. For further details refer to ES **Volume 4, Chapter 5: Ecology and Nature Conservation.**

6.2.6 PPW 12 (Ref 1.3) states *'In wholly exceptional circumstances and only where development is considered to be appropriate and is not likely to damage a SSSI and there is broad and clear agreement for mitigation and enhancement as part of a development plan should development be proposed. This means that development will be considered unacceptable in the absence of an agreed position in a development plan which indicates that it is acceptable in terms of its effect on the notified features of a SSSI'*. For application of the stepwise approach see **Section 7.**

6.2.7 All designated habitat that is permanently or temporarily affected as part of the proposed works has been assessed within the Habitat Regulation Assessment. For further details refer to **Volume 8, Appendix 7.1.B. Report to Inform Habitats Regulation Assessment.**

6.3 Irreplaceable Habitat

6.3.1 As detailed in **Section 4,** irreplaceable habitat includes ancient woodland, semi-natural woodland, individual ancient, veteran, heritage and ancient hedgerows. The proposed works will result in a small, localised impact to one veteran tree.

6.3.2 The works proposed will result in incursion of the Root Protection Area (RPA) or canopies of seven veteran trees (T40, T48, T71, T614, T625, T680 and T731).It is not expected that these trees will be lost or damaged as a result of the works provided the mitigations as set out in ES **Volume 8, Appendix 4.5.K** are implemented. Where existing hard surfaced access routes are to be used during construction activity, they will not be subject to change where they transect RPAs of retained trees. This is therefore not considered to be a change in use or a new impact (such areas are shown as a pink hatch on the Tree Protection Plan). It is deemed no permanent impact will occur to these seven veteran trees.

6.4 Other Habitats

6.4.1 Habitats presented within **Appendix A – Table A1** will be either retained, temporarily lost (reinstated), permanently lost, created or enhanced as part of the proposed works see **Appendix A, Figure 4.5.L.2**. Off-site habitat creation and enhancement has not been included within this table. In summary, the following habitats are likely to be temporarily lost by the proposed works and reinstated within three years:

- 0.09 ha of Broadleaved woodland -plantation
- 0.62 ha of scrub – dense/continuous
- 0.03 ha of scrub-scattered
- 0.06 ha of Acid grassland – semi-improved
- 4.52 ha of Neutral grassland -semi-improved
- 10.01 ha of improved grassland
- 11.68 ha of Marsh/marshy grassland
- 12.37 ha of poor semi-improved grassland
- 0.05 ha of other tall herb and fern -ruderal
- 4.35 ha of arable
- 1.34 ha of amenity grassland
- 0.15 ha of marginal and inundation-marginal vegetation
- 0.05 km of intact hedge -native species-rich
- 0.04 km standing water
- 0.6 km running water
- 0.18 km running water -mesotrophic
- 25 Individual Trees

6.4.2 The following habitats are likely to be permanently lost by the proposed works:

- 0.08 ha Broadleaved woodland – plantation.
- 0.16 ha Scrub dense/continuous
- 0.12 ha Acid grassland – semi-improved.
- 0.01 ha Neutral grassland – semi-improved.
- 0.19 ha of Improved grassland (CFGM).
- 0.29 ha of Marsh/Marshy grassland
- 0.01 ha Marginal and inundation -marginal vegetation.
- 0.04 ha Amenity grassland.
- 0.24 km of species-poor hedgerow
- 0.39 km dry ditch
- 73 Individual Trees.
- 56 Groups of Trees.

6.4.3 In addition to the habitats to be temporarily lost and reinstated and those that will be permanently lost, areas of habitat creation and enhancement are also proposed to provide habitat compensation in efforts to work towards achieving a net benefit, these are shown on the Landscape Plan. NGET aim to deliver on-site habitat compensation in a coordinated and strategic

manner in line with **section 1.3.6**. Where achievable compensation identified targets areas to sustain green infrastructure or wildlife corridors and maintain habitat connectivity.

6.4.4 Habitats presented in **Table 6-1** will be created or enhanced on-site and are considered to provide benefits above no net loss when combined with the proposed work area of habitat presented in **Appendix A** - **Table A1**, (these areas are in addition to the habitats subject to temporary loss and retainment).

Table 6-1 Habitats created or enhanced as part of NBB and GI

Phase 1 habitat description	Created/ enhanced	Area (ha) created/enhanced post works
A2.1 - Scrub - dense/continuous	Created	0.3
B4 - Improved grassland	Created	0.19
B6 - Poor semi-improved grassland	Created	0.03
A1.1.2 - Broadleaved woodland - plantation	Created	0.06
B5 - Marsh/marshy grassland	Created	0.06
SuDS	Created	0.02
B2 -Neutral Grassland	Enhanced	0.32
Linear Features		**Area (km) created/enhanced Post Works**
J2.1.1 - Intact hedge - native species-rich	Created	0.23
Point Features		**Number count created**
Individual Trees	Created	100

7. Demonstration of Policy Compliance

7.1 Application and Compliance of Stepwise

7.1.1 This section outlines the 'stepwise approach' that has been followed to avoid, minimise, mitigate and compensate impacts resulting from the proposed works.

Avoidance

7.1.2 Biodiversity and wider ecosystem benefits were prioritised during the preliminary design phase of the proposed works, leading to refinements that minimised potential impacts, such as retaining existing habitats and avoiding disturbance wherever feasible. As part of this process, an options appraisal (see **Volume 8, Appendix 4.3.A: Options Appraisal Report**) divided the Glaslyn cable route into five sections. Multiple route options were considered for each section, with the preferred alignment selected based on reduced complexity and minimised impacts to designated sites, Section 7 habitats, and broader ecological and environmental receptors. Building on this foundation, further LPA consultation and landscape strategies have informed the final design submitted for consent, ensuring continued alignment with the 'Avoidance' principle of the stepwise approach. For more detail on the options appraisal and application of avoidance principles, refer to **ES Volume 4, Chapter 3: Assessment of Alternatives**.

Minimise

7.1.3 Where it was not possible to avoid specific biodiversity impacts, measures to minimise the impacts were recommended. This led to the recommendation of several strategies which will aim to minimise the proposed works impact on biodiversity. Design optioneering ensured that the proposed works minimised its impact on statutory designated and non-statutory designated habitats and species (see **Table 7-1** for further details). This accords with the 'Minimise' principle of the stepwise approach.

Mitigate

7.1.4 Where predicted impacts still occur following avoidance measures and measures to minimise impacts, mitigation measures will be implemented for habitats and species. Species mitigation and habitat mitigation/ enhancement measures have been designed to reduce the impacts of the proposed works. On-site habitat mitigation options were explored with National Grid and are identified on the landscape plan. On-site species mitigation is presented within ES **Volume 4, Chapter 5: Ecology and Nature Conservation.** The following mitigation will be applied as part of the proposed works:

- A robust CEMP (**Volume 8, Appendix 4.2.A: Outline Construction Environmental Management Plan**) will detail the measures required to manage the environmental effects of the proposed works and demonstrate how compliance with environmental legislation will be achieved. The CEMP will detail the measures required to mitigate construction related effects on important ecological features (IEFs), including those associated with construction dust deposition, air pollution, pollution incidents, water quality, light, noise and vibration. For further detail on an assessment of construction impacts and significance of effects on IEFs during construction and construction mitigation measures refer to Section 5.9 of **Volume 4, Chapter 5: Ecology and Nature Conservation.**
- Habitat avoidance measures to be implemented during construction, inclusive of species mitigation, irreplaceable habitat, watercourses and vegetation clearance.
- The proposed works have been designed to avoid IEFs present in or adjacent to the Glaslyn works site as far as is practicable. The following minimum buffers from key habitat features will be applied to reduce the likelihood of significant ecological effects, where practicable:
    - 15 m from woodlands; to prevent incursion into Root Protection Areas (RPAs).
    - 5 m from hedgerows increasing to 15 m where there are hedgerow trees to prevent incursion into RPAs.
    - 15 m from individual retained trees to prevent incursion into RPAs to protect the tree and reduce the likelihood of disturbing any roosting bats that could be present.
    - A minimum of 10 m stand-off buffers from watercourses (bank tops) and ponds, including dry ditches, to protect riparian habitats and to mitigate for potential hazards such as chemical and spoil spills into watercourses or water bodies, with the exception of where watercourses and ditches (including seven Main Rivers) are crossed by cabling works and open cut techniques are required, or where bridge construction is required to facilitate creation of the permanent haul road, or where existing cable requiring removal is already in the buffer.
    - A minimum of 50 m from Afon Glaslyn bankside (in Glaslyn SSSI) to reduce the likelihood of disturbance to otter, which are a feature of this statutory designated site.
- Further details regarding unavoidable works in tree RPAs is contained in the **Volume 8, Appendix 4.5.K: Arboricultural Impact Assessment Report**. Precautionary measures discussed in that report include protective fencing and temporary ground protection measures (where necessary) and ensuring all soil storage remains outside RPAs.
- A suitably experienced Environmental Manager will be appointed for the duration of the construction phase. In addition, a qualified and experienced Environmental Clerk of Works (ECoW) will be available during the construction phase to advise, supervise and report on the delivery of the mitigation methods and controls outlined in the CEMP. The ECoW will monitor that the works proceed in accordance with

relevant environmental requirements and adhere to the required good practice and mitigation measures. The ECoW will be supported as necessary by appropriate specialists, including ecologists and arboriculturists.

- Ongoing monitoring of habitats and species will be carried out throughout construction, over seen by an appointed ECoW of suitable qualifications and experience. The ECoW will have the appropriate authority to review reasonable avoidance measures, oversee works and recommend action as appropriate, including temporarily stopping works where non-compliant working is observed, e.g. to safeguard protected species and their habitats, or where any other breaches of environmental legislation are likely to occur.

Compensate

7.1.5 Where permanent habitat loss occurs, particularly habitats protected under PPW12 (Ref 1.3), with associated planting compensation ratios, National Grid has actively explored opportunities for on-site habitat compensation. **Table 7-3** outlines feasible habitat creation and enhancement within National Grid land holdings and can therefore be delivered directly. These areas also meet requirements for wider environmental mitigation, such as landscape screening. With respect to areas of land that will be returned to private landowners following completion of the work, National Grid can only require private landowners to retain or maintain proposed biodiversity enhancements where agreement has been reached to do so. This constraint makes it unachievable to deliver full NBB on-site in this case.

7.1.6 Where on-site NBB and GI enhancements are not achievable, National Grid is committed to delivering NBB through off-site measures. Any biodiversity improvements proposed on third-party land will need to be secured through voluntary agreements. National Grid is currently working with a third-party supplier to identify and develop suitable off-site compensation options to compensate for the habitat loss (**Appendix A- Table A1)** that will occur as a result of the proposed works. This accords with the 'Compensate' principle of the stepwise approach.

7.1.7 The stepwise approach which has been applied for ecological receptors permanently and temporarily impacted by the proposed works is summarised in **Table 7-1.**

Table 7-1 Stepwise approach taken to deliver NBB for Glaslyn proposed works

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
Designated Sites [Glaslyn SSSI and Afon Glaslyn]	Permanent and temporary loss	The design is such that the construction and operational footprint required has been minimised, thereby avoiding land take, as far as is possible from designated sites within the proposed works. Where possible the design avoids the need for separate HDD sections when	A small area of the Glaslyn SSSI (approximately 1.6 ha) will be directly impacted temporarily to accommodate an HDD compound at the edge of the SSSI. Complete avoidance was not feasible due to the technical limitations of the HDD length. In addition, four new link boxes will be constructed in that same area, on mounds which will require the permanent loss of approximately 96.8 m^2 of marshy grassland habitat.	Standard environmental protection measures, as provided in the CEMP (**Volume 8, Appendix 4.2.A: Outline Construction Environmental Management Plan**), will be implemented during the construction phase. For further details refer to ES **Volume 4: Glaslyn Cables.**	National Grid is actively exploring habitat compensation for 1.6 ha of Glaslyn SSSI (coastal floodplain grazing marsh) through a trusted third-party provider. This initiative will be delivered in collaboration with expert ecological partners, ensuring that the approach is evidence-based, locally appropriate, and aligned with best practice. The proposed compensation site will be within the same geographic area as the proposed works, supporting strategic biodiversity objectives and maintaining ecological connectivity.

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
		crossing a designated site to avoid impacts. Direct habitat loss to Afon Glaslyn and its riparian habitat will be avoided using HDD techniques.	Works proposed within and around the SAC and remaining sections of the Glaslyn SSI will be minimised, with the existing cables being retained and decommissioned in situ (this reduces the level of impact compared with full removal). Small areas of vegetation clearance required for maintenance purposes have been isolated to areas of non-qualifying habitat, to reduce the impact to the rest		

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
			of the SAC and SSSI.		
Irreplaceable Habitat (Ancient and Veteran Trees)	Temporary loss	The design is such that the construction and operational footprint required has been designed to avoid areas of ancient woodland, ancient trees and veteran trees wherever possible.	The design is such that the construction and operational footprint required has been minimised as far as possible to minimise potential impacts to ancient woodland, ancient trees and veteran trees. Through this process only seven veteran trees are maybe to be temporarily impacted.	Currently the proposed works will result in incursion of the RPA or canopies of 142 tree features. This includes seven veteran trees (T40, T48, T614, T625, T645, T680 and T731). There will be a localised narrowing of the easement, protective fencing of the full RPA and all spoil generated will be stored outside of the RPA. Following these measure, no permanent impacts to the veteran tree's structure or status or protected.	There will be no permanent impact to irreplaceable habitat and as such no compensation is required.
S7 Priority Habitat	Permanent and temporary loss	The design is such that the construction	Wherever possible cables will be left in situ	All habitats temporarily impacted **(**see **Section 5** and	The proposed works will result in the permanent loss of approximately 1.6 ha of the

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
		and operational footprint required has been minimised as far as possible, thereby avoiding land take of S7 habitats. However, this was not entirely possible for the entire Glaslyn works site. A large proportion of the Glaslyn works site falls within CFGM priority habitat layer, which includes	to avoid impacts to S7 Priority Habitats. Monitoring pits will be installed throughout the Glaslyn works site, these works will be localised, temporary and approximately 24 m x 10 m in area. Their exact location is yet to be determined, although may affect S7 Priority Habitats. Localised and predominantly temporary loss of marginal vegetation will be necessary to facilitate works on other watercourses, including bridge	**Appendix A – Table A1)** will be reinstated within three years of completion. Standard environmental protection measures formalised through the CEMP will be applied to all S7 habitats temporarily and permanently effected by the proposed works. For further details refer to ES **Volume 8, Appendix 4.2.A: Outline Environmental Construction Management Plan** for further details	CFGM priority habitat layer, which equates to 1.95% of the overall area of CFGM that falls within the Glaslyn works site. The following habitats which fall under the CFGM priority habitat layer and are permanently lost are (excluding linear and point features) are: • 0.19 ha of improved grassland. • 0.16 ha of scrub. • 0.01 ha of neutral grassland -semi-improved • 0.29 ha of Marsh/marshy grassland • 0.89 ha of poor-semi-improved grassland • 0.01 ha of other tall herb and fern -ruderal

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
		areas of improved, poor semi-improved, semi-improved neutral grassland, marshy grassland as well as woodland and scrub habitats. All water bodies present within the Glaslyn works site will be retained.	replacements, culverts and open cut crossings. Minor permanent habitat loss is expected in areas where new bridge construction is required.		• 0.04 ha of Cultivated/ disturbed land – amenity grassland • 0.03 ha of Cultivated/ disturbed land – ephemeral/ short perennial • 0.01 ha of Marginal and inundation – marginal vegetation The total loss of this area 1.66 ha would not have an significant effect on the structure, function or conservation status of CFGM or the ability of the CFGM to retain its ecological function or value, as it would affect approximately 1.95% of the CFGM recorded within the Glaslyn works site. In addition to the compensation sought for 1.6 ha of Glaslyn SSSI, National Grid are proactively seeking habitat compensation for the loss of 1.6 ha within the CFGM priority habitat layer. This will be delivered through a trusted third-

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
					party provider, in collaboration with experienced ecological partners. The approach will be evidence-based, locally appropriate, and aligned with recognised best practice to ensure meaningful ecological outcomes. The proposed works will result in a loss of 0.05ha of Broadleaved semi-natural woodland. Compensation is required to be at a scale, design and species mix reflective of that area lost. In such circumstances, the planting rate must be at a minimum of 1600 trees per hectare for broadleaves (Ref 1.3). 80 trees are required to meet the full compensation requirement set out in PPW 12. National Grid is proactively addressing this shortfall through habitat compensation for 80 trees. This will be delivered via a trusted third-party provider, in collaboration with experienced

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
					ecological partners. The approach will be evidence-based, locally appropriate, and aligned with recognised best practice to ensure meaningful
Trees	Permanent and temporary loss	The design is such that the construction and operational footprint required has been minimised as far as possible. The land take for proposed works targets habitats of low value, and not classified as S7 Priority Habitat, for the main cable route. The step wise	Standard environmental protection measures, as provided in the CEMP (**Volume 8, Appendix 4.2.A: Outline Construction Environmental Management Plan**), will be implemented during construction. This will include suitable measures to suppress dust, reduce site runoff and reduce spillage risk and water pollution risk. Soil storage	n/a	A total of 73 individual trees will be lost as a result of the proposed works. To maintain on-site green infrastructure, compensation is required at a minimum replacement ratio of 3:1, equating to 219 trees. Where feasible, compensation has been delivered on-site, with 100 trees to be planted, achieving no net loss and satisfying wider environmental mitigation requirements. However, an additional 119 trees are required to meet the full compensation requirement set out in PPW 12. National Grid is proactively addressing this shortfall through habitat compensation for the remaining 119 trees. This will be delivered via a trusted third-party

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
		approach has been followed for any habitat impacted by the proposed works.	and bunds will be secured to prevent their deterioration that would cause sedimentation into watercourses and water bodies.		provider, in collaboration with experienced ecological partners. The approach will be evidence-based, locally appropriate, and aligned with recognised best practice to ensure meaningful ecological outcomes. The proposed compensation site will be located within the same geographic area as the development site, supporting strategic biodiversity objectives and maintaining ecological connectivity.
Species poor-hedgerow	Permanent and temporary loss	Wherever possible, existing hedgerows have been retained and buffered (minimum of 5 m) to avoid direct impacts, in line with the	The design is such that the construction and operational footprint required has been minimised as far as possible, thereby reducing the land take of hedgerows where possible.	Loss of 0.24 km of species-poor hedgerow is unavoidable. 0.05 km of species-rich hedgerow and 0.02 km of species poor hedgerow are to be reinstated after a three-year construction period. Where temporary removal is needed,	A total of 0.24 km of hedgerow will be lost as a result of the proposed works. To maintain on-site green infrastructure, compensation is required at a minimum replacement ratio of 3:1, equating to 0.72 km of species-rich hedgerow Where feasible, compensation has been delivered on-site, with 0.23 km of species-rich hedgerow to be planted, achieving no net loss and satisfying wider

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
		stepwise approach.		replacement sections with similar species and improved condition will be reinstated.	environmental mitigation requirements. However, an additional 0.49 km of species-rich hedgerow is required to meet the full compensation requirement. National Grid is proactively addressing this shortfall through habitat compensation for the remaining 0.49 km of species-rich hedgerow. This will be delivered via a trusted third-party provider, in collaboration with experienced ecological partners. The approach will be evidence-based, locally appropriate, and aligned with recognised best practice to ensure meaningful ecological outcomes. The proposed compensation site will be located within the same Local Planning Authority geographic area as the development site, supporting strategic biodiversity objectives and maintaining ecological connectivity.

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
Broadleaved woodland Plantation	Permanent and temporary loss	1.12 ha of Broadleaved woodland plantation is retained.	The design is such that the construction and operational footprint required has been minimised as far as possible, thereby reducing the land take of all woodland types.	A permanent loss of 0.08 ha of Broadleaved woodland -plantation is unavoidable. A temporary loss of 0.09 ha of Broadleaved woodland -plantation is required. Where temporary removal or pruning of the canopy is required, native species will be selected and planted in location of the removal to facilitate the proposed works.	To compensate for the loss of 0.08ha of Broadleaved woodland -plantation and maintain green infrastructure as part of the proposed works, compensation is required to be at a scale, design and species mix reflective of that area lost. In such circumstances, the planting rate must be at a minimum of 1600 trees per hectare for broadleaves (Ref 1.3). 128 trees are required to meet the full compensation requirement set out in PPW 12. National Grid is proactively addressing this shortfall through habitat compensation for 128 trees. This will be delivered via a trusted third-party provider, in collaboration with experienced ecological partners. The approach will be evidence-based, locally appropriate, and aligned with recognised best practice to ensure meaningful ecological outcomes.

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
					It is recommended that National Grid exhaust all options of on-site woodland planting prior to committing to off-site compensation for Broadleaved woodland plantation, see section 9.
Poor-Semi improved grassland	Permanent and temporary loss	15.97 ha of poor-semi-improved grassland is retained.	The design is such that the construction and operational footprint required has been minimised as far as possible, thereby reducing the land take of species-poor grassland.	A permanent loss of 0.89 ha of poor semi-improved grassland is unavoidable. A temporary loss of 12.37 ha of poor-semi-improved grassland is required. Where temporary removal is needed; the grassland will be reseeded within 3 years of construction. Where topsoil and sub soil require removal, these will be returned to the same location as taken from and kept separately for different habitat types, to	To compensate for the loss of 0.89 ha of poor semi-improved grassland, 0.32 ha of species-rich meadow is to be enhanced from poor semi-improved grassland. This area has been agreed in principle with Porthmadog Town Council. The proposed creation of a smaller area of species-rich meadow is considered to deliver a net benefit for biodiversity when compared to retaining the larger extent of poor semi-improved grassland. While reduced in size, the new habitat will be of significantly higher ecological value, supporting a greater diversity of plant species and associated fauna.

Habitat type	Permanently/temporarily/ no impact	Avoid	Minimise	Mitigate	Compensate
				preserve the original soil profile and seed bank.	Newly planted habitat will be managed and monitored for 5 years, with enhancement and management detailed in ES **Volume 8 Appendix 4.4.C Outline Landscape and Ecological Management Plan (LEMP).**

7.2 Application and Compliance of DECCA

7.2.1 The construction of the proposed works will result in a permanent loss of several habitat types (CFGM, trees, Broadleaved plantation woodland, species poor-grassland). Habitat mitigation and compensation will ensure that any lost habitats are replaced with habitats of equal or greater extent and/or quality where possible. For compensation replacement ratios per habitat type see **Table 7-2.** Where habitats cannot be fully mitigated for or compensated for on-site (CFGM, Trees, plantation woodland, species poor grassland) off-site compensation is being explored by National Grid.

7.2.2 Where impacts to biodiversity were predicted, following the application of avoidance measures and measures to minimise impacts, mitigation has been identified, and compensation will be provided where impacts will still arise. The measures aiming to increase ecosystem resilience can be categorised per mitigation/compensation type and are summarised below in **Table 7-22.** Each measure's contribution to ecosystem resilience is also highlighted using the DECCA Framework.

Table 7-2 Mitigation and compensation measures and their contribution to ecosystem resilience

Habitat impacted	Mitigation or compensation measures	Diversity	Extent	Condition	Connectivity	Adaptability to change
Trees	Tree planting (Compensation)	Planting of different ages, sizes and species of tree will contribute to the structural diversity of trees within the Glaslyn works site.	100 trees are to be planted in addition the 25 retained trees on-site. An additional 119 trees will be sought off-site to satisfy PPW12 (Ref 1.3) planting compensation ratios and maintain the extent of GI within the surrounding area.	Trees will be replanted in areas that promote ecological connectivity, where possible, these will be near priority ecological network areas, priority green infrastructure areas, or areas where tree removal occurred.	By maintaining trees, the ecological continuity of the site remains. This helps preserve the existing biodiversity and supports species that rely on the specific conditions provided by these tree types.	This mitigation measure is likely to support adaptability to change through the provision of ecosystem service resilience.
Hedgerow	Replanting of hedgerow over cable route (mitigation) Hedgerow creation (compensation)	A mix of whips and standard sized shrubs of native species of local provenance in-keeping with the overall species composition of hedgerows affected will be used in	Additional hedgerows will be planted within the Glaslyn works site. 0.23 km of species-rich hedgerow will be planted to adjoin to the existing species-poor hedge within the Glaslyn works site. An additional 0.49 km of	Hedgerows planted will naturally mature to form part of a fully functioning hedgerow network.	Replanting where gaps are created by the proposed works will maintain connectivity of the hedgerow network.	This mitigation measure is likely to support adaptability to change through the provision of ecosystem service resilience and expansion of green infrastructure networks.

Habitat impacted	Mitigation or compensation measures	Diversity	Extent	Condition	Connectivity	Adaptability to change
		replanting of hedgerows to maintain the species diversity of the existing species-rich hedgerows.	species-rich hedgerow will be sought off-site to satisfy PPW12 (Ref 1.3) planting compensation ratios and maintain the extent of GI within the surrounding area.			
Species Rich Meadow	Enhancement of poor condition semi-improved grassland to species rich meadow (compensation).	0.32 ha of species-poor grassland is proposed to be enhanced to species-rich meadow, which will enhance the genetic diversity of the grassland.	0.32 ha of species-rich meadow is to be enhanced from poor semi-improved grassland. This will increase the extent of species-rich grassland on-site.	Enhancing the grassland type will improve the overall condition of grassland habitat. Detailed management prescriptions are presented in the LEMP **(Appendix 4.4.C)**.	Preserving and replanting grasslands can enhance habitat connectivity, allowing species to move and disperse more freely disperse.	A diverse seedbank allows for greater adaptability to changing environmental conditions. In addition, by enhancing semi-improved grassland post-construction it provides essential ecosystem services such as soil stabilisation, water filtration and carbon sequestration.

7.3 Application and Compliance of Building with Nature Standards Framework

7.3.1 Opportunities for incorporating green infrastructure have been undertaken paying due regard to the BwNSF (Ref 1.5). The BwNSF (Ref 1.5) sets out best practice standards to define a benchmark of good green infrastructure and how to deliver it. **Table 7-3** evidences how the Proposed works has worked towards upholding and achieving these standards where applicable.

Table 7-3 Summary of proposed green infrastructure mitigation and enhancement and its link to BwNSF (Ref 1.5)

Standard	Justification for meeting the standard
1 Optimises Multifunctionality and Connectivity	Ecological connectivity has been preserved where possible, through the replanting and creation of species-rich grassland, hedgerows, trees and woodland. Replacement planting of trees and hedgerows will help to main connectivity with wider habitats for species such as bats. Existing Public Rights of Way (PRoWs) will be temporarily diverted to ensure public safety. On completion of the works, all affected PRoWs will be reopened.
2 Positively responds to the Climate Emergency	The design will satisfy current construction standards to ensure the design is resilient to changes in climate. Where appropriate, the Construction Contractor will use low carbon approaches to construction. A robust CEMP (**Volume 8, Appendix 4.2.A: Outline Construction Environmental Management Plan**) will detail the measures required to manage the environmental effects of the proposed works and demonstrate compliance with environmental legislation will be implemented.
3 Maximises Environmental Net Gains	Environmental net gain will be delivered through mitigation and compensation. All environmental impacts associated with the proposed works will be actively mitigated against. A robust CEMP (**Volume 8, Appendix 4.2.A: Outline Construction Environmental Management Plan**) will detail the measures required to manage the environmental effects of the proposed works and demonstrate how compliance with environmental legislation will be implemented.
4 Champions a Context Driven Approach	Net Benefit will be provided on and off-site. The like-for-like replacement and compensation above no net loss of GI (hedgerows and trees) and creation of grassland will ensure that Gwynedd Council Strategic Policy PS19 of the Joint Local Development Plan will be met.

Standard	Justification for meeting the standard
5 Creates Distinctive Places	Net Benefit will be provided on and sought off-site. The like-for-like replacement and compensation above no net loss of GI (hedgerows, trees and CFGM) and enhancement of grassland will ensure that Gwynedd Council Strategic Policy PS19 of the Joint Local Development Plan will be met.
6 Secures Effective Place-keeping	All habitat creation and enhancement proposed as part of this NBB assessment will require regular maintenance and monitoring [on and off-site]. Management of all habitats created or enhanced [on-site] will be detailed within the LEMP and monitored for at least 5 years. Off-site habitat management and monitoring of NBB rests with experienced nature conservation organisations and land managers for which this is their area of expertise and core business, a proportionate timeframe to the type of habitat compensation will be applied. An appropriate legal mechanism will be put in place to secure these off-site arrangements. This demonstrates a commitment to effectively implement, establish and maintain mitigation at all stages of the development process.
7 Brings Nature Closer to People	Areas where green infrastructure [hedgerows, trees and woodland] has been reinstated or created and areas where species-poor grassland has been enhanced promotes brining nature closer to people, promoting active living for communities surrounding the proposed works. Certain areas of the proposed works is an operational site, limited public access or PRoW. The nature of the operation of these areas restricts opportunities to bring people closer to nature.
8 Supports Equitable and Inclusive Places	The proposed works restricts opportunities to make the site more equitable and inclusive.
9 Delivers Climate Resilient Water Management	The proposed works will avoid impact to all main rivers through HDD methods. All ditches will be restored post-construction.
10 Brings Water Closer to People	Working buffers and active mitigation will be applied to all construction works surrounding watercourses on-site, to protect the resilience of watercourse. A robust CEMP (**Volume 8, Appendix 4.2.A: Outline Construction Environmental Management Plan**) will detail the measures required to manage the environmental effects of the proposed works and demonstrate compliance with environmental legislation will be implemented.
Standard 11 Delivers Wildlife Enhancement	Trees and hedgerows removed as part of the proposed works will be replanted on-site where feasible, contributing to

Standard	Justification for meeting the standard
	the 3:1 planting ratio. The remainder of habitat compensation required will be sought off-site. To achieve wildlife enhancement species-rich meadow (good quality) will be created on-site. To achieve wildlife enhancement CFGM will need to be enhanced or created off-site. National Grid is proactively seeking habitat compensation for the combined loss of 1.3ha This will be delivered through a trusted third-party provider, in collaboration with experienced ecological partners.
12 Underpins Nature's Recovery	Habitat creation and or enhancement discussed in **Table 7-1** and **Table 7-2** will enhance the quality of existing habitats and improve connectivity on and off-site.

8. Management and Monitoring

8.1.1 All habitat enhancement and creation suggested to achieve a NBB will need to be managed and monitored for at least 5 years, as all habitat enhancement and creation would be considered as a priority habitat (**Section 4.4**). All on-site habitat creation and enhancement will be monitored and maintained by National Grid for the 5-year management duration. Any management and monitoring actions beyond this time will be secured via legal agreement with landowners.

8.1.2 The LEMP (**Appendix 4.4.C)** will identify the landscape provisions within the Glaslyn works site and any relevant mitigation and habitat compensation identified for NBB. It will include a clear timetable, management and monitoring commitments. The frequency of habitat monitoring will be in line with best practice.

8.1.3 The monitoring of establishing habitats (individual trees, moderate condition broadleaved woodland, species-rich hedgerow and species-rich meadow) will include a condition assessment, including the presence of negative and positive indicator species, and any remedial actions (e.g. removal of INNS). Post-construction monitoring will determine the efficacy of mitigation measures and help to identify where management, mitigation improvements or changes are necessary.

8.1.4 The Arboriculture method statement will be fully detailed prior to the Construction Contractor commencing on site to ensure the retention and protection of ancient and veteran trees.

8.1.5 The implementation of the above measures will help to ensure the delivery of NBB, GI and ecosystem resilience in the long-term.

8.1.6 Where habitat compensation is secured off-site, for the most part, will be secured by a suitable legal agreement. The responsibility for implementation, management and monitoring of NBB rests with experienced nature conservation organisations and land managers for which this is their area of expertise and core business. .

9. Conclusion

9.1.1 The NBB assessment and GI Infrastructure Statement incorporates guidance from the stepwise approach, the DECCA Framework and the BwNSF (Ref 1.5) to inform a qualitative comparison between baseline biodiversity and proposed post-development biodiversity. This comparison has been used to determine the overall impact on green infrastructure from the proposed works and to determine whether a Net Benefit for Biodiversity has been achieved.

9.1.2 Through consideration of this guidance, the proposed works will also contribute to overcoming the key biodiversity challenges in Gwynedd as outlined in the North West Wales Area Statement (Ref 2.7), notably reversing the decline of, and enhancing, biodiversity.

9.1.3 NBB is achieved through habitat mitigation and compensation highlighted in **Table 7-1 and 7-2**, through a combination of on and off-site habitat delivery. All on-site habitat creation and enhancements will reside on National Grid land holdings, except for species-rich grassland enhancement, individual trees and species-rich hedgerow which will require third party engagement. The location of on-site habitat compensation is identified on the landscape plan. All habitat compensation planting proposed will be managed and monitored by National Grid for 5 years. A LEMP will be produced to determine the frequency and requirements for ongoing management and monitoring to ensure the desired habitat is achieved. On-site habitat compensation includes:

- 0.3 ha of Scrub
- 0.19 ha of improved grassland
- 0.03 ha of poor-semi-improved grassland
- 0.06 ha of Marsh/marshy grassland
- 0.02 ha of Suds
- 0.32 ha of Species-rich meadow
- 0.23 km of species-rich hedgerow
- 100 individual trees

9.1.4 As part of on-site habitat reinstatement and compensation measures, it is recommended that all species-poor hedgerows be enhanced to either species-rich or intact species-poor hedgerows to maximise the GI value on-site.

9.1.5 To compensate for the remaining shortfall of habitat loss, off-site delivery through a third-party provider will support compensation efforts for the following habitats:

- 1.6 ha of Glaslyn SSSI
- 1.6 ha of Coastal Flood Plain Grazing Marsh

- 0.49 km of species-rich hedgerow
- 119 individual trees
- 128 trees to compensate for 0.08ha of Broadleaved woodland-plantation.
- 80 trees to compensate for 0.05ha of Broadleaved woodland-semi-natural.

9.1.6 Mitigation measures are also to be included in the CEMP to reduce potential effects on-site to IEFs. For further information on mitigation measures refer to ES **Volume 4, Chapter 5: Ecology and Nature Conservation and** ES **Volume 8, Appendix 4.2.A: Outline Construction Environmental Management Plan and Appendix 4.4.C Outline Landscape Ecological Management Plan.**

9.1.7 The indicative location of on-site habitat compensation is referenced on the landscaping plan, with finalised locations to be determined at detailed design. The NBB and GI commitments outlined within this assessment will be reviewed and refined to align with detailed design to ensure NBB can be and GI is maintained and ensure the management and monitoring of these habitats has been secured in line PPW 12 (Ref 1.3).

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Appendix A –Baseline and Proposed Works

- Figure 4.5. L.1 - Phase 1 Baseline Habitats
- Figure 4.5. L.2 - Net Benefit For Biodiversity Post Works Plan
- Appendix A - Table A1: Habitat retention, permanent loss and temporary losses as part of the Glaslyn proposed works.

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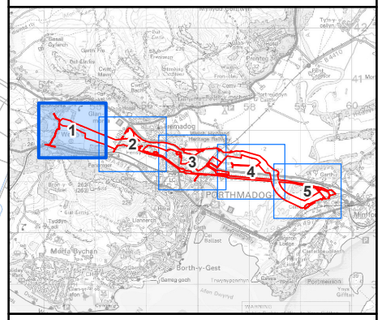

Legend

- Glaslyn Works Site Boundary

Phase 1 Habitat Feature

- A3.1 - Broadleaved parkland/scattered trees
- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- G2 - Running water
- G2.2 - Running water - mesotrophic
- J2.4 - Fence
- A1.1.1 - Broadleaved woodland - semi-natural
- A1.2.1 - Coniferous woodland - semi-natural
- A1.3.1 - Mixed woodland - semi-natural
- A1.3.2 - Mixed woodland - plantation
- A2.1 - Scrub - dense/continuous
- A2.2 - Scrub - scattered
- B4 - Improved grassland
- B5 - Marsh/marshy grassland
- B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- F2.1 - Marginal and inundation - marginal vegetation
- G2 - Running water
- J1.2 - Cultivated/disturbed land - amenity grassland
- J3.6 - Buildings
- J4 - Bare ground
- Hardstanding

NOTES

1: Only existing trees to be reinstated are shown on the figure.

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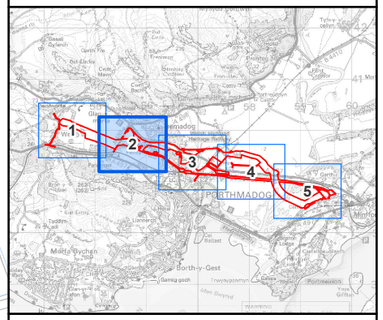

Legend

- Glaslyn Works Site Boundary

Phase 1 Habitat Feature

- A3.1 - Broadleaved parkland/scattered trees
- A3.1 - Broadleaved parkland/scattered trees
- G2 - Running water
- G2.2 - Running water - mesotrophic
- J2.1.1 - Intact hedge - native species-rich
- J2.2.2 - Defunct hedge - species-poor
- J2.4 - Fence
- J2.5 - Wall
- J2.6 - Dry ditch
- A1.1.1 - Broadleaved woodland - semi-natural
- A1.1.2 - Broadleaved woodland - plantation
- A1.2.2 - Coniferous woodland - plantation
- A2.1 - Scrub - dense/continuous
- B4 - Improved grassland
- B5 - Marsh/marshy grassland
- B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- F2.1 - Marginal and inundation - marginal vegetation
- G2 - Running water
- J1.1 - Cultivated/disturbed land - arable
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- J3.6 - Buildings
- J4 - Bare ground
- Hardstanding

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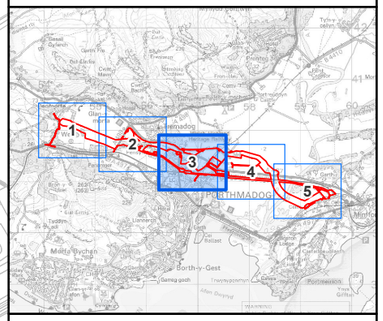

Legend

- Glaslyn Works Site Boundary

Phase 1 Habitat Feature

- A3.1 - Broadleaved parkland/scattered trees
- A2.2 - Scrub - scattered
- A3.1 - Broadleaved parkland/scattered trees
- G1 - Standing water
- G2 - Running water
- J2.4 - Fence
- J2.5 - Wall
- J2.6 - Dry ditch
- A1.1.1 - Broadleaved woodland - semi-natural
- A1.1.2 - Broadleaved woodland - plantation
- A1.3.1 - Mixed woodland - semi-natural
- A2.1 - Scrub - dense/continuous
- A2.2 - Scrub - scattered
- B2.2 - Neutral grassland - semi-improved
- B4 - Improved grassland
- B5 - Marsh/marshy grassland
- B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- F2.1 - Marginal and inundation - marginal vegetation
- G2 - Running water
- J1.1 - Cultivated/disturbed land - arable
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.4 - Introduced shrub
- J3.6 - Buildings
- J4 - Bare ground
- Hardstanding

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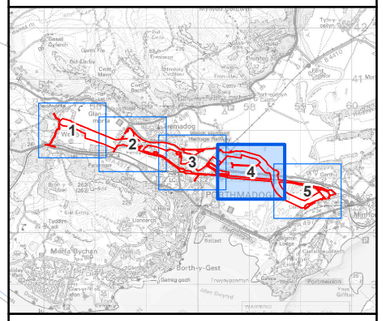

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Glaslyn Works Site Boundary

Phase 1 Habitat Feature

- A2.2 - Scrub - scattered
- G2 - Running water
- J2.4 - Fence
- J2.6 - Dry ditch
- A1.1.1 - Broadleaved woodland - semi-natural
- A1.1.2 - Broadleaved woodland - plantation
- A2.1 - Scrub - dense/continuous
- A2.2 - Scrub - scattered
- B2.2 - Neutral grassland - semi-improved
- B4 - Improved grassland
- B5 - Marsh/marshy grassland
- B6 - Poor semi-improved grassland
- F1 - Swamp
- F2.2 - Marginal and inundation - inundation vegetation
- G1 - Standing water
- G2 - Running water
- J1.2 - Cultivated/disturbed land - amenity grassland
- J3.6 - Buildings
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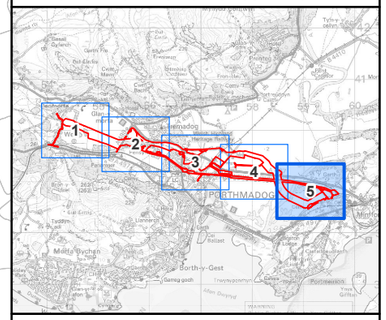

Legend

- Glaslyn Works Site Boundary

Phase 1 Habitat Feature

- A3.1 - Broadleaved parkland/scattered trees
- G2 - Running water
- J2.4 - Fence
- J2.5 - Wall
- J2.6 - Dry ditch
- A1.1.1 - Broadleaved woodland - semi-natural
- A1.1.2 - Broadleaved woodland - plantation
- A2.1 - Scrub - dense/continuous
- B1.2 - Acid grassland - semi-improved
- B4 - Improved grassland
- B5 - Marsh/marshy grassland
- B6 - Poor semi-improved grassland
- F1 - Swamp
- F2.2 - Marginal and inundation - inundation vegetation
- G1 - Standing water
- G2 - Running water
- J1.2 - Cultivated/disturbed land - amenity grassland
- J1.3 - Cultivated/disturbed land - ephemeral/short perennial
- J1.4 - Introduced shrub
- Hardstanding

NOTES

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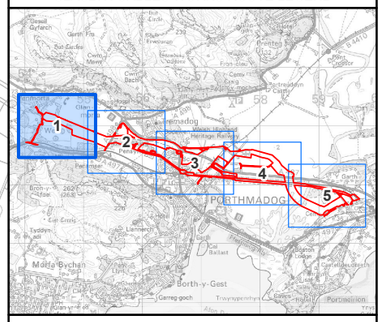

Legend

- Glaslyn Works Site Boundary
- Cables
- Proposed Permanent Works

Purpose of Planting

Trees

- Reinstated

Linear Habitats

- Retained
- Reinstated

Area Habitats

- Retained
- Reinstated
- Created

NOTES

1: Only existing tree points to be reinstated and created trees are shown on the figure.

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POST WORKS PLAN

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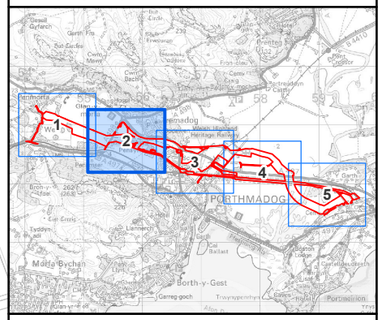

Legend

- Glaslyn Works Site Boundary
- Cables
- Proposed Permanent Works

Purpose of Planting

Trees

- Reinstated

Linear Habitats

- Retained
- Reinstated

Area Habitats

- Retained
- Reinstated
- Created

NOTES

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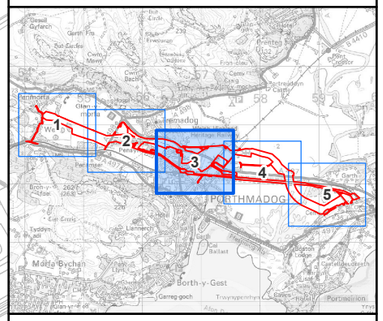

Legend

- Glaslyn Works Site Boundary
- Cables

Purpose of Planting

Trees

- Reinstated

Linear Habitats

- Retained
- Reinstated

Area Habitats

- Retained
- Reinstated
- Enhanced
- Created

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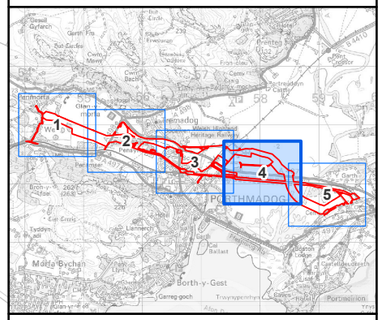

Legend

- Glaslyn Works Site Boundary
- Cables

Purpose of Planting

Linear Habitats

- Retained
- Reinstated

Area Habitats

- Retained
- Reinstated
- Created

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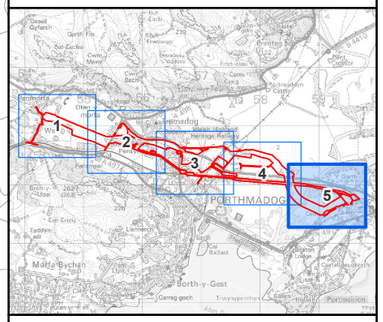

Legend

- Glaslyn Works Site Boundary
- Cables
- Proposed Permanent Works

Purpose of Planting

Trees

- Reinstated
- Created

Linear Habitats

- Retained
- Reinstated

Area Habitats

- Retained
- Reinstated
- Created

NOTES

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Appendix A - Table A1: Habitat retention, permanent loss and temporary losses as part of the Glaslyn proposed works

Phase 1 Habitat Type	Baseline Area (km/ha)	Post-Works Area (km/ha)	Change in Habitat Area	Post-Works Nature
Polygon Features (ha)				
A1.1.1 - Broadleaved woodland - semi-natural	3.55	3.50	0.05	Permanent Loss
A1.1.2 – Broadleaved woodland-plantation	1.2	0.08	1.12	Permanent Loss
		0.09		Temporary Loss
A1.2.1 Coniferous woodland -semi-natural	0.11	0.11	0	Retained
A1.2.2 - Coniferous woodland - plantation	0.04	0.04	0	Retained
A1.3.1 - Mixed woodland - semi-natural	0.03	0.03	0	Retained
A1.3.2 - Mixed woodland - plantation	0.52	0.3	0.22	Temporary Loss
A2.1 - Scrub - dense/continuous	2.85	0.16	2.69	Permanent Loss
		0.62		Temporary Loss

Phase 1 Habitat Type	Baseline Area (km/ha)	Post-Works Area (km/ha)	Change in Habitat Area	Post-Works Nature
A2.2 - Scrub - scattered	0.22	0.03	0	Temporary Loss
B1.2 - Acid grassland -semi-improved	0.24	0.12	0.12	Permanent Loss
		0.06		Temporary Loss
B2.2- Neutral grassland – semi-improved	6.09	0.01	6.08	Permanent Loss
		4.52		Temporary Loss
B4 - Improved grassland	19.41	0.19	19.22	Permanently Lost
		10.01		Temporary Loss
B5 - Marsh/marshy grassland	25.55	0.29	25.26	Permanently Lost
		11.68		Temporary Loss
B6 - Poor semi-improved grassland	16.86	0.89	15.97	Permanently Lost
		12.37		Temporary Loss
C3.1 – Other tall herb and fern -ruderal	0.65	0.01	0.64	Permanently Lost
		0.05		Temporary Loss
J1.1 – Cultivated/disturbed land – arable	7.14	4.35	0	Temporary Loss

Phase 1 Habitat Type	Baseline Area (km/ha)	Post-Works Area (km/ha)	Change in Habitat Area	Post-Works Nature
J1.2 – Cultivated/disturbed land – amenity grassland	4.42	0.04	4.38	Permanently Lost
		1.34		Temporary Loss
J1.3 – Cultivated/disturbed land – ephemeral/ short perennial	0.46	0.03	0.43	Permanently Lost
F1 – Swamp	1.9	1.9	0	Retained
F2.1 – Marginal and inundation – marginal vegetation	0.32	0.01	0.31	Permanently Lost
		0.15		Temporary Loss
Z99 - Hardstanding	6.01	0.13	5.88	Permanent Loss
		0.4		Temporary Loss
J4 – Bare Ground	0.43	0.2	0.23	Permanent Loss
		0.17		Temporary Loss
J3.6- Buildings	0.39	0.39	0	Retained
Hedge Features (km)				
J2.1.1 – Intact hedge – native species-rich	1.63	0.24	1.39	Permanent loss

Phase 1 Habitat Type	Baseline Area (km/ha)	Post-Works Area (km/ha)	Change in Habitat Area	Post-Works Nature
		0.05		Temporary Loss
J2.2.2 – Defunct hedge - species-poor		0.02		Temporary Loss
Water Features (km)				
J2.6 - Dry ditch	1.04	0.39	0	Permanently Lost
G1- Standing water	0.08	0.04	0	Temporary Loss
G2 – Running water	4.34	0.6	0	Temporary Loss
G2 – Running water -mesotrophic	0.18	0.18	0	Retained
Individual Tree Features (point)				
A3.1 - Broadleaved parkland/scattered trees [Individual Trees]			73	Permanent Loss
			25	Temporary Loss
Tree Groups			56	Permanent Loss

Appendix B – Summary of Legislation and Policy

Legislation

The UK is no longer a member of the European Union (EU). EU legislation as it applied to the UK on 31 December 2020 is now a part of the UK domestic legislation. EU legislation which applied directly or indirectly to the UK before 11.00pm on 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'.

The Secretary of State for the Environment, Food and Rural Affairs and Welsh Ministers have made changes to parts of the *Conservation of Habitats and Species Regulations 2017* (referred to as the 2017 Regulations) so that they operate effectively. Most of these changes involve transferring functions from the European Commission to the appropriate authorities in England and Wales. All other processes or terms in the 2017 Regulations remain unchanged and existing guidance is still relevant.

Designated Sites

Locally Designated Sites

Local Wildlife Sites (LWSs) are sites with 'substantive nature conservation value' and include Site of Importance for Nature Conservation (SINC). They are defined areas, identified and selected for their nature conservation value, based on important, distinctive and threatened habitats and species within a region.

They are usually selected by the relevant Wildlife Trust, along with representatives of the local authority and other local wildlife conservation groups.

The LWS selection panel select all sites that meet the assigned criteria, unlike Site of Special Scientific Interest (SSSI) which for some habitats are a representative sample of sites that meet the national standard. Consequently, many sites of SSSI quality are not designated and instead are selected as LWSs. LWSs can therefore be amongst the best sites for biodiversity.

Protected Species

Bats/Otter

These species, known as European Protected Species, are protected under Regulation 43 of the 2017 Regulations (as amended). This makes it an offence to:

- deliberately capture, injure or kill an animal.
- deliberately disturb an animal; or,
- damage or destroy a breeding site or resting place used by an animal.

Deliberate capture or killing is taken to include 'accepting the possibility' of such capture or killing. Deliberate disturbance of animals includes in particular any disturbance which is likely to:

- impair their ability to survive, breed, reproduce or rear or nurture young;

- in the case of animals of hibernating or migratory species, to hibernate or migrate; or,
- significantly affect the local distribution or abundance of the species to which they belong.

Where development works are at risk of causing one or more of the offences listed above, a mitigation licence from Natural Resources Wales can be obtained to facilitate the works that would otherwise be illegal.

These species are also protected under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). This makes it an offence to intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb an animal in such a place.

Lower levels of disturbance not covered by the *Conservation of Habitats and Species Regulations 2017* (as amended) remain an offence under the *Wildlife and Countryside Act 1981* although a defence is available where such actions are the incidental result of lawful activity that could not reasonably be avoided.

Nesting Birds

All wild birds are protected under the *Wildlife and Countryside Act 1981* (as amended), with some species afforded great protection under Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended). In addition to the protection from killing or taking that all birds receive; Schedule 1 birds and their young must not be disturbed at, or in the vicinity of the nest.

There are no licensing purposes that explicitly cover development activities affecting wild birds.

Common Species of Reptile (common lizard, slow worm, grass snake and adder)

Common species of reptile are protected against intentional killing and injury under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). There is no requirement for a licence where development works affect common species of reptiles. Instead, Natural Resources Wales advise[1] that where reptiles are present, they should be protected from any harm that might arise during the development works through appropriate mitigation.

Badger

Badgers and their setts are protected under the *Protection of Badgers Act 1992* (as amended). This makes it an offence to:

- wilfully kill, injure or take a badger;
- intentionally or recklessly damage, destroy or obstruct access to a badger sett; or,
- disturb a badger in its sett.

It is not illegal to carry out disturbance activities near setts that are not occupied, *i.e.* those that do not show signs of current use.

Where required, licences for development activities involving disturbance or sett interference or closure are issued by Natural Resources Wales. Licences for activities involving watercourse maintenance, drainage works, or flood defences are issued under a separate process.

[1] Reptiles: guidelines for developers, English Nature 2004

When assessing the requirement for a licence in respect of development, Natural Resources Wales state that badgers are relatively tolerant of moderate levels of noise and activity around their setts, and that a low or moderate level of apparent disturbing activity at or near to badger setts does not necessarily disturb the badgers occupying these setts[2].

Licences are normally not granted from December to June inclusive (the badger breeding season) because dependent cubs may be present within setts.

Species and Habitats of Principal Importance for the Conservation of Biodiversity

Section 7 of the *Environment (Wales) Act 2016* sets out the duty for public authorities to conserve biodiversity in Wales. Habitats and species of principal importance for the conservation of biodiversity are referred to in Section 7 of the *Environment (Wales) Act 2016*. The list can be found on the Natural Resources Wales website[3].

The list is used as a guide for decision makers such as public bodies, including local and regional authorities, in implementing their duty under Section 7 of the *Environment (Wales) Act 2016* to have regard to the conservation of biodiversity in Wales when carrying out their normal functions.

Hedgerows

Under the Hedgerow Regulations 1997, it is against the law to remove or destroy certain hedgerows without permission from the local planning authority. In general, permission will be required before removing “important hedgerows” that are at least 20 m in length, over 30 years old and meet specific archaeological and historical or wildlife and landscape criteria. The local planning authority will assess the importance of the hedgerow using the criteria set out in the regulations.

Invasive Non-Native Plant Species

Under the *Wildlife and Countryside Act 1981* (as amended), it is an offence to plant or otherwise cause species listed under Schedule 9 Part II to grow in the wild.

Species listed on Invasive Alien Species of Union concern under the *Invasive Alien Species (Enforcement and Permitting) Order 2019* are subject to restrictions and measures set out in the Regulations. These include restrictions on keeping, importing, selling, breeding, growing and releasing into the environment.

Any contaminated soil or plant material is classified as controlled waste and should be disposed of in a suitably licensed landfill site, accompanied by appropriate Waste Transfer documentation, and must comply with section 34 of the *Environmental Protection Act 1990.*

Environment Act (Wales 2016).

The Environment (Wales) Act 2016 replaced the existing biodiversity duty (in the Natural Environment and Rural Communities Act 2006) which required public authorities to have a regard to conserving biodiversity. The new Section 6 duty takes this further, requiring all public authorities, when carrying out their functions in Wales, to seek to “maintain and enhance

[2] Interpretation of ‘Disturbance’ in relation to badgers occupying a sett, Natural England (2009)

[3] https://www.biodiversitywales.org.uk/Section-7

biodiversity" where it is within the proper exercise of their functions. In doing so, public authorities must also seek to "promote the resilience of ecosystems". This was introduced to plan and manage Wales' natural resources in a sustainable and joined-up way and is intended to work alongside the Wellbeing of Future Generations Act 2015.

The Well-being of Future Generations Act 2015

The Wellbeing of Future Generations Act 2015 requires national government, local government, local health boards and other specified public bodies to carry out sustainable development and work towards objectives that contribute to seven wellbeing goals. Sustainable development in the Act means "the process of improving the economic, social, environmental and cultural wellbeing of Wales by taking action, in accordance with the sustainable development principle (i.e. not compromising the ability of future generations to meet their needs), aimed at achieving the well-being goals".

Nature Recovery Action Plan (Wales) (NRAP)

The NRAP complements The Well-being of Future Generations (Wales) Act 2015 and the Environment Act (Wales) 2016. The NRAP[4] sets out how the United Nations Environment Programme's Convention on Biological Diversity's (CBD) Strategic Plan for Biodiversity (and the associated Aichi Biodiversity Targets for 2011-20 in Wales) is addressed in Wales[5]. The ambition of the plan is 'To reverse the decline in biodiversity, for its intrinsic value, and to ensure lasting benefits to society'. The NRAP is split into three parts:

Part 1: Our Strategy for Nature sets out the commitment to reversing the loss of biodiversity in Wales, and the objectives for action. These objectives are listed below:

- Engage and support participation and understanding to embed biodiversity throughout decision making at all levels.
- Safeguard species and habitats of principal importance and improve their management.
- Increase the resilience of our natural environment by restoring degraded habitats and habitat creation.
- Tackle key pressures on species and habitats.
- Improve our evidence, understanding and monitoring.
- Put in place a framework of governance and support for delivery.

Planning Policy

Planning Policy Wales, 2024

PPW sets out the land use planning policies of Welsh Government. It is supplemented by a series of TANs, Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales.

Chapter 6. Distinctive and Natural Places outlines Welsh Government's objectives for the environmental and cultural components of placemaking. These components are complementary

[4] Welsh Government (2020) Nature Recovery Action Plan.

[5] Convention on Biological Diversity (2011) Aichi Biodiversity Targets.

to those of the Active and Social and Productive and Enterprising themes and collectively the three themes come together to contribute towards the national sustainable placemaking outcomes.

The Environment (Wales) Act 2016 Part 1 – Section 6 'Biodiversity and resilience of ecosystems duty' states that public authorities "*must seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions".* Planning Policy Wales (Ref 1.3) (PPW) expands on this by stating that "*This means development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity".*

To facilitate the fulfilment of Section 6, a NBB approach has been adopted by the Welsh Government. This approach has been included in the 12th edition of PPW[6] and sets out the requirement for a Green Infrastructure Statement. Relevant sections of PPW are:

Paragraph 6.2.11: *The quality of the built environment should be enhanced by integrating green infrastructure into development through appropriate site selection and use of creative design. With careful planning and design, informed by an appropriate level of assessment, green infrastructure can embed the benefits of biodiversity and ecosystem services into new development and places, help to overcome the potential for conflicting objectives, and contribute to health and well-being outcomes.*

Paragraph 6.2.12: *A green infrastructure statement should be submitted with all planning applications. This will be proportionate to the scale and nature of the development proposed and will describe how green infrastructure has been incorporated into the proposal… The green infrastructure statement will be an effective way of demonstrating positive multi-functional outcomes which are appropriate to the site in question and must be used for demonstrating how the step-wise approach (see 'Method of Approach' below) has been applied.*

Paragraph 6.2.13: *There are multiple ways of incorporating green infrastructure, depending on the needs and opportunities a site presents, and the green infrastructure assessment should be referred to, as appropriate, in order to ascertain local priorities… In most cases the green infrastructure statement should highlight any baseline data considered and surveys and assessments undertaken, including but not limited to, habitats and species surveys, arboricultural surveys and assessments, sustainable drainage statements, landscape and ecological management plans, open space assessments and green space provision and active travel links.*

Section 6.4 addresses Biodiversity and Ecological Networks. The policy includes the duties and requirements set out in Section 6 the Environment Wales Act (2016) and pays due regard to the State of Natural Resources Report (Natural Resources Wales (NRW), 2016) by taking all reasonable steps to maintain and enhance biodiversity. There is a focus on ecosystem services and the benefits of protecting and enhancing biodiversity.

The relevant measures in place to conserve landscape and biodiversity include:

- Statutory designations;
- Non-statutory designations;
- Maintaining and enhancing biodiversity;
- Ecosystem resilience and connectivity of ecological networks; and,

[6] Welsh Government (2024) Planning Policy Wales. Edition 12. February 2024.

- Protection and consideration of protected and notable species and habitats.

Sections relevant to this Green Infrastructure Statement are detailed below.

Paragraph 6.4.5: *Planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means development should not cause any significant loss of habitats or populations of species (not including non-native invasive species), locally or nationally and must work alongside nature and it must provide a net benefit for biodiversity and improve, or enable the improvement, of the resilience of ecosystems. A net benefit for biodiversity is the concept that development should leave biodiversity and the resilience of ecosystems in a significantly better state than before, through securing immediate and long-term, measurable and demonstrable benefit, primarily on or immediately adjacent to the site. The step-wise approach outlined below is the means of demonstrating the steps which have been taken towards securing a net benefit for biodiversity. In doing so, planning authorities must also take account of and promote the resilience of ecosystems, in particular the following attributes, known as the DECCA Framework:*

- diversity between and within ecosystems;
- the extent or scale of ecosystems;
- the condition of ecosystems including their structure and functioning;
- the connections between and within ecosystems; and
- adaptability of ecosystems including their ability to adapt to, resist and recover from a range of pressures likely to be placed on them through climate change for example.

Paragraph 6.4.21: Planning authorities must follow a step- wise approach to maintain and enhance biodiversity, build resilient ecological networks and deliver net benefits for biodiversity by ensuring that any adverse environmental effects are firstly avoided, then minimised, mitigated, and as a last resort compensated for. Enhancement must be secured by delivering a biodiversity benefit primarily on site or immediately adjacent to the site, over and above that required to mitigate or compensate for any negative impact.

Paragraph 6.4.12: Having worked iteratively through the stages of the step-wise approach (see 'Method of Approach' below), and providing evidence in the Green Infrastructure Statement that the step-wise approach has been followed, a scheme of enhancements must be provided to ensure a NBB. Where biodiversity enhancement proportionate to the scale and nature of the development is not proposed as part of an application, significant weight will be given to its absence, and unless other significant material considerations indicate otherwise, it will be necessary to refuse permission.

Paragraph 6.4.13: Improving ecosystem resilience, particularly improving connectivity to the immediate surroundings, would be a key contribution to on-site avoidance, minimisation, and mitigation strategies and enhancement. How a development would improve the attributes of resilience should be demonstrated as far as this is reasonably practical.

Paragraph 6.4.20: Statutorily designated sites must be protected from damage and deterioration, with their important features conserved and enhanced by appropriate management. The contribution of the designated site to wider resilient ecological networks should be recognised and captured as part of a strategic approach to planning policy and decision making. The links between planning and wider management activity for the restoration and recovery of nature should be made. Complementary, and joint, action between all sectors and beyond the boundaries of the designated sites themselves is necessary to improve extent, connectivity and adaptability and address the nature emergency.

Paragraph 6.4.29: SACs and SPAs are of European importance. Under the Conservation of Habitats and Species Regulations (2017) (the Habitats Regulations), all public bodies (including planning authorities) must have regard to the requirements of the EC Habitats and Birds Directives when carrying out their functions. SACs and SPAs on land are underpinned by notification as SSSIs and hence subject to protection afforded by the SSSI provisions. Before authorising development or adopting a land use plan which is likely to have a significant effect on a SACor SPA (including where outside the boundary of the SAC or SPA), planning authorities must carry out an appropriate assessment of the implications for the designated features, consult NRW and have regard to NRW's representations. The development can normally only be authorised, or the plan adopted, if the planning authority ascertains that it will not adversely affect the integrity of the site, if necessary taking into account any additional measures, planning conditions or obligations.

Paragraph 6.4.31: Although non-statutory designations do not have a statutory process for their protection, Sites of Importance for Nature Conservation, Local Wildlife Sites, Local Nature Reserves, and Regionally Importance Geodiversity Sites make a vital contribution to delivering an ecological network for biodiversity and resilient ecosystems, and they should be given protection in development plans and the development management process.

Paragraph 6.4.35: The presence of a species protected under European or UK legislation, or under Section 7 of the Environment (Wales) Act 2016 is a material consideration when a planning authority is considering a development proposal which, if carried out, would be likely to result in disturbance or harm to the species or its habitat and to ensure that the range and population of the species is sustained.

Paragraph 6.4.39: Planning authorities should protect trees, hedges, groups of trees and areas of woodland where they have ecological value, contribute to the character or amenity of a particular locality, or perform a beneficial green infrastructure function.

Paragraph 6.4.26: Ancient woodland, semi-natural woodlands, individual ancient, veteran and heritage trees and ancient hedgerows are irreplaceable natural resources, and have significant landscape, biodiversity and cultural value. Such trees, woodlands and hedgerows are to be afforded protection from development which would result in their loss or deterioration unless very exceptionally there are significant and clearly defined public benefits; this protection must prevent potentially damaging operations and their unnecessary loss.

Paragraph 6.4.44: the protection and planting of trees and hedges should be delivered, where appropriate, through locally specific strategies and policies, through imposing conditions when granting planning permission, and/or by making Tree Preservation Orders (TPOs).

Technical Advice Note 5 (TAN5) Nature Conservation and Planning

The PPW is supplemented by a series of TANs. TAN 5 provides guidance on how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation. It provides advice on areas including the key principles of positive planning for nature conservation, nature conservation in Local Development Plans and development management procedures. It also provides advice on development affecting designated sites and habitats, in addition to protected or habitats and species of principal importance.

Key Principles include that the town and country planning system in Wales should integrate nature conservation into all planning decisions; that the town and country planning system should look for development to provide a net benefit for biodiversity conservation with no significant loss of habitats or populations of species, locally or nationally and that they should ensure that the UK's international and national obligations for site, species and habitat protection are fully met in all planning decisions.

The National Plan

The National Plan 2024[7] sets out Wales' national development framework that details the Welsh Government's twenty-year plan for shaping the growth and development of the country. Relevant to this Green Infrastructure Statement is Policy 9 – Resilient Ecological Networks and Green Infrastructure which is outlined below:

To ensure the enhancement of biodiversity, the resilience of ecosystems and the provision of green infrastructure, the Welsh Government will work with key partners to:

- *identify areas which should be safeguarded and created as ecological networks for their importance for adaptation to climate change, for habitat protection, restoration or creation, to protect species, or which provide key ecosystems services, to ensure they are not unduly compromised by future development; and*
- *identify opportunities where existing and potential green infrastructure could be maximised as part of placemaking, requiring the use of nature-based solutions as a key mechanism for securing sustainable growth, ecological connectivity, social equality and well-being.*

Planning authorities should include these areas and/or opportunities in their development plan strategies and policies in order to promote and safeguard the functions and opportunities they provide. In all cases, action towards securing the maintenance and enhancement of biodiversity (to provide a net benefit), the resilience of ecosystems and green infrastructure assets must be demonstrated as part of development proposals through innovative, nature-based approaches to site planning and the design of the built environment.

Local Planning Policy

A summary of relevant local planning policies is provided below.

Document	Planning policy	Summary of policy text
Anglesey and Gwynedd Joint Local Development Plan	Policy AMG 2: Special Landscape Areas	When considering a proposal within Special Landscape Areas (SLA), as identified by the Proposals Map and listed below, there will be a need to appropriate consideration to the scale and nature of the development ensuring that there is no significant adverse detrimental impact on the landscape. The development should aim to maintain, enhance or restore the recognised character and qualities of the SLA. The proposal should have regard to the relevant 'Statement of Value and Significance'. Where appropriate, the Councils will require a Landscape and Visual Impact Assessment in order to consider the impact of the development on the designated area. In exceptional circumstances, where development is necessary and could result in significant impact on the landscape, appropriate mitigation and compensation measures should be provided.
	Policy AMG 3: Protecting	Proposals that would have significant adverse impact upon landscape character as defined by the Landscape Character Areas included within the current Landscape Strategy for the

[7] Welsh Government (2021) Future Wales: The National Plan 2040. February 2021

Document	Planning policy	Summary of policy text
	and enhancing features and qualities that are distinctive to the local landscape character	relevant authority, must demonstrate through a landscape assessment how landscape character has influenced the design, scale, nature and site selection of the development.
	Policy AMG 5: Local Biodiversity and Conservation	Proposals must protect and, where appropriate, enhance biodiversity that has been identified as being important to the local area by: • Avoiding significant harmful impacts through the sensitive location of development. • Considering opportunities to create, improve and manage wildlife habitats and natural landscape including wildlife corridors, stepping stones, trees, hedges, woodlands and watercourses. A proposal affecting sites of local biodiversity importance will be refused unless they can conform with all of the following criteria: • That there are no other satisfactory alternative sites available for the development. • The need for the development outweighs the importance of the site for local nature conservation. • That appropriate mitigation or compensation measures are included as part of the proposal. Where necessary, an Ecological Assessment which highlights the relevant local biodiversity issues should be included with the planning application.
	Policy AMG 6: Protecting Sites of Regional or Local Significance	Proposals that are likely to cause direct or indirect significant harm to Local Nature Reserves (LNR), Wildlife Sites (WS) or regionally important geological / geomorphologic sites (RIGS) will be refused, unless it can be proven that there is an overriding social, environmental and/or economic need for the development, and that there is no other suitable site that would avoid having a detrimental impact on sites of local nature conservation value or local geological importance. When a development is granted, it will be necessary to ensure that there are appropriate mitigation measures in place. It will be possible to use planning conditions and/or obligations in order to safeguard the site's biodiversity and geological importance.

Document	Planning policy	Summary of policy text
Natur Gwynedd – Local Biodiversity Action Plan		Natur Gwynedd is the local biodiversity action plan for Gwynedd outside the Snowdonia National Park. The aims are to: • to help conserve the biodiversity of Gwynedd and, thereby, contribute to biodiversity conservation in Wales, the UK and the world. • to develop effective local partnerships to make sure that what we do will be maintained long term. • to increase our knowledge of Gwynedd's biodiversity. • to raise public awareness of biodiversity in Gwynedd. Natur Gwynedd details the Habitat Action Plans and Species Action Plans for Gwynedd outside the Snowdonia National Park.

Supplementary Planning Guidance

The Supplementary Planning Guidance for 'Maintain and Creating Distinctive and Sustainable Communities' (Ref 2.4), adopted by Gwynedd Council in 2019 supports the implementation of the Joint Local Development Plan It provides planning advice on a number of areas relating to sustainable design, construction and climate change. The green infrastructure approach combines all these elements to achieve a more joined-up approach to the environment.

With regards to Green Infrastructure Statements, the guidance states:

'The culmination of analysis and conclusions of an impact assessment should be used to inform a Green Infrastructure Statement, which shows how all elements of the proposed green infrastructure (retained and new) and any associated uses and movement have a clear role and purpose in the new development. Conclusions drawn from analysis of this resource should be expressed in an illustrative way, in the form of a Green Infrastructure Masterplan or Landscape Masterplan or similar. The resulting approach should explain how this is achieving good design'.

A Green Infrastructure Statement should apply the mitigation hierarchy. The application of the mitigation hierarchy should be appropriate to the scale of the development proposed and to the scale of the impact upon green infrastructure. Generally, the larger the proposed works, the more of the elements of green infrastructure listed in policy KP16 will need to be considered.

'An important element of planning for sustainable development is to contribute towards tackling climate change by reducing carbon emissions. In order for a development to be genuinely sustainable, it must be designed and built with the aim of tackling the threat deriving from climate change. Development proposals in the area can help achieve this aim by avoiding areas presently at risk from flooding now, or areas that are anticipated to be at risk in future, and by building sustainable drainage systems (SUDS), and by connecting and improving the green infrastructure network in the area to help wildlife and help it adapt to a changing climate'.