

5.2.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 consent applications under the Town and Country Planning Act 1990 (TCPA) and Section 37 of The Electricity Act 1989 ('the Electricity Act') for the construction and operation of the Pentir to Trawsfynydd Reinforcement Project (the 'Project'). The Project comprises the following elements:

- Underground cabling works in the existing Pentir substation.
- A new substation, replacement of tower 4ZC067 and new cables from the replaced tower down into the substation (downleads). A new 132 kV cable to connect the existing SPEN DB route to the new substation, which will be partly underground cable and partly overhead line, and removal of a section of the SPEN DB route that will no longer be required.
- An extension to the existing Wern Cable sealing End Compound (CSEC), replacement of the Glaslyn Cables, including the removal of some redundant sections of cable and making safe other redundant sections that will be left buried, a new CSEC at Minffordd and raising the floor level of a new Tunnel Head House (THH), previously consented as part of the Eryri (previously Snowdonia) Visual Impact Provision (EVIP) project, and the removal of the existing Garth CSEC.
- Replacement of downleads from tower 4ZC005, underground cabling works, installation of new equipment, including a shunt reactor, and amendments to the substation compound fence line.
- Replacement of cables and fittings ("reconductoring") on the 4ZC overhead line between towers 4ZC005 and 4ZC027, and then between towers 4ZC044 and 4ZC070 as well as replacement of the earthwire with an Optical Ground Wire (OPGW). Installation of fibre optic cables along the earthwire between towers 4ZC070 and 4ZC140.
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1.1.2 This Outline Construction Environmental Management Plan (CEMP) focuses on the Trawsfynydd 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 Statement¹ 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

¹ Pentir to Trawsfynydd Reinforcement Project (Environmental Statement; Volume 5: Trawsfynydd Substation)

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 Construction Environmental Management Plan and relevant supporting plans to be produced before commencement of the Proposed Works.

1.2 The Proposed Works

- 1.2.1 The Trawsfynydd works site is an existing 400 kilo Volt (kV) substation in Eryri (Snowdonia) National Park (ENP), North West Wales. It is approximately 3.2 kilometres (km) north of Trawsfynydd Village, in the administrative boundary of Eryri National Park Authority. The location of the Proposed Works is illustrated on **Figure 1-1** ("the Trawsfynydd works site"). The Proposed Works will be centred on Grid Reference SH 691384 within the existing Trawsfynydd Substation compound (the 'Trawsfynydd works site').
- 1.2.2 The Trawsfynydd works site covers an area approximately 3.05 hectares (ha)., although the permanent development will be entirely within the existing substation footprint. The land within the Trawsfynydd works site comprises the existing Trawsfynydd Substation, the access road, office and welfare facilities, material storage areas, laydown areas and car parking.
- 1.2.3 The proposed works are situated at approximately 180 metres (m) Above Ordnance Datum (AOD) on relatively flat terrain. The site has two entrances: the main entrance at the south of the compound and a secondary entrance along the western boundary, accessed via Nuclear Restoration Services (NRS) land. The area is bordered by mixed, semi-natural woodland.
- 1.2.4 Nearby, the former Trawsfynydd Nuclear Power Station, currently being decommissioned, lies about 50 m south-west of the substation. Llyn Trawsfynydd, a popular spot for outdoor recreation, is 155 m to the south. Surrounding agricultural land is generally poor in quality, classified as Grade 4 and pockets of Grade 5.
- 1.2.5 The 4ZC overhead power line exits the substation to the north-west, with lines running north to Ffestiniog and eastward. Pylons are prominent features in the landscape, particularly noticeable to the east as elevation increases.
- 1.2.6 Access to the Trawsfynydd Substation is from the east via the A470, which is situated 560 m away. Residences and farms in the vicinity are sparse, the nearest being 315 m to the north.
- 1.2.7 There are four Public Rights of Ways (PRoWs) within 500 m of the works site, including three footpaths and one bridleway. Additionally, a new cycle route (Trawsfynydd to Gellilydan) is under development, which will connect with National Cycle Network Route 82, located 300 m west of the site.
- 1.2.8 The Proposed Works are summarised below:
- Removal of redundant cables;
 - New 400 kV cables, shunt reactor and gantry;
 - Replacement downleads from Tower 4ZC005; and

- Alterations to the fence alignment.

1.2.9 Construction will take place over a three year period between early 2026 – early 2029.

1.2.10 The Proposed Project includes the following principal elements which have been described in **Table 1.1**

Table 1-1 Proposed Works of Project

Proposed Work	Description
Site Clearance	<ul style="list-style-type: none"> • A small area of semi-natural broadleaved woodland, covering approximately 180 cubic metres (m²), has self-seeded at the northern extent of the existing Trawsfynydd Substation and will need to be cleared. There are two additional areas of scattered young trees covering approximately 225 m², these are located at the north-western extent of the existing Trawsfynydd Substation and would also be removed.
Removal of Existing Equipment	<ul style="list-style-type: none"> • Removal of existing electrical apparatus and the demolition of old concrete slabs and foundations; • Draining, de-commissioning and dismantling of old existing redundant 400 kV oil-filled high voltage cables (Pentir – Bryncir circuit) and associated plant i.e. three 300 litre tanks (one per phase); • Breaking redundant concrete foundations using a combination of mini excavator and breaker; • Disposal of resultant arisings within the Trawsfynydd works site; and • General ground arisings would be stockpiled locally for re-use.
New portable relay rooms	<ul style="list-style-type: none"> • Delivery of the new shunt reactor (abnormal indivisible load (AIL) to the Trawsfynydd works site would be planned and co-ordinated; • Amendment of one set of downloads from existing tower 4ZC005 to connect to a new gantry; • Adjustment of substation compound fence to accommodate the amended downloads; and • Construction of drainage and manholes.
Cables	<ul style="list-style-type: none"> • Re-use of infrastructure (where suitable) for an existing circuit, the 400 kV cables which

Proposed Work	Description
	<p>runs along the western boundary of the substation compound would be replaced;</p> <ul style="list-style-type: none"> • A new 400 kV cable would be routed along the existing Trawsfynydd Substation access road, in parallel to the existing 400 kV cables approximately 40 m east. The cables would be contained within ducts in separate trenches or concrete troughs approximately 1 m deep; and • Circuit 1 is new and will use existing troughs running through the centre of the existing Trawsfynydd Substation. Circuit 2 would branch off into the existing Trawsfynydd Substation access road in ducting. There would be three cables per circuit, and it will be 2500 mm² single core cable.
Reinstatement	<ul style="list-style-type: none"> • Within the Trawsfynydd Substation compound, all working areas would be reinstated with 300 mm of type 1 and 75 mm of 10 mm limestone chippings.
Installation Activities	<ul style="list-style-type: none"> • Foundations for the new structures, including an AIS bay, shunt reactor and landing gantry, would be constructed from reinforced concrete. The concrete would be delivered to the Trawsfynydd works site by truck mixer, ready mixed from the nearest supplier; • Steel structures and associated electrical equipment would be erected using a combination of mobile cranes, mobile elevation working platforms and telehandlers; • Stone and aggregates would be delivered to the Trawsfynydd works site as and when required, from nearby quarries; • The ducts and cable drums would be securely stored within the compound area. A combination of hydraulic winches and a crane would be used to install the ducts and troughs; and • Sheet scaffolding would be placed around the cable sealing end structure to provide suitable access for cable termination and mounting structures, the scaffolding would be removed on completion.

- 1.2.11 Before the proposed works commence, the necessary safety permits and authorisations would be issued by National Grid and the electrical equipment would be made safe. Power outages would also be agreed with National Grid in advance.
- 1.2.12 Designated access routes through the substation and working areas would be established before any of the proposed works take place and safety briefings communicated to the workforce.
- 1.2.13 Prior to the new underground cables being brought into service, commissioning tests would be required, starting with testing the individual items of plant and culminating with testing the installed system as a whole, before being brought into operation.
- 1.2.14 The Proposed Works are planned to be undertaken over a period of approximately three years from 2026 – 2029. Construction will occur in phases which will include activities summarised below.

	2026			2027				2028				2029	
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Site mobilisation													
Civils enabling works													
400 kV works													
Civils construction													
High voltage plant installation													
Commissioning													
Demobilisation													
Close out													

- Site mobilisation – site set up for cabins and civils;
- Civils enabling works – access, main site office establishment, earthworks, drainage and platform;
- 400 kV works – de-oiling and purging of the existing cables; removing lids, breaking concrete bound sand and exposing cables; cutting at capping at joint bays, removal of cables; and clean throughs and removal of steelwork;
- Civils construction – cable sealing end bases and structures;
- High voltage plant installation;
- Commissioning – commissioning test, starting with testing the individual items of plant and culminating with testing the installed system as a whole;
- Demobilisation – removal of all temporary infrastructure i.e. cabins and offices; and
- Close out – handover assets and final as built drawings.

1.3 Purpose of the 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 Project. The Outline CEMP aims to ensure that

adverse effects on the environment and local communities, from the construction phase of the Project, 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 Outline 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:

- Health And Safety Plan (HSP);
- Materials Management Plan (MMP);
- Soil Management Plan (SMP);
- Asbestos Management Plan (AMP);
- Pollution Prevention Plan (PPP);
- Site Waste Management Plan (SWMP);
- Outline Construction Traffic Management Plan (CTMP);
- Contractor Environmental Management System (EMS);
- Pollution Incident Control Plan (PICP); and

- Emergency Response Plan (ERP).

1.5.3 Outline plans will need to be updated once further information is available or as agreed as part of any planning condition.

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. Environmental Management

2.1 Conformance with Corporate and Project EMS

- 2.1.1 National Grid take their responsibilities for Environmental Sustainability and compliance 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.

2.2 Conformance with Planning Conditions

- 2.2.1 National Grid Electricity Transmission plc (NGET) is submitting a planning application under the Town and Country Planning Act 1990 (TCPA) to Eryri National Park Authority for the construction and operation of the Trawsfynydd part of 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 The Outline 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 Consents 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 Project, 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	Responsibilities
Project Manager	<ul style="list-style-type: none">• Overall responsibility for ensuring conformance with the Outline CEMP; and incident investigation.
Safety, Health, Environment, Security and Quality (SHESQ) Manager	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• 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.
Environmental Manager Ecological Clerk of Works (ECoW)	<ul style="list-style-type: none">• Oversee ecological mitigation works.

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

Table 2-2 Management Plans to be Prepared by the Contractor

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)	Emergency Response Plan (ERP)
Site Drainage Plan (SDP)	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 where required.
- 2.5.5 Environmental issues that arise 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 issues 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 where applicable. The Contractor shall also liaise closely with Natural Resources Wales (NRW), Eryri National

Park Authority and other key stakeholders throughout the Construction Phase of the Proposed Works.

2.6 Environmental Performance

Audits and Inspections

- 2.6.1 The Contractor shall undertake site inspections at a frequency that is relevant to the risk, 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); and
 - Spill response materials.
- 2.6.2 Environmental performance data will be collected and collated into the SHE Plan by the Contractor.
- 2.6.3 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.
- 2.6.4 All monitoring reports will be made available to statutory and non-statutory bodies on request subject to General Data Protection Regulation (GDPR).
- 2.6.5 Type and frequency of inspections and audits will be defined within subsequent management plans and detailed CEMP to be developed.

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. This PICP will be developed 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 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;
- 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. Environmental 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) documents², 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(s) will be required to 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 provide Suitable Experienced Personnel (SEP) to monitor and manage works for which they are responsible.
- 3.2.6 The Contractor will have an Environmental Management System (EMS) certified to British Standard (BS) EN ISO 14001.
- 3.2.7 Site inspections will be recorded in an environmental log book, incorporating all environmental areas.

² 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.

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 and will be confirmed as part of the Planning Application. Prior 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 There may be some periods of extended or 24-hour working, however this would be by agreement with the Local Planning Authority.
- 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;
 - 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.

3.4 Lighting

- 3.4.1 General low-level lighting for access will be required at the temporary construction compounds and task lighting required as needed for the general works. Lighting will be used only when required and will comprise lighting of work areas and access and egress with low level directional lighting.
- 3.4.2 Construction lighting will follow required guidance such as Institute of Lighting Professionals Guidance Note 08/23 Bats and Artificial Lighting at Night³ and Institute of Lighting Professionals Guidance Note 1 for the Reduction of Obtrusive Light⁴.
- 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 and away from watercourses or dry ditches;

³ Institute of Lighting Professionals (2023). Guidance Note 08/23 Bats and Artificial Lighting at Night.

⁴ Institute of Lighting Professionals (2021). Guidance Note 1 for the reduction of obtrusive light 2021

- Direction of lights will seek to avoid spillage onto neighbouring properties habitats, highway or waterway; and
- Unnecessary lights will be switched off.

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. However, task-specific and fixed general lighting will likely be required in months with reduced daylight hours (early mornings and up to 5:30 pm for general workforce) to meet safety requirements.

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. For further details on lighting, see section 3.4.

3.6 Welfare

- 3.6.1 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.
- 3.6.2 A Construction Traffic Management Plan (CTMP) will be prepared and will provide details of procedures for construction related traffic.
- 3.6.3 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.
- 3.6.4 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.
- 3.6.5 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.
- 3.6.6 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.
- 3.6.7 Vehicular access will be maintained at all times to community facilities which perform emergency service activities.
- 3.6.8 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 Pollution Prevention/Storage and Plant

- 3.7.1 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 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.

Title	Details
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.

- 3.7.2 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.
- 3.7.3 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

- 3.7.4 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.
- 3.7.5 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 10 m from any watercourse including surface water drains; and at least 50 m from any borehole or well; Oil storage containers include:
 - Oil drums and fixed tanks;
 - Intermediate containers (IBCs);
 - Mobile bowlers – 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 as required 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

3.7.6 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.

3.7.7 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

- 3.7.8 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

- 3.7.9 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

- 3.7.10 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 Plant

- 3.7.11 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 bowsters 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

- 3.7.12 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.

3.8 Material/Resource and Waste Management

- 3.8.1 There are no allocated/safeguarded mineral or waste sites are located within Trawsfynydd works site. Additionally, since materials and wastes arising from extraction, processing and manufacture of construction components are being developed in a manufacturing environment with their own waste management plans. Therefore, materials and waste has been scoped out of the assessment for the Proposed Works.
- 3.8.2 Best working practices and measures to manage the wastes produced during the construction phase of Proposed Works have been provided below.

- 3.8.3 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).
- 3.8.4 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.
- 3.8.5 The Contractor will ensure that waste storage areas will be incorporated into the design with waste segregation measures are in place.
- 3.8.6 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 Geology, Hydrogeology, Land Use and Agriculture (Soils)

- 3.9.1 The Trawsfynydd works site is situated in a geologically significant area noted for scientific and educational value, with high-value sandstone and igneous rock resources. Most development is within the existing substation, but redevelopment may disturb geology, particularly areas of high-quality and rare materials. There is potential contamination in made ground and around the former nuclear power station, with risks of new contaminant pathways arising from construction activities. Ground disturbance and possible dewatering during works could mobilise existing contamination, affecting soil, groundwater, and surface watercourses.
- 3.9.2 The nearest off-site human health receptor is a residential property 25 m south of the access road and within 250 m of the main works area. There is one priority habitat for lowland fens and reed beds approximately 55 m north-east of Trawsfynydd works site.
- 3.9.3 Key construction mitigation and control measures to prevent adverse effects on Geology, Hydrogeology, and Land Contamination have been provided in **Table 4-1**.

Contaminated Land

- 3.9.4 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.
- 3.9.5 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; and
 - Preparation and adoption of a site and task specific health and safety plan as is required under Health and Safety legislation.
- 3.9.6 The Contractor shall ensure that the contaminated materials are segregated and stockpiled 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.
- 3.9.7 The permanent storage of contaminated materials on site shall not be permitted.
- 3.9.8 The Contractor will ensure that:
- Suitable PPE and 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).
- 3.9.9 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 Bryncir 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.
- 3.9.10 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. The investigation should also include the assessment and potential remediation of contamination encountered.

- 3.9.11 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.
- 3.9.12 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, ingestion or inhalation of potential soil or groundwater contamination. Earthworks will be completed in accordance with a 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.
- 3.9.13 Incorporation of a temporary surface water drainage strategy will limit any contaminated run-off entering surrounding surface watercourses.
- 3.9.14 New service trenches and the drainage system will be designed to prevent the migration of contaminants if identified.
- 3.9.15 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.

Use of Support Fluids

- 3.9.16 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).
- 3.9.17 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

- 3.9.18 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. Measures in relation to pollution prevention are outlined in Section 3.7 of this Outline CEMP. 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;
- 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; and
- 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.
- 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.
- Construction will not be undertaken during extreme wet weather where it may lead to erosion of sediments or could increase the risk of flooding.

3.9.19 The handling and temporary storage of soils will be in accordance with DEFRA (2009) Construction code of Practice and the IoQ (2021) Soil Handling Guide.

3.9.20 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.

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

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

3.9.23 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 (Gwynedd Council) prior to being implemented to mitigate unacceptable contaminated land related risks.

3.9.24 A Pollution Prevention Plan will outline key pollution mitigation measures to be adopted including a Control of Substances Hazardous to Health, fuel inventory and key contacts

to be notified in the event of a significant pollution incident, which may subsequently lead to the contamination of controlled waters or soils.

- 3.9.25 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.
- 3.9.26 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 Water Quality, Resources and Flood Risk

- 3.10.1 The closest watercourses to the Trawsfynydd works site are unnamed tributaries (~12 m away) of the Afon Tafarn-helyg (~40 m away). The Trawsfynydd works site (and wider Trawsfynydd Substation) is bounded to the north and the east by networks of unnamed small watercourses. Llyn Trawsfynydd (a Water Framework Directive (WFD) Lake waterbody) is south of the Trawsfynydd Substation, 30m away at its closest point. The Trawsfynydd works site is mostly within Flood Zone 1 and a small expanse of Flood Zone 2 extending along the existing access road/within existing transformer areas (flooding from Small Watercourses and surface water mapping).
- 3.10.2 Since Trawsfynydd Substation already appears to have a connection to the wider water environment, Proposed Works at Trawsfynydd Substation are not anticipated to have significant impacts on Water Quality, Resources and Flood Risks in the immediate or local area.
- 3.10.3 Appropriate industry best practice and published guidelines will be followed to reduce pollution and sediment movement during construction.
- 3.10.4 The Contractor shall refer to the CIRIA C648- Control of Water Pollution for linear construction projects. Technical Guidance dated 2006 and the accompanying site guide (CIRIA C649).
- 3.10.5 Washing of equipment using detergent will be carried out at commercial facilities only. Washing of vehicles and equipment without the use of detergent will be only carried out at either commercial facilities, or at purpose-built wash stations where the water is contained for controlled disposal.
- 3.10.6 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.

- 3.10.7 The Contractor shall put in place special measures for the mixing of grout and washing out of grouting lines and equipment. Direct discharge of grout washout into sewers will be not permitted.
- 3.10.8 Temporary holding tanks shall be provided, by the Contractor, as required. 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.

Surface Water Resources

- 3.10.9 The Contractor shall refer to the CIRIA C648- Control of Water Pollution for linear construction projects. Technical Guidance dated 2006 and the accompanying site guide (CIRIA C649).
- 3.10.10 Washing of equipment using detergent will be carried out at commercial facilities only. Washing of vehicles and equipment without the use of detergent will be only carried out at either commercial facilities, or at purpose-built wash stations where the water is contained for controlled disposal.
- 3.10.11 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.
- 3.10.12 The Contractor shall put in place special measures for the mixing of grout and washing out of grouting lines and equipment. Direct discharge of grout washout into sewers will be not permitted.
- 3.10.13 Temporary holding tanks shall be provided, by the Contractor, as required. 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.

Surface Water Resources

- 3.10.14 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.
- 3.10.15 Best practice measures to be implemented include:
- Contractor will ensure that the drains do not act as pathways for contamination or cause flooding off-site, consulting with the Local Flood Authority wherever necessary;
 - Dewatering and discharge of water will be carefully controlled to prevent the risk of sediment laden run-off entering watercourses;
 - Water removed from excavations will be treated in a suitable manner to avoid the passage of silt into local watercourses. 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);

- 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 (including topsoil where possible) and parking bays are located outside of any areas vulnerable to flooding; and
- No refuelling or storage of hazardous materials within 10m of a watercourse or 50m of a well, spring or borehole.

Groundwater Compliance

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

3.10.17 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.

Other Discharges

3.10.18 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.

- 3.10.19 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.
- 3.10.20 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.
- 3.10.21 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.
- 3.10.22 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.

Permitted Discharges

- 3.10.23 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). 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; and
 - 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; carry out any remediation works necessary.

Flooding

- 3.10.24 Mitigation measures to control on-site flooding will be implemented by the contractor and will comprise of the following:
- 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);
 - 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);

- Where possible, soils will be stored at least 10 m 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; and

3.10.25 Where required, ensure that 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 Historic Environment

3.11.1 Assessment of historic environment was scoped out due to there being no intervisibility between the World Heritage Site, Scheduled Monuments and Listed Buildings and the proposed works, and a negligible potential to impact unknown archaeological remains, with significant effects unlikely to occur.

3.11.2 However, best working practices to be implemented/ followed by Contractor during construction phase have been provided below:

- If an archaeological site is found, all works will stop until an archaeological management plan is produced to identify the controls and measures that are required to be put in place to effectively manage the archaeological works during the Proposed Works.

3.12 Traffic and Transport

3.12.1 Several roads on the local and strategic highway network have been identified as roads that would be used by traffic associated with the proposed works and could be subject to increases in traffic. These include A487 north of A470, A470 east of A487, A487 south of A470, A487 south of Trawsfynydd Substation access road and Trawsfynydd Substation access road. No Public Right of Ways (PROWs) cross the Trawsfynydd works site, however there are four PROWs (three footpaths and a bridleway) within 500m of the site.

3.12.2 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.

- 3.12.3 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**.
- 3.12.4 The Project has looked to mitigate by design issues in relation to traffic and transport. Access locations have been selected to be located along routes that are suitable for the category of traffic proposed to use it.
- 3.12.5 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.
- 3.12.6 During the pre-construction stage, the Contractor shall produce a detailed CTMP based on the Outline CTMP which is to be implemented and monitored throughout the construction programme. The detailed CTMP shall ensure that all traffic associated with the Proposed Works construction 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 Proposed Works associated with the movement of traffic;
 - Ensure all third-party traffic interfacing with the Proposed Works 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;
 - Include a Driver Information Pack covering a variety of topics and providing information on the requirements of working on the Proposed Works; and
 - Use of traffic marshals to manage HGV movements with local traffic and pedestrians/cyclists to minimise exposure for these groups to construction traffic;
- 3.12.7 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.
- 3.12.8 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.
- 3.12.9 The Contractor will implement Travel Plan that includes 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.

3.13 Air Quality and Emissions

- 3.13.1 There are two Ancient Woodland ecological receptors identified within 50 m of the Trawsfynydd works site. Llyn Trawsfynydd (a popular leisure site) is within 250 m of the Trawsfynydd works site and susceptible to impact from dust emissions.
- 3.13.2 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.
- 3.13.3 Best working practices to be implemented/followed by Contractor during construction phase have been provided as follows:
- Continuous dust monitoring will be undertaken at agreed points prior to work commencing on site and throughout construction;
 - Where practicable, solid screens or barriers will be installed around dusty activities or the Site boundary that are at least as high as any stockpiles at site;
 - Earthworks and exposed areas or soil stockpiles will be managed to prevent wind-borne dust. Methods such as covering, seeding or water suppression;
 - All vehicle operators will be switched off when not in use and ensured that there will be no idling;
 - A maximum speed limit of 15 miles per hour (mph) on surfaced and 10 mph on unsurfaced haul roads and work areas will be imposed;
 - Equipment will be 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;
 - Scabbing (roughening of concrete surfaces) will be avoided if possible, to reduce concrete dust;
 - For smaller supplies of fine powder materials, it will be ensured that bags are sealed after use and stored appropriately to prevent dust;
 - All construction plant and equipment will be maintained and in good working order;
 - On-site haul roads will be inspected for integrity and instigate necessary repairs to the surface as soon as reasonably practicable;
 - Where practicable, hard surfaced haul routes will be installed, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned;
 - Access points to the local highway will be prepared with temporary hard surfacing and wheel washing facilities;
 - It will be ensured that the construction traffic does not pass along sensitive roads (residential roads, congested roads, via unsuitable junctions, etc.) where possible, and that vehicles are kept clean (using wheel washers, etc.) and sheeted when on public highways.
 - There will be no bonfires or burning of waste materials; and

- Stockpile cover will be removed only in small areas during works and not all at once.

3.13.4 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 Noise and Vibration

- 3.14.1 There are four PRowS within 300m of the Trawsfynydd works site and Llyn Trawsfynydd is 155 m south, which is a popular tourist attraction for leisure uses such as walking, cycling, fishing, canoeing and kayaking.
- 3.14.2 The construction activities are expected to cause temporary, low to negligible impacts, with no significant effects.
- 3.14.3 The Contractor shall implement Best Practicable Means (BPM) as per recommendations set out in BS5228 (Code of practice for noise and vibration control on construction and open sites), and current guidelines set down by the Health and Safety Executive. The Contractor will comply with the noise regulations or restrictions imposed by the Local Authority. The Contractor will apply to the Local Authorities for prior consent under Section 61 of the Control of Pollution Act for noisy activities where required. The Contractor shall implement all noise control measures required to meet any noise limits agreed with the Local Authorities.
- 3.14.4 The Contractor shall bring to the site only plant conforming to relevant national, European Union or international standards, directives and recommendations on noise and vibration emissions. All generators and compressors used on the site shall be 'sound reduced' models fitted with acoustic linings and all ancillary pneumatic percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers for types of plant and equipment whose noise emissions are governed by EC Directives, only plant bearing the appropriate conformity mark shall be used on site.
- 3.14.5 Operations of equipment shall be stopped whenever unreasonable noise or disturbance results from faulty equipment. Faults to equipment shall be remedied by the Contractor immediately or the equipment shall be replaced.
- 3.14.6 All powered equipment in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum required.
- 3.14.7 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.
- 3.14.8 The Contractor shall ensure that audible warning systems, e.g. vehicle reversing sirens, are switched to a setting, which is compatible with Health and Safety Executive requirements.
- 3.14.9 The Contractor shall undertake to keep site noise to a minimum and must carry out all works with the local community in mind.
- 3.14.10 For all construction activities the following construction noise limits as set out in Section E5 of BS5228 will apply (subject to any alternate agreement in terms of a Section 61 Consent.):
- 65 dB for daytime;

- 55 dB for evening and weekends (Saturday after 1pm and Sunday); and
- 45 dB for night-time.

3.14.11 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.

3.15 Ecology and Nature Conservation

- 3.15.1 The Trawsfynydd works site is mainly hardstanding, with two small parcels of broadleaved scattered trees, and one small parcel of semi-natural broadleaved woodland within the west of the existing Trawsfynydd Substation. Land in the wider area surrounding the Trawsfynydd works site is a mix of semi-natural habitats and development. There are 15 statutory designated sites for nature conservation present within the 5 km Study Area. The closest designated site to the Trawsfynydd works site is Migneint-Arenig-Dduallt Special Area of Conservation (SAC)/Special Protection Area (SPA), located 1.08 km north-east. The closest area of ancient woodland (plantation on ancient woodland) to the Proposed Works is approximately 180 m west. A veteran willow tree was identified in an area of planted broadleaved woodland 23 m south-west of the existing access road for the Trawsfynydd works site. Lowland dry acid grassland is adjacent (Habitats of Principal Importance) is located adjacent to the Proposed Works. Two small parcels of broadleaved scattered trees, and one small parcel of semi-natural broadleaved woodland are also present in the west of the existing Trawsfynydd Substation.
- 3.15.2 The proposed works have the potential to affect ecology and nature conservation through disturbance (light, noise, vibration and human activity), habitat degradation, species mortality and spread of invasive non-native species during construction.
- 3.15.3 Embedded mitigation measures have been integrated into the proposed works to minimise potential ecological impacts from construction, operation, and maintenance. The proposed works have been designed to avoid impacts on designated sites and key habitats, with buffers applied to woodlands, hedgerows, trees, and watercourses. The detailed CEMP will outline measures to address construction dust, pollution, light and noise.
- 3.15.4 Measures contained in The Environment (Wales) Act 2016 and best practice guidance on the control and removal of invasive weed species will be implemented.
- 3.15.5 Contractors and site staff will receive a toolbox talk on the various ecological sensitivities of the development as part of their site induction.
- 3.15.6 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; and
- 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.

3.15.7 The ECoW will have previous experience in similar ECoW roles and be approved by the Applicant. The ECoW will be appointed in advance of the main construction programme commencing to ensure pre-construction surveys are undertaken and any advance mitigation measures required are implemented.

3.15.8 The detailed mitigation measures have been provided in **Table 4-1**.

3.16 Climate Resilience

3.16.1 Direct GHG emissions could arise from works on the Trawsfynydd works site as a result of the site clearance/remediation, construction, operation and maintenance activities. Indirect GHG emissions could arise off-site and encompass embodied carbon in materials, transportation, upstream activities (such as well-to-tank processes and transmission and distribution losses), as well as the processing and disposal of waste. No significant impacts were identified in the Environmental Statement in relation to GHG and climate risks.

3.16.2 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 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 prior 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.

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

- Avoiding sharp acceleration and braking to conserve fuel;
- Adjusting haul and access road/points to smoother gradients to avoid unnecessary fuel usage; and
- Only using plant when required (including future planning as to what plant is required, and when).

3.17 Landscape and Visual

- 3.17.1 The Trawsfynydd works site and Study Area lie within the Eryri (Snowdonia) National Park (ENP) and *Dragon Square and Dame Sylvia Crowe Garden* at the former Trawsfynydd Nuclear Power Station at Trawsfynydd is Grade II* Registered Historic Park and Garden. The land surrounding the former Trawsfynydd Nuclear Power Station features a mix of agricultural fields and woodland, including areas of ancient woodland, which together create an enclosed feel amid the open landscape. To the south, the large waterbody of Llyn Trawsfynydd lies approximately 155 m from the site.
- 3.17.2 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.
- 3.17.3 Best working practices and measures to reduce impacts on landscape and visual receptors during construction phase will be implemented by the Contractor. A qualified and experienced Environmental Clerk of Works (ECoW) and Ecological Clerk of Works (ECcOW) will be available during the construction phase to advise, supervise and report on the delivery of the mitigation methods. The ECoW will monitor that the works proceed in accordance with relevant environmental requirements and adhere to the required good practice and mitigation measures.

3.18 Major Accidents and Disasters

- 3.18.1 Construction activities have not been identified to pose any Major Accidents and Disasters. However, general working practices will be implemented by the Contractor during Construction Phase of Proposed Works.

- 3.18.2 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).
- 3.18.3 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.
- 3.18.4 The Proposed Works will be managed in accordance with Environmental, Health & Safety Management systems.
- 3.18.5 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

- 4.1.1 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.
- 4.1.2 **Tables 4-1** of this Outline CEMP outlines the key construction mitigation and control measures within the REAC that will be 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			
T-PD-001	All scrap waste material will be disposed of off-site to a designated licenced waste or recycling site	To ensure that contaminants do not enter the ground and minimise the quantities of waste	Construction Contractor
T-PD-002	General ground arisings would be stockpiled locally for re-use.	To re-use excess material and limit permanent removal of soils.	Construction Contractor
T-PD-003	Within the Trawsfynydd Substation compound, all working areas would be reinstated with 300 mm of type 1 and 75 mm of 10 mm limestone chippings.	To return the Site to its original state and minimise adverse impacts in operation	Construction Contractor
T-PD-004	Before the proposed works commence, the necessary safety permits and authorisations would be issued by National Grid and the electrical equipment would be made safe. Power outages would also be agreed with National Grid in advance.	To comply with permit requirements and ensure safety	Construction Contractor
T-PD-005	Designated access routes through the substation and working areas would be established before any of the proposed works take place and safety briefings communicated to the workforce.	To ensure safety of the workforce	Construction Contractor

T-PD-007	During installation, the appointed Contractor would be required to operate under a detailed site-specific Construction Environmental Management Plan (CEMP) It would, as a minimum, implement the mitigation measures identified in this ES. The detailed CEMP would set out a variety of control measures for managing the potential environmental effects of the proposed 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.	
T-PD-008	During darker evenings there would be task lighting and low-level lighting to access walkways to ensure safe pedestrian passage from the site welfare facilities to the site of the works. It would adhere to required guidance such as Institute of Lighting Professionals Guidance Note 08/23 Bats and Artificial Lighting at Night and Institute of Lighting Professionals. Guidance Note 1 for the Reduction of Obtrusive Light.	To ensure pedestrian safety and minimise impacts on sensitive receptors	
T-PD-009	Foundations for the new structures, including an AIS bay, shunt reactor and landing gantry, would be constructed from reinforced concrete. The concrete would be delivered to the Trawsfynydd works site by truck mixer, ready mixed from the nearest supplier. 2.4.6 Stone and aggregates would be delivered to the Trawsfynydd works site as and when required, from nearby quarries.	To minimise distances materials are transported	
T-PD-010	Access to the Trawsfynydd works site would be gained via the existing Trawsfynydd Substation access road off the A470. No works are required to the access road between the A470 and Trawsfynydd Substation compound, however widening works to the south-eastern corner of the 275 kV section of the Trawsfynydd Substation will be required to allow the shunt reactor to be transported around the bend as well as accommodate the weight. The shunt reactor would require transportation by special order due to being over 150 tonnes. The shunt reactor would arrive via beach landing site at Black Rock Sands, approximately 16.3 km west of the Trawsfynydd works site. The shunt reactor would be delivered via an abnormal indivisible load (AIL) to the Trawsfynydd works site.	To allow safe access to site	Construction Contractor

T-PD-011	<p>Generally, construction activities would be undertaken during daytime periods only, from Monday to Friday 7.30 am – 5.30 pm (including an hour set up and hour shut down). No bank holiday or weekend working will be undertaken, unless agreed with the Local Planning Authority (Eryri National Park Authority).</p> <p>There may be some periods of extended or 24 hour working, however this would be by agreement with the Local Planning Authority (Eryri National Park Authority).</p>	To minimise construction impacts on sensitive receptors	Construction Contractor
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Geology, Hydrology, Land Use and Agriculture (Soils)

T-GH-001	<p>A detailed CEMP will be developed and implemented by the appointed Contractor 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 methodology techniques. The 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 if encountered during construction.</p>	To ensure mitigation and management measures are followed correctly during the construction stage of works.	Construction Contractor
T-GH-002	<p>An appropriate intrusive ground investigation of selected areas of the Trawsfynydd works site will be undertaken in accordance with the relevant guidance including Eurocode 7 (BS EN 1997-2:2007), BS 5930 (2015 + A1 2020) and BS 10175 (2011 + A2 2017) and using the UK Specification for Ground Investigation (2022).</p> <p>The ground investigation will be designed to target the potentially contaminative sources identified within the site associated with the existing Trawsfynydd Substation. There will also be a need to obtain geotechnical information to inform the proposed works including on the potential for ground instability.</p> <p>If areas of the Trawsfynydd works site are shown to pose an unacceptable risk, infrastructure would be moved to a different location if feasible. However, if it is not possible to move the infrastructure in</p>	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.	Construction Contractor

contact with the ground, remedial measures would be identified and implemented.

T-GH-003	<p>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.</p> <p>Potential impacts specific to construction workers (and off site users including residential properties) during the construction phase would be controlled and mitigated by the following measures and through working in accordance with CIRIA C811 :</p> <ul style="list-style-type: none">- 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.	<p>To mitigate unacceptable contaminated land related risks to the environment and construction workers and ensure works are legally compliant</p>	Construction Contractor
T-GH-004	<p>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 materials management plan 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 suitable for re-use, they are re-used appropriately, sustainably and remain outside the waste hierarchy. Materials which need to be removed from the Trawsfynydd works site are 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.</p>	<p>Limit permanent removal of soils during construction phase, re-use excess material and to reduce adverse impacts on land and soil</p>	Construction Contractor
T-GH-005	<p>Any material imported to the Trawsfynydd works site, such as for supporting foundations, will be natural quarried stone or, if recycled, the material will undergo chemical and geotechnical testing to confirm</p>	<p>To ensure that contaminants do not enter the ground.</p>	Construction Contractor

material suitability. The suite of contaminants and site use criteria will be agreed with regulatory authorities to demonstrate that the material is suitable for use on site and does not pose a risk to human health or the environment.

T-GH-006	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 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.	To minimise risk of site workers coming into contact with asbestos on site.	Construction Contractor
T-GH-007	<p>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, be put to use either on the Trawsfynydd works site or on other sites.</p> <p>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 (WAC) analysis, as required.</p>	To ensure that contaminants do not enter the ground and minimise the quantities of waste.	Construction Contractor
T-GH-008	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.	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

T-GH-009	A Pollution Prevention Plan will outline key pollution mitigation measures to be adopted including a Control of Substances Hazardous to Health (COSHH), fuel inventory and key contacts to be notified in the event of a significant pollution incident, which may subsequently lead to the contamination of controlled waters or soils.	To reduce the potential effects associated with fuels, oils and chemicals required during construction	The Applicant / Construction Contractor
T-GH-010	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/or 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	Construction Contractor
T-GH-011	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 boundary for the duration of the works.	To reduce the potential effects associated with fuels, oils and chemicals required during construction	Construction Contractor
T-GH-012	An understanding of groundwater throughout the proposed works will be obtained from ground investigation and monitoring: including before, during and after construction. A more detailed hydrogeological assessment will be undertaken where 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	To minimise the risk of groundwater flooding and impacts from dewatering to groundwater receptors	Construction Contractor

such assessment will consider the effects of any draw down or impacts on nearby abstractions or resources along with ground instability. An environmental permit will be required for any discharging activity to surface waters or groundwater associated with the dewatering or a trade effluent consent for discharge into foul sewer. Dewatering will be developed in consultation with NRW and other stakeholders if appropriate.

Traffic and Transport

T-TT-001	Existing access points will be used to facilitate vehicle movements into the Trawsfynydd works site.	To facilitate movements into the works site	The Applicant / Construction Contractor
T-TT-002	Swept path analysis for AILs and HGVs would be carried out to ensure suitable routing.	Maintain the safe and effective flow of traffic on the road network	The Applicant / Construction Contractor
T-TT-003	HGVs and AILs will follow the designated routes	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
T-TT-004	Utilisation of internal routes in the Trawsfynydd works site to avoid using the existing road network	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
T-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, and temporary traffic signals or barriers will be implemented. Construction traffic generally would give priority to other road users.	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
T-TT-006	Restricting HGV movements to ensure arrivals/departures between 09:00 and 17:00 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

T-TT-007	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 routeing. In addition, adequate space would be made available in the Trawsfynydd 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
T-TT-008	Implementing a monitoring system to record the route of all HGVs travelling to and from the site, to record any non-compliance with the agreed routeing strategy/delivery hours and to communicate any issues to the relevant suppliers to ensure the correct routes and times are followed	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
T-TT-009	Construction staff (e.g. non-HGV vehicles) would be directed to take the most direct route to the Trawsfynydd works site 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
T-TT-010	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 Trawsfynydd works site	Maintain the safe and effective flow of traffic on the road network and encourage sustainable behaviour	Construction Contractor
T-TT-011	Providing limited (but sufficient) on-site car and cycle parking to accommodate the expected parking demand of workers on Trawsfynydd works site	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
T-TT-012	A specialised haulage service would be employed to allow the shunt reactor AIL to travel 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 also be given advanced notification under the Road Vehicle Authorisation of Special Types Order 2003	Maintain the safe and effective flow of traffic on the road network	Construction Contractor

Air Quality and Emissions

T-AQ-001	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible	To minimise air quality impacts on receptors	Construction Contractor
T-AQ-002	Display the name and contact details of person(s) accountable for air quality and dust issues on the construction compound fence. This may be the environment manager/engineer or the site manager	To ensure the Proposed Works air quality contacts are known.	Construction Contractor
T-AQ-003	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 minimise air quality impacts	Construction Contractor
T-AQ-004	Make the complaints log available to the local authorities when asked	To minimise air quality impacts	Construction Contractor
T-AQ-005	Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book	To minimise air quality impacts	Construction Contractor
T-AQ-006	Undertake daily on-site and off-site inspection (including roads), where receptors are nearby, to monitor dust, record inspection results, and make the log available to the Local Authority when asked	To monitor and minimise air quality impacts	Construction Contractor
T-AQ-007	Carry out regular site inspections to monitor compliance with the detailed CEMP commitments, record inspection results, and make an inspection log available to the Local Authorities when asked	To monitor and minimise air quality impacts	Construction Contractor
T-AQ-008	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

T-AQ-009	Ensure all vehicles switch off engines when stationary - no idling vehicles	To minimise air quality impacts	Construction Contractor
T-AQ-010	Sustainable power sources (solar panels etc.) to be used where practicable. Where available, generators are to be low emission with hybrid battery systems (or to current best practice)	To minimise air quality impacts	Construction Contractor
T-AQ-011	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 reduce risk of dust blowing around Site and to protect workers from inhalation.	Construction Contractor
T-AQ-012	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate	To ensure dust creating activities are dampened down to reduce risk to Site workers.	Construction Contractor
T-AQ-013	Use enclosed chutes and conveyors (if used) and covered skips	Reduce risk of materials becoming loose and potential contamination of Site.	Construction Contractor
T-AQ-014	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport	To minimise impacts associated with trackout	Construction Contractor
T-AQ-015	Avoid site runoff of water or mud	To minimise air quality impacts	Construction Contractor
T-AQ-016	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable	To minimise air quality impacts	Construction Contractor
T-AQ-017	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 minimise air quality impacts	Construction Contractor

Ecology and Nature Conservation

T-EC-001	<p>The proposed works have been designed to avoid key nature conservation and ecological features present in or adjacent to the Trawsfynydd works site as far as practicable. The following minimum buffers from key habitat features are applied where practicable for the Trawsfynydd works site excluding use of the unmodified existing access road which may fall in these buffers, and where new cable ducts are required adjacent to the perimeter fence:</p> <ul style="list-style-type: none"> • 15 m from woodlands. • 15 m from individual trees. • A minimum of 10 m from watercourses (bank top), including dry ditches, to protect riparian habitats and to mitigate for potential hazards such as chemical and soils spills into watercourses or waterbodies, with the exception of where the existing access road crosses watercourses, as no modification of the existing crossing and road is required. 	To avoid and minimise adverse impacts to habitats.	Construction Contractor
T-EC-002	<p>The detailed CEMP will provide the measures required to mitigate construction related effects on ecology, including those associated with construction dust deposition, air pollution, pollution incidents, water quality, light, noise and vibration. The implementation of the CEMP will manage the environmental effects of the proposed works and demonstrate compliance with environmental legislation.</p>	To avoid and minimise adverse impacts to habitats.	Construction Contractor
T-EC-003	<p>Vegetation clearance will avoid the nesting bird period (i.e., March to August inclusive). To avoid killing or injuring animals potentially sheltering under vegetation, such as reptiles and amphibians, vegetation will be cut in two phases; first to approximately, but no less than, 15 cm above ground level, and left undisturbed until it can be cut to ground level during the typical reptile and amphibian active season (March to October, inclusive). Where vegetation clearance cannot avoid the nesting bird period, a check for the presence of any active nests would be carried out by a suitably experienced ornithologist, prior to vegetation removal. If active nests are found, then appropriate buffer zones (species dependent) where no works take place would be put in place and the area monitored until the young birds have fledged.</p>	To avoid adverse impacts to nesting birds, reptiles, amphibians and other animals	Construction Contractor

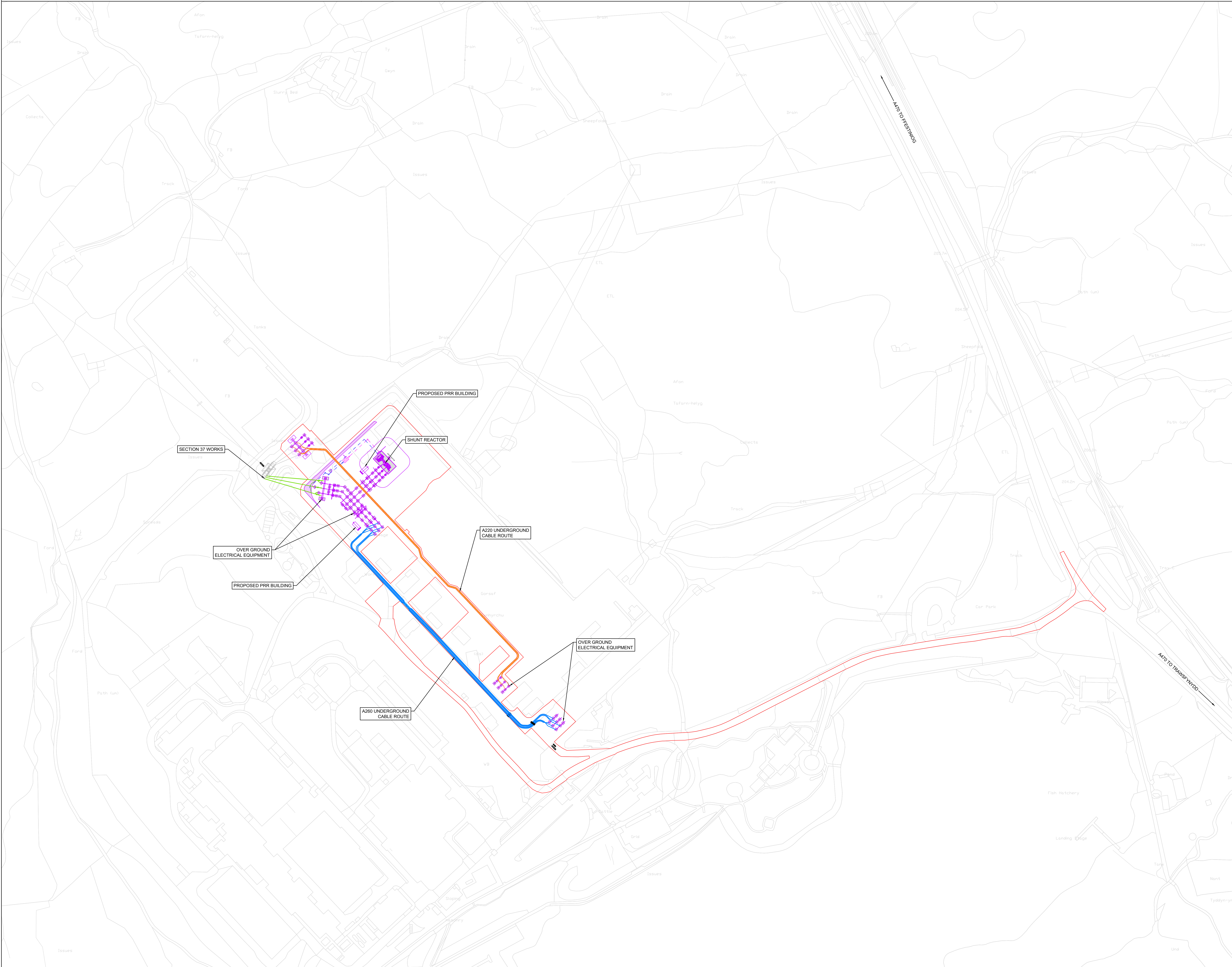
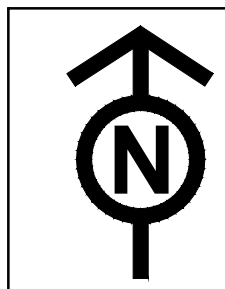
Vegetation at ground level (any vegetation beneath the trees within the Trawsfynydd works site), and areas potentially suitable for basking reptiles (including hardstanding) will be carefully checked prior to removal. Any habitat features within such areas which may conceal sheltering reptiles and amphibians (e.g., rubble mound bunds, any other debris) will not be dismantled during their inactive season (i.e., November to February inclusive).

T-EC-004	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 provided where this is not practicable. However, task-specific and fixed 'general' lighting may be required in months with reduced daylight hours (early mornings and up to 5.30 pm for general workforce) to meet safety requirements.	To reduce disturbance to nocturnal and crepuscular fauna during construction.	Construction Contractor
T-EC-006	<p>Where lighting is required, it will conform to best practice guidelines with respect to minimising light spill into adjacent habitats and preventing disturbance to bats and other species, including Institute of Lighting Professionals Guidance Notes (in particular GN08/23 Bats and Artificial Lighting at Night. This guidance was produced in collaboration with the Bat Conservation Trust, and GN-1: Reduction of Obtrusive Light in so far as it is reasonably practicable. The following such measures will be taken:</p> <ul style="list-style-type: none"> • Lights installed will be of the minimum brightness and 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. 	To reduce disturbance to nocturnal and crepuscular fauna during construction.	The Applicant / Construction Contractor

T-EC-007	To comply with relevant wildlife legislation, pre-construction surveys, such as an updated badger survey, and bat roost assessments of any potentially managed or lost trees inside the Trawsfynydd works site, will be undertaken to support the baseline findings. Checks for nesting birds (including nesting peregrine on pylons or other adjacent structures potentially suitable) and reptiles will also be undertaken. 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. 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.	To avoid adverse impacts to protected species and comply with conservation legislation	The Applicant / Construction Contractor
T-EC-008	Implementation of measures to avoid animals being injured or killed within construction working areas, such as through the inclusion of perimeter fencing and covering excavations or providing a means of escape, will exclude them from such areas and prevent them from becoming trapped in excavations, which will be secured through the detailed CEMP.	To avoid adverse impacts to protected species and comply with conservation legislation	Construction Contractor
T-EC-009	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, and inform any protected species licensing that may be required should species distribution change or detailed design result in licensing requirements for species such as bats, badger or otter, which are currently not anticipated to be necessary.	To inform detailed design and any protected species licencing requirements	The Applicant / Construction Contractor
T-EC010	Ongoing monitoring of habitats and species will be carried out throughout construction of the proposed works, overseen by an appointed Ecological Clerk of Works (ECoW) with suitable experience. The ECoW will have the authority to review RAMS, oversee works and recommend action as appropriate, including temporarily stopping works where necessary to safeguard protected species and their habitats, or where any other breaches of environmental legislation are could occur.	To ensure mitigation and management measures are followed correctly during the construction stage of works.	Construction Contractor

Climate Change

T-CC-001	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
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Legend

- APPLICATION SITE BOUNDARY
- PROPOSED ABOVE GROUND EQUIPMENT
- WORKS TO BE CARRIED OUT UNDER SECTION 37 AGREEMENT
- EXISTING TRAWSFYNYDD SUBSTATION
- EXISTING UNDERGROUND A220 CABLE TROUGH
- PROPOSED UNDERGROUND A220 CABLE ROUTES
- PROPOSED UNDERGROUND A260 CABLE ROUTES
- PROPOSED OIL SUPPLY
- PROPOSED WATER SUPPLY
- PROPOSED VEHICLE BARRIER
- PROPOSED ROAD RE-ALIGNMENT WORKS
- PROPOSED PLANT FOUNDATIONS

Notes

This drawing is scaled at paper size A0, therefore any prints taken at smaller sizes will affect accuracy of the measurement units and should not be scaled against

Scale Bar

25m0m50m125m

1:1250

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P01	12/09/25	FIRST ISSUE	TM	MT	RW
Issue	Date	Remarks	Drawn	Checked	Approved

Title

FIGURE 1-1 TRAWSFYNYDD
PROPOSED OVERALL LAYOUT (FOR TCPA)

nationalgrid

Figure Number

PTC1 / PTNO - TRAWSFYNYDD

Drawing Reference

PTNO-WSP-SS51-C00484-DRW-CP-000004

Scale <p>1:1250</p>	Sheet Size <p>A0</p>	Sheet <p>SHEET 1 OF 1</p>	Issue <p>1</p>
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Appendix 5.5.A Trawsfynydd Aquatic Survey Report

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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 within the Trawsfynydd element of the Pentir to Trawsfynydd Reinforcement Project (the 'Project') and has been prepared by AECOM on behalf of National Grid Electricity Transmission plc (NGET). Baseline data presented within this appendix has been used to inform the assessment in Environmental Statement (ES) **Volume 5, Chapter 5: Ecology and Nature Conservation**.
- 1.1.2 The terms of reference used to describe the proposed works in this report are broadly consistent with those defined in ES **Volume 5, Chapter 2: Trawsfynydd Works**.
- 1.1.3 This appendix is supported by **Figure 5.5.A.1: Aquatic Survey Locations**.

1.2 Project Description

- 1.2.1 This appendix of the ES covers the Trawsfynydd Works (as shown in ES **Volume 5, Trawsfynydd Works, Figure 5.2.2**):
- The Trawsfynydd Substation is an existing substation in Eryri (Snowdonia) National Park (ENP) in North West Wales.
 - The proposed works will comprise:
 - Removal of redundant cables.
 - New 400 kilovolts (kV cables), shunt reactor and gantry.
 - Replacement downleads from Tower 4ZC005.
 - Alterations to the fence alignment.
 - Based on the proposed works, the potential impacts associated with the Construction phase have been outlined below:
 - Habitat degradation – indirect impacts resulting in change to condition of aquatic habitats e.g., changes in water quality from chemical pollution or soil spills.
 - Species mortality – indirect impacts resulting in change to condition of aquatic habitats e.g., changes in water quality from chemical pollution or soil spills.
 - There are no anticipated Operational or Maintenance impacts to aquatic receptors.

1.3 Scope

- 1.3.1 Aquatic surveys for Trawsfynydd Substation were proposed but access was not available. However, aquatic scoping and macroinvertebrates surveys were completed as part of the wider works assessment (see **Volume 6: Wider Works**) and were within 2 kilometres (km) of the Trawsfynydd works site. These have been considered within this baseline to provide context on the potential species present.

- 1.3.2 The desk study and survey work undertaken in 2024 reported in this appendix:
- Outline the legislation and guidance relevant to aquatic receptors, notably: 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 within the relevant area; and,
 - Inform the ecological impact assessment and identification of mitigation measures (where required)
- 1.3.3 Recommendation for any avoidance, mitigation and enhancement for aquatic species are provided in ES **Volume 5, 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 (Zol). CIEEM guidance (Ref 1.1) defines a Zol 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 Zol 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 Zol 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 Zol 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).
- The Trade in Endangered Species of Wild Fauna and Flora (Amendment) (EU Exit) Regulations 2018 (Ref 2.2).
- Joint Nature Conservation Committee (JNCC) Global Red List (Ref 2.3).
- The Council of Europe's Convention on the Conservation of European Wildlife and Natural Habitats 1979 (or Bern Convention) (Ref 2.4).
- 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 2.5).
- Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 2.6).
- Oslo and Paris Conventions (OSPAR) 1992 (Ref 2.7).
- Environmental Protection Act 1990 (Ref 2.8).
- Environment (Wales) Act 2016 (Ref 2.9).
- The Salmon and Freshwater Fisheries Act (1975) Ref 2.10).
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (the 'Water Framework Directive' or WFD) (Ref 2.11).
- Wildlife and Countryside Act 1981 (as amended) (WCA) (Ref 2.12).
- The Conservation of Habitats and Species Regulations 2017 (as amended) (Ref 2.13).
- The Eels (England and Wales) Regulations 2009 (Ref 2.14).
- Natural Environment and Rural Communities (NERC) Act 2006 (Ref 2.15).
- JNCC – UK Biodiversity Framework 2024 (Ref 2.16).

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 Trawsfynydd 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), as well as proposed or potential sites).
 - 5 km from the Trawsfynydd 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 Trawsfynydd 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 Trawsfynydd works site for Habitats of Principal Importance (HoPI), as listed under Section 7 of the Environment Wales Act (2016) (Ref 2.9).
- 3.1.3 Notable (protected and invasive) aquatic receptors (fish, macroinvertebrates, and macrophyte species) within a 2 km from the Trawsfynydd 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 located within 2 km from the Trawsfynydd work site was also identified from the NRW DataMapWales website (Ref 3.7).

3.2 Aquatic Surveys

- 3.2.1 Survey sites were selected according to watercourses in the Study Area site which have potential to be affected. Two sites were scheduled to be surveyed (**Table 3-1** and **Figure 5.5.A.1: Aquatic Survey Location**) comprising of a ditch adjacent to the Trawsfynydd substation (1A) and the Afon Tafarn-helyg (1B).
- 3.2.2 Access to site 1A was not possible and as such, no surveys could be completed.

3.2.3 The surveys at 1B were completed in their respective seasons (see subsequent sections) in 2024.

Table 3-1 - Trawsfynydd aquatic survey sites

Site ID	National Grid reference	Aquatic scoping	Macro-invertebrates
1A	SH 68991 38536	No access	
1B	SH 68939 38785	✓	✓

Aquatic Scoping Surveys

3.2.4 During the site visit to 1B, an aquatic scoping survey was 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

3.2.5 Aquatic macroinvertebrate surveys were undertaken at one site in autumn 2024. The specific location and date of the survey is shown in **Table 3-2** below.

Table 3-2 - Aquatic macroinvertebrate survey locations and dates

Water crossing reference ID	Watercourse	Site name	National grid reference	Survey date	Season	Distance from the works site
WCX69	Afon Tafarn-helyg	1B	SH 68939 38785	02/11/2024	Autumn	0.25 km north-west

3.2.6 The aquatic macroinvertebrate survey was undertaken by suitably qualified and experienced aquatic ecologists. The sampling procedure 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 sample was 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. The survey was not undertaken during or immediately following periods of high flow in accordance with best practice guidance.

- 3.2.7 The sample collected was sorted and analysed in a laboratory setting by suitably trained and experienced aquatic ecologists. A list of the aquatic macroinvertebrate taxa present were produced in line with Environment Agency guidance (Ref 3.8). The sample was 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
 - 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.
- 3.2.8 Aquatic macroinvertebrate species were cross referenced against the JNCC Taxon Designations list (Ref 3.11) to identify any protected and/or notable species. 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)

- 3.2.9 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 within this report.

Lotic-invertebrate Index for Flow Evaluation (LIFE)

- 3.2.10 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)

- 3.2.11 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)

- 3.2.12 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.
- 3.2.13 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)

- 3.2.14 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).
- 3.2.15 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.
- 3.2.16 Furthermore, analysis using RICT is only suitable for freshwater (not estuarine or marine) sites on rivers or streams that are naturally permanently flowing. As such, 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

- 3.2.17 Aquatic macrophyte surveys were scoped out as they were assessed as being absent from site 1B during the aquatic scoping exercise, and due to the proposed works are

being completed within the existing hard standing of the substation with no direct impacts on watercourses proposed.

Fish Surveys

- 3.2.18 Fish surveys were scoped out from site 1B during the aquatic scoping exercise due to watercourse being deemed unsuitable for fish (too shallow and fast flowing). Also notwithstanding, the proposed works are being completed within the existing hard standing of the substation with no direct impacts on watercourses proposed.

3.3 Limitations

Desk Study

- 3.3.1 The desk study is not exhaustive and relies on records being submitted and available within the Study Area.

Field Surveys

- 3.3.2 Aquatic scoping and any subsequent surveys for site 1A were not possible due to the land parcel being inaccessible. Given that the proposed works being completed within the existing hard standing of the substation with no direct impacts on watercourses proposed, it is not thought that this represents a limitation to the assessment.
- 3.3.3 Ecosystems are dynamic and constantly changing, and therefore 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 3.16). 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 A total of six statutory designated sites that contain aquatic ecology features were identified (**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	Description	Approximate distance from works site
Migneint-Arenig-Dduallt SAC and SSSI	Annex I habitats that are a primary reason for selection of this site: Blanket bogs (* if active bog) Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: <ul style="list-style-type: none">• Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>• Natural dystrophic lakes and ponds	1.08 km north-east
Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC	Some of the Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site are: <ul style="list-style-type: none">• Watercourses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation.• Northern Atlantic wet heaths with <i>Erica tetralix</i>• Bog woodland (priority feature)	1.44 km south-west
Ceunant Llennyrch NNR	Oak woodland with 230 species of mosses and liverworts. Afon Prysor runs through the reserve.	1.71 km west
Coedydd De Dyffryn Maentwrog SSSI	Afon Prysor runs through the site	1.62 km north

Afon Eden - Cors Goch Trawsfynydd SAC and SSSI	<p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <p>Active raised bogs</p> <p>Annex II species that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> Freshwater pearl mussel Floating water-plantain <p>Annex II species present as a qualifying feature, but not a primary reason for site selection:</p> <p>Atlantic Salmon</p>	3.36 km south
Rhinog NNR, SAC, SSSI	<p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i> bogs (* if active bog) <p>Annex II species present as a qualifying feature, but not a primary reason for site selection:</p> <p>Floating water-plantain <i>Luronium natans</i></p>	4.60 km south-west

- 4.1.2 No non-statutory designated sites were identified in the Study Area that contain aquatic features.

Water Framework Directive status

- 4.1.3 There are three Water Framework Directive (WFD) waterbodies in that have the potential to be impacted either directly or indirectly by the proposed works (**Table 4-2**).

Table 4-2 Water Framework Directive (WFD) waterbodies located within 2 km of the Works Site

Waterbody	WFD water body ID	Ecological status	Approximate distance from works site
GB31034870	Llyn Trawsfynydd	Moderate	0.03 km south
GB110065053751	Prysor - Downstream Llyn Trawsfynydd	Moderate	1.75 km west
GB110065053752	Prysor - Upstream Llyn Trawsfynydd	Poor	1.04 km south-east

Prysor-downstream Llyn Trawsfynydd

- 4.1.4 Prysor-downstream Llyn Trawsfynydd (WFD water body ID: GB110065053751) is a Heavily Modified Water Body (HMWB) with a 'Moderate' Ecological Status. It is classified as 'Good' for fish in 2019, macrophytes in 2018 and diatoms in 2015, and 'High' for invertebrates in 2015.

Llyn Trawsfynydd

- 4.1.5 Llyn Trawsfynydd (WFD water body ID: GB31034870) is lake designated as a HMWB with a 'Moderate' Ecological Status. It is classified as 'Moderate' for phytoplankton, 'High' for invertebrates but it is not classified for fish.

Prysor - Upstream Llyn Trawsfynydd

- 4.1.6 Prysor – Upstream Llyn Trawsfynydd (WFD water body ID: GB110065053752) is a natural river with a 'Poor' overall Ecological Status. It is classified as 'Good' for fish in 2019, 'Poor' for macroinvertebrates in 2015, 'Good' for macrophytes in 2018 and 'Good' for diatoms in 2015.

Habitats of Principal Importance

- 4.1.7 Rivers are Habitats of Principal Importance (HoPI) listed under Section 7 of the Environment (Wales) Act (2016) (Ref 2.9). The Afon Tafarn-helg is approximately 40 m from the Trawsfynydd works site at its closest location.

Notable Species Identified in the Desk Study

Aquatic Macroinvertebrates

- 4.1.8 The desk study has returned no records of notable aquatic macroinvertebrate species within 2 km of the works area from all data sources.

Aquatic Macrophytes

- 4.1.9 The desk study has returned no records of the notable aquatic macrophytes within 2 km of the works area from all data sources ().

Fish

- 4.1.10 The desk study has returned a single record of the protected brown/sea trout (*Salmo trutta*) within 2 km of the works area. **Table 4-3** provides information on its conservation designation and details of records.

Table 4-3 - Notable fish species identified in the Study Area

Species	Conservation Designation (S)	Number of records	Most recent record	Location of the closest record	Data Source
Brown/sea trout (<i>Salmo trutta</i>)	The Salmon and Freshwater Fisheries Act 1975 (Ref 2.10) WCA (Ref 2.12) Environment (Wales) Act (2016) (Ref 2.9) UK Biodiversity Framework (Ref 2.16)	1	2018	1.59 km south-east	NRW

INNS and Non-Native Species

- 4.1.11 The desk study has returned historic records of three invasive non-native species (INNS) within 2 km of the works area (**Table 4-4**).
- 4.1.12 Japanese knotweed (*Fallopia japonica*), New Zealand pigmyweed (*Crassula helmsii*), Himalayan balsam (*Impatiens glandulifera*) are all deemed INNS. Japanese knotweed and Himalayan balsam are not directly aquatic species but these are commonly found in the riparian zone, and specifically in the case of Himalayan balsam, rivers help to facilitate their dispersal.

Table 4-4 - INNS and non-native species recorded within the Study Area

Species	Conservation designation (S)	Number of records	Most recent record	Location of the closest record	Data Source
Japanese knotweed (<i>Fallopia japonica</i>)	Wildlife and Countryside Act 1981 Schedule 9 (Ref 2.12)	82	2024	0.06 km east	Cofnod
		1	2024	1.71 km north-west	NBN
New Zealand pigmyweed (<i>Crassula helmsii</i>)	Wildlife and Countryside Act 1981 Schedule 9 (Ref 2.12)	16	2024	0.11 km south	Cofnod
Himalayan balsam (<i>Impatiens glandulifera</i>)	Wildlife and Countryside Act 1981 Schedule 9 (Ref 2.12)	14	2022	1.01 km north	Cofnod

Species	Conservation designation (S)	Number of records	Most recent record	Location of the closest record	Data Source
	Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 2.6)				

4.2 Aquatic Surveys

Aquatic Macroinvertebrate Surveys

- 4.2.1 The aquatic macroinvertebrate taxa list can be found in Appendix E. A description of the macroinvertebrate community at each site is provided below.

Site 1B

- 4.2.2 This survey was taken from the Afon Tafarn-helyg, just outside of Llyn Trawsfynydd Power Station. The channel (average width: 0.8 m; average depth: 0.2 m) was heavily shaded by overhanging trees and some proportions were culverted. The riverbed was dominated by bedrock (60%), with cobble and boulder also present (20% each). The dominate flow types within this site were runs and riffles. Woody debris and tree roots were present within the surveyed reach covering 25% and 40% of the channel respectively. Conversely, no macrophytes, moss, or algae were present at this site.
- 4.2.3 The autumn macroinvertebrate community of Site 1B was largely accounted for by stoneflies (29%), caddisflies (25%) and snails (16%). The sample was dominated by the stonefly *Protonemura meyeri* (27%) and most caddisflies were observed to be *Hydropsyche siltalai* (8%). All snails within the community were identified as the non-native, non-invasive, New Zealand mud snail (16%). No notable aquatic macroinvertebrate species were identified at this site.

Macroinvertebrate Index Results

- 4.2.4 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 the survey completed at Site 1B are summarised in **Table 4-5**.

Table 4-5 Macroinvertebrate index scores

Site name	Season	WHPT-NTAXA	WHPT-ASPT	CCI Score-interpretation	LIFE Score (Species) - interpretation	PSI Score (Species) - interpretation
1B	Autumn	27	6.60	13.3 – Fairly high conservation value	8.33 – High sensitivity to reduced flows	81.48 – Minimally sediments/unsedimented

- 4.2.5 The CCI score for site 1B was interpreted as 'Fairly High' conservation value. The highest CCI-scoring species recorded at this site were the stonefly, *Protonemura meyeri*, and the dragonfly *Calopteryx virgo*. Both species achieved a CCI score of five, which is considered as local.
- 4.2.6 The LIFE score for site 1B was 8.33 which indicates a high sensitivity to reduced flows. The PSI score of 81.48 indicates that the site is minimally sedimented/unsedimented.
- 4.2.7 The WHPT-NTAXA score of 27 recorded at Site 1B reflects very good, unpolluted and/or unimpacted conditions.

RICT Results

- 4.2.8 **Table 4-6** displays the Ecological Quality Ratio (EQR) and WFD macroinvertebrate status for the WHPT ASPT and NTAXA indices for Site 1B, 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 this site is based only on single season value and is included for interpretative purposes only.
- 4.2.9 Analysis using RICT is appropriate to apply to Site 1B because it is only suitable for freshwater (not estuarine or marine sites) on rivers or streams that are permanently flowing. RICT analysis cannot be taken on any site that identified as a ditch (not naturally flowing) as the application is only possible for sites on naturally or permanently flowing watercourses.

Table 4-6 Macroinvertebrate indicative WFD classification

Index	Season	1B
WHPT-NTAXA Ecological Quality Ratio (EQR)	Autumn	1.52 (High)
WHPT-ASPT Ecological Quality Ratio (EQR)	Autumn	0.90 (Good)
MINTA most probable WFD invertebrate classification	Autumn	Good [†]

† 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.

5. Discussion

- 5.1.1 A desk study and complementary field surveys were undertaken to help inform the proposed works for the Trawsfynydd substation. 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.

Designated Sites

- 5.1.2 There are six statutory designated sites within 2 km of the proposed works that require consideration due to associated aquatic ecology features present at these sites.
- 5.1.3 Three WFD waterbodies are located within 2 km of the proposed works being: Llyn Trawsfynydd (WBID: GB31034870), Prysor - Downstream Llyn Trawsfynydd (WBID: GB110065053751) and Prysor - Upstream Llyn Trawsfynydd (WBID: GB110065053752). These are classified as Moderate, Moderate, and Poor Ecological Status, respectively.

Aquatic Macroinvertebrates

- 5.1.4 No notable species were identified in the desk study or during field surveys.
- 5.1.5 The survey found that Site 1B contained a macroinvertebrate community adapted to tolerate minimal sedimentation, with high sensitivity to reduced flows. RICT analysis demonstrated that the site retains good water quality.
- 5.1.6 The site achieved a CCI score indicative of a macroinvertebrate community with a Fairly High conservation value. However, no species was recorded at a Conservation Score greater than five. Analysis of WHPT-ASTP revealed that the site is very Good, unpolluted and with unimpacted conditions.
- 5.1.7 No macroinvertebrate INNS were recorded in the desk study. However, the non-native New Zealand mud snail was observed during the field survey. This species is widespread and common across the UK. Whilst there are no statutory constraints arising from the presence of this species, best practice biosecurity measures should still be implemented.

Aquatic Macrophytes

- 5.1.8 No notable aquatic macrophyte species identified in the desk study.
- 5.1.9 The INNS Himalayan Balsam, New Zealand pigmyweed, and Japanese knotweed were identified within 2 km of the works area. These are all Schedule 9 species under Wildlife and Countryside Act 1981 (Ref 2.12) with Himalayan balsam also being listed under the Invasive Alien Species (Enforcement and Permitting) Order 2019 (Ref 2.6). These legislations make it an offence to spread these species and mitigation measures will be required to prevent their spread during all phases of the proposed works.

Fish

- 5.1.10 The desk study revealed the presence of the notable fish species brown/sea trout. This species is migratory, and its respective legislation is outlined in **Table 4-3**

Mitigation Measures

- 5.1.11 Given the presence of protected and non-native species, to inform the ecological impact assessment, mitigation measures have been identified below. The works proposed for Trawsfynydd Substation will be completed on existing hard standing with no direct effects to watercourses proposed. The mitigation measures proposed below are in relation to potential indirect effects which may be caused during the construction works:
- Preconstruction surveys of all watercourses proposed to be crossed to inform mitigation for 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 implemented to prevent pollution spills from construction or temporary site drainage. This will also cover appropriate biosecurity measures for INNS.
 - Any lighting as part of the construction/operation to be directed away from watercourses.
- 5.1.12 Should the construction methodology change to where watercourses are proposed to be directly or indirectly affected, then additional mitigation measures would be required. For example, the avoidance of works during ecologically sensitive times of year. In this instance, this would be the spawning of brown/sea trout and the migration of sea trout (smolts and adults). These timings have been outlined below in **Table 5-1**.

Table 5-1 - Key ecological timings for notable fish species identified

Receptor	Life Stage	J	F	M	A	M	J	J	A	S	O	N	D
Sea trout	Smolt migration												
	Adult migration												
	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 **Table A-1** below. The derived CCI scores generally vary from 0 to > 20, as detailed in the

Table A-2 below. The

Table A-2 below 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 (f)

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 **Table B-1** 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 **Table B-2**. 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 centimetres per second (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 **Table C-2**. 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) system¹ (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). As such, 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.

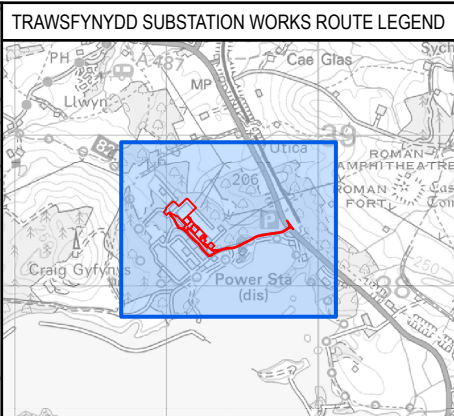
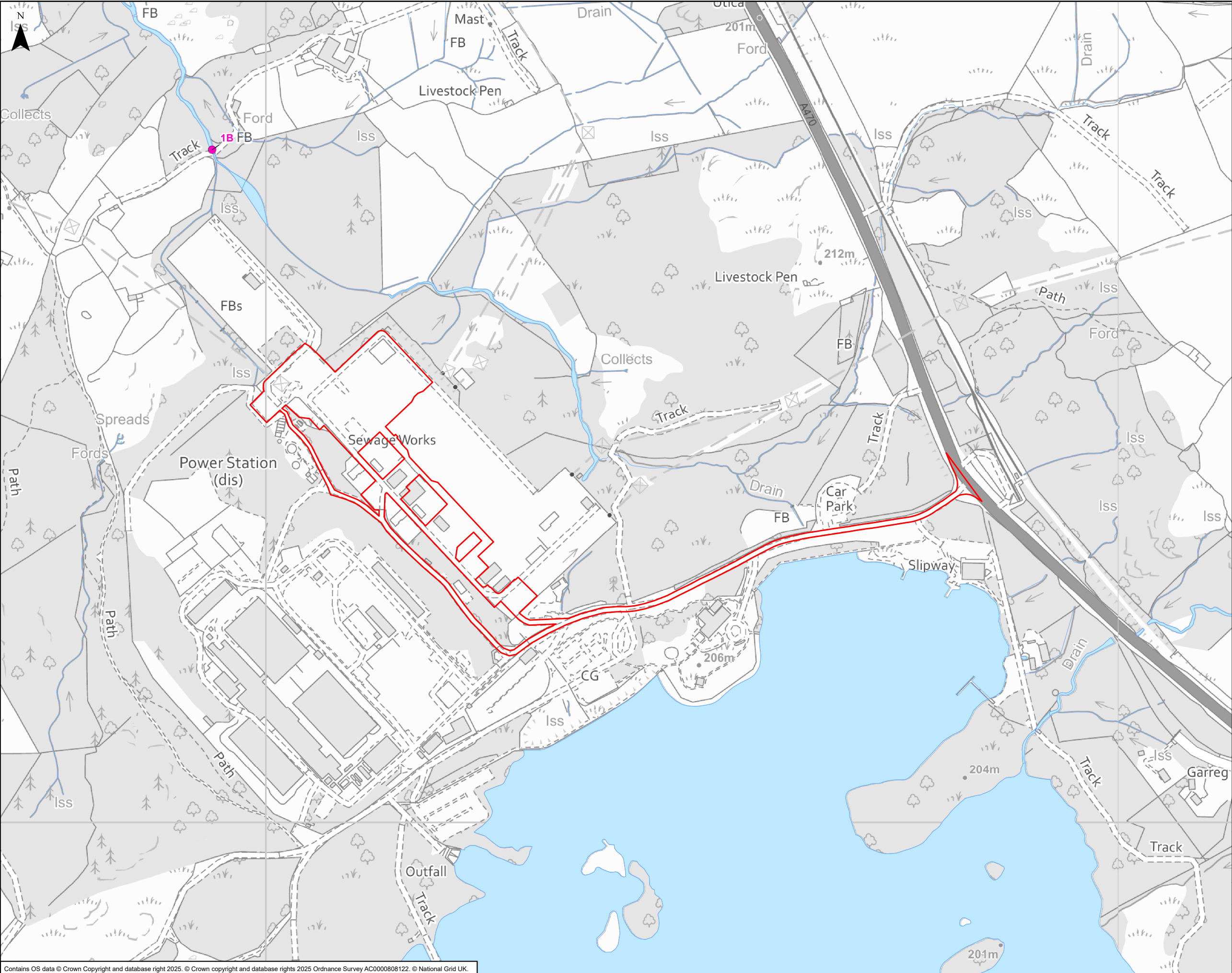
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Appendix E Macroinvertebrate Taxa List

Table E-1 – Macroinvertebrate Taxa List in Autumn 2024.

Family	Species	Site 1B
Flatworms		
Hydrobiidae	<i>Potamopyrgus antipodarum</i>	66
Limpets and mussels		
Sphaeriidae	Sphaeriidae (juvenile/damaged)	1
Sphaeriidae	<i>Pisidium/Euglesa/Odhneripisidium</i>	1
Worms		
Oligochaeta	Oligochaeta	20
Leeches		
Glossiphoniidae	<i>Glossiphonia complanata</i>	4
Crustaceans		
Gammaridae	<i>Gammarus pulex/fossarum agg.</i>	8
Gammaridae	<i>Gammarus pulex</i>	8
Crangonyctidae	<i>Crangonyx floridanus/pseudogracilis</i>	13
Mayflies		
Baetidae	Baetidae (juvenile/damaged)	1
Baetidae	<i>Baetis sp.</i>	1
Baetidae	<i>Baetis rhodani/atlanticus</i>	3
Heptageniidae	Heptageniidae (juvenile/damaged)	1
Heptageniidae	<i>Rhithrogena sp.</i>	2
Heptageniidae	<i>Ecdyonurus sp.</i>	3
Stoneflies		
Nemouridae	<i>Protonemura sp.</i>	3
Nemouridae	<i>Protonemura meyeri</i>	110
Leuctridae	<i>Leuctra sp.</i>	2
Leuctridae	<i>Leuctra fusca</i>	1
Perlodidae	<i>Perlodes mortoni</i>	1

Family	Species	Site 1B
Damselflies		
Calopterygidae	<i>Calopteryx virgo</i>	1
Cordulegasteridae	<i>Cordulegaster boltonii</i>	1
Beetles		
Hydraenidae	<i>Hydraena gracilis</i>	1
Elmidae	<i>Elmis aenea</i>	5
Elmidae	<i>Limnius volckmari</i>	21
Caddisflies		
Rhyacophilidae	<i>Rhyacophila sp.</i>	4
Rhyacophilidae	<i>Rhyacophila dorsalis</i>	3
Glossosomatidae	Glossosomatidae (juvenile/damaged)	10
Hydropsychidae	<i>Hydropsyche siltalai</i>	33
Limnephilidae	Limnephilidae (juvenile/damaged)	7
Limnephilidae	<i>Potamophylax sp.</i>	2
Limnephilidae	<i>Potamophylax latipennis</i>	1
Beraeidae	<i>Beraea maurus</i>	1
Leptoceridae	<i>Oecetis sp.</i>	1
Leptoceridae	<i>Oecetis testacea</i>	4
Goeridae	<i>Silo sp.</i>	1
Goeridae	<i>Silo pallipes</i>	5
Sericostomatidae	<i>Sericostoma personatum</i>	30
Trueflies		
Chironomidae	Orthoclaadiinae	22
Chironomidae	Tanytarsini	2
Pediciidae	Pediciidae	1
Simuliidae	Simuliidae (damaged/juvenile)	2
Simuliidae	Simulium ornatum group	1
Ceratopogonidae		1
Other Taxa		
Diptera	Diptera sp.	1

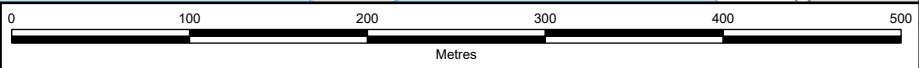


- Legend**
- Trawsfynydd Works Site Boundary
 - Ordinary Watercourse
 - Macroinvertebrate Survey Location

A	01/08/2025	Environmental Statement	MH	RC	JS
Rev	Date	Description	GIS	Chk	App

nationalgrid					
Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT					
Volume: VOLUME 8: APPENDICES TRAWSFYNYDD SUBSTATION WORKS					
Document Title: FIGURE 5.5.A.1 AQUATIC SURVEY LOCATIONS					
Creator: MH	Date: 01/08/2025	Checker: RC	Date: 01/08/2025	Approver: JS	Date: 01/08/2025
Document Type: FIGURE	Scale: 1:4,250	Format: A3	Sheets: 1 OF 1	Rev: A	

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5.5.B. Trawsfynydd Statutory Designated Sites Citations

1. Statutory sites designated for nature conservation

- 1.1.1 This document concerns the section of the Pentir to Trawsfynydd Reinforcement Project relating to Trawsfynydd Substation and is a Technical Appendix to **Volume 5 Trawsfynydd Works, 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.
- 1.1.2 This Appendix provides details on the designated sites in the ecology Study Areas of the Trawsfynydd works site, as described below and in **Section 5.3 of Volume 5 Trawsfynydd Works, 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 Trawsfynydd works site (extended to 30 km for SACs designated for bats), and their respective reasons for designation. These sites are shown in ES **Volume 5: Trawsfynydd Works, Figures 5.5.1 and 5.5.2**.
- 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 Trawsfynydd works site, and their respective reasons for designation. These sites are shown in ES **Volume 5: Trawsfynydd Works, Figure 5.5.2**.
- 1.1.5 There are six international statutory sites designated for nature conservation in the 10 km Study Area. There are two further SAC designated for bats within 30 km of the Trawsfynydd works site. Fifteen 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 Trawsfynydd 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 Trawsfynydd works site
Migneint-Arenig-Dduallt SAC	<p>Annex I habitats that are a primary reason for selection of this site are:</p> <ul style="list-style-type: none"> • European dry heaths. • Blanket bogs (priority feature). <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site are:</p> <ul style="list-style-type: none"> • Oligotrophic to mesotrophic standing waters with vegetation of <i>the Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>. • Natural dystrophic lakes and ponds. • Northern Atlantic wet heaths with <i>Erica tetralix</i>. • Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles. 	1.08 km north-east
Migneint-Arenig-Dduallt SPA	<p>The site qualifies as it is used regularly by 1% or more of the Great Britain population of a species listed on Annex 1, in any season (5-year peak mean for 1993/94 – 1997/98):</p> <ul style="list-style-type: none"> • Hen harrier (<i>Circus cyaneus</i>) (10-12 pairs = 2% of GB population). • Merlin (<i>Falco columbarius</i>) (9-12 pairs = 0.7-0.9% of GB population). • Peregrine (<i>Falco peregrinus</i>) (12 pairs = 1% of GB population). 	1.08 km north-east
Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd	<p>Annex I habitats that are a primary reason for selection of this site are:</p> <ul style="list-style-type: none"> • Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles. 	1.44 km south-west

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
Oakwoods and Bat Sites SAC	<ul style="list-style-type: none"> Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>) (priority feature). <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site are:</p> <ul style="list-style-type: none"> Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation. Northern Atlantic wet heaths with <i>Erica tetralix</i>. European dry heaths. <i>Tilio-Acerion</i> forests of slopes, screes and ravines (priority feature). Bog woodland (priority feature). <p>Annex II species lesser horseshoe bat (<i>Rhinolophus hipposideros</i>) is a primary reason for selection of this site.</p>	
Pen Llyn a'r Sarnau/ Llyn Peninsula and the Sarnau SAC	<p>Annex I habitats that are a primary reason for selection of this site are:</p> <ul style="list-style-type: none"> Sandbanks which are slightly covered by sea water all the time. Estuaries. Coastal lagoons (priority feature). Large shallow inlets and bays. Reefs. <p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site are:</p> <ul style="list-style-type: none"> Mudflats and sandflats not covered by seawater at low tide. 	3.35 km north-west

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
	<ul style="list-style-type: none"> • <i>Salicornia</i> and other annuals colonizing mud and sand. • Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>). • Submerged or partially submerged sea caves. <p>Annex II species present as a qualifying feature, but not a primary reason for site selection are:</p> <ul style="list-style-type: none"> • Bottlenose dolphin (<i>Tursiops truncatus</i>). • Otter (<i>Lutra lutra</i>). • Grey seal (<i>Halichoerus grypus</i>). 	
Afon Eden - Cors Goch Trawsfynydd SAC	<p>Annex I habitat active raised bogs (priority feature) is present as a qualifying feature, but not a primary reason for selection of this site.</p> <p>Annex II species that are a primary reason for selection of this site are:</p> <ul style="list-style-type: none"> • Freshwater pearl mussel (<i>Margaritifera margaritifera</i>). • Floating water-plantain (<i>Luronium natans</i>). <p>Annex II species present as a qualifying feature, but not a primary reason for site selection are:</p> <ul style="list-style-type: none"> • Atlantic salmon (<i>Salmo salar</i>). • Otter. 	3.36 km south
Rhinog SAC	<p>Annex I habitats that are a primary reason for selection of this site are:</p> <ul style="list-style-type: none"> • European dry heaths. • Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles. 	4.60 km south-west

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
	<p>Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site are:</p> <ul style="list-style-type: none"> • Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>. • Northern Atlantic wet heaths with <i>Erica tetralix</i>. • Alpine and Boreal heaths. • Blanket bogs (if active bog) (*priority feature). • Depressions on peat substrates of the <i>Rhynchosporion</i>. <p>Annex II species floating water-plantain (<i>Luronium natans</i>) is present as a qualifying feature, but not a primary reason for site selection.</p>	
Mwyngloddiau Fforest Gwydir/Gwydyr Forest Mines SAC	<p>Annex I habitat Calaminarian grasslands of the <i>Violetalia calaminariae</i> is present as a primary reason for selection of this site.</p> <p>Annex II species lesser horseshoe bat is a qualifying feature, but not a primary reason for site selection.</p>	19.87 km north
Glynllifon SAC	The Annex II species that is a primary reason for selection of this site is lesser horseshoe bat. Glynllifon is both a maternity and hibernation site for a large population of lesser horseshoe bats.	21.08 km north-west
Migneint-Arenig-Dduallt SSSI	<p>Features of Special Scientific Interest Habitats:</p> <ul style="list-style-type: none"> • Blanket bog. • Dry heath. • Wet heath. 	1.08 km north-east

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
	<ul style="list-style-type: none"> • Upland broad-leaved woodland and scrub. • Lakes (nutrient-poor and brown, peaty lakes). • Flush and spring. • A mixture of associated habitats including grassland and rush pasture, swamp, cliff-ledge communities, vegetated scree, rock crevice communities, boulders, scree, rivers, streams and bracken. <p>Plants:</p> <ul style="list-style-type: none"> • Nationally scarce plants (marsh clubmoss (<i>Lycopodiella inundata</i>), tall bog-sedge (<i>Carex magellanica</i>) and rock stonecrop (<i>Sedum forsterianum</i>)) and regionally rare or threatened flowering plants (mountain everlasting (<i>Antennaria dioica</i>), northern bedstraw (<i>Galium boreale</i>), dwarf willow (<i>Salix herbacea</i>), few-flowered sedge (<i>Carex pauciflora</i>), water sedge (<i>Carex aquatilis</i>) and stiff sedge (<i>Carex bigelowii</i>)). • An assemblage of mosses and liverworts which are nationally rare, nationally scarce and/or Atlantic species including the nationally rare liverwort, Welsh notchwort (<i>Gynocolea acutiloba</i>). <p>Animals:</p> <ul style="list-style-type: none"> • The upland breeding bird assemblage. • Hen harrier. • Merlin. • Peregrine. • Insects and other invertebrates: 	

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
	<ul style="list-style-type: none"> — The upland invertebrate assemblage. — The locally uncommon large heath butterfly (<i>Coenympha tullia</i>). — The nationally rare ground beetle (<i>Trechus rivularis</i>). — The nationally scarce weevil (<i>Anthonomus conspersus</i>). — The nationally rare fungus gnat (<i>Brevicornu kingi</i>). 	
Coed y Rhygen SSSI	<p>Features of Special Scientific Interest</p> <p>Habitats:</p> <ul style="list-style-type: none"> • Oak woodland. <p>Plants:</p> <ul style="list-style-type: none"> • Mosses and liverworts. • Lichens. <p>Animals:</p> <ul style="list-style-type: none"> • Invertebrates (notably the nationally rare <i>Triogma trisulcata</i> and the nationally scarce <i>Pedicia unicolor</i>). <p>Breeding bird population typical of western oakwoods.</p>	1.44 km south-west
Coedydd De Dyffryn Maentwrog SSSI	<p>Features of Special Scientific Interest</p> <p>Habitats:</p> <ul style="list-style-type: none"> • Broadleaved woodland. <p>Plants:</p> <ul style="list-style-type: none"> • Mosses (notably the rare moss <i>Sematophyllum demissum</i>) and liverworts. 	1.62 km north

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
	<ul style="list-style-type: none"> • Lichens. • Slime moulds. <p>Animals:</p> <ul style="list-style-type: none"> • Lesser horseshoe bat. <p>Afon Prysor runs through the site</p>	
Ceunant Cynfal SSSI	<p>Features of Special Scientific Interest</p> <p>Habitats:</p> <ul style="list-style-type: none"> • Oak woodland. <p>Plants:</p> <ul style="list-style-type: none"> • Mosses and liverworts. • Lichens. <p>Animals:</p> <ul style="list-style-type: none"> • Breeding bird population typical of western oakwoods. 	2.65 km north
Morfa Harlech SSSI	<p>Features of Special Scientific Interest</p> <p>Marine features:</p> <ul style="list-style-type: none"> • The Glaslyn and Dwyryd estuary - marine interest. • Morfa Harlech beach - marine interest. • A marine biotope (physical habitat and the associated community of species including animals and plants) lower shore muddy gravel with sand gaper clam (<i>Mya arenaria</i>) and bristle worms (Polychaeta species.). <p>Terrestrial habitats:</p>	3.12 km north-west

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
	<ul style="list-style-type: none"> Sand dunes. Salt marsh. <p>Plants:</p> <ul style="list-style-type: none"> The nationally rare plant dwarf spike rush (<i>Eleocharis parvula</i>). The nationally rare plant Welsh mudwort (<i>Limosella australis</i>). The nationally rare petalwort (<i>Petalophyllum ralfsii</i>). Three nationally rare mosses. Nationally scarce mosses and liverworts. <p>Animals:</p> <ul style="list-style-type: none"> Breeding bird assemblage. Wintering pintail (<i>Anas acuta</i>). Sand lizard (<i>Lacerta agilis</i>). Otter. Water vole (<i>Arvicola amphibius</i>). The nationally rare mining bee <i>Colletes cunicularius</i>. Invertebrate assemblage of sand dune specialists. 	
Coedydd Dyffryn Ffestiniog (Gogleddol) SSSI	<p>Features of Special Scientific Interest</p> <p>Habitats:</p> <ul style="list-style-type: none"> Western sessile oak woodland. 	3.22 km north

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
	Plants: <ul style="list-style-type: none"> • Mosses and liverworts. • Lichens. • Slime moulds. Animals: <ul style="list-style-type: none"> • Lesser horseshoe bat. • Breeding bird population typical of western oakwoods. 	
Afon Eden - Cors Goch Trawsfynydd SSSI	Features of Special Scientific Interest Habitats: <ul style="list-style-type: none"> • River. • Raised bog, blanket bog, wet modified bog and valley mire. • Broadleaved woodland. • Neutral and acid grassland. • Mixture of associated habitats including marshy grassland, flush, swamp. Plants: <ul style="list-style-type: none"> • Floating water-plantain. • Regionally rare plants (bog-rosemary (<i>Andromeda polifolia</i>), water sedge)). • An assemblage of lichens that are nationally rare and nationally scarce. Animals: <ul style="list-style-type: none"> • Freshwater pearl mussel. 	3.36 km south

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
	<ul style="list-style-type: none"> • Atlantic salmon. • Large heath butterfly. • Otter. 	
Cwm Cynfal SSSI	Designated due to its floristic importance in which the pattern of vegetation is closely related to the pattern of the underlying basic and acidic soils and rocks. The flora is particularly rich in ferns and bryophytes. Notable higher plants include mountain melick (<i>Melica nutans</i>).	4.57 km north-east
Rhinog SSSI	<p>Features of Special Scientific Interest</p> <p>Habitats:</p> <ul style="list-style-type: none"> • Heathland. • Blanket bog. • Ungrazed ledges. • Calcareous grassland and flush. • Woodland. • Lakes. <p>Plants:</p> <ul style="list-style-type: none"> • Lichens and liverworts. • Mosses. • Internationally rare floating water-plantain. • Nationally scarce marsh clubmoss. • Regionally uncommon stiff sedge and dwarf willow. 	4.60 km south-west

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
	<p>Animals:</p> <ul style="list-style-type: none"> Locally important breeding populations of upland birds. Birds typical of western oak woodland. 	
Coed Y Rhygen NNR	<p>Features of the NNR</p> <p>Habitats:</p> <ul style="list-style-type: none"> Oak woodland, considered an example of remnant Celtic (Atlantic) rainforest. <p>Plants:</p> <ul style="list-style-type: none"> Mosses and liverworts. 	1.43 km south-west
Ceunant Llennyrch NNR	<p>Features of the NNR</p> <p>Habitats:</p> <ul style="list-style-type: none"> Oak woodland, considered an example of remnant Celtic (Atlantic) rainforest. <p>Plants:</p> <ul style="list-style-type: none"> Mosses and liverworts; 230 species recorded here. Lichens; considered one of the richest woodland lichen sites in Wales. <p>Animals:</p> <ul style="list-style-type: none"> Woodland bird assemblage. Notable species include redstart (<i>Phoenicurus phoenicurus</i>), wood warbler (<i>Phylloscopus sibilatrix</i>) and pied flycatcher (<i>Ficedula hypoleuca</i>). <p>Afon Prysor runs through the reserve.</p>	1.71 km west
Coed Camlyn NNR	<p>Features of the NNR</p> <p>Habitats:</p>	2.57 km north-west

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
	<ul style="list-style-type: none"> • Oak woodland. <p>Plants:</p> <ul style="list-style-type: none"> • Mosses and liverworts. • Lichens. <p>Animals:</p> <ul style="list-style-type: none"> • Woodland bird assemblage. 	
Ceunant Cynfal NNR	<p>Features of the NNR</p> <p>Habitats:</p> <ul style="list-style-type: none"> • Oak woodland, considered an example of remnant Celtic (Atlantic) rainforest. <p>Plants:</p> <ul style="list-style-type: none"> • Mosses and liverworts; 154 species recorded here. • Lichens. <p>Animals:</p> <ul style="list-style-type: none"> • Invertebrates. • Lesser horseshoe bat. • Woodland bird assemblage. 	2.71 km north-east
Coedydd Maentwrog NNR	<p>Features of the NNR</p> <p>Habitats:</p> <ul style="list-style-type: none"> • Oak woodland, considered an example of remnant Celtic (Atlantic) rainforest. <p>Plants:</p>	3.30 km north

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Trawsfynydd works site
	<ul style="list-style-type: none"> • Mosses and liverworts: 200 species recorded here. • Lichens: 120 species recorded here. <p>Animals:</p> <ul style="list-style-type: none"> • Invertebrates. • Lesser horseshoe bat. • Woodland bird assemblage. 	
Coed Cymerau NNR	<p>Features of the NNR</p> <p>Habitats:</p> <ul style="list-style-type: none"> • Ancient broadleaved oak woodland. • Semi-improved acidic grassland. • Mires. <p>Animals:</p> <ul style="list-style-type: none"> • Lesser horseshoe bat. • Barn owl (<i>Tyto alba</i>). • Woodland bird assemblage. 	3.74 km north

5.5.C Trawsfynydd 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 The Trawsfynydd works site ('the Site') covers an area approximately 3.05 hectares (ha), which includes the existing access road into the substation; however, the permanent development will be entirely within the existing substation footprint. **Appendix A** Tree Constraints Plan (TCP) shows the Site.
- 1.1.3 The proposed works are shown on the Tree Protection Plan (TPP) at **Appendix C** and comprises:
- Removal of redundant cables.
 - New 400 kV cables, shunt reactor and gantry.
 - Replacement downloads from Tower 4ZC005.
 - Alterations to the fence alignment.
- 1.1.4 Access to the Trawsfynydd works site would be gained via the existing Trawsfynydd Substation access road off the A470. It is not anticipated that any works to the access road would be required.
- 1.1.5 This report identifies preliminary information in relation to the nature and level of constraints posed by existing trees on the Site and considers the likely direct and indirect impacts of a proposed development. The TPP identifies trees to be removed or retained and illustrates how retained trees are to be protected.

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 to trees, woodlands and hedgerows and 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 LPA is Eryri (Snowdonia) National Park Authority.

- 1.2.4 The Eryri Local Development Plan 2016 – 2031 (Ref 1.2) contains the National Park Authority's policies and approach to determining Development Proposals that have the potential to impact on trees and woodland.
- 1.2.5 Extracts from the National Park Local Development Plan are in **Appendix D.2**.

British Standard

- 1.2.6 '*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 the context of the development.
- 1.2.7 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 then 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.
- 1.2.8 An Arboricultural Impact Assessment is then developed to identify the likely direct and indirect impacts of the Project, and a TPP is prepared to identify trees to be removed or retained and to illustrate how retained trees are to be protected.
- 1.2.9 An Arboricultural Method Statement (AMS) is often required as a condition of planning consent to detail how sensitive operations are to be undertaken near to retained trees.

1.3 Methodology

- 1.3.1 A desk study has been undertaken to identify constraints from statutory and non-statutory designations on Site. The findings of the desk study are in **Section 3**.
- 1.3.2 The fieldwork Study Area comprises woodland around the northern and western boundary of the existing substation and the treed areas adjacent access roads to the east of the disused power station. The fieldwork was undertaken in December 2024 and comprised a preliminary, non-intrusive, visual survey undertaken from ground level with the specific intention of evaluating the quality and benefits of trees within the tree survey Study Area. 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 Trees have been plotted indicatively with reference to Ordnance Survey base mapping, GPS positions, site features and publicly available aerial photography. All positions must be considered indicative only and the relative distances of features must be measured on the Site.
- 1.3.4 Data for two tree groups, UTF76 and UTF77, which are in the substation, have been provided by AECOM ecologists. Positions for these groups have been based on aerial imagery.
- 1.3.5 The survey was otherwise conducted in accordance with the requirements of BS5837 Trees in relation to design, demolition and construction – Recommendations (BS5837) (Ref 1.3).

- 1.3.6 Where further inspection is deemed appropriate to ascertain the condition of the tree or other arboreal features, this has been identified within 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 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 the RPA of all surveyed trees is depicted as a circle and no RPAs have been amended.
- 1.3.8 The RPA of veteran or ancient trees has been amended in accordance with standing advice (Ref 1.4) from Natural England and the Forestry Commission and established best practice, which requires the RPA to be a radius equivalent to 15 x stem diameter or canopy spread +5 metres (m), whichever is the greater area.
- 1.3.9 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**.
- 1.3.10 The tree categorisation process recommended by BS5837 (Ref 1.3) is summarised in the **Table 1-1** and corresponds with the tree canopy outline shown on the TCP included as **Appendix A** and the information in the Tree Survey Schedule included as **Appendix B**.

Table 1-1 BS5837:2012 Tree categorisation (Ref 1.3)

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 that provide essential benefits to society and the wider environment. Any proposed works with the potential to impact on trees must take into consideration the value of trees on the Site, 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 within 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. 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 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 is shown on the TCP included in **Appendix A**.
- 2.2.6 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 within RPAs, which allow the protection of roots and soil structure that are essential for tree growth and keep any incursion to a minimum.

- 2.2.7 Further steps to improve or increase the useable rooting area available to the tree may also be required.

2.3 Above ground constraints

- 2.3.1 Tree stems and branches can restrict available space on the 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 works and future land use. Annual tree growth can lead to direct damage if stems or branches come into physical contact with structures and this must also be taken into consideration.

2.4 Trees and Risk in the Context of Development

- 2.4.1 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 2.1).
- 2.4.2 The tree survey carried out as the basis of this report has been undertaken primarily for planning purposes and is not designed to assess the safety of trees on the Site.
- 2.4.3 The Construction (Design and Management) Regulations (2015) (Ref 2.2) 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 (HSE) could seek to prosecute those responsible. Additionally, third parties may make claims for damages.

2.5 Trees and Wildlife

- 2.5.1 Consideration must be given to the presence of species protected under the Wildlife and Countryside Act 1981 - as amended (Ref 2.3), the Countryside Rights of Way Act 2000 (Ref 2.4) and the Conservation of Habitats and Species Regulations 2017 (Ref 2.5), in particular the presence of bats and nesting birds. It is recommended that wherever possible, significant tree/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.

2.6 Tree Works

- 2.6.1 Any tree surgery recommendations contained within this report are to be undertaken in accordance with BS3998:2010 Tree work – Recommendations (BS3998) (Ref 2.6) 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) and Conservation Areas

- 3.1.1 AECOM contacted Eryri (Snowdonia) National Park Authority in November 2024 and was informed that there were no TPOs or Conservation Area designations identified that could affect trees in or immediately adjacent the Site.

Site of Special Scientific Interest (SSSI)

- 3.1.2 AECOM checked Datamap Wales (Ref 3.1) and there were no SSSI designations in or adjacent the Site.
- 3.1.3 There are six international statutory sites for nature conservation (i.e., Special Area of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites) within 10 kilometres (km) and two further SACs designated for bats within 30 km of the Site.
- 3.1.4 Fifteen other statutory designated sites for nature conservation (national designations: Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs), Local Nature Reserve (LNRs) are present within 5 km.

Felling Licence

- 3.1.5 National Grid as a licence holder for transmission under The Electricity Act 1989 (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 (m³) 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).
- 3.1.6 Full planning consent is an exemption from the need to apply for consent for works to trees protected by the Hedgerow Regulations (Ref 3.3), a TPO, the need to give notice of the intention to undertake works within a Conservation Area and the need to apply for a Felling Licence with Natural Resources Wales (to fell more than 5 m³ per calendar quarter). TPOs can be made at any time. Relevant checks should be made to Eryri National Park Authority to check for new TPOs prior to commencement of any works on Site.

3.2 Non-Statutory Designations

Ancient Woodland

- 3.2.1 AECOM checked the DataMapWales website (Ref 3.1) on 14th January 2025. Two woodland compartments outside of the Site, one to the west and one to the east to the

north of the A470 site entrance, are listed in the ancient woodland inventory (Ref 3.4). The location of these woodlands are shown in Plate 1. Ancient woodland (including conifer plantation on ancient woodland) is irreplaceable natural resource and given a very high priority in the planning process. All such features must be retained and their buffer zones fully respected.

- 3.2.2 Two surveyed woodland groups W20 and W22 contained multi-stemmed willows on a raised plateau adjacent to the Site along the access road, with stem diameters indicating ancient age class, and several mature willows that displayed veteran characteristics.
- 3.2.3 Ancient woodland and ancient and veteran trees are an irreplaceable natural resource, which is afforded a high priority in the planning process, *“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”* (Ref 1.1)
- 3.2.4 In accordance with the Step Wise Approach in PPW (Ref 1.1), 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.

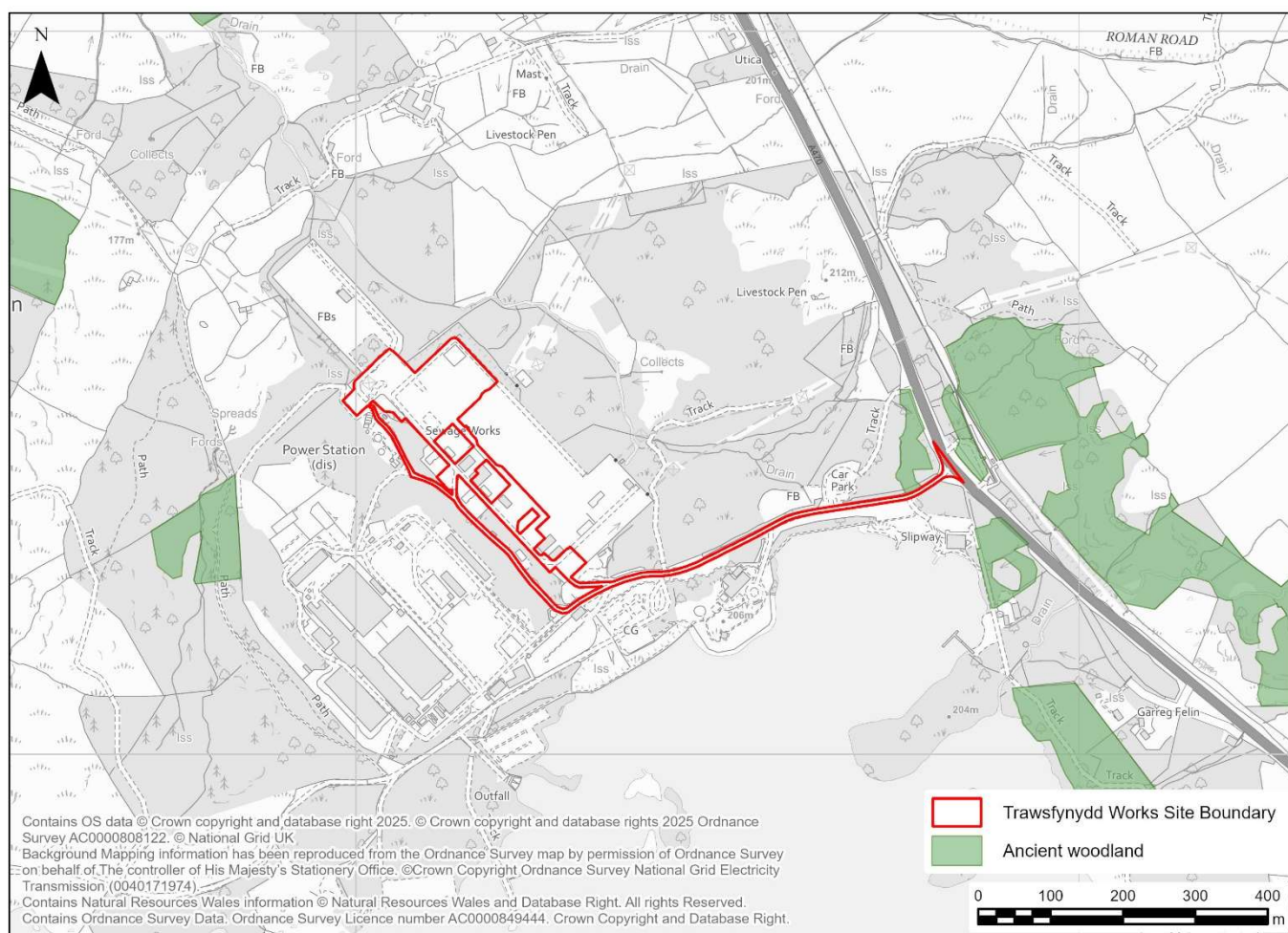


Plate 1 Map of the works site showing Ancient Woodland Inventory records of ancient woodland within the surrounding landscape

- 3.2.5 AECOM also checked the Woodland Trust Ancient Tree Inventory (Ref 3.4) (3rd January 2025) for the presence of any notable, veteran or ancient trees within or immediately adjacent to the Site and none have been recorded.
- 3.2.6 However, trees with veteran and ancient characteristics have been identified during detailed tree survey fieldwork. This is discussed further in **Section 4** of this report.

4. Field Work Observations

4.1 The Site

- 4.1.1 The works site lies on relatively flat ground surrounded by mixed, semi-natural woodland. The former power station site abuts the southern boundary of Trawsfynydd Substation.
- 4.1.2 The existing 4ZC overhead line exits the Trawsfynydd Substation to the north-west, additional overhead lines leave to the east.
- 4.1.3 The existing Trawsfynydd Substation is accessed from the east via the A470, which runs in a north-west to south-east direction approximately 560 m east of the Trawsfynydd works site.

4.2 The Trees

- 4.2.1 A combined total of 75 tree features including, 53 individual trees, six tree groups, one hedgerow and 15 woodland groups were recorded during the survey. Two additional groups that were not part of the tree survey have been included and categorised based on information from AECOM Ecologists.
- 4.2.2 Of these identified tree features, 16 features are of high quality (category A); 49 of moderate quality (category B); 10 of low quality (category C); and 2 identified as 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 the survey area.

Table 4-1 Summary of tree features in each quality category.

Quality Category	A	B	C	U
Number of tree features	16	47 (+2)	10	2

Summary of tree features in each quality category

- 4.2.4 Individual trees have been recorded along the boundary of the substation and along access roads in the disused power station site to record tree data in finer detail for greater understanding of the impacts of the proposed works on individual trees. The rest of the tree features have been recorded as groups, which better reflects the nature of the surrounding tree cover, which is a patchwork of woodland features.
- 4.2.5 The most significant tree features are trees of ancient or veteran status, which provide irreplaceable habitat and are often culturally important to the locale. Trees T16, T17, T18, T21 and T23 meet the stem girth parameters of ancient tree status. T23 exhibits

features associated with veteran status, such as hollowing and deadwood habitat. The woodland group W20 contains willows with the dimensions that indicate ancient status. W22 also contains a number of multi-stemmed willow with veteran features.

- 4.2.6 The surrounding woodland is mainly comprised of broadleaf woodland with a broad mixture of planted species intermixed with riparian species, such as grey willow and downy birch. Established conifer plantation are also present in compartments away from the bounds of both the substation and the disused power station grounds.
- 4.2.7 An unsurveyed area of woodland to the north-west of the power station is recorded as conifer plantation on the Ancient Woodland Inventory. A further unsurveyed woodland parcel to the east, at the shared entrance to the substation and disused power station from the A470, is recorded as being Ancient Semi Natural Woodland (Ref 3.1). Both woodland parcels are outside the Site.
- 4.2.8 The trees collectively form part of the naturalistic surrounding landscape, which contributes to the visual amenity of the location within the Eryri (Snowdonia) National Park.
- 4.2.9 The surveyed trees are largely moderate quality Category B. However, across the Site, the trees vary in their quality from very low (Category U) to high (Category A) value.
- 4.2.10 Site photographs are 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 immediately adjacent to 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 brief summary of trees to be removed, tree works and incursions related to the proposed works are 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	0	UTF76 & UTF77 (unsurveyed features)	0	0
Total	0	Two groups	0	0
Trees which may require some incursion into their construction exclusion zone to allow the proposed works	0	W39, W29 and W24	0	0
Total	0	Three woodland areas	0	0
Trees to be pruned to facilitate the proposed works	T16, W22 & T26	T8, W24, W29 and W39	H1 & W4	0
Total	Two individual trees and one woodland	One individual tree and three woodlands	One hedge and one woodland	0

5.2 Trees to be Removed

- 5.2.1 In the Site, two unsurveyed tree features are to be removed (UTF76 and UTF77) to facilitate the proposed works; these two groups are classed as moderate quality (Category B). These tree groups are growing in the substation and would require

removal for fire safety reasons regardless of the proposed works. Their removal does not represent an additional impact from the proposed works.

- 5.2.2 No Category U trees require removal to facilitate the proposed works, however the removal of two trees (T3 and T12) is justified as part of the general management of site trees due to their condition.
- 5.2.3 All of the trees to be removed are in the red line application boundary.
- 5.2.4 Tree removals are required for fire safety reasons and to avoid inappropriate tree retention close to new electricity infrastructure.
- 5.2.5 All of the remaining recorded trees can be retained and protected.

5.3 Incursions within the RPA or Canopy Spread

Background

- 5.3.1 The proposed works will require significant excavation in an internal access road inside the fenced substation adjacent to W39 and W24, within their RPAs. These works may impact on the roots or rooting environment of retained trees in these woodland groups. In some cases, this may lead to premature tree death through the compaction of soils and the severance of roots enabling colonisation of the inner wood substrate (e.g., by wood decay fungi); a reduction of water uptake and energy storage; hydraulic dysfunction of sapwood and a potentially significant negative effect on tree stability.
- 5.3.2 Root death may result where soil levels are increased within RPAs causing a reduction in the normal exchange of soil gases, soil water and a significant increase in mechanical resistance within the soil. The compaction of soil from construction access in RPAs is likely to lead to root death through the above impacts.
- 5.3.3 Action can be taken to avoid, reduce or and/or mitigate the above impacts, as outlined in the subsections below.

Construction Access

- 5.3.4 H1, W4, T8, T16, W22, T26, all have canopies or foliage overhanging the power station access road. Trees in W24, W29, W39 have canopies that overhang or are near both the power station access road and the substation access roads and clearance above the roads is being maintained through pruning. Tree works are further addressed in **Section 6.4**.
- 5.3.5 All access from the highway to the works site will be restricted to areas of hardstanding.

High Voltage Cable Installation

- 5.3.6 The north-eastern edge of the RPAs of W24, W29 and W39 will have incursions from the installation of high voltage (HV) cables in the fenced substation's internal access road. The cables will be installed in ducts and pre-cast concrete troughs, which will be contained within 1 m deep trenches.
- 5.3.7 Excavation in the RPAs of trees W24, W29 and W39 will be undertaken under the supervision of the Project Arboriculturist.

- 5.3.8 The final alignment of the trenches will be adjusted to provide the greatest clearance from the trees as possible. Where excavation must occur within an RPA, the edge of the trench closest to the trees will be excavated carefully under the supervision of an arboriculturist to a methodology to be agreed with Eryri National Park Planning Authority. Any roots <25 mm will be carefully pruned back to the face of the trench and any larger roots will be assessed by the arboriculturist who will advise on appropriate management. Following root pruning, the arboriculturist will consider the requirement for any additional tree removals or remedial works and will liaise with the Local Authority Tree Officer, as required.
- 5.3.9 All access for cable installation works will be via existing hard surfacing. Should soft ground in RPAs need to be accessed, ground protection adequate to prevent compaction will be used within RPAs to preserve soil structure on unsurfaced ground. Where appropriate, trench boxes or sheet piles will be employed to reduce the extent of excavation and access required within RPAs.
- 5.3.10 Where spoil from excavations is stored in RPAs it must be stored on appropriate ground protection. Excavations are to be lined with impermeable sheeting to prevent the leaching of any toxic chemicals into the surrounding soil.
- 5.3.11 All works within RPAs must be supervised by an arboriculturist.

5.4 Tree Works

- 5.4.1 Tree removals and/or tree pruning works to facilitate the proposed works are detailed in the Tree Survey Schedule, included as **Appendix B**. Features H1, W4, T8, T16, W24 and W39 are growing from the same level as the power station access road, along which the shunt reactor will be transported to Site. These individual trees and those trees along the roadside edge of the woodland areas will likely require some reduction pruning of branch ends over the access road to provide adequate clearance for the shunt reactor.
- 5.4.2 The shunt reactor delivery is an abnormal indivisible load (AIL) requiring circa 5.2 m clearance from ground level to pass unobstructed and with a width of circa 4 m and with a large turning circle due to a large train length of 35 – 65 m..
- 5.4.3 This level of pruning does not represent a change as clearance between the roads and canopies is required regardless of the proposed works and it is unlikely to have a long-term negative impact on the health or amenity of the trees.
- 5.4.4 A dead alder (T3) and a dead willow (T12) are recommended to be felled due to their condition and proximity to the road. The removal of these trees would be necessary regardless of the proposed works.
- 5.4.5 No additional works to retained trees are likely to be required. All tree work is to follow the principles of *BS3998: 2010 Treework – Recommendations* (Ref 2.6) 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).
- 5.4.6 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 Eryri National Park Authority.

5.5 The Future Impact of Retained Trees

- 5.5.1 The future impact of trees on the Site must be considered in relation to any development proposals. Trees and groups to be retained must be afforded suitable space to ensure they remain viable in the long term. Trees that are currently not fully grown will increase in size and this must be considered in conjunction with the Proposed Development and future use of the Site.
- 5.5.2 The retained trees are outside the Site boundary and outside the existing substation extents and will not have a significant future impact on the future use of the Site. Management of the trees on and adjacent to the Site will be consistent with current management which maintains clearances from the electrical infrastructure for fire safety purposes and away from boundary fences to maintain site security.
- 5.5.3 For electricity infrastructure, the main future impacts will be the safety requirement to maintain clearance from overhead power lines, pylons and related infrastructure and considerations with regards to the future growth of trees in proximity to above ground apparatus. National Joint Utilities Group (NJUG) 4 (Ref 5.2) succinctly summarises the reasons for the clearances in Section 3.3:

“3.3 Special Considerations when Planning the Installation of Above Ground Apparatus

The aerial parts of a tree are constantly growing larger and are prone to bend and flex in windy conditions. As a result parts of a tree may come close to or into contact with above ground apparatus.

3.3.1 Electricity The overhead apparatus belonging to the electricity supply industry is subject to minimum clearances from adjacent trees and other structures. This is to ensure the safety of the public and protect against flashover and loss of supply. Local conditions may require an increase in the clearances specified in current electricity industry standards.

Part IV of The Electricity Supply Regulations covers the construction of power lines above ground. Schedule 4(9) of the Electricity Act 1989 enables electricity companies to require the felling or lopping of trees which obstruct or interfere with the working of their lines or constitute an unacceptable source of danger.

In addition to the above reference should be made to the Energy Networks Association (ENA) document Engineering Recommendation G55/1- Safe Tree Working in Proximity to Overhead Electric Lines (see section 8).

Clearances between overhead electricity cables and vegetation are specified in TS 43-8 (Issue 5) Overhead Line Clearances, 2019: This specification defines the minimum clearances between ENAMC overhead lines at all nominal system voltages and objects, ground....”

5.6 Tree Protection

- 5.6.1 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 (or utilising existing fencing) where no access will be permitted. Where access is necessary within this area, special measures, such as the use of ground protection and arboricultural supervision, are generally required.

- 5.6.2 Along the border between the substation and the power station is a security fence, which runs along the north-eastern edge of W24, W29 and W39. In these locations there will be no requirement for tree protection fencing as the existing fencing will provide the equivalent protection.
- 5.6.3 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 undertaken near retained trees. Issues to be addressed by the AMS are listed in the conclusion of this report.

5.7 Site Organisation, Storage and Use of Materials, Plant and Machinery

- 5.7.1 Planned works are in the existing site boundaries (trees are managed to ensure clearance) therefore no additional site management is anticipated. The default position is that 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.
- 5.7.2 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, builders' 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.
- 5.7.3 The storage of materials and arisings 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.
- 5.7.4 For these reasons, the storage of materials and any washing, mixing or refuelling will take place in agreed allocated areas at least 5 m from the edge of the RPA of retained trees.
- 5.7.5 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.
- 5.7.6 Particular care is required where high sided vehicles, long reach machinery and plant with jibs, booms and counterweights are to operate near retained trees. A banksman will be used where the movement of plant or long reach machinery occurs within 5 m of any part of a retained tree to ensure no damage is sustained.

5.8 Services

- 5.8.1 Excavation to install services has the potential to result in unacceptable root severance that could result in instability, dysfunction or the death of trees. Repeated incursions are particularly damaging and must be avoided by bundling services wherever possible.
- 5.8.2 Where existing services become redundant within the RPA of a retained tree, the default position must be that they be decommissioned and left in situ. Where this is not feasible, as is the case for the installation of the new underground high voltage cables being replaced in the substation, the guidance on managing exposed roots (**Appendix F**) will be followed.
- 5.8.3 The high voltage cables are to be installed into the existing fenced substation's internal access road using open cut trenching techniques (as discussed in **Section 6.3**). The trenching is occurring within the outer edge of the RPA of woodland groups W24, W29 and W39. These works have the potential to cause physiological and structural damage to trees along the edge. The Project Arboriculturist will be on Site to supervise the excavation works to monitor and record any damage to tree roots and where necessary advise on appropriate management to maintain tree safety following the installation works.

6. Conclusion

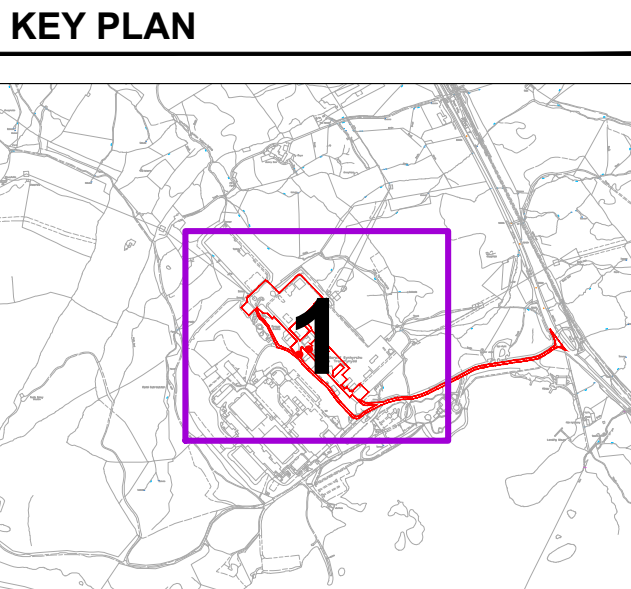
- 6.1.1 In total, 75 tree features including, 53 individual trees, six tree groups, one hedgerow and 15 woodland groups have been recorded during the survey. Two unsurveyed tree groups (UTF76 and UTF77) in the substation are additionally included within the report.
- 6.1.2 The proposed works will require the removal of the two unsurveyed tree group features classified as moderate quality (Category B). These tree groups are growing within the substation grounds and would require removal for safety reasons regardless of the proposed works.
- 6.1.3 Two Category U trees do not require removal for the proposed works but are not suitable for long term retention in the current context of the Site and their removal is justified regardless of the proposed works.
- 6.1.4 Tree removals are required due to fire safety requirements, and in the case of UTF77, to avoid inappropriate tree retention close to the new energy infrastructure.
- 6.1.5 Ongoing tree management will be necessary around the periphery of the substation to maintain safe clearances between the canopies of outside trees and the energy infrastructure and equipment. This represents no change to current management.
- 6.1.6 Due to the low stature of the trees to be removed and their location within the grounds of the substation, which is almost entirely surrounded by woodland, there is no expectation of significant impacts on visual amenity from public vantages.
- 6.1.7 A hedge, the roadside trees within four woodland groups along with three individual trees within the grounds of the disused power station and substation may require a small degree of pruning to provide a reasonable clearance of the adjacent access road to allow for construction traffic and materials delivery including the delivery of a shunt reactor. This work is required regardless of the proposed works but should be completed prior to the commencement of works to ensure the tree is not damaged. This level of pruning will not have a significant negative impact on the health or amenity value of the tree.
- 6.1.8 Woodland edge trees impacted by the installation of HV cables in the fenced substation's internal access road adjacent to W24, W29 and W39 will be assessed on Site to determine where trees will require removal or reductions if substantial roots are encountered.
- 6.1.9 Issues to be addressed by an AMS:
- Conditions of planning consent.
 - Pre commencement meeting and site briefing.
 - Order and phasing of operations.
 - Tree works.
 - Tree protection fencing.
 - Ground protection.
 - Movement of people, plant and materials.

- Enabling works.
- Removal of tree protection measures.

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Appendix A Tree Constraints Plan



KEY

TH	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
	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 CURRENT AND MATURE SHADING ARCS (AS DEFINED BY BS 5837:2012)
	SCHEDULED ANCIENT TREE (AS IDENTIFIED DURING SITE SURVEY)

ISSUE/REVISION

NO	DATE	DESCRIPTION
P02	04.04.25	SECOND ISSUE
P01	04.03.25	FIRST ISSUE
VR	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE CONSTRAINTS PLAN OVERLAY (SHEET 01)
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SHEET NUMBER	REV.
60686216-ACM-XX-XX-AB-TCP-001	P02

Appendix B Tree Survey Schedule

H1*	Dogwood (<i>Cornus sanguinea</i> Dogwood)	2	<100#	0.2	0.2	0.2	0.2	n/a	0	Good	SM	Good			Tip pruning of small diameter (up to 30mm) tertiary branches which extend into the adjacent access road.	10+	C2	1.2
T2*	Alder (<i>Alnus sp</i>)	7	200#	1.5	1.5	1.5	1.5	n/a	n/a	Good	SM	Good				20+	B2	2.4
T3*	Alder (<i>Alnus sp</i>)	7	200#	1.5	1.5	1.5	1.5	n/a	n/a	Dead	SM	Dead		Fell (asap)		<10	U2	2.4
W4*	Alder (<i>Alnus sp</i>), Dogwood (<i>Cornus sanguinea</i> Dogwood), Ash (<i>Fraxinus excelsior</i>), Hawthorn (<i>Crataegus monogyna</i>)	8	<220#	2	2	2	2	n/a	3	Good	SM	Good	Small area of semi mature alder with occasional hawthorn and dogwood and small ash close to centre.		Tip pruning of small diameter (up to 50mm) secondary and tertiary branches which extend into the adjacent access road to achieve a clearance above ground level of 5.2m.	10+	C2	2.64
T5*	Sessile Oak (<i>Quercus petraea</i>)	15	350	3.5	3.5	3.5	3.5	3.0/S	2.5	Good	EM	Good				20+	B2	4.2m
T6*	Goat Willow (<i>Salix caprea</i>)	6	240#	2	2	2	2	n/a	1	Fair	SM	Fair	Old stump showing main stem severed and removed with younger, matured side shoot retained to west. Large wound visible with no sign of callus growth. Deadwood nearby has multitude of small brown fungal fruiting bodies (toadstool) likely saprobic.			10+	C2	2.88
T7*	Goat Willow (<i>Salix caprea</i>)	6	240,200#	2	2	2	2	n/a	1	Good	SM	Fair				10+	C2	3.75
T8*	Sycamore (<i>Acer pseudoplatanus</i>)	12	740	6	6	6	6	1.5/N	2.5	Good	EM	Good	Single stem to 1.5m before trifurcating into broad spreading well proportioned crown.		Tip pruning of small diameter (up to 50mm) secondary and tertiary branches which extend into the adjacent access road to achieve a clearance above ground level of 5.2m.	20+	B2	8.88

T9*	Grey willow (<i>Salix cinerea</i>)	10	380	2	3	5	3	1.5/N	0.5	Fair	EM	Fair	Early mature willow which appears to be layering with low spreading bows. Significant lower deadwood with low target.			20+	B2	4.56
T10*	Grey willow (<i>Salix cinerea</i>)	10	450#	4.5	4.5	4.5	4.5	0.5/E	0.5	Fair	EM	Fair	Early mature willow with low spreading bows.			20+	B2	5.4
T11*	Grey willow (<i>Salix cinerea</i>)	10	300#	2	2	2	2	0.2/E	0	Fair	EM	Fair	Willow toppled towards road but fallen short by 1m. On the ground. Still alive.			10+	C2	3.6
T12*	Goat Willow (<i>Salix caprea</i>)	6	240#	2	2	2	2	n/a	1	Dead	SM	Dead	Dead tree within falling distance of an access road.	Fell (asap)		<10	U2	2.88
T13*	Ash (<i>Fraxinus excelsior</i>)	16	460,530	6	6	6	6	7.0/N	7	Fair	M	Good	Bifurcated from 1m. Union appears sound with adaptation growth showing. Crown appears sparse.			20+	B2	8.42
T14*	Grey willow (<i>Salix cinerea</i>)	10	280,280#	3	3	3	3	4.0/E	0.5	Fair	EM	Fair	Two branch failures to ground but still attached to union. Otherwise good condition.			20+	B2	4.75
T15*	Grey willow (<i>Salix cinerea</i>)	11	520#	3	3	3	3	2.0/S	3	Good	EM	Good				20+	B2	6.24
T16*	Grey willow (<i>Salix cinerea</i>)	16	830	6	6	6	6	2.0/N	6	Good	A	Good			Tip pruning of small diameter (up to 50mm) secondary and tertiary branches which extend into the adjacent access road to achieve a clearance above ground level of 5.2m.	40+	A2	12.45
T17*	Grey willow (<i>Salix cinerea</i>)	16	1000#	5	5	5	2	2.0/N	6	Good	A	Good	Multi stem. Too steep to access.			20+	B2	15
T18*	Grey willow (<i>Salix cinerea</i>)	16	1000#	5	5	2	5	2.0/N	6	Good	A	Good	Multi stem. Too steep to access.			20+	B2	15
T19*	Downy Birch (<i>Betula pubescens</i>)	12	510	3	3	3	3	n/a	n/a	Good	M	Good	Tall, well proportioned birch on top of a steep bank overlooking the road below.			40+	A2	6.12

W20*	Grey willow (<i>Salix cinerea</i>)	10	<800#	3	3	3	3	n/a	n/a	Good	A	Good	Old grove of grey willow			40+	A2	9.6
T21*	Goat Willow (<i>Salix caprea</i>)	12	1360	5	7	5	6	1.5/W	0	Good	A	Good	Broad bole with multiple stems emerging. Some decay features in buttress and decay in upright stems and broken decaying branches.			40+	A1,2,3	20.4
W22*	Grey willow (<i>Salix cinerea</i>), Dogwood (<i>Cornus sanguinea</i> Dogwood), Ash (<i>Fraxinus excelsior</i>), Hawthorn (<i>Crataegus monogyna</i>), Alder (<i>Alnus sp</i>), Ash (<i>Fraxinus excelsior</i>), Sessile Oak (<i>Quercus petraea</i>), Hazel (<i>Corylus avellana</i>), Sycamore (<i>Acer pseudoplatanus</i>), Downy Birch (<i>Betula pubescens</i>), Beech (<i>Fagus sylvatica</i>)	12	<500#	3	3	3	3	n/a	2	Good - Dead	Y-V	Good - Dead	Semi natural woodland with a large mix of species. Willow represents the oldest trees within it and contains trees with veteran features. Areas have been replanted with a mix of broadleaf species.		Tip pruning of small diameter (up to 50mm) secondary and tertiary branches which extend into the adjacent access road to achieve a clearance above ground level of 5.2m.	40+	A2	6
T23*	Grey willow (<i>Salix cinerea</i>)	10	800#	2.5	2.5	2.5	2.5	2.0/N	6	Good	A	Good	Half of tree (1 stem) completely failed and on the ground leaving upright snag ca. 1m c 30cm and decaying old branch ca. 8m - likely veteran. DBH assessed as of ca.40cm from ground level.			40+	A2,3	12
W24*	Sessile Oak (<i>Quercus petraea</i>), Alder (<i>Alnus sp</i>), Holly (<i>Ilex aquifolium</i>), Hazel (<i>Corylus avellana</i>), Downy Birch	7	<250#	2	2	2	2	n/a	1	Good	SM	Good			Tip pruning of small diameter (up to 50mm) secondary and tertiary branches which extend into the adjacent access road to achieve a clearance above ground level of 5.2m.	20+	B2	3

	(<i>Betula pubescens</i>)														Incursion into RPA from excavation and cable installation under arboricultural supervision.			
T25*	Scots Pine (<i>Pinus sylvestris</i>)	16	560	1.5	1.5	1.5	1.5	3.0/W	6	Good	M	Good				40+	A2	6.72
T26*	Scots Pine (<i>Pinus sylvestris</i>)	17	530	1.5	2.5	2	3.5	1.5/W	6	Good	M	Good			Tip pruning of small diameter (up to 50mm) secondary and tertiary branches which extend into the adjacent access road to achieve a clearance above ground level of 5.2m.	40+	A2	6.36
T27*	Scots Pine (<i>Pinus sylvestris</i>)	17	490	3	3	2	1	3.0/S	6	Good	M	Good				40+	A2	5.88
W28*	Grey willow (<i>Salix cinerea</i>), European Larch (<i>Larix decidua</i>)	7	<350#	3	3	3	3	n/a	3	Good	SM	Good	Predominantly willow with a single larch.			20+	B2	4.2
W29*	Scots Pine (<i>Pinus sylvestris</i>), Downy Birch (<i>Betula pubescens</i>), Holly (<i>Ilex aquifolium</i>), Grey willow (<i>Salix cinerea</i>)	14	<450#	3	3	3	3	n/a	3	Good	Y-M	Good	Mainly comprised of a central group of pines with outer edge made up mainly of willow and birch. On a raised bank.		Tip pruning of small diameter (up to 50mm) secondary and tertiary branches which extend into the adjacent access road to achieve a clearance above ground level of 5.2m. Incursion into RPA from excavation and cable installation under arboricultural supervision.	20+	B2	5.4
T30*	Scots Pine (<i>Pinus sylvestris</i>)	16	400#	2.5	2.5	2.5	2.5	3.0/W	6	Good	M	Good				40+	A2	4.8
T31*	Scots Pine (<i>Pinus sylvestris</i>)	16	400#	3	3	3	3	3.0/W	6	Good	M	Good				40+	A2	4.8
T32*	Scots Pine (<i>Pinus sylvestris</i>)	16	400#	3	4	3	3	3.0/W	6	Good	M	Good				40+	A2	4.8
T33*	Scots Pine (<i>Pinus sylvestris</i>)	16	550#	3	5	3	3	3.0/W	6	Good	M	Good	Wolf tree			40+	A2	6.6
T34*	Scots Pine (<i>Pinus sylvestris</i>)	16	760#	4.5	4.5	4.5	4.5	0.5/S	2	Good	M	Good	Wolf tree			40+	A2	9.12

T35*	Beech (<i>Fagus sylvatica</i>)	16	420#	5	3	3	3	5.0/N	5	Good	EM	Good				20+	B2	5.04
W36*	Sessile Oak (<i>Quercus petraea</i>), Downy Birch (<i>Betula pubescens</i>), Beech (<i>Fagus sylvatica</i>), Hazel (<i>Corylus avellana</i>)	14	<300#	2.5	2.5	2.5	2.5	n/a	6	Good	Y-SM	Good	Predominantly birch with some larger beech amongst it and occasional oak and hazel within a small, wooded area with boulders scattered across woodland floor.			40+	A2	3.6
T37*	Whitebeam species (<i>Sorbus sp</i>)	4	180	1.5	1.5	1.5	1.5	2.0/N	1.5	Fair	SM	Fair	Ivy clad and enveloped canopy			20+	B2	2.16
T38*	Whitebeam species (<i>Sorbus sp</i>)	4	180	1.5	1.5	1.5	1.5	2.0/N	1.5	Fair	SM	Fair	Ivy clad and enveloped canopy			20+	B2	2.16
W39*	Whitebeam (<i>Sorbus aria</i>), Downy Birch (<i>Betula pubescens</i>), Grey willow (<i>Salix cinerea</i>)	14	<460	2.5	2.5	2.5	2.5	n/a	2.5	Good	Y-M	Good		Tip pruning of small diameter (up to 50mm) secondary and tertiary branches which extend into the adjacent access road to achieve a clearance above ground level of 5.2m. Incursion into RPA from excavation and cable installation under arboricultural supervision.		20+	B2	5.52
W40*	Scots Pine (<i>Pinus sylvestris</i>), Alder (<i>Alnus sp</i>), Sessile Oak (<i>Quercus petraea</i>), Goat Willow (<i>Salix caprea</i>), Holly (<i>Ilex aquifolium</i>)	18	<500#	3	3	3	3	n/a	4	Good - Dead	Y-EM	Good - Dead				20+	B2	6
T41*	Sessile Oak (<i>Quercus petraea</i>)	17	400,500#	10	10	10	10	n/a	n/a	Good	EM	Good	Moderate deadwood in crown. Not enough for veteran status. Watercourse barrier preventing access to stems. surveyed from afar.			40+	A1,2,3	7.68

G42*	Spruce (<i>Picea sp</i>)	18	<650#	5	5	5	5	n/a	0	Good	SM-M	Good - Fair	Dense bracken and scrub surround group. Not accessed. Proximal stems with competing crowns.			20+	B2,3	7.8
G43*	Silver Birch (<i>Betula pendula</i>), Rowan (<i>Sorbus aucuparia</i>), Common Oak (<i>Quercus robur</i>)	12	<200#	3.5	3.5	3.5	3.5	n/a	0.5	Good	SM	Good - Fair	Sporadic spacing of stems, some proximal resulting in competing crowns.			20+	B2,3	2.4
T44*	Grey willow (<i>Salix cinerea</i>)	9	400#	2.5	2.5	2.5	2.5	3.0/W	7	Good	EM	Fair	Previous clearance works have left a truncated branch ca. 4m east. At bottom of steep rocky slope			20+	B2	4.8
T45*	Silver Birch (<i>Betula pendula</i>)	13	400	4	5	5	4	1.7/E	3.5	Good	SM	Fair	Surface roots engulf large rock, S. Minor lean bias, N. Minor crown suppression, N.			20+	B2	4.8
G46*	Silver Birch (<i>Betula pendula</i>)	13	<300#	3	3	3	3	n/a	3	Good	SM	Good - Fair	Multi stemmed from ground and 0.5 m on individuals. Proximal stems with competing crowns.			20+	B2	3.6
W47*	Grey willow (<i>Salix cinerea</i>)	8	<200#	2	2	2	2	n/a	1.7	Good	SM	Good	All branches cleared of fence line by ca 1.5m			20+	B2	2.4
T48*	Spruce (<i>Picea sp</i>)	18	600#	5	5	5	5	n/a	0.5	Good	M	Good	Stem surrounded by low limbs and scrub/bracken. Not accessed. Lower half of eastern crown suppressed.			20+	B2	7.2
W49*	Grey willow (<i>Salix cinerea</i>), Downy Birch (<i>Betula pubescens</i>), Ash (<i>Fraxinus excelsior</i>)	10	<250#	2	2	2	2	n/a	2	Good - Dead	SM-EM	Good - Dead	Etiolated ash occasional. Birch dominant. One collapsed willow fallen from centre of group to west.			20+	B2	3
G50*	Silver Birch (<i>Betula pendula</i>)	5	<75#	1	1	1	1	n/a	0.5	Good	Y	Good - Fair	Proximal stems with competing crowns.			10+	C2	0.9
T51*	Sycamore (<i>Acer pseudoplatanus</i>)	11	470	3	3	3	3	2.5/S	0.5	Good	SM	Good	Truncated branch from fence clearance south			20+	B2	5.64
T52*	Scots Pine (<i>Pinus sylvestris</i>)	12	150#	2.5	3	2.5	2.5	2.0/S	2	Good	SM	Good	On steep slope and not accessed.			20+	B1,2	1.8

G53*	Grey willow (<i>Salix cinerea</i>)	7	<100#	2.5	2.5	2.5	2.5	n/a	2	Good	Y	Good - Fair	On steep slope and not accessed.			10+	C2	1.2
T54*	Downy Birch (<i>Betula pubescens</i>)	10	350#	1.5	1.5	2.5	1.5	n/a	0.5	Good	EM	Good	Drawn up. Low epicormic in stem.			20+	B2	4.2
T55*	Scots Pine (<i>Pinus sylvestris</i>)	11	330#	1	2.5	2	1	1.2/S	1.5	Good	SM	Good	Lower half of crown suppressed, NW.			20+	B1,2	3.96
T56*	Grey willow (<i>Salix cinerea</i>)	11	200,350,200#	4	4	4	4	0.5/N	5	Good	EM	Good	Multi-stem from base			20+	B2	5.4
T57*	Goat Willow (<i>Salix caprea</i>)	15	200,380,250#	6	4	4	5	4.0/W	4	Good	M	Good	Stems surrounded by scrub and bracken. Not accessed. Multi stemmed from base. Ivy to 6 m. Moderate dead wood.			20+	B2,3	5.96
W58*	Downy Birch (<i>Betula pubescens</i>), Grey willow (<i>Salix cinerea</i>)	11	<250#	2	2	2	2	n/a	n/a	Good	SM-EM	Fair	Edge group of young birch and willow. Many roughly pruned back to provide clearance from perimeter fence.			20+	B2	3
T59*	Downy Birch (<i>Betula pubescens</i>)	10	400#	3	1.5	3	3	n/a	0.5	Good	M	Good	Broad spreading birch with failed hanging branch east			20+	B2	4.8
T60*	Downy Birch (<i>Betula pubescens</i>)	10	410	3.5	1.5	2.5	2.5	n/a	0.5	Good	M	Good	Clearance pruned from perimeter fence			20+	B2	4.92
T61*	Silver Birch (<i>Betula pendula</i>)	13	390#	3	2	2	3	1.0/N , 1.0/W	2	Good	SM	Good	Limbs pruned at 3 - 10 m, S.			20+	B2	4.68
T62*	Grey willow (<i>Salix cinerea</i>)	11	380,300,200#	1	4	4	4	0.5/E	2	Good	M	Good	Multi-stemmed from base			20+	B2	6.29
T63*	Silver Birch (<i>Betula pendula</i>)	14	580	5	5	5	5	2.0/E , 2.0/S	2	Good	M	Good	Wound with cavity at 2.5 m, W. Numerous clumps of burrs within crown.			20+	B1,2	6.96
G64*	Goat Willow (<i>Salix caprea</i>), Ash (<i>Fraxinus excelsior</i>)	4	<120#	1	1	1	1	n/a	0	Fair	Y	Fair	Group under high voltage power lines. Previously topped. Densely formed crowns with high competition.			10+	C2,3	1.44
W65*	Downy Birch (<i>Betula pubescens</i>), Grey willow (<i>Salix cinerea</i>)	11	<250#	2	2	2	2	n/a	0	Good - Fair	Y-SM	Good - Fair	Mainly birch with pockets of multi-stem willow. Those closest to perimeter fence have been cut back for clearance			10+	C2	3

													leaving truncated branches and upright stems.					
T66*	Grey willow (<i>Salix cinerea</i>)	11	320,180,180#	0.5	4	4	4	2.0/N	2	Good	M	Fair	Multi-stem from base. Half of canopy to west is topped out leaving uprights truncated.			10+	C2	4.91
T67*	Grey willow (<i>Salix cinerea</i>)	11	300,180,160#	3	3	3	3	5.0/N	n/a	Good	M	Good	Multi-stem from base.			20+	B2	4.62
T68*	Downy Birch (<i>Betula pubescens</i>)	12	260,210	1.5	1.5	1.5	1.5	5.0/N	5	Good	EM	Fair	One stem to north topped at ca 3m			20+	B2	4.01
T69*	Silver Birch (<i>Betula pendula</i>)	13	740	6	1	6	1	n/a	3	Good	M	Good	Would be Cat A but don't envisage birch of this age existing for an additional 40+ years.			20+	B1,2,3	8.88
T70*	Downy Birch (<i>Betula pubescens</i>)	13	340	2.5	3	3	1.5	n/a	5	Good	M	Good	All branches west removed to stem to a height of ca. 10m			20+	B2	4.08
T71*	Grey willow (<i>Salix cinerea</i>)	10	250,200#	2.5	1.5	2	1	n/a	5	Good	EM	Fair	Bifurcated at base. Branches removed for clearance from perimeter fence.			20+	B2	3.84
T72*	Silver Birch (<i>Betula pendula</i>)	14	400,450	5	5	5	5	3.0/N	3	Good	M	Good - Fair	V-shaped main union forms at 0.5 m. No obvious signs of active separation.			20+	B2,3	7.22
W73*	Grey willow (<i>Salix cinerea</i>), Downy Birch (<i>Betula pubescens</i>)	10	<300#	2	2	2	0.5	n/a	1	Good - Fair	Y-M	Good - Fair	Group of largely multi-stem willow with occasional birch			20+	B2	3.6
T74*	Silver Birch (<i>Betula pendula</i>)	15	700	4	7	6	6	2.5/W	4	Good	M	Fair	Large leaning stems off main stem at 1-2 m, S.			20+	B2,3	8.4
W75*	Downy Birch (<i>Betula pubescens</i>), Grey willow (<i>Salix cinerea</i>), Sessile Oak (<i>Quercus petraea</i>)	10	200	2	2	2	0.5	n/a	2	Good - Fair	Y-EM	Good - Fair	Woodland edge group harshly pruned away from perimeter			20+	B2	2.4
UTF 6*	Birch (<i>Betula sp.</i>), Sycamore (<i>Acer pseudoplatanus</i>), Willow (<i>Salix sp.</i>)	-	-	-	-	-	-	-	-	-	-	-	Data captured by AECOM ecologists. Self seeded birch, sycamore, willow trees with bare ground and	-	Fell	-	B2	1.2

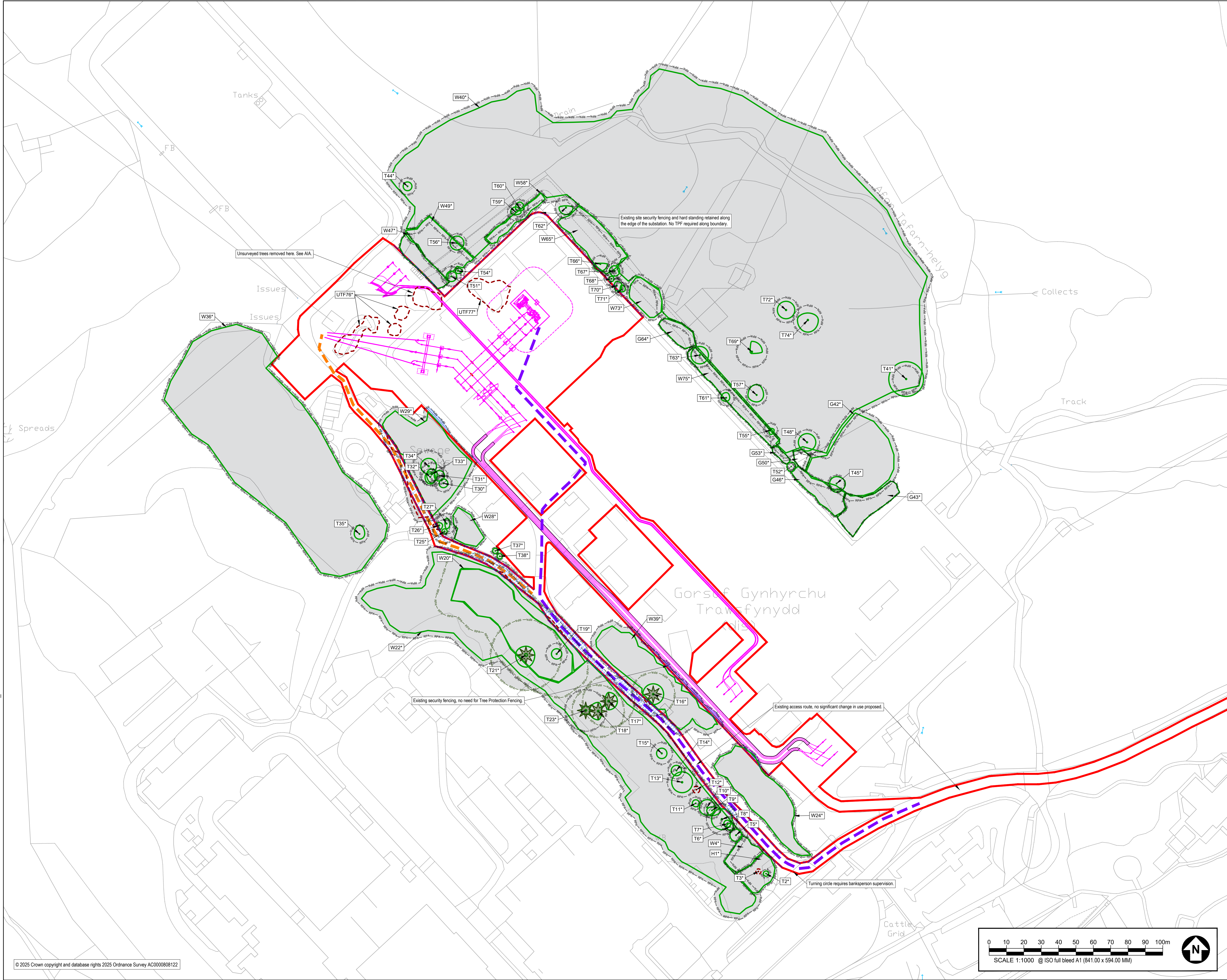
													scattered shrub / ruderal beneath					
UTF 77*	Silver birch (<i>Betula pendula</i>), Willow (<i>Salix sp.</i>)	-	-	-	-	-	-	-	-	-	-	-	Data capture by AECOM ecologists. Young willow and birch with limited understorey of moss, fern, ivy willow, herb	-	Fell		- B2	2.4

Key to Abbreviations

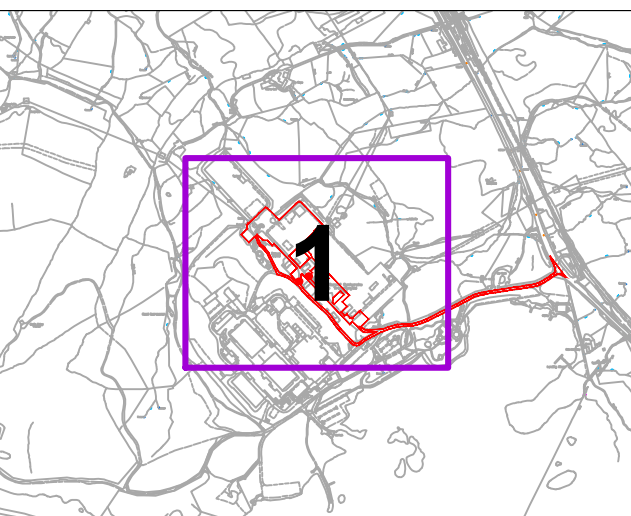
Ref No	Specific identification number given to each tree or group. T=Tree/H=Hedge/G=Group/W=Woodland	
Species	Common name followed by botanical name shown in <i>italics</i>	
RPA	Root Protection Area (As defined by BS5837)	
Stem diameter	Diameter of main stem, measured in millimetres at 1.5 m above ground 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).	
Category	Categorisation of the quality and benefits of trees on the Site as per Table 1 and 2 of BS5837 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.	

Structural condition	<p>Good: No significant structural defects</p> <p>Fair: Structural defects which can be resolved via remedial works.</p> <p>Poor: Structural defects which cannot be resolved via remedial works.</p> <p>Dead: Dead.</p>
Physiological condition	<p>Good: Normal vitality including leaf size, bud growth, density of crown and wound wood development.</p> <p>Fair: Lower than normal vitality, reduced bud development, reduced crown density, reduced response to wounds.</p> <p>Poor: Low vitality, low development and distribution of buds, discoloured leaves, low crown density, little extension growth for the species.</p> <p>Dead: Dead</p> <p>Fair/Good = Indicates an intermediate condition</p> <p>Fair – Good = Indicates a range of conditions (e.g. within a group)</p>
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).
Works to facilitate the development	Tree works identified as necessary to facilitate the proposed works following a desk top analysis of the proposals in relation to tree constraints.

Appendix C Tree Protection Plan



1. TREE CATEGORIES AS DEFINED BY BS 5837:2012
2. TREE LOCATIONS ARE BASED ON 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:
PTN0PTC1-SH-ENG-DWG-0082-EPLAY-0002 Traws Cable Route Model.dwg
PTN0PTC1-SH-ENG-DWG-0083-EPLAY-0004 Traws Primary Layout Option 7.dwg
PTN0PTC1-SH-ENG-DWG-0086-Traws - Structural.dwg
PTN0PTC1-SH-ENG-DWG-1078-TRAWSFYNYDD SUBSTATION RED LINE BOUNDARY DRAWING.dwg



- FEATURE ID TAGS**
(A PREFIX OF 'T' DENOTES A SINGLE TREE, 'G' A GROUP, 'H' A HEDGE, 'W' A WOODLAND, 'UTF' AN UNSURVEYED TREE FEATURE, 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)
- SCHEDULED ANCIENT TREE**
(AS IDENTIFIED DURING SITE SURVEY)
- TPF**
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)
- PROPOSED DEVELOPMENT LAYOUT**
(BASED UPON DRAWING REFERENCES LISTED IN THE GENERAL NOTES)
- INDICATIVE ROUTE FOR THE TRANSPORT OF MACHINERY, MATERIALS AND EQUIPMENT FOR DOWN LINE INSTALLATION.**
- INDICATIVE ROUTE FOR THE TRANSPORT OF THE SHUNT REACTOR**

NO	DATE	DESCRIPTION
P01	04.04.25	FIRST ISSUE
VR	DATE	DESCRIPTION

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 Site is in Eryri (Snowdonia) National Park Authority.

The Eryri Local Development Plan 2016 – 2031¹² has policies which pertain to the importance of trees to the character and importance of the National Park, stating the importance of protection of the trees as a natural asset:

8.1.20 To conserve and enhance the 'Special Qualities' and purposes of the National Park, development will only be permitted where all the following apply:

8.1.21 Development Policy 1: General Development Principles

8.1.22 6. The development does not result in the loss of landscape features, including woodland, and Ancient Semi-Natural woodland in particular, healthy trees.

Appendix E Site Photography



Plate E-1 Woodland edge trees within W65 showing typical clearance pruning from the edge of the substation perimeter fence



Plate E-2 Woodland edge recorded as W75 showing broadleaf species along the woodland edge with coniferous plantation species within



Plate E-3 T21 Goat willow (*Salix caprea*) that meets the stem girth parameters of ancient tree status



Plate E-4 W36 mixed species broadleaf woodland

Appendix F Outline Tree Protection Measures

F.1 Tree Protection Fencing

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 BS5837:2012 Figure 7 (included 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 and / or existing palisade security fencing 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**).

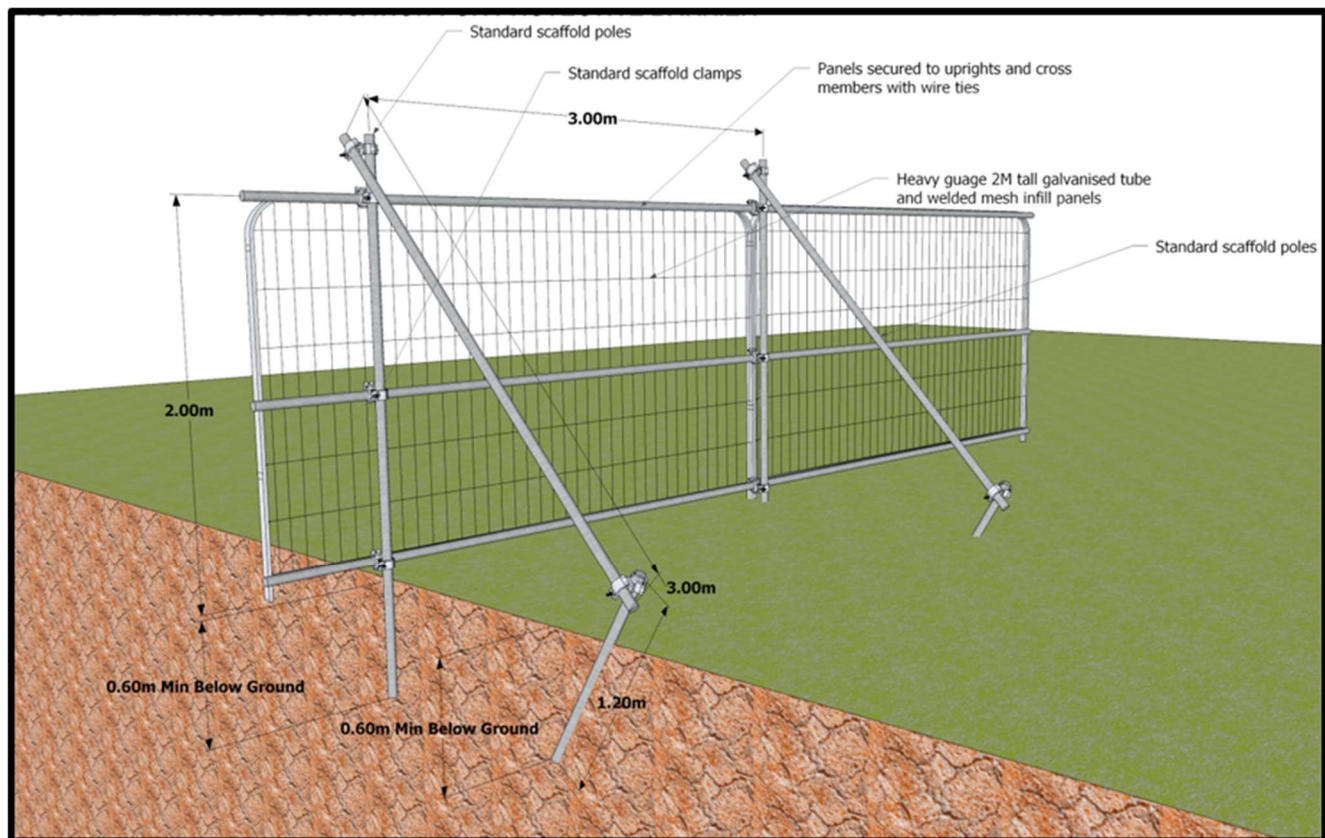


Plate F-1 Default specification for protective barrier

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 150 mm 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 cm³) for clay soils, to 1.75 g per cm³ 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 100mm 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 5m 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



5.5.D 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 produce a Net Benefit for Biodiversity (NBB) Assessment and Green Infrastructure (GI) Statement to support the application for full planning permission for the removal of existing and installation of new underground cables at the existing Trawsfynydd substation in the North West Wales ('The proposed works'). This planning application is required for development at the existing Trawsfynydd substation which is needed 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 the **Trawsfynydd Planning Statement** and the Environment Statement (ES) **Volume 1: Project Introduction**.
- 1.1.2 This report combines both the NBB assessment and GI Statement outputs into one document.

1.2 The Proposed Works

- 1.2.1 The proposed works cover an area of approximately 3.05 hectares (ha), located in Eryri (Snowdonia) National Park (ENP), North West Wales. The proposed works will be contained in the existing Trawsfynydd substation footprint, and includes the access roads, a compound (comprising office and welfare facilities), laydown storage and car parking (The Trawsfynydd works site).
- 1.2.2 The proposed works would include the following components:
- Removal of redundant cables.
 - New 400 kV cables, shunt reactor and gantry.
 - Replacement downleads from Tower 4ZC005.
 - Alterations to the fence alignment.
- 1.2.3 For further information related to the proposed works at Trawsfynydd Substation or the wider context of works for the Pentir to Trawsfynydd Project, refer ES **Volume 5, Chapter 2: Trawsfynydd Substation Works** and ES **Volume 1: Project Introduction**.

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 (Ref 1.1). 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 will be implemented for any net benefit achieved.

1.3.3 The objectives of this Green Infrastructure Statement are to demonstrate how the proposed works has:

- 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, 2022) (Ref 1.5).

1.4 National Grids Position

1.4.1 National Grid are committed to delivering a NBB and GI Statement across all new developments in Wales, in line with PPW 12 (Ref 1.3).

1.4.2 National Grid aim to deliver NBB and GI on-site following the stepwise approach, with any biodiversity or ecological creation or enhancement following the DECCA framework.

1.4.3 Where NBB and GI are delivered within National Grids 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

- 2.1.1 The Environment (Wales) Act 2016 provides legislation to plan and manage Wales's natural resources (Ref 1.2). It delivers against the Welsh Government's Programme for Government (Ref 2.6) commitment to introduce new legislation for the environment. 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 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 1.2).

The Well-Being of Future Generations (Wales) Act 2015

- 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 1.3). 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 Planning Policy Wales (PPW) 12 (Ref 2.7) 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 provide the national planning policy framework for Wales. PPW 12 sets out the importance of delivery of NBB and GI, aligning with Section 6 of the Environment (Wales) Act 2016. The following are relevant to NBB and GI 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)

2.1.4 Future Wales: The National Plan 2040 ('Future Wales') (Ref 1.5) 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 Future Wales includes 'Policy 9 - Resilient Ecological Networks and Green Infrastructure' which 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,

nature-based 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. These planning policies have 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 1.2). Area Statements are published for the seven regions of Wales to facilitate the implementation of the national natural resources policy (2017) Ref 2.4). Each Area Statement outlines the key challenges facing particular localities and provides guidance on what can be done to meet those challenges and how natural resources can be better managed. Area statements should be used as an important source of information for planning of green infrastructure and net benefit (Ref 1.4).
- 2.2.2 Trawsfynydd Substation is in the area addressed in the North West Wales Area Statement (Ref 2.5). 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 Green infrastructure 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

Eryri National Park

- 2.3.1 Relevant local planning policy and supplementary guidance documents for Eryri National Park are currently covered by the Eryri national park Local Development Plan. The Local Development Plan (Ref 2.1) adopted covers the period between 2016-2031. The following policies have considered in relation to NBB and GI:

- Chapter 3: Protecting, enhancing and maintaining the natural environment
- Development policy 1: General development principles
- Strategic Policy D: Natural Environment (D)
- Strategic Policy Dd: Climate Change (Dd)

2.3.2 The current guidance states:

- *‘Any development within Eryri National Park should negate its effect on local biodiversity and take active steps to enhance it. Details of biodiversity enhancement can also be provided as part of a Green Infrastructure Statement’ (Ref 2.2).*
- *“The development will not have an unacceptable adverse impact on the characteristic biodiversity of Snowdonia, particularly habitats and species protected under national and European legislation”*
- *“The development does not result in the loss of landscape features, including woodland, and Ancient Semi-Natural woodland in particular, healthy trees, hedgerows, dry stone walls or damage any important open space or public view”.*

2.3.3 Eryri national park have also produced supplementary planning guidance (SPG) for Nature Conservation and Biodiversity, adopted in 2016 (Ref 2.3). The SPG has been used alongside the Local Development Plan to ensure the proposed works confirm to local policy.

3. Limitations and Assumptions

- 3.1.1 For general ecology assumptions and limitations in reference to survey findings see ES **Volume 5, Chapter 5: Ecology and Nature Conservation**.
- 3.1.2 All on-site habitat was identified through on-site field observation surveys see ES **Volume 5, Chapter 5: Ecology and Nature Conservation**. Habitats of Principal Importance (HoPI) and Section 7 Habitats were identified by Cofnod biological records centre (Ref 3.1) and DataMap Wales (Ref 3.2) and confirmed by on-site field observations.
- 3.1.3 Species enhancements proposed to achieve NBB is detailed in **Section 7**. It is assumed that National Grid will maintain and monitor proposed species mitigation for 5 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 proposed works at Trawsfynydd Substation 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 5, Trawsfynydd Works.**
- **ES Volume 8, Appendix 5.5.C Arboriculture Impact Assessment.**
- Planning Drawings.

4.2 Designated Sites

4.2.1 No designated sites lie within the Trawsfynydd works site.

4.2.2 For a full list of designated sites within 5 kilometres (km) of the Trawsfynydd works site, and within 10 km of designated sites for bats, please refer to **Table 5-1 in Volume 5, Chapter 5: Ecology and Nature Conservation** as well as **Volume 8, Appendix 5.5.B Statutory Designated Sites Citations**. For the distribution of these designated sites, please refer to **Figure 2.5.1** and **Figure 2.5.2**.

4.3 Irreplaceable Habitat

4.3.1 Irreplaceable habitats (as defined in PPW 12) 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’* (Ref 1.3)

4.3.2 No Irreplaceable habitat has been identified on-site, and there will be no impacts to irreplaceable habitat from the proposed works.

4.3.3 The closest area of Irreplaceable Habitat (Ancient Woodland) to the Trawsfynydd works site is approximately 180 metres (m) west of the Trawsfynydd Substation.

4.4 Priority Habitat

- 4.4.1 Section 7 lists Priority Habitats (as defined by Environment Act (Wales) 2016) (Ref 1.2) 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 the Section 7 list (Ref 4.4).
- 4.4.2 No S7 Priority Habitats fall within the Trawsfynydd works site.

4.5 Habitats

- 4.5.1 The Trawsfynydd works site is mainly hardstanding, with two small parcels of broadleaved scattered trees, and one small parcel of semi-natural broadleaved woodland within the west of the existing Trawsfynydd Substation (see **Figure 5.5.6** and **Volume 5, Chapter 5: Ecology and Nature Conservation**).
- 4.5.2 Baseline data was collected using Phase 1 survey methodology (for further details refer to **Volume 5, Chapter 5: Ecology and Nature Conservation**). The following habitats with their Phase 1 habitat codes are present within the Trawsfynydd works site (**Appendix A, Figure 5.5.D.1**):
- A1.1.1 Broadleaved woodland - semi-natural,
 - A3.1 Broadleaved parkland/ scattered trees,
 - B4 Improved grassland,
 - J5 Other habitat,
 - J3.6 Buildings, and
 - Z99 Hardstanding.
- 4.5.3 Detailed descriptions of baseline habitat are in **Volume 5, Chapter 5: Ecology and Nature Conservation**.

4.6 Species

- 4.6.1 No species are likely to be present within the Trawsfynydd works site pre- or post-construction due to the majority of habitat being hardstanding.
- 4.6.2 The Trawsfynydd works site is hardstanding with minimal vegetation (including scattered trees) and offers limited opportunities for breeding birds and is therefore suboptimal for non-breeding birds.
- 4.6.3 Except for desk study records of bird species, no protected or notable species were recorded within the works site boundary. With respect to the ecology report concluded that the Trawsfynydd works site, where temporary land take is required, is hardstanding and unsuitable for breeding birds and suboptimal for non-breeding birds. Habitats present adjacent to the Trawsfynydd works site are likely to support breeding and non-breeding birds.

- 4.6.4 For details of the species present, or potentially present, within the Trawsfynydd works site, please refer to **Table 5-4** in **Volume 5, Chapter 5: Ecology and Nature Conservation**.

4.7 Public Rights of Way

- 4.7.1 There are four Public Rights of Way (PRoW) within 500 m of Trawsfynydd works site, which do not provide direct access to the the Trawsfynydd works site. These PRoW are not expected to be impacted by the proposed works.

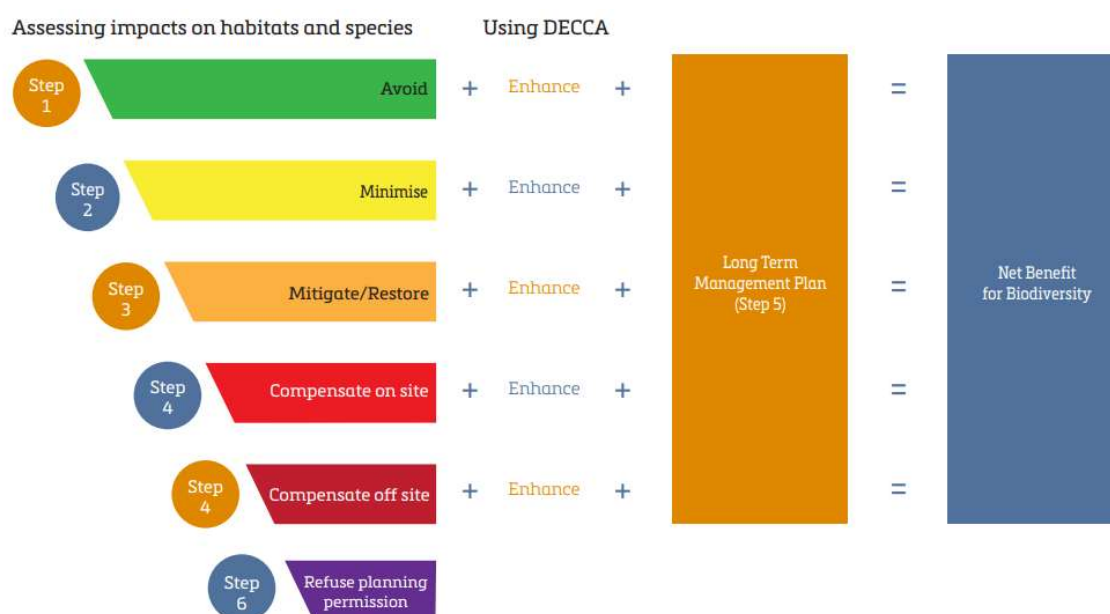
4.8 Water

- 4.8.1 No ponds are located with 250 m of the Trawsfynydd works site.
- 4.8.2 The Trawsfynydd works site contains no running water. Drains are understood to be present in close proximity: the closest approximately 12 m from the Trawsfynydd works site. Loss or fragmentation of these watercourses will not occur.

5. Methodology

5.1 Step-wise Approach

- 5.1.1 The proposed works have been designed in accordance with the stepwise approach (see **20 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 51**) to ensure that adverse effects on biodiversity is 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 51: 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 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 on-site, 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 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 1.4).

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 1.2), referred to as the DECCA Framework (see

5.2.3 **Plate 52**). 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.

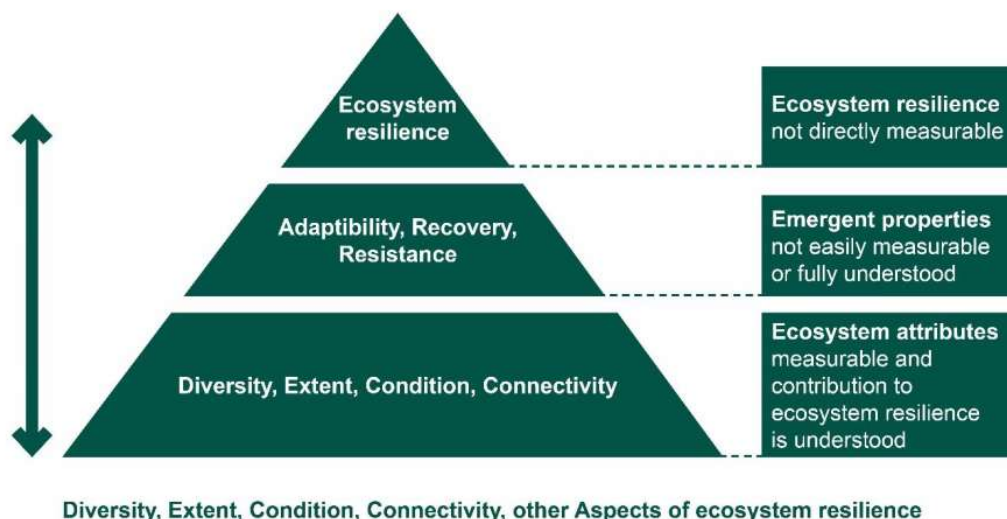


Plate 52: DECCA Framework (Ref 5.1)

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 51: Building with Nature Standards Framework Themes** highlights the BwNSF 2.0 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	<i>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'.</i>
Standard 2: Positively Responds to the Climate Emergency	<i>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</i>

Building with Nature Standard Framework Theme	Description of Theme
	<i>approaches to design, construction and long-term maintenance.</i>
Standard 3: Maximises Environmental Net Gains	<i>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.</i>
Standard 4: Champions a Context Driven Approach	<i>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.</i>
Standard 5: Creates Distinctive Place	<i>The green infrastructure is integral to the project and is designed to reinforce local distinctiveness and/or create a distinctive sense of place.</i>
Standard 6: Secures Effective Place-Keeping	<i>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.</i>
Standard 7: Brings Nature Closer to People	<i>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.</i>
Standard 8: Supports Equitable and Inclusive Places	<i>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.</i>
Standard 9: Delivers Climate Resilient Water Management	<i>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</i>

Building with Nature Standard Framework Theme	Description of Theme
	<i>wherever possible, includes measures for the retention and reuse of rainwater.</i>
Standard 10: Brings Water Close to People	<i>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.</i>
Standard 11 Delivers Wildlife Enhancement	<i>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.</i>
Standard 12 Underpins Nature's Recovery	<i>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.</i>

6. Review of Habitat Change

- 6.1.1 The majority of the Trawsfynydd works site is hardstanding. The proposed works are confined to the existing hard standing area of the Trawsfynydd Substation, with the exception of a small area (approximately 180 square metres (m²)) of self-seeded, semi-natural broadleaved woodland.
- 6.1.2 A Net Benefit will be achieved through species-specific enhancements, which is proportionate to the small loss of on-site habitat. Species-specific enhancements will negate species displacement as a result of the 180 m² woodland loss. The creation of the following is proposed in the National Grid owned land within the Trawsfynydd works site:
- Three Schwegler bird boxes suitable for a range of species.
 - Three Schwegler bat boxes suitable for cavity and crevice dwelling bats.

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.

Avoid

- 7.1.2 Biodiversity and wider ecosystem benefits were considered early in the design process for the proposed works. This led to design and programme changes, including the retention of habitats and avoidance of disturbance where possible. Paragraph 5.8.8 of **Volume 5, Chapter 5: Ecology and Nature Conservation** details habitat avoidance measures to be implemented during construction. This accords with the ‘Avoidance’ principle of the stepwise approach.

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 design changes which aimed to minimise the proposed works impact on biodiversity. This accords with the ‘Minimise’ principle of the stepwise approach.

Mitigate

- 7.1.4 The proposed works will permanently impact a small area (approximately 180 m²) of self-seeded, semi-natural broadleaved woodland. Due to the fixed location and operational requirements of the proposed electricity infrastructure, avoidance of this area is not feasible without compromising the viability of the works. While the woodland contributes to local green infrastructure, its ecological value is limited due to its unmanaged and fragmented condition, lack of structural diversity, and absence of notable species or connectivity to wider ecological networks.
- 7.1.5 **Volume 5, Chapter 5: Ecology and Nature Conservation** has assessed potential impacts to roosting bats and nesting birds and does not identify any requirement for species-specific mitigation measures. The woodland referenced is of limited ecological interest, and based on the assessment, species displacement is considered unlikely.
- 7.1.6 Where predicted impacts may still occur following avoidance measures and measures to minimise impacts, mitigation measures will be implemented for habitats and species. Section 5.8 of **Volume 5, Chapter 5: Ecology and Nature Conservation** the following mitigation will be applied as part of the proposed works:
- The CEMP (**Volume 8, Appendix 5.2.A: Outline Construction Environmental Management Plan**) will detail the measures required to mitigate construction related effects on ecology, including those associated with construction dust deposition, air pollution, pollution incidents, water quality, light, noise and vibration.

- Vegetation clearance will avoid the nesting bird period (i.e., March to August inclusive). To avoid killing or injuring animals potentially sheltering under vegetation, such as reptiles and amphibians, vegetation will be cut in two phases; first to approximately, but no less than, 15 centimetres (cm) above ground level, and left undisturbed until it can be cut to ground level during the typical reptile and amphibian active season (March to October, inclusive). Where vegetation clearance cannot avoid the nesting bird period, a check for the presence of any active nests would be carried out by a suitably experienced ornithologist, prior to vegetation removal. If active nests are found, then appropriate buffer zones (species dependent) where no works take place would be put in place and the area monitored until the young birds have fledged. Vegetation at ground level (any vegetation beneath the trees within the Trawsfynydd works site), and areas potentially suitable for basking reptiles (including hardstanding) will be carefully checked prior to removal. Any habitat features within such areas which may conceal sheltering reptiles and amphibians (e.g., rubble mound bunds, any other debris) will not be dismantled during their inactive season (i.e., November to February inclusive).
- Where lighting is required, it will conform to best practice guidelines with respect to minimising light spill into adjacent habitats and preventing disturbance to bats and other species, including Institute of Lighting Professionals Guidance Notes (GN08/23 Bats and Artificial Lighting at Night). This guidance was produced in collaboration with the Bat Conservation Trust, and GN-1: Reduction of Obtrusive Light in so far as it is reasonably practicable.

- 7.1.7 In accordance with the stepwise approach, proportionate measures have been incorporated to address potential species displacement, through species-specific enhancements with the installation of bat and bird boxes. This accords with the 'Mitigation' principle of the stepwise approach.
- 7.1.8 National Grid will implement a five-year monitoring and maintenance programme for Schwegler bat and bird boxes installed as part of biodiversity enhancement measures. Monitoring will be conducted annually to assess box condition, occupancy, and species use, with inspections timed to avoid disturbance during sensitive breeding or roosting periods. All bat box inspections will be carried out by licensed ecologists in accordance with relevant legislation. Maintenance will include cleaning bird boxes between nesting seasons, repairing or replacing damaged boxes, and ensuring boxes remain securely fixed and accessible. Monitoring outcomes will be recorded and reviewed to inform adaptive management.
- 7.1.9 Compensation is not required as part of the proposed works, as the stepwise approach has been satisfactorily fulfilled prior to reaching this stage.

7.2 Application and Compliance of DECCA

- 7.2.1 The provision of species-specific enhancements has the potential to increase the species and genetic diversity by providing additional roosting and nesting resources for bat and bird species. This also has the potential to increase connectivity across the landscape through this provision of additional roosting and nesting resources.

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 7.1). The BwNSF sets out best practice standards to define a benchmark of good green infrastructure and how to deliver it. **Table 7-1** evidence how the proposed works have worked towards upholding and achieving these standards where applicable.

Table 7-1: Summary of Proposed Green Infrastructure Mitigation and Enhancement and its Link to BwNSF

Standard	Justification for meeting the standard
1 Optimises Multifunctionality and Connectivity	The proposed works have been designed to avoid key nature conservation and ecological features present in or adjacent to the Trawsfynydd works site. The following minimum buffers from key habitat features are applied where practicable for the proposed works Site excluding use of the unmodified existing access road which may fall in these buffers, and where new cable ducts are required adjacent to the perimeter fence. There will be a 15 m buffer for woodlands, and a 10 m buffer for hedgerows, increased to 15 m where there are hedgerow trees, 15 m for individual trees and a minimum of 10 m from watercourses including dry ditches, with the exception of where the existing access road crosses watercourses, as no modification of the existing crossing and road is required.
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 5.2.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 species enhancement and compensation. A robust CEMP (Volume 8, Appendix 5.2.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.
4 Champions a Context Driven Approach	GI will be fragmented on-site due to the small loss of woodland.
5 Creates Distinctive Places	All species-specific enhancements proposed contribute positively to the character and identity of the site. Although a small area of woodland will be lost, it is already fragmented and does not contribute

	meaningfully to ecological connectivity. The design ensures that the loss does not compromise the distinctiveness of the place, and enhancements such as bat and bird boxes will reinforce local biodiversity.
6 Secures Effective Place-keeping	All species-specific enhancement proposed as part of this NBB assessment will require regular maintenance and monitoring. Management of species-specific enhancement will be managed and monitored for at least 5 years. This demonstrates a commitment to effectively implement, establish and maintain mitigation at all stages of the development process.
7 Brings Nature Closer to People	The proposed works is an operational site, with no public access or PRow. The nature of the operation of the Trawsfynydd works site restricts opportunities to bring people closer to nature.
8 Supports Equitable and Inclusive Places	The Trawsfynydd works site is an operational substation this restricts opportunities to make the site more equitable and inclusive.
9 Delivers Climate Resilient Water Management	No watercourses will be impacted by the proposed works. Construction buffers will be applied to any watercourses crossed by access tracks.
10 Brings Water Closer to People	
11 Delivers Wildlife Enhancement	The installation of bat and bird boxes directly contributes to wildlife enhancement by creating new, safe roosting and nesting opportunities for species that are increasingly pressured by habitat loss.
12 Underpins Nature's Recovery	

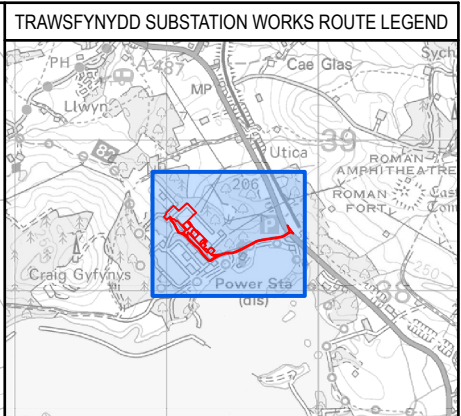
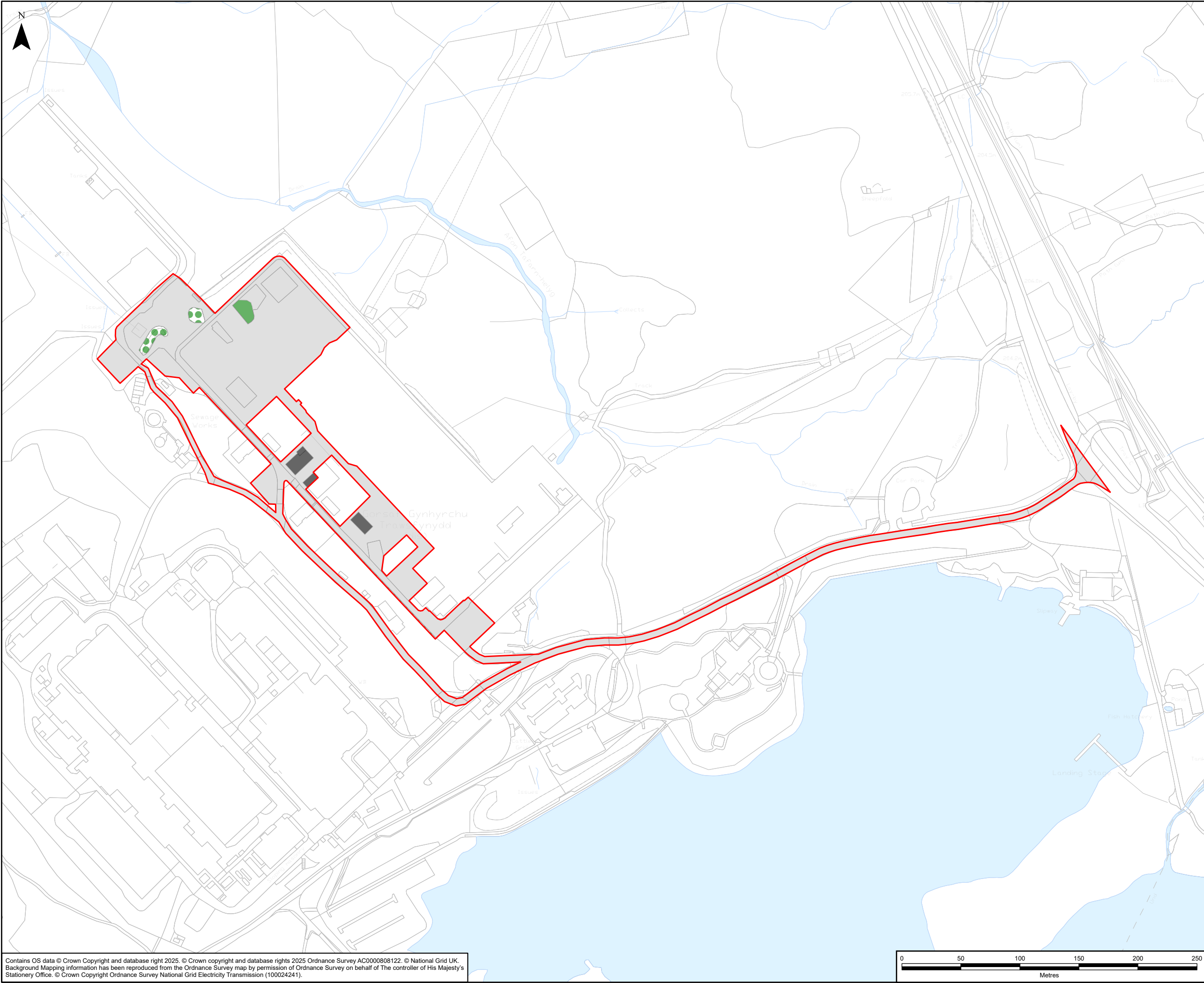
8. Conclusion

- 8.1.1 The NBB assessment and GI Statement incorporates guidance from the stepwise approach, the DECCA Framework, and the BwNSF (Ref 8.2) 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.
- 8.1.2 Through consideration of this guidance, the proposed works will also contribute to overcoming the key challenges in Gwynedd as outlined in the North West Wales Area Statement (Ref 2.6), notably reversing the decline of, and enhancing, biodiversity.
- 8.1.3 A proportionate Net Benefit for Biodiversity is achieved through species-specific enhancement. Due to the nature of hardstanding within the Trawsfynydd works site and nature of the proposed works, no habitat can be enhanced or created on-site. Species-specific enhancements, through the implementation of bat and bird boxes (**see Section 7**), are to be used to achieve a Net Benefit.
- 8.1.4 Standard mitigation measures are also to be included in the CEMP to identify and stop potential effects to ecological receptors within the proposed works Site, although overall the proposed works Site was not found to support any important ecological receptors, and these are considered best practice precautionary measures. The DECCA framework has been applied and demonstrated in this NBB Assessment and GI Statement, and the provision of species-specific enhancements and woodland compensation will ensure that that proposed works deliver a Net Benefit.
- 8.1.5 Species-specific enhancements will be managed and monitored post-construction by National Grid, with long-term management secured for 5 years.

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- Ref 1.5 Building with Nature (2023). *Building with Nature Green Infrastructure Standards Framework.* [BwNSF](#)
- Ref 2.1 Eryri National Parks Authority (n.d.) Eryri Local Development Plan 2016 – 2031 [Cynllun-Datblygu-Lleol-Saesneg.pdf](#)
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- Ref 4.1 Natural Resources Wales (2025) [LANDMAP - the Welsh landscape baseline](#)
- Ref 4.2 Welsh Government (2018) [Urban Tree Cover 2018. DataMapWales](#)
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- Ref 8.2 Building with Nature Partnership (2022) [Building with Nature Standards Framework](#)

Appendix A – Baseline Constraints Plan



- Legend**
- Trawsfynydd Works Site Boundary
 - Phase 1 Habitat Feature**
 - A1.1.1 - Broadleaved woodland - semi-natural
 - A1.1.2 - Broadleaved woodland - plantation
 - A1.3.1 - Mixed woodland - semi-natural
 - A1.3.2 - Mixed woodland - plantation
 - A2.2 - Scrub - scattered
 - A3.1 - Broadleaved parkland/scattered trees
 - B4 - Improved grassland
 - B6 - Poor semi-improved grassland
 - C3.1 - Other tall herb and fern - ruderal
 - J1.2 - Cultivated/disturbed land - amenity grassland
 - J3.6 - Buildings
 - Hardstanding

A	11/09/2025	Environmental Statement	CA	JC	SK
Rev	Date	Description	GIS	Chk	App
nationalgrid					
Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT					
Volume: VOLUME 8: APPENDICES TRAWSFYNYDD SUBSTATION WORKS					
Document Title: FIGURE 5.5.D.1 PHASE 1 BASELINE HABITATS					
Creator: CA	Date: 11/09/2025	Checker: JC	Date: 11/09/2025	Approver: SK	Date: 11/09/2025
Document Type: FIGURE	Scale: 1:3,000	Format: A3	Sheets: 1 OF 1	Rev: A	

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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 Importance (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 and 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 advise¹ 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 setts².

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 website³.

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

² Interpretation of ‘Disturbance’ in relation to badgers occupying a sett, Natural England (2009)

³ <https://www.biodiversitywales.org.uk/Section-7>

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 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 Wellbeing 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 NRAP⁴ 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 Wales⁵. 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.

⁴ Welsh Government (2020) [Nature Recovery Action Plan](#).

⁵ Covention on Biological Diversity (2011) [Aichi Biodiversity Targets](#).

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 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)^{Error! Bookmark not defined.} (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 PPW⁶ 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.*

⁶ Welsh Government (2024) Planning Policy Wales. Edition 12. February 2024.

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,
- 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 an 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 SAC or 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 2024⁷ 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.

⁷ Welsh Government (2021) Future Wales: The National Plan 2040. February 2021

Local Planning Policy

A summary of relevant local planning policies is provided in **Table 4.9-1** below.

Table 4.0-1 Summary of Local Planning Policy

Document	Planning Policy	Summary of Policy Text
Eryri Local Development Plan	Development Policy 1: General Development Principles	<p>To conserve and enhance the ‘Special Qualities’ and purposes of the National Park, development will only be permitted where all the following apply [related to NBB and GI]:</p> <ul style="list-style-type: none"> • <i>“The development will not have an unacceptable adverse impact on the characteristic biodiversity of Snowdonia, particularly habitats and species protected under national and European legislation.</i> • <i>The development does not result in the loss of landscape features, including woodland, and Ancient Semi-Natural woodland in particular, healthy trees, hedgerows, dry stone walls or damage any important open space or public view.</i> • <i>Appropriate services and infrastructure can be provided without compromising the quality and character of the landscape and cultural heritage.</i> • <i>The development will not have an unacceptable adverse impact, through increased resource use, discharges or emissions, on public health, surface and ground water (quality, quantity or ecology), air quality, soil and the best and most versatile agricultural land.</i> • <i>The development is compatible with, and does not cause significant harm, to the environment, neighbouring</i>

residential amenity or the amenity of the Park by way of noise, dust, vibration, odour, light pollution, hazardous materials or waste production.

- *The development will not have an unacceptable adverse impact on public rights of way, other recreational routes or open country.*
- *The provision of adequate and efficient infrastructure, including utilities such as water supply, sewers, waste management, power generation and distribution, telecommunications, public transport and community facilities underpins the delivery of sustainable development in the National Park”.*

Strategic Policy D: Natural Environment

“The natural resources, biodiversity, geodiversity and ‘Special Qualities’ of the Snowdonia National Park will be protected from inappropriate development. Where development is deemed acceptable developers will be expected to ensure that the natural environment is protected and enhanced.

Proposals should not adversely affect the National Park’s biodiversity resources including designated sites from an international through to a local level, as well as wider biodiversity resources e.g. habitats and species outside designated sites.

Development proposals which are likely to adversely affect the integrity of European designated sites (either alone or in combination with other plans of projects) will not be permitted unless the requirements of the Conservation of Habitats and Species Regulations 2010 have been fulfilled and hence the following criteria can be met:

-
- *There is no alternative solution*
 - *There are imperative reasons of over-riding public interest for the development. The following requirements will apply to development affecting nationally and locally designated sites:*
 - *The location, design and construction of the development is such that damage to nature conservation features are mitigated, and opportunities for nature conservation gain are taken.*
 - *Compensatory measures are provided if necessary.*
 - *The remaining nature conservation features are protected and enhanced, and provision is made for their management.*

Development will only be permitted within the Undeveloped Coast where it can be demonstrated that a coastal location is essential. Development which harms the unspoilt landscape character or wildlife habitats will not be permitted.

Development proposals which are likely to adversely affect habitats and species listed in the Local Biodiversity Action Plan will be subject to the guidelines of the Supplementary Planning Guidance on Local Biodiversity”.

Strategic Policy Dd:
Climate Change

“The contribution that emissions of greenhouse gases from the National Park make to climate change will be reduced and the impacts of climate change on the National Park will be addressed in this Plan by

- *Ensuring that any coastal and flood protection works, including managed realignment, considered to be necessarily have no adverse environmental*
-

impacts or that they can be satisfactorily mitigated.

- *Conserving and enhancing areas of woodland, upland soils and peatland areas to assist in carbon retention, water storage and flood prevention.*
- *Facilitating species adaptation and migration through protecting habitat connectivity corridors and enhancing biodiversity. iv. Directing development to locations which reduces the need to travel, especially by private car”*

Supplementary Planning Guidance

Eryri national park have also produced supplementary planning guidance (SPG) for Nature Conservation and Biodiversity, adopted in 2016. The SPG has been used alongside the Local Development Plan to ensure the proposed works confirm to local policy.

5.6.A Historic Environment Desk Based Assessment for the Trawsfynydd Works

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1. Introduction

- 1.1.1 This report comprises a desk-based assessment (DBA), which sets out the heritage baseline conditions for the proposed works. This DBA is included as an Appendix (**Volume 8, Appendix 5.6-A**) to **Volume 5, Chapter 6: Historic Environment**.
- 1.1.2 The purpose of the DBA is to identify all known designated and non-designated historic assets in the Trawsfynydd works site and the defined study areas (as set out in **Section 3.1**) to establish the archaeological and historical background.
- 1.1.3 The DBA assesses the potential for the survival of previously unknown historic assets and archaeological remains to exist in the Trawsfynydd works site and provides an assessment of the significance of the known historic assets and previously unrecorded archaeological assets that maybe affected by the proposed works. The DBA concludes with an assessment of potentially affected historic assets in the Trawsfynydd works site and study areas.

1.2 Site Location and Proposed Works

- 1.2.1 National Grid Electricity Transmission plc (NGET) is proposing reinforcement of the existing double circuit electric line which runs between Pentir Substation near Bangor and Trawsfynydd Substation in Eryri National Park (ENP) ('the Project'). These
- 1.2.2 Works at Trawsfynydd Substation would be limited to within the existing compound, north-east of the former nuclear power station at Trawsfynydd (SH691383) accessed via the current access road to the substation. The total area measures approximately 440 metres (m) north-west to south-east by 560 m north-east to south-west.
- 1.2.3 Detailed information on the proposed works is provided in ES **Volume 5, Chapter 2: Trawsfynydd Substation Works**.
- 1.2.4 For the purposes of this assessment, 'the Trawsfynydd works site' means the area in the existing substation where works will take place and the existing substation access road.

1.3 Aims

- 1.3.1 The aims of the assessment are:
 - To place the Trawsfynydd works site in its historical and archaeological context through the collation of baseline information.
 - To identify the presence of known historic assets (both designated and non-designated) in the Trawsfynydd works site and the 500 m and 3 kilometres (km) study areas (see **Section 3**),
 - To assess the potential for previously unrecorded archaeological remains to exist in the Trawsfynydd works site.
 - To identify the extent of previous ground disturbance which may have affected the survival of archaeological remains in the Trawsfynydd works site.

- To assess the significance of historic assets in the Trawsfynydd works site and study area, and the likely significance of previously unrecorded archaeological remains that may be in the Trawsfynydd works site.
- To identify historic assets and previously unrecorded archaeological remains that have the potential to be impacted by the proposed works which will be taken forward for assessment in the ES.

1.4 Structure of the Document

1.4.1 This DBA is divided into the following sections:

- The legislative and planning policy framework is provided in **Section 2** (Legislation, Policy and Guidance).
- The methodology for the assessment and for the determination of the study areas is set out in **Section 3** (Assessment Methodology).
- A description of the archaeological and historical background of the Trawsfynydd works site and description of historic assets in the Trawsfynydd works site and study areas, as well as a summary of previous archaeological investigations undertaken in the study areas, is set out in **Section Error! Reference source not found.** (Heritage Baseline).
- **Section Error! Reference source not found.** assesses the potential for unrecorded archaeological remains to exist in the Trawsfynydd works site and provides an assessment of the significance of known and potential historic assets which have the potential to be impacted by the proposed works (Assessment of Baseline).
- A summary of the results of the assessment is provided in **Section Error! Reference source not found.** (Conclusions).

1.4.2 This DBA is supported by **Volume 8, Appendix 5.6.B: Gazetteer of Historic Assets.**

1.4.3 This DBA is also supported by the following figures at the end of this report:

- **Figure 5.6.A.1:** Designated Historic Assets within 3 km of Trawsfynydd Substation.
- **Figure 5.6.A.2:** Non-designated Historic Assets within 500 m of Trawsfynydd Substation.
- **Figure 5.6.A.3:** Historic Landscape Character Areas within 500 m of Trawsfynydd Substation.
- **Figure 5.6.A.4:** Extract from Tithe Survey of Maentwrog Parish in the County of Merioneth 1841.
- **Figure 5.6.A.5:** Historical OS Map 1888.
- **Figure 5.6.A.6:** Historical OS Map 1901.
- **Figure 5.6.A.7:** Historical OS Map 1953.

2. Legislation, Policy and Guidance

2.1.1 Legislation, planning policy and guidance relevant to the historic environment and pertinent to the proposed works are detailed in **Volume 8, Appendix 1.1.A Legislation, Policy and Guidance, Chapter 6. Historic Environment** and are summarised below.

2.2 Legislation

- Ancient Monuments and Archaeological Areas Act 1979 (Ref 2.1).
- Planning (Listed Buildings and Conservation Areas) Act 1990 (Ref 2.2).
- The Historic Environment (Wales) Act 2016 (Ref. 2.3) and relevant regulations.
- The Historic Environment (Wales) Act 2023 (Ref. 2.4).
- The Hedgerow Regulations 1997 (Ref. 2.5).

2.3 National Planning Policy

- The 2023 Overarching NPS for Energy (EN-1) (Ref 2.6).
- The 2023 NPS for Electricity Networks Infrastructure (EN-5) (Ref 2.7).
- Planning Policy Wales 2024 (Ref 2.8).
- Future Wales 2021 The National Plan to 2040 (Ref 2.9).
- Technical Advice Note 24: The Historic Environment (Ref 2.10).

2.4 Local Planning Policy

- Eryri Local Development Plan 2016 – 2031 (Ref 2.11).

2.5 Guidance

2.5.1 This DBA has been carried out using guidance from the following sources which are relevant to the heritage assessment:

- Conservation Principles for the sustainable management of the historic environment in Wales (Ref 2.12).
- Heritage Impact Assessment in Wales (Ref 2.13).
- Managing Change to Listed Buildings in Wales (Ref 2.14).
- Managing Change to Registered Historic Parks and Gardens in Wales (Ref 2.15).
- Managing Conservation Areas in Wales (Ref 2.16).
- Managing Historic Character in Wales (Ref 2.17).
- Managing Lists of Historic Assets of Special Local Interest (Ref 2.18).

- Setting of Historic Assets in Wales (Ref 2.19).
- Chartered Institute for Archaeologists Standard and guidance for historic environment desk-based assessment (Ref 2.20).

3. Assessment Methodology

3.1 Study Area

- 3.1.1 The study areas set out below have been agreed through consultation with Heneb: The Trust for Welsh Archaeology (see **Volume 5, Trawsfynydd Substation, Chapter 6. Historic Environment**, Section 6.6 Consultation and Scope of Assessment) and are presented on **Figures 5.6.A.2 and 5.6.A.3**.

Historic Assets

- 3.1.2 The historic assets discussed in this assessment, including designated and non-designated historic assets, are identified by their unique identification number assigned by Cadw for designated historic assets, and by the HER (Heneb) for non-designated historic assets. Any additional assets identified through other sources such as the PAS, NMR or National Museum Wales (NMW) databases are identified in the text using either the assigned prefix AEC or the number assigned by the organisation who holds the database. Each asset can be cross-referenced to the gazetteer in **Volume 8, Appendix 6-B** and shown on **Figures 5.6.B.2 and 5.6.B.3**.

Designated Historic Assets

3 km Study Area

- 3.1.3 A study area of 3 km from the Trawsfynydd works site has been defined to provide historical and archaeological context and to identify designated historic assets with the potential to be affected by the proposed works.
- 3.1.4 The settings of designated historic assets of the highest value (i.e., World Heritage Sites, scheduled monuments, Grade I and II* listed buildings, registered parks and gardens and conservation areas containing a number of assets of the highest value) outside of the defined study area will be considered. These assets will be considered as the proposed works may have the potential to result in long-term change to the settings of designated historic assets, some of which may be at a distance from the Trawsfynydd works site.

Non-designated Historic Assets

500 m detailed study area

- 3.1.5 A detailed study area of 500 m from the Trawsfynydd works site has been defined to provide full historical and archaeological context and to identify designated and non-designated historic assets with the potential to be affected by the proposed works.
- 3.1.6 Undesignated historic assets are identified with their Historic Environment Record (HER) reference number which uses the prefix 'PRN'. Each asset identifier is placed in parentheses and highlighted in bold in the text.

3.2 Data and Information Sources

- 3.2.1 This assessment has collated cultural heritage data from several sources, comprising:
- Formal search of the Heneb HER for Gwynedd for information relating to non-designated historic assets, previous archaeological investigations and historic landscape character data.
 - Records from the National Monuments Record (NMR) of Wales, held by the Royal Commission on the Ancient and Historic Monuments of Wales (RCAHMW) (Ref 3.1).
 - Records from the National Museums Wales database (Ref 3.2).
 - Records held by Cadw on designated historic assets in Wales (Ref 3.3).
 - Published and unpublished literature (including a detailed review of reports for previous fieldwork carried out close to the Trawsfynydd works site).
 - Documentary, cartographic and other resources as deposited in the local archives.
 - Local authority conservation area appraisals and management documents and their mapping (Snowdonia National Park).
 - Various online resources including the British Geological Survey (BGS) Geology of Britain Viewer (Ref 3.4) and the British Geological Survey GeoIndex Onshore (Ref 3.5).
 - Research Framework for the Archaeology of Wales (Ref 3.6).
 - National Library of Scotland for historic maps (Ref 3.7).
 - Vertical aerial photography of the study area available from the National Collection of Aerial Photographs (Ref 3.8), the Britain from Above database (Ref 3.9), or the APU Welsh Government Aerial Photography (available on DataMapWales) (Ref 3.10).
 - Available 1 m spatial resolution light detecting and ranging (LiDAR) data published by the Welsh Government (Ref 3.9).
 - Defence of Britain Database (Ref 3.11).
 - Relevant records available from the Portable Antiquities Scheme (Ref. 3.12).

3.3 Site Walkover Survey

- 3.3.1 A walkover and visual appraisal of known and potential historic assets in the Trawsfynydd works site and 3 km study area was undertaken between 12th and 14th November to:
- Identify known historic assets in the Trawsfynydd works site.
 - Identify areas with the potential to contain any previously unidentified archaeological or historical remains.
 - Identify and assess the setting of historic assets in the Trawsfynydd works site and 3km study area.
 - Identify the location, extent and severity of modern ground disturbance and previous construction impacts.

- Assess ground conditions and the suitability of the Trawsfynydd works site for further evaluation.

3.4 Previous Ground Disturbance

- 3.4.1 The previous impact to buried archaeological remains caused by historic development has been assessed using a five-point scale of ‘very high’, ‘high’, ‘medium’, ‘low’ and ‘very low’, the definitions of which are set out in **Table 3-1**.

Table 3-1 – Level of Previous Ground Disturbance

Magnitude of Previous Disturbance	Description
Very High	Deep level basement or sub-basement excavated into the underlying natural geology resulting in the removal of all subsurface archaeological deposits.
High	Extensive and deep disturbance resulting in the removal of all but the deepest archaeological deposits such as wells or quarry pits, deep foundations, quarrying and large utilities.
Medium	Moderate previous disturbance which may extend to some depth, but where there remains the potential for archaeological remains to survive either between or beneath existing impact levels such as building foundations and utility trenches.
Low	Shallow previous disturbance such as areas of car parking and surfacing where archaeological remains may survive with limited truncation beneath the level of impact.
Very Low	No known historic development impacts to subsurface archaeological remains. Potential for the survival of archaeological horizons from Prehistory to the Post-medieval period.

3.5 Archaeological Potential

- 3.5.1 Archaeological potential assesses the possibility that unrecorded archaeological remains may exist in the Trawsfynydd works site in addition to the known archaeological resource identified in the baseline. The potential for unrecorded archaeological remains to exist in the Trawsfynydd works site has been determined by professional judgement guided by an assessment of the existing heritage resource, visual inspection during a site walkover and consideration of the impact resulting from previous modern development or ground disturbance in the Trawsfynydd works site.
- 3.5.2 The potential for an area to contain archaeological remains is rated ‘high’, ‘medium’, ‘low’, ‘negligible’, or ‘unknown’. This rating is based on an understanding of the archaeological resource as a whole and takes into account its national, regional and local context. The rating also considers the number and proximity of known and predicted archaeological/historical sites or find spots in the Trawsfynydd works site and the surrounding study areas.

3.6 Significance of Historic Assets

- 3.6.1 The assessment criteria used in the DBA is based on Cadw guidance on heritage impact assessment in Wales (Ref 2.12) and the setting of historic assets in Wales (Ref 2.18). Each heritage asset is assigned a significance (heritage value) rating in the DBA. The significance (heritage value) of historic assets has been determined by the professional judgement of qualified and experienced heritage consultants guided by statutory and non-statutory designations, national, regional, and local policies, and archaeological research frameworks.
- 3.6.2 The value of a heritage asset is guided by its designated status, but is derived also from its heritage interest, which is defined by Cadw as a combination of its evidential, historical, aesthetic or communal interest. The setting of a heritage asset can also contribute to its value. Using professional judgement and the results of consultation with heritage stakeholders, historic assets are also assessed on an individual basis and regional variations and individual qualities are considered where applicable. In articulating effects, professional judgement will be made on the level of impact (positive or negative) that a heritage asset will experience as a result of the proposed works, supported by an appropriate narrative linking this to how the asset will have its significance changed.

Table 3-2 below provides the criteria for assigning heritage value, but in all cases professional judgement will be applied regarding the appropriate category for individual historic assets, with a justification for this assessment provided.

Table 3-2 – Criteria for Determining the Value of Historic Assets

Value of Historic Assets	Description
High	World Heritage Sites. Scheduled Monuments. Aircraft crash sites. Grade I and II* Listed Buildings. Registered battlefields. Grade I and II* registered parks and gardens. Conservation areas of demonstrable high value. Non-designated historic assets (archaeological sites, historic buildings, monuments, parks, gardens, or landscapes) that can be shown to have demonstrable national or international importance. Well preserved historic landscape character areas, exhibiting considerable coherence, time-depth, or other critical factor(s).
Medium	Grade II Listed Buildings. Conservation areas. Grade II registered parks and gardens. Non-designated historic assets (archaeological sites, historic buildings, monuments, park, gardens, or landscapes) that can be shown to have demonstrable regional importance.

	<p>Averagely preserved historic landscape character areas, exhibiting reasonable coherence, time-depth, or other critical factor(s).</p> <p>Historic townscapes with historic integrity in that the assets that constitute their make-up are clearly legible.</p>
Low	<p>Locally Listed Buildings.</p> <p>Non-designated historic assets (archaeological sites, historic buildings, monuments, park, gardens, or landscapes) that can be shown to have demonstrable local importance.</p> <p>Assets whose values are compromised by poor preservation or survival of contextual associations to justify inclusion into a higher grade.</p> <p>Historic landscape character areas whose value is limited by poor preservation and/ or poor survival of contextual associations.</p>
Very Low	<p>Assets identified on national or regional databases, but which have no evidential, historical, aesthetic or communal value.</p> <p>Assets whose values are compromised by poor preservation or survival of contextual associations to justify inclusion into a higher grade.</p> <p>Landscape with no or little significant historical merit.</p>

3.7 Limitations and Assumptions

- 3.7.1 The assessment has relied upon data and records provided by third parties, and it has been assumed that this information is accurate and up to date at the time of reporting.
- 3.7.2 Historic aerial photographic records of the Trawsfynydd works site and study area were assessed but no records with suitable coverage or of sufficient resolution were available from the National Collection of Aerial Photographs database (Ref 3.8), the Britain from Above database (Ref 3.9) or the APU Welsh Government Aerial Photography (available on DataMapWales) (Ref 3.10)

4. Heritage Baseline

4.1 Site Conditions

Geology

- 4.1.1 The underlying bedrock in the Trawsfynydd works site is the Rhinog Formation – comprising interbed sandstone and mudstone. This is a sedimentary bedrock formed between 526 and 508 million years ago, during the Cambrian period.
- 4.1.2 Superficial deposits in the immediate area of the Trawsfynydd works site comprise Devensian Diamicton Till. This is a sedimentary superficial deposit formed between 116 and 11.8 thousand years ago during the Quaternary period (Ref 3.4).

Previous Geotechnical Investigations undertaken in the Trawsfynydd Works Site

- 4.1.3 Geotechnical investigations were undertaken in the Trawsfynydd works site in October 1958 in advance of the construction of the existing substation. The locations of boreholes are illustrated on the British Geological Survey's GeoIndex Onshore map viewer (Ref. 3.5).
- 4.1.4 Borehole No. 142 (SH63NE66) revealed peat and moss up to 1.5 feet (c. 0.45 m) below ground level (bgl); and natural moraine comprising clayey sand and gravel with cobbles and large boulders between 1 foot (c. 0.30 m) and 8.25 feet (c. 2.5 m) bgl.
- 4.1.5 Borehole No. 144 (SH63NE67) revealed peat and moss up to 2.5 feet (c. 0.76 m) bgl; and natural moraine comprising clayey sand and gravel with cobbles and large boulders between 2.5 feet (c. 0.76 m) and 12.5 feet (c. 3.8 m) bgl.
- 4.1.6 Borehole No. 145 (SH63NE68) revealed peat up to 1.5 feet (c.0.45 m) bgl; and natural moraine comprising large boulders with clayey sand and gravel between 1.5 (0.45 m) and 15.5 feet (4.7 m) bgl.
- 4.1.7 Borehole No. 146 (SH63NE69) revealed topsoil up to 1 foot (c.0.30 m) bgl; clay and silt between 1 foot (c.0.30 m) and 3 feet (c. 0.90 m) bgl; and natural moraine comprising sand, gravel and boulder between 3 feet and 12 feet (c. 0.90 m and 3.7 m) bgl.

Topography

- 4.1.8 Trawsfynydd Substation is at the north end of Llyn Trawsfynydd in the grounds of the power station for which it was built. . The terrain is relatively level and low lying, in a broad valley at 214 m Above Ordnance Datum (AOD). The landscape immediately surrounding the station was designed by landscape consultant Sylvia Crowe and architectural consultant Sir Basil Spence. Large areas of land around the Trawsfynydd works site were afforested with the planting of spruce, beech, birch, rowan, sycamore and Pinus contorta. This was intended to ease the transition between the wider landscape and the power station. As much use as possible was made of natural, local materials and local, indigenous plants in the landscaping (see paragraphs 4.4.77 to

4.4.79 on the Historic Landscape Character Area 5 Trawsfynydd power station and lake).

- 4.1.9 The landscape character chiefly comprises an artificial lake built in connection with two power stations in the 20th century. There are several dams associated with the lake, and two power stations, Trawsfynydd on the northern shore and another outside the study area to the north on the banks of the Dwyrdd. The nuclear station (**PRN 18271**) was decommissioned, and the site is being promoted as a leisure and tourist attraction, principally for fishing and boating.

Findings from Site Walkover Surveys

- 4.1.10 A site walkover was carried out of the Trawsfynydd works site on 14th November 2024 to examine the area of proposed works. No new assets were recorded as part of the walkover survey.

4.2 Previous Archaeological Investigations

- 4.2.1 There have been no previous archaeological investigations undertaken in the Trawsfynydd works site.
- 4.2.2 Ten archaeological investigations have been undertaken in the 500 m study area. The locations are illustrated on **Figure 6-3** and presented in the gazetteer (**Volume 8, Appendix 6-B Gazetteer of Historic Environment Assets**).
- 4.2.3 A field survey (**PRN 40001**) was carried out by the Gwynedd Archaeological Trust on the upland areas of Gwynedd in 1986 (Ref 4.1).
- 4.2.4 A field survey (**PRN 40406**) was carried out by the Gwynedd Archaeological Trust of deserted rural settlement sites in eastern Caernarfonshire as part of a Cadw funded thematic monument type survey (Ref 4.2).
- 4.2.5 Gwynedd Archaeological Trust was also grant aided by Cadw to undertake a project concerned with Roman roads in North West Wales between 2004-2005 (**PRN 40538**) (Ref 4.3). Further work (**PRN 40542**) on the same project was carried out (Ref 4.4).
- 4.2.6 A desk-based assessment (**PRN 44558**) was carried out by Gwynedd Archaeological Trust for the Glastir Private Woodland Management scheme (a sustainable woodland management programme in Wales). The project identified new sites in private woodlands in the Glastir scheme using historic Ordnance Survey digital mapping. The project output is a GIS table with metadata (Ref 4.5).
- 4.2.7 RSK Environment Ltd (RSK) undertook an archaeological desk-based assessment (**PRN 45076**) and field reconnaissance survey in 2010 for a proposed 38 km-long pipeline between Pwllheli and Blaenau Ffestiniog in Gwynedd. The desk-based assessment (DBA) considered sources from the Gwynedd Archaeological Trust and Snowdonia National Park Historic Environment Records. Tithe maps, estate maps (where available) and 1st and 2nd edition Ordnance Survey mapping were analysed. The DBA was supported by an Archaeological Field Reconnaissance Survey (FRS), and a review of borehole data. It identified 618 archaeological sites or areas of interest in the study area. These comprise five scheduled monuments, 189 listed buildings, four conservation areas, three registered parks and gardens and 417 non-designated archaeological sites. Sites ranged from negligible to high archaeological importance and dated from the prehistoric to modern periods. Data was gathered for a study area of

typically 1 km based on the proposed pipeline centreline, referred to throughout this report as the Study Area (Ref 4.6).

- 4.2.8 A watching brief (**PRN 45108**) was carried out by Clwyd-Powys Archaeological Trust between February 25th and March 23rd 2016 to monitor topsoil stripping carried out during the construction of new underground 33 kV electricity cables from the Trawsfynydd Nuclear Power station towards Maentwrog in Snowdonia National Park (Ref 4.7).
- 4.2.9 Clwyd-Powys Archaeological Trust was commissioned by Iberdrola Engineering and Construction in 2014 to undertake a cultural heritage assessment (**PRN 45251**) on the routes of two new underground electricity cables between Maentwrog and Trawsfynydd. The mitigation of five features by a combination of watching brief and avoidance was suggested (Ref 4.8).
- 4.2.10 Gwynedd Archaeological Trust carried out a desk-based assessment (**PRN 45447**) in 2008 as part of a Tir Gofal archaeological management plan at Coed Cae Du, Glyn Meibion Mawr and Tyddyn Cwper (Ref 4.9).
- 4.2.11 Gwynedd Archaeological Trust was grant aided by Cadw to undertake a project recording historic farmsteads (**PRN 46608**) in North Anglesey and West Meirionnydd, as part of a pan-Wales initiative to record surviving traditional farmsteads (Ref 4.10).

4.3 Historic Assets

- 4.3.1 The historic assets discussed in this assessment, including designated and non-designated historic assets, are identified by their unique identification number assigned by Cadw for designated historic assets, and by the HER (Heneb) for non-designated historic assets. Each asset can be cross-referenced to the gazetteer in **Volume 8, Appendix 6-B** and shown on **Figures 5.6.B.2 and 5.6.B.3**.

Designated Historic Assets

Within the Trawsfynydd Works Site

- 4.3.2 There are no designated historic assets in the site.

Within the 3 km Study Area

- 4.3.3 There are no World Heritage Sites in the 3 km study area.
- 4.3.4 There are six scheduled monuments in the 3 km study area. These are listed below with their distance from the Trawsfynydd works site:
- Hut Circle 800 m West of Moelfryn-Isaf (**ME131**), approximately 2.93 km south-west.
 - Tomen y Mur (**ME078**), approximately 817 m north-east.
 - Castell Tomen y Mur (**ME002**), approximately 653 m north-east.
 - Roman Practice Camp 440 m West-South-West of Braich-Ddu (**ME260**), approximately 1.77 km east.
 - Enclosed Hut Group at Nurse Cae Du (**ME163**), approximately 518 m north-west
 - Enclosed Hut Circle Settlement at Dolbelydr (**ME174**), approximately 2.91 km east.

- 4.3.5 There are 26 listed buildings (Grade II) within 3 km of the Trawsfynydd works site. There are no Grade I or II* listed buildings in the study area.
- 4.3.6 The Grade II listed buildings are dispersed across the study area and comprise farmsteads and associated farm buildings, war memorials, ancillary buildings, schools and churches dating to the post-medieval and modern periods. The closest Grade II listed buildings to the Trawsfynydd works site are as follows:
- Cartshed at Creigiau Duon (**Cadw 83991**), approximately 580 m north.
 - Creigiau Duon (**Cadw 83995**), approximately 590 m north.
 - Milepost (**Cadw 84009**), approximately 814 m north.
 - Former dairy at Tafarn Helyg (**Cadw 83999**), approximately 1.13 km north.
 - Former forge at Tafarn-helyg (**Cadw 84000**), approximately 1.14 km north.
 - Tafarn-helyg (**Cadw 84023**), approximately 1.14 km north.
 - Coed Cae-du Farmhouse (**Cadw 4847**), approximately 857 m south-east.
 - Pont Tafarn-helyg (**Cadw 84015**), approximately 1.16 km north.
 - Holy Cross Church (**Cadw 4840**), approximately 1.4 km north.
 - Gellilydan Terrace (**Cadw 83970, 83976, 83981**), approximately 1.5 km north-west.
 - Pandy Bach (**Cadw 84013**), approximately 1.6 km north.
- 4.3.7 There is one registered park and garden within 3 km of the Trawsfynydd works site. The Dragon Square and Dame Sylvia Crowe Garden (**PGW(Gd)64(GWY)**) in the grounds of the Trawsfynydd Power Station, is approximately 70 m south-west.
- 4.3.8 There is one Conservation Area within 3 km of the Trawsfynydd works site. The Maentwrog Conservation Area (**WAL/SNOW/2**) is approximately 2.8 km north-west.

Non-Designated Historic Assets

Within the Trawsfynydd Works Site

- 4.3.9 There are no known non-designated historic assets in the Trawsfynydd works site.
- 4.3.10 A site walkover and visual appraisal in the Trawsfynydd works site did not identify any previously unrecorded features or areas with the potential to contain any previously unidentified archaeological or historical remains.

Within the 500 m Study Area

- 4.3.11 17 non-designated archaeological assets have been identified in the 500 m study area. These non-designated assets comprise built historic sites dating to the post-medieval date.

4.4 Archaeological and Historical Background

Palaeolithic and Mesolithic (1,000,00 BC to 4,000 BC)

- 4.4.1 Remains from the Palaeolithic period are rare, and to date, no material from this period has been yet identified in the Trawsfynydd works site or in the 500 m or 3 km study areas.
- 4.4.2 North Wales contains some of the most nationally significant sites for the study of the British Palaeolithic, in the form of cave sites in the Clwydian Range. These are Bontnewydd Cave, Cae Gronw Cave, Cae-Gwyn Cave, Ffynnon Beuno Cave and Lynx Cave in Denbighshire approximately 50 km east of the Trawsfynydd works site, Lynx Cave also in Denbighshire approximately 64 km east of the Trawsfynydd works site, and Gop Cave and Gwaenysgor Cave approximately 54 km east-north-east of the Trawsfynydd works site in Flintshire. These have produced important lithic, faunal, and human bone evidence, including, at Bontnewydd Cave, the first evidence from Wales of Lower Palaeolithic early Neanderthals dating from c. 225,000 years ago. There is no significant evidence noteworthy evidence of Palaeolithic activity outside of these caves known from Wales.
- 4.4.3 No Mesolithic findspots, archaeological remains or sites have been identified in the Trawsfynydd works site or in the 500 m study area, however, a number of prehistoric flint and chert artefacts were found during archaeological excavations in advance of the Porthmadog bypass at Y Bryn near Tremadog (**PRN 33595**), approximately 13 km west of the Trawsfynydd works site, including a number of cores and broken flakes of possible later Mesolithic date.

Neolithic to Bronze Age (4,000 BC to 700 BC)

- 4.4.4 Neolithic and early Bronze Age activity is mostly represented in the archaeological record by flint tools and funerary monuments.
- 4.4.5 North Wales contains numerous Neolithic funerary monuments, and has also recently yielded evidence, from Llanfaethlu on Anglesey, of an early Neolithic village – the first to be discovered in North Wales – which reveals a cluster of four houses.
- 4.4.6 The evidence for, and emphasis on, formal ritual and elaborate burial, so characteristic of the Earlier Bronze Age, fell away during the Later Bronze Age. Climate may, again, have contributed to the decline in popularity of the upland locations, which had previously been favoured for burial and ritual. In contrast, the evidence for settlement increases during this period. From the Later Bronze Age, hillforts begin to dominate the landscape. Undefined settlement is also well represented, as are field systems and other components of potentially contemporary landscapes. The quality of the field evidence in certain areas of Gwynedd is very high. The identifiable hierarchy of settlement reflects a perceived increase in the stratification of society dominated by a warrior aristocracy (Ref 4.11).
- 4.4.7 No Neolithic or Bronze Age findspots, archaeological remains or sites have been identified in the Trawsfynydd works site or the 500 m or 3 km study areas.
- 4.4.8 Neolithic settlement sites are particularly rare in North Wales and our interpretation could be due to a bias towards the survival of the large funerary monuments and ritual sites, the settlement sites having been destroyed by later activity and the erosion of topsoil in the later prehistoric and Romano-British periods.

Iron Age (800 BC to AD 43)

- 4.4.9 The Iron Age in North Wales roughly spans the centuries between c. 800 BC and the beginning of the Roman conquest in AD 43. It is distinguished by the impressive numbers of surviving hillforts and settlements present in the archaeological record. However, archaeological excavations have been few and far between and the material culture for the Iron Age in Wales is correspondingly sparse. What there is, largely recovered from deliberately deposited hoards, is exotic and unusual rather than domestic and every day. Swords, spearheads and fine metalwork created in geographically widespread typological and artistic styles testify to broad cultural contacts and the presence of a warrior elite. However, the pottery or tools that could describe local society and the organisation of domestic life are usually lacking (Ref 4.12). Continuing into the Iron Age, hillforts begin to dominate the landscape. Undefended settlement is also well represented, as are field systems and other components of potentially contemporary landscapes
- 4.4.10 The Enclosed Hut Group at Nurse Cae Du (**ME163**) is approximately 518 m north-west of the Trawsfynydd works site. The monument comprises the remains of a small but substantial and undisturbed enclosed settlement, which probably dates to the late prehistoric or Romano-British periods. Two large circular huts and one long rectangular hut can be clearly seen, ranged around a central courtyard. Associated are field enclosures and paddocks, and a short distance away are the remains of a later rectangular structure also with associated paddock. Trackways can similarly be identified although their date is uncertain.
- 4.4.11 The Hut Circle 800 m West of Moelfryn-Isaf (**ME131**) is approximately 2.93 km south-west of the Trawsfynydd works site. The monument is a large, well-preserved hut circle of the Iron Age or Romano-British period, measuring about 11 m in internal diameter, on an east-facing slope. It has been scarped into the hillside (the uphill side has been dug into the slope and the downhill side built up), and has an entrance facing towards the south-east. It is fairly well preserved, although there is little standing masonry. The line of the wall is marked by large stones, presumably facing stones, except on the south, where more remains, including some core material. Some internal facing is visible but more is probably protected by fallen stone (possibly external facing too).
- 4.4.12 Enclosed Hut Circle Settlement at Dolbelydr (**ME174**) is approximately 2.91 km east of the Trawsfynydd works site. The monument comprises the complete and well-preserved remains of a small, compact, enclosed settlement which probably dates to the Iron Age or Romano-British period. The settlement lies on a small, west-facing natural promontory, jutting out from the side of a small valley and overlooking a small stream and a wide stretch of better-quality land. The settlement consists of three buildings set within and forming part of an enclosure, possibly a single homestead.

Roman (AD 43 to AD 410)

- 4.4.13 North-West Wales contains some of the defining type-sites of the age – the enclosed and unenclosed hut-groups together with some of the best known and extensively excavated military installations; Segontium is a prime example. It is also one of the few British regions which Classical sources specifically mention: the Anglesey campaign of AD 60 and the final capture of the island by Julius Agricola in AD 77 are notable geographical markers in the context of first century military operations (Ref 4.13).
- 4.4.14 The upland region of Gwynedd saw less Roman settlement compared to south-east Wales, and to a lesser extent south-west Wales. Following its conquest in the 70s of the

first century and a garrisoning phase which effectively only lasted to the mid-second century, its native communities accepted Roman rule, but seemingly played no part in the process of ‘Romanization’. Urban centres are notably absent, whilst there is no hint of villa development. Military remains are more obvious, and, in the case of Segontium, indicative of a long-lasting, but markedly localised garrisoning phase. There is evidence for the exploitation of the region’s metals by Mediterranean-style business partnerships (societates), whilst Romanization has been perceived as being essentially limited to the circulation of a range of consumer durables – pottery, coinage, metalwork and objects of worked stone, such as rotary querns – on settlement sites whose origins lie in the latter centuries BC. When the politico-military infrastructure of Roman Britain collapsed in the early fifth century, there was a return to a pre-Roman socio-economic framework in the region (Ref 4.13).

- 4.4.15 During the Roman occupation of Wales and England arterial roads were built to allow the quick and decisive movement of the Roman legions to subdue any rebellions quickly. Gwynedd has several of these important roads crossing through it.
- 4.4.16 A Roman Road, which ran from Segontium to Pen Llystyn to Tomen y Mur (**PRN 17821**) is projected to run in an east-north-east to west-south-west orientation, approximately 347 m north of the Trawsfynydd works site.
- 4.4.17 Tomen y Mur is a Roman military landscape on upland slopes overlooking the Trawsfynydd basin. The large scheduled area comprises two scheduled monuments (**ME002** and **ME078**) in four adjoining parts, containing several specific sites, although adjacent and intervening areas are also scheduled, approximately 653 m north-east of the Trawsfynydd works site. In summary, the main elements are as follows:
- a fort, at SH70603865.
 - earthworks south-east of the fort including a bath-house at SH70693855 and a probable mansio (accommodation for travellers) at SH70713857, and a bridge abutment, at SH70733852.
 - a medieval motte, constructed over part of the Roman fort, at SH70553868.
 - a vicus (civilian settlement) north-east of the fort, at SH70693877.
 - a ludus or amphitheatre north-east of the fort, at SH70813890.
 - Roman burial barrows east-north-east of the amphitheatre, at SH70893891.
 - a parade ground east-north-east of the fort, at SH70813875.
 - a mound south-east of the parade ground at SH70893864, with other earthworks south-west of this at SH70853865 and possible leats east of the parade ground.
 - Roman burial barrows beside the road south-east of the fort, at SH70953827, SH70923833 and SH71023816 and in the same area, the remains of two possible marching camps SH7098 3832.
 - a fort annexe and two practice camps at SH70433878 and SH70423871 and a medieval homestead enclosure at SH70393881, to the north-west of the fort.
- 4.4.18 The fort stands in a commanding position on a low spur with wide views over the Vale of Ffestiniog to the north-west and the undulating country to the south. It had two main structural phases. The earlier fort had earth and timber defences consisting of two banks topped by a timber palisade. Between the banks there were initially two ditches, but these were later replaced by a single ditch. This fort was probably constructed as a

result of the campaign of the general Agricola, during the period that Julius Frontinus was governor of Britain, between AD74 and AD78, when the system of forts linked by roads was first established in North-West Wales. The early fort forms a rectangle some 158 m by 110 m internally. The north-west defences of this fort survive as low earthworks about 30 m beyond the defences of the later, reduced fort.

- 4.4.19 The second phase fort, probably constructed in about AD120 when Hadrian was emperor, had an internal area of 122 m by 110 m and was defended by a stone wall, as well as the existing earth banks and ditches. On three sides the wall stood on top of the earlier inner bank, but on the north-west a new ditch was dug and bank created. The defences of this second phase now appear as banks surmounted by modern field walls, and the interior of the fort is level with the tops of the banks. Squared stones taken from the wall can be seen in the abandoned farmstead to the north of the fort and in field walls around the site. The stone could have been quarried at several places below and to the south-west of the fort. Ten 'centurial stones' have been found at Tomen y Mur. They are inscribed in Latin and commemorate the building of sections of the wall by different groups of soldiers. Like most forts in north Wales, it was abandoned by AD135.
- 4.4.20 It has been suggested that three Roman roads approach the fort, from the north-west, north-east and south-east. In addition, a feature similar to an agger (a raised causeway for a road), 50 m long, 15 m wide, 0.6 m high and orientated north-west to south-east has been recorded in line with the centre point of the north-west side of the fort.
- 4.4.21 Earthworks south-east of the fort including a bath-house, a probable mansio (accommodation for travellers), and a bridge abutment. Archaeological surveys have shown that there was a small vicus (civilian settlement) either side of the road on the north-east side of the fort. This probably consisted of shops and workshops, houses and gardens.
- 4.4.22 There was a ludus or amphitheatre north-north-east of the fort. The amphitheatre was probably used principally as a facility for training soldiers, but possibly also for entertainment. It consists of an oval earthwork with internal diameters of 28 m north-south by 23 m east-west. A bank of grassed-over stone 1.5 m to 2 m high and c.8 m wide runs around the perimeter and the interior is level. A field wall has been built across it and it has been damaged by a 19th-century quarry tramway, a lane and a track.
- 4.4.23 On a low knoll east-north-east of the amphitheatre and close to the assumed line of the Roman road heading north are what are thought to be Roman burial barrows. Two appear as low, grassy mounds with square ditches around them, a later bank runs between them. One mound is 6 m across and the other 4 m across, the ditches around them are about 1.5 m wide and 0.2 m deep. There may be others nearby.
- 4.4.24 To the east of the fort are the remains of a large platform, approximately 120 m by 110 m, which has clear banks on the south-west and south-east sides, that on the south-east measuring 0.7 m high and 3 to 4 m wide, the interior is partially levelled. It is interpreted as a partially completed parade ground.
- 4.4.25 To the south-east of the parade ground is a mound in the shape of a truncated pyramid, 15 m square at the base, 8m square at the summit and 3.5 m high. Projecting to north-east and south-west are level-topped banks 25 m in length, 10 m wide and 1.5 m high. It has been variously interpreted as the site of a monument, a tribunal (a raised platform for a commanding officer) and a temple complex and alternatively dismissed as a natural hillock. It may be a natural feature that has been enhanced. South-west of this feature (and south of the parade ground) are a series of small rectangular enclosures

bounded by low earth banks. They may be contemporary with the Roman occupation, but are probably later. To the east and south of the parade ground is a leat which once carried water to the bath-house, it is 1 m wide and 0.2 to 0.3 m deep. A second leat, for carrying water to the fort runs to the north.

- 4.4.26 Beside the road some 450 m south-east of the fort is a mound interpreted as a Roman burial barrow, showing signs of having been robbed. It is square in plan with sides measuring between 10.7 m and 11.6 m long, around which is a level berm, then a square ditch 3 m wide and 0.6 m deep with an external bank. Adjoining it on the north-west are the remains of another, much smaller barrow. Two other small barrows once lay along the road to the north-west, but have been ploughed out. Further to the south-east is another mound, which may be Roman or prehistoric in date. Surrounding the barrow on a large square platform, the remains of what have been interpreted as two superimposed marching camps can be seen on air photographs.
- 4.4.27 A fort annexe on the north-west side of the fort was discovered by geophysical survey. Two practice camps are also present, comprising small, square enclosures, bounded by a bank and ditch, although only one is now visible, measuring 13 m across. The Ordnance Survey suggested the presence of a Roman field system in this area, comprising low banks and traces of ditches.
- 4.4.28 There is another Roman practice camp 440 m west-south-west of Braich Ddu (**ME260**), approximately 1.77 km east of the Trawsfynydd works site. This well-preserved Roman practice camp survives as an earthen bank and ditch with well-defined centrally entrances and associated internal 'claviculae', or entrance shielding banks on all four sides. The camp was constructed as part of a military training exercise by auxiliary soldiers from the primary fort at Tomen-y-Mur. The camp demonstrates particular attention to the corners and entrances, which were the most difficult elements to build. The camp is roughly square on plan with internal dimensions of 21 m by 23 m, with the earthworks most well-preserved on the north and east sides. The defensive banks survive to a maximum height of 0.7 m and are somewhat spread, to a width of c.3 m. Traces of a 1.5 m wide ditch survive on all four sides, with the best preservation being on the south-east side. The 'claviculae' survive on all four sides of the camp and measure some 4m in length with the 'clavicula' on the north-east side being the most well-preserved.
- 4.4.29 As mentioned above in para. 4.4.14, the Enclosed Hut Group at Nurse Cae Du (**ME163**) approximately 518 m north-west of the Trawsfynydd works site comprises the remains of a small enclosed settlement which probably dates to the late prehistoric or Romano-British periods. Two large circular huts and one long rectangular hut can be clearly seen, ranged around a central courtyard. Associated are field enclosures and paddocks, and a short distance away are the remains of a later rectangular structure also with associated paddock.
- 4.4.30 The Hut Circle 800 m West of Moelfryn-Isaf (**ME131**) is approximately 2.93 km south-west of the Trawsfynydd works site. The monument is a large, well-preserved hut circle of the Iron Age or Romano-British period, measuring about 11 m in internal diameter, on an east-facing slope.
- 4.4.31 Enclosed Hut Circle Settlement at Dolbelydr (**ME174**) is approximately 2.91 km east of the Trawsfynydd works site. The monument comprises the complete and well-preserved remains of a small, compact, enclosed settlement which probably dates to the Iron Age or Romano-British period. The settlement consists of three buildings set within and forming part of an enclosure, possibly a single homestead.

Early Medieval (AD 410 to 1066)

- 4.4.32 The period c AD 400-1075 in north-west Wales, spanning the centuries between the end of Roman rule and the first Norman intervention, is still poorly understood. The documentary evidence is notoriously sparse and frequently difficult to interpret. It suggests the possibility of Irish settlement in the region and the movement of Cunedda and his followers from Manaw Gododdin around the end of the Roman period. It indicates the establishment of the important kingdom of Gwynedd by the early 6th century and its gradual rise at the expense of probable minor kingdoms such as Rhos and Meirionydd. It is also possible to chart to some extent Anglo-Saxon alliances and hostilities and from the 9th century onwards Viking raids and likely settlement. At the same time the documentary evidence can throw light on the development of Christianity by helping to identify major ecclesiastical sites (Ref 4.14).
- 4.4.33 In 1934, the hut group at Pant-y-Saer (Anglesey) was heralded as the first possible early medieval settlement in Wales because of the recovery of a penannular brooch during excavation. This was followed in the late 1950s and 1960s by minor excavation of the hillforts at Dinas Emrys and Degannwy, the early medieval phases of which were recognised by the presence of imported pottery. Over the last 25 years or so evidence of early medieval activity has come to light by chance on a few hut group sites such as Graeanog and Cefn Cwmwd. The most spectacular discovery has been the Viking Age and earlier settlement at Y Glŷn, Llanbedrgoch (Ref 4.14).
- 4.4.34 It is generally agreed that there was a mixed farming economy in the north-west as elsewhere in Wales during the early medieval period and that the best use of pasture was probably facilitated by transhumance. However, in contrast with South Wales, there is no evidence concerning landed estates in the documentary record. The farming economy must have been sufficiently developed to have produced some excess in order to support the lifestyles evidenced on the few high-status sites that have been recognised (Ref 4.14).
- 4.4.35 The origins of Christianity in North West Wales lie in the Roman period, though no evidence has so far been found. During the 5th and 6th centuries the evidence of the inscribed stones suggests that Christianity expanded, at least amongst the upper echelons of society, and during the 6th century major monastic sites such as Bangor are likely to have been founded. Around the 8th century there may have been a gradual shift from burial in kin cemeteries to burial associated with ecclesiastical sites which eventually became parish churches and chapels of ease; in addition, some early cemeteries developed into local church sites. Some minor churches may have been connected with landed estates. Over the last few years there have been major advances enabling recognition and increased understanding of early medieval ecclesiastical and burial sites in North West Wales (Ref 4.14).
- 4.4.36 There is a tradition associated with a late medieval motte at Tymon y Mur (see para 4.4.38), based on the tale of Math fab Mathonwy, that the motte was also the site of an early medieval llys (a royal court of the Princes of Gwynedd), but this has not been confirmed by archaeological excavation.
- 4.4.37 No findspots, archaeological remains or sites of early medieval date have been identified in the Trawsfynydd works site or the 500 m and 3 km study areas, though sites are known in the wider region.

Medieval (1066-1640)

- 4.4.38 The 11th century saw the first Norman incursions into Wales, their initial defeat by Gruffydd ap Cynan, king of Gwynedd (d. 1137) and the start of a successful period of Welsh rule which was to end in 1282/3 with the death of Llywelyn ap Gruffydd and conquest by Edward I. During the tense period which led to his eventual campaign of conquest, in July 1277, Edward launched a punitive expedition into North Wales with an army of 15,500 (Ref 4.15). From Chester the army marched into Gwynedd, camping first at Flint and then Rhuddlan and Deganwy, most likely causing widespread damage to the areas it passed through.
- 4.4.39 As a result of King Edward I's attempt to bring Wales under England's rule, a number of defensive structures were constructed during 1276 and 1295. The original Norman town of Caernarfon and Castell Caernarfon, approximately 9 km south-west of the Trawsfynydd works site, was an example of King Edward I's fortified towns and exceptional medieval architecture. The town and castle, designed by a military architect, Master James of St George was designed to withstand damage (Ref 4.16) and protect royal interests in the region.
- 4.4.40 The name Castell Tomen y Mur derives from the Norman motte (castle mound) of stone and earth (**ME002**), upon which once stood a timber tower. The scheduled area is approximately 653m north-east of the Trawsfynydd works site, with the motte itself approximately 750 m north-east of the works site. Tomen y Mur was used when William II (William Rufus) and Henry I campaigned against King Gruffydd ap Cynan of Gwynedd in the 11th-12th centuries. The motte is about 10 m high and is surrounded by a ditch 4 m wide, with a counterscarp bank surmounted by a modern field wall. The top is uneven, with two principal hollows on the south-east and south-west which may represent the sites of original buildings (or possibly robbing). It is slightly oval, measuring approximately 14 m north-south by 19 m east-west. The earlier second phase Roman fort was likely used as the bailey, however, a slight bank to the north-east of the motte may be the remains of an inner bailey.
- 4.4.41 Also, in the wider Tomen y Mur complex, a medieval homestead enclosure measuring 40 m by 25 m lies on a steep north facing slope.
- 4.4.42 No findspots, archaeological remains or sites of medieval date have been identified in the Trawsfynydd works site or the 500 m study area, though sites are known in the wider 3 km study area.

Post-Medieval (1640 to 1900)

- 4.4.43 The post-medieval period is one of the most significant periods to have shaped modern-day Wales. The majority of social, economic and landscape changes occurred during the post-medieval period because of heavy industry and agriculture.
- 4.4.44 Due to large industries developing in Gwynedd, there was a surge in the construction of housing and commercial buildings. As a result of this, there was a specific local vernacular that developed from the ever-growing industrial communities (Ref 4.17).
- 4.4.45 In the 500 m study area, there are a number of buildings and structures associated with post-medieval upland farming.
- 4.4.46 There are the remains of a settlement (**PRN 1816**) approximately 334 m north-west of the Trawsfynydd works site which comprises as follows:

- A small structure (A) 3.0 m x 2.0 m x 0.5 m high with a lintel over an entrance on the east side.
- A long narrow (possibly originally roofed) enclosure (B) with an entrance on the east side.
- A two roomed outbuilding (C) with an in-situ lintel over the entrance.
- An outbuilding to central house (D) with walls up to 2 m high with no windows listed.
- Probably main room of the house 6 to 8 m square (E) with a doorway in the east wall reached by a narrow passageway except for over the doorway the walls stood up to 2 m high and are fairly solid in construction.
- A substantial paddock terraced north-east of the corner of the remains of a much-ruined stone-built structure (F).

- 4.4.47 This complex of structures represents a central dwelling house with a number of outhouses and paddocks probably post medieval in date.
- 4.4.48 The site of a fulling mill (**PRN 36701**) is recorded at Pandy Gwylan, approximately 270 m north of the Trawsfynydd works site. RCAHMW noted this as site of Pandy Gwylan - no other evidence of mill. OS 1st edition map shows tenter frames in the field to the east of the mill. RC states that a 'shell' of the mill remains. Obscured by trees on Next Perspectives Aerial Photographs. The mill has the inscription 'William Jones 1815' on the lintel, but may already have been disused by 1840. The Tithe Award schedule lists the property as 'Gwylan' (the neighbouring farm), although on the map the name 'Pandy' can be seen, deleted. The mill had an internal overshot water-wheel, possibly driving two pairs of stocks. It was probably in use in the later 19th century, since the first edition Ordnance Survey twenty-five inch map (1888) shows tenter-frames in the field adjoining. Close by was the dye-house.
- 4.4.49 The site of an enclosure (**PRN 57331**) was identified west of Ty Gwyn using early Ordnance Survey maps. The enclosure is approximately 350 m north of the Trawsfynydd works site.
- 4.4.50 Another enclosure site (**PRN 57332**) was identified north-west of Trawsfynydd Power Station using early Ordnance Survey maps. The enclosure is approximately 356 m north-west of the Trawsfynydd works site.
- 4.4.51 There is the site of an outfarm (**PRN 99545**), south of Hendre-mu, which is now flooded. It is approximately 260 m south-east.
- 4.4.52 Another outfarm (**PRN 99546**), east of Hendre-mur, was approximately 30 m south.
- 4.4.53 A post-medieval farm (**PRN 99547**) at Hendre-mur, which is now flooded. It is approximately 26 m south.
- 4.4.54 The site of a post-medieval smallholding (**PRN 99548**) at Tyddyn-y-gareg-isaf, was approximately 73 m north.
- 4.4.55 The site of a post-medieval smallholding (**PRN 99549**), again at Tyddn-y-gareg-isaf, was approximately 223 m north-east.
- 4.4.56 No findspots or archaeological remains of post-medieval date have been identified in the Trawsfynydd works site.

Modern (1900 to Present)

- 4.4.57 During the First World War, Wales prepared communities and the landscape for heavy impact, as seen with other areas around Britain. Due to the relatively sparse nature of Gwynedd, a substantial range of buildings were constructed / re-used for the purpose of defence (Ref 4.18). Both newly constructed hospitals in Bangor and Caernarfon were used for injured soldiers serving in the war (Ref 4.8). Alongside this, other schemes such as large-scale food production (allotments) and forestry were also formed to help support the war effort.
- 4.4.58 During the Second World War, Wales continued to support the war effort, whilst also defending the coastline of Gwynedd against invasion. One notable defensive structure still extant are WWII-era anti-tank cubes along Fairbourne beach (Ref 4.19). Despite evidence of WWII remains in Gwynedd, there are no known remains dating to WWII in the study area.
- 4.4.59 The historic character of the area comprises an artificial lake built in connection with two power stations in the 20th century (Area 5 Trawsfynydd power station and lake (PRN 18271). There are several dams associated with the lake, and two power stations, one on the northern shore and the other outside the project area to the north on the banks of the Dwyryd. The nuclear station has now been decommissioned, and the site is being heavily promoted as a leisure and tourist attraction, principally for fishing and boating.
- 4.4.60 The former Trawsfynydd Nuclear Power Station (**PRN 4472**) is to the immediate south-west of the Trawsfynydd works site. The power station was constructed between 1959 and 1963 to architectural specifications by Sir Basil Spence. It started service in 1965 and its twin Magnox reactors generated electricity for 26 years before it reached the end of its service life in 1991; the station was closed in 1993. The first inland civil nuclear power station in the UK, it used fresh water for cooling drawn from Trawsfynydd lake, originally created in the 1920s as part of a hydro-electric project at Maentwrog. The power station is set in extensive landscaped grounds (**PGW(Gd)64(GWY)**) designed by Sylvia Crowe. The Central Electricity Generating Board was keen to recognise that Trawsfynydd was a Welsh power station and so the practice produced a vast 'mosaic' in boulder-sized pebbles in the form of a Welsh dragon which formed the paving of the central court.

Undated

- 4.4.61 A number of sites of unknown date have been recorded in the 500 m study area.
- 4.4.62 There is a building (**PRN 90399**) identified as 'Gwylan' on the first edition of Ordnance Survey mapping. The site of the building is approximately 280 m north-west of the Trawsfynydd works site.
- 4.4.63 There is another building (**PRN 90400**) south of the building identified as 'Gwylan' on first edition Ordnance Survey mapping. The site of the building is approximately 180 m north-west.
- 4.4.64 A structure or enclosure of unknown date (**PRN 27441**) first depicted on the 1st edition OS map of 1889. The site of the possible structure is approximately 407 m north.
- 4.4.65 The site of a sheepfold (**PRN 90395**) was identified east of Craig Gyfynys marked on the Ordnance Survey first edition map of 1889. The site of the sheepfold is approximately 500 m south-west.

- 4.4.66 The site of another sheepfold (**PRN 90396**) was identified north-east of Craig Gyfynys on the Ordnance Survey first edition map of 1889. The site of the sheepfold is approximately 380 m west-north-west.
- 4.4.67 Another sheepfold site (**PRN 90397**) was identified south-west of Gwylan on the Ordnance Survey first edition map of 1889. The sheepfold site is approximately 300 m west.
- 4.4.68 There is another sheepfold site (**PRN 90398**) identified south of Gwylan on the Ordnance Survey first edition map of 1889. The sheepfold site is approximately 290 m north-west.

Cartographic Assessment

- 4.4.69 A review of the tithe map 'Parish of Maentwrog in the County of Merioneth' (1841) shows the Trawsfynydd works site to have been in two parcels of uncultivated land. The first was called Hendre's Muir (Parcel 83), which was owned by Reverend Robert Roberts, and occupied by William Evans. Immediately north, the second parcel of uncultivated land was called Tyddyn y garreg (Parcel 27), and owned by the trustees of the late Richard Parry and occupied by John Richards and Evan Thomas. Further to the north was another parcel of uncultivated land called Gwylan (Parcel 86), owned by Mary and Jane Ellis and occupied by Rees Howell (**Figure 5.6.A.4**).
- 4.4.70 The first edition OS six-inch map series dating to 1888 highlights (Figure) the Trawsfynydd works site to be in rough, rocky and marshy terrain, only partly enclosed for agricultural purposes. A public footpath ran across the northern edge of the study area. The map depicts small farmsteads in the vicinity: 'Hendre-r-mur' approximately 26 m; Tyddyn-y-gareg approximately 223 m north-west; Gwylan approximately 280 m north-west and Gyfynys approximately 510 m south-west. The landscape remained largely the same in the second edition (1901) of the OS six-inch map series. By the fourth edition of the OS six-inch map series (1953), the farm of Hendre-r-mur itself was later submerged under a water reservoir expanded to cater for the demands of the Trawsfynydd Power Station, but otherwise the landscape remained the same (see **Figures 5.6.A.5 to 5.6.A.7**).

Aerial Photography Assessment

- 4.4.1 An aerial photograph taken in May 1960 has provided a vertical view of the Trawsfynydd works site when it was undergoing construction (Ref 3.10). The nuclear reactors and other buildings associated with the power station were in the early stages of construction. The land to be occupied by the substation had already been stripped of vegetation and was ready for construction works. The exposed subsoils comprised a mixture of peat and glacial moraines, as already detailed in 1958 geotechnical investigations of the Trawsfynydd works site. The land to the immediate south and south-west of the power station was significantly modified with the presence of work compounds, large earthen embankments and access roads. Beyond the works area, the landscape was similar to what was depicted in the OS historic mapping, and comprised rough agricultural pasture. To the north of the works area, the paddocks associated with the farm of Gwylan were still evident, though the farmstead itself was no longer evident. The aerial photograph also shows the Trawsfynydd water reservoir was lowered, presumably to facilitate the construction works.

LiDAR Assessment



Plate 1: Image taken from a LiDAR 1 m resolution 2020-22 DSM (multidirectional hillshade) (DataMapWales)

- 4.4.2 Recent LiDAR coverage of the Trawsfynydd works site (at 1 m resolution) did not reveal any additional historic assets. The LiDAR coverage revealed it that the substation itself is again well screened by the planted woodland and tree belts masking views into and out of the works site.

Historic Landscape Characterisation

- 4.4.3 The Gwynedd Historic Landscape Characterisation (GHLC) forms part of a national project to characterise the historic landscape. The GHLC is formed of an assessment of historic and current mapping that separated blocks of landscape into types based upon morphology or land use. Three GHLC types were identified within 500 m of the Trawsfynydd works site. These are displayed below in **Table 4-1**.
- 4.4.4 The GIS data for the Extended Study of Historic Characterisation Landscapes (ESHCL) which records the historic landscape type within the Trawsfynydd works site was obtained from Heneb as part of the HER data request, and is presented in **Figure 6.5**. Historic Land Classification (HLC) types presented in **Figure 6.5** have been used in this study to establish the existing time depth of the historic landscape of the Trawsfynydd works site and to examine how the surviving historic landscape of the works site relates to that of the surrounding areas, and to the rest of Gwynedd; this enables an assessment of the sensitivity of the historic landscape to change.

Table 4-1 – Gwynedd Historic Landscape Types

HLC Number	HLC Name	Sub-Type
Area 5	Trawsfynydd power station and lake	Lake, dam, power station
Area 16	Farming settlements north of Trawsfynydd	Farmsteads, enclosures, woods
Area 18	Coed Caersaeson	Forestry, farmsteads

- 4.4.5 The Trawsfynydd works site is in **Area 5**. Most of this character are comprises an artificial lake built in connection with two power stations in the 20th century. There are several dams associated with the lake, and two power stations – Trawsfynydd nuclear power station the northern shore and Maentwrog hydroelectric power station outside the project area to the north, on the banks of the Dwyryd. The nuclear station has now been decommissioned, and the site is being heavily promoted as a leisure and tourist attraction, principally for fishing and boating.
- 4.4.6 The 1840 tithe map shows at least two farms (Brynhir at c. SH699351, and Llwynderw at c. SH703370) near the former course of the river which are now below the lake. Little else is known of the early history of the area. The land which is now occupied by the lake was purchased in the mid-1920s by the North Wales Power Company: work began in 1925. The lake was formed by the construction of four dams (Smith, 1971) which between them impounded the water to form Llyn Trawsfynydd. The principal dam, built cross the Afon Prysor (at the northern end of the lake), was the first large arch dam ever built in Great Britain (ibid, 232) and was approximately 29 m high and 11 m thick at the base.
- 4.4.7 Work on the construction of Atomfa Trawsfynydd (power station) begun in July 1959, by which time Snowdonia had been designated as a National Park. Both of the station's reactors were in operation by March 1965 and the station was finally opened in October 1968. Built at a cost of £103 million, Trawsfynydd power station was the former Central Electricity Generating Board's (CEGB) first inland power station, and the first to use a lake to obtain water for cooling the condensers of its turbo-alternators. Although it has since been decommissioned, at its height the station discharged 70,000 gallons of effluent weekly into the lake (which usually contained c. 35 million gallons of water. The landscape immediately surrounding the station (particularly to the north) was designed by landscape consultant Sylvia Crowe and architectural consultant Sir Basil Spence (although little remains today).
- 4.4.8 To the immediate east and north of the Trawsfynydd works site is **Area 16**. The principal characteristics of the area are the regular fields and areas of woodland which contain stone-built farms, built in an apparent variety of styles but all sturdy, built from granite with slate roofs, surrounded by their outbuildings. There is also some use of corrugated iron as a structural material and as weather-proofing.
- 4.4.9 The farms in the area are recorded on the tithe map and the field pattern also seems to have remained largely unchanged. Given the absence of evidence for earlier settlement (either relict or in the form of late medieval houses) it would seem that this is a marginal farming landscape of late 18th – early 19th century date.
- 4.4.10 To the immediate west and also north of the Trawsfynydd works site is **Area 18**. Most of the area comprises a large rocky outcrop which is mainly covered by modern forestry,

which is currently being harvested. The farms just within the northern bonds of the area appear to be 18th or early 19th century in date. They are all recorded on the 1840 tithe map, clustered together in a relatively small area surrounded by a pattern of small, irregular fields with an area of woodland on the edge of what is now Llyn Trawsfynydd (the area now under the lake is taken up with much larger (presumably more-productive) fields

Registered Historic Landscapes

- 4.4.11 Trawsfynydd Substation is also just inside the northern boundary of the Trawsfynydd Basin and Cwm Prysor Registered Historic Landscape HLW (Gw) 11.
- 4.4.12 The Trawsfynydd Basin forms a distinctive topographical unit to the south of Snowdonia, between the Rhinog Mountains and the western foothills of the Arenig. The basin floor is at 200 m above OD with the east and west sides rising to watershed summits in excess of 500 m above OD. The south side is shallower however, with a gap and route out of the basin provided by the River Eden valley. The northern lip of the basin overlooks the Vale of Ffestiniog and Snowdonia which lies beyond this. Cwm Prysor forms a tributary valley on the east side of the basin and affords a natural route up to the watershed below Moel y Slates and beyond, outside the area. This characteristically upland and remote area of Wales, apart from being a historic route corridor, contains well preserved evidence of military control and activities, from the Roman period onwards, as well as a small range of late prehistoric, medieval and later settlement.

Roman Landscape

- 4.4.13 Arguably the most important features of this area are the exceptionally complete Roman military remains, centred on Tomen-y-mur, but also including Dolddinas practice camps and sections of Roman road and tile kilns at Pen-y-stryd. The complex around Tomen-y-mur is unparalleled in Wales and includes the fort itself, fragments of a bath house, an amphitheatre, a parade ground which is overlooked by a mound thought to be the tribunal, a vicus or civilian settlement, a bridge, a road, leats, barrows and so on, in an almost undisturbed setting. The oval embanked amphitheatre is the only one of its kind known to exist at a Roman auxiliary fort in Britain. The site has not been excavated, but finds from the complex include nine inscribed stones. To the east lie at least five practice camps at Dolddinas, and to the south alongside the contemporary road are the remains of tile kilns and sections of Sarn Helen, the arterial north-south Roman route through Wales.

Medieval Landscape

- 4.4.14 Tomen-y-mur is cited as one of the courts in the early Welsh Mabinogi tale of Math fab Mathonwy, in which it is known as Mur Castell, and its military significance continued into the medieval period with the construction of the motte (tomen) which now crowns the fort. The Normans had twice, in 1095 and 1114, attacked the stronghold of Gwynedd and built an earthen motte in the Roman fort, probably because its location was still militarily and strategically central in relation to Gwynedd and therefore an easy base from which to mount attacks, with a surviving network of Roman roads coming in from the north, east and south.

Post Medieval Landscape

- 4.4.15 The village of Trawsfynydd itself is a characteristic slate quarrying settlement of more recent origin, which developed in the last century when most of the men worked in the quarries at Blaenau Ffestiniog. However, close to the Roman remains at Tomen-ymur are the remains of Braich Ddu slate quarry, a shallow, dispersed working that produced good coloured slate. It closed in 1868, but some significant features remain, including the rough slab causeway with an interesting bridge.

Modern Landscape

- 4.4.16 The Maentwrog hydro-electric power station (approximately 3.8 km north-west of the Trawsfynydd Substation) was built in 1928, which led to the creation of an artificial lake here, and in the 1960s the nuclear power station was added and the lake extended. The latter building was designed by the architect Sir Basil Spence and the immediately surrounding area landscaped by Sylvia Crowe. Power generation has recently ceased however, as the station came to the end of its useful life.

5. Assessment of Baseline

5.1 Previous Ground Disturbance

- 5.1.1 Historic cartographic evidence dating from the mid-19th to mid-20th centuries illustrates that the Trawsfynydd works site is in an area of marginal farmland with a number of farmsteads in the general vicinity – Tyddyn-y-gareg, Henre'r-y-mur, Gyfynys and Gwylan. Until the present-day sub-station was built, the area was a mixture of rough pasture and marshy terrain with no evidence for any previous settlement. Borehole data available from earlier pre-construction works on the Trawsfynydd works site in 1958 revealed that the original ground surface comprised peat and moss up approximately 0.76 m in depth, underneath which was a natural moraine comprising clayey sand and gravel with cobbles and large boulders (see paras 4.1.3 to 4.1.7). The levelling of the ground across the footprint of the substation would have impacted upon the topsoil and subsoil deposits and a high level of ground disturbance is assessed.

5.2 Archaeological Potential

- 5.2.1 **Palaeolithic to Mesolithic:** There are no known assets of a Palaeolithic or Mesolithic date recorded in the Trawsfynydd works site. Notwithstanding the presence of peat recorded on site during geotechnical investigations in 1958, there is no indication that activity of this date exists in the Trawsfynydd works site or elsewhere in the 500m and 3km study areas, and the potential for encountering remains of this period is low.
- 5.2.2 **Neolithic to Bronze Age:** There are no known assets of Neolithic and Bronze Age date recorded in the Trawsfynydd works site. Notwithstanding the presence of peat recorded on site during geotechnical investigations in 1958, and that prehistoric activity has been identified in the wider landscape, there is no indication that activity of this date exists in the Trawsfynydd works site or elsewhere in the 500 m and 3 km study areas, and the potential for encountering remains of this period is low.
- 5.2.3 **Iron Age:** There are no known assets of Iron Age date recorded in the Trawsfynydd works site. The wider area sees settlement of the Iron Age and Roman periods. The Enclosed Hut Group at Nurse Cae Du (**ME163**) is approximately 518 m north-west. The Hut Circle 800m West of Moelfryn-Isaf (**ME131**) is approximately 2.93 km south-west. The Enclosed Hut Circle Settlement at Dolbelydr (**ME174**) is approximately 2.91 km east.
- 5.2.4 There is no indication that this activity extends to within the Trawsfynydd works site, and the potential for encountering remains of this period is negligible.
- 5.2.5 **Roman:** There are known assets of Roman date recorded in the Trawsfynydd works site. A Roman Road, which ran from Segontium to Pen Llystyn to Tomen y Mur (**PRN 17821**) is projected to run in an east-north-east to west-south-west orientation, approximately 347 m north of the Trawsfynydd works site
- 5.2.6 Notwithstanding the presence of the Roman Road (**PRN 17821**), the Roman military landscape at Tomen y Mur (**ME002** and **ME078**), and other possible settlements (**ME163** and **ME131**) in the wider area, there are no known assets of Roman date

recorded in the Trawsfynydd works site, and consequently the potential for unknown remains from this period in the Trawsfynydd works site is low.

- 5.2.7 **Early Medieval:** There are no known assets of early medieval date recorded in the Trawsfynydd works site. There is no indication that this activity extends to within the Trawsfynydd works site or elsewhere in the 500 m or 3 km study areas, and the potential for encountering remains of this period is negligible.
- 5.2.8 **Medieval:** There are no known assets of medieval date recorded in the Trawsfynydd works site. However, there is settlement in the wider area. Castell Tomen y Mur (**ME002**) is approximately 653 m north-east and comprises a motte which likely used an earlier Roman fort for a bailey. Also, in the wider Tomen y Mur complex, is a medieval homestead enclosure.
- 5.2.9 There is no indication that this activity extends to within the Trawsfynydd works site, and the potential for encountering remains of this period is negligible.
- 5.2.10 **Post-Medieval:** There are no known assets of post-medieval date recorded in the Trawsfynydd works site. Within the 500m study area, there are a number of buildings and structures (**PRN 1816**), enclosures (**PRN 57331** and **57332**), outfarms (**PRN 99545** and **99546**), a farm (**PRN 99547**) and smallholdings (**PRN 99548** and **99549**) associated with post-medieval upland farming. The site of a fulling mill (**PRN 36701**) is recorded at Pandy Gwylan, approximately 270 m north.
- 5.2.11 There is no indication that this activity extends to within the Trawsfynydd works site, and the potential for encountering remains of this period is **negligible**.
- 5.2.12 **Modern:** The former Trawsfynydd Nuclear Power Station (**PRN 4472**) is to the immediate south-west of the Trawsfynydd works site. Otherwise, there are no known assets of modern date recorded in the site. There is no indication that this activity extends to within the Trawsfynydd works site or elsewhere in the study area, and the potential for encountering remains of this period is negligible.

Summary of Archaeological Potential and Significance of Archaeological Remains

- 5.2.13 The significance of the potential previously unrecorded remains of these periods would derive from their archaeological and historical interest and their potential to contribute to our understanding of past human activity based on national, regional or local frameworks. Isolated artefactual material or truncated/disturbed remains is considered to be of low value, whilst well preserved and in situ evidence for occupation/settlement remains could be of medium or even high value.
- 5.2.14 In the preceding section, it was assessed that given the presence of peat within the Trawsfynydd works site as indicated in geotechnical investigations of the site in 1958 before construction of the substation, that the potential for unknown remains from the Palaeolithic, Mesolithic, Neolithic and Bronze Age in the Trawsfynydd works site could be considered low.
- 5.2.15 It was also assessed that given the presence of Roman Road and the Roman military landscape in the 3 km study area that the potential for unknown remains from this period in the Trawsfynydd works site could be considered low. However, given that the Trawsfynydd works site is completely occupied by a late 20th-century substation, the construction of which has removed the topsoil and truncated subsoil deposits, the potential for unknown Roman remains is reduced to negligible.

- 5.2.16 For all other periods, there is a negligible potential to encounter archaeological remains.

5.3 Historic Landscape Sensitivity to Change

- 5.3.1 The importance and significance of historic landscape character is assessed in terms of sensitivity to change. Those with a high sensitivity to change should be accommodated and preserved where possible within new developments or should be subject to well managed changes. Historic landscapes with a lower sensitivity to change can be potentially enhanced by new developments and can absorb most types and scales of essential, well-managed change.
- 5.3.2 The Trawsfynydd works site is in a post-medieval landscape comprising extant agricultural fields and woodland, as well as Lyn Trawsfynydd, a water reservoir of modern date. Due to the industrial nature of the substation on the site, there is no connection between the Trawsfynydd works site and the post-medieval agricultural landscape in which it is situated.
- 5.3.3 Post-medieval field systems are common throughout Gwynedd and Wales, reducing its sensitivity.
- 5.3.4 The Trawsfynydd works site is in **HLC Area 5** Trawsfynydd power station and lake (see paras 4.4.78 to 4.4.80). Most of this character are comprises the artificial lake. The lake was originally part of the development of the Maentwrog hydro-electric power station in 1928. The lake was extended following the construction of the nuclear power station and the substation in 1960. The immediate vicinity of the Trawsfynydd works site was landscaped by Sylvia Crowe with woodland planting as well as designed gardens **(PGW(Gd)64(GWY)** 70 m to the south-west.
- 5.3.5 The historic landscape character of the Trawsfynydd works site is assessed as being of low value and the sensitivity to change is assessed as low.
- 5.3.6 The proposed works would not alter the ability to appreciate the historic landscape of the Trawsfynydd works site, as following the replacement of existing cross site underground cables in the substation, amendments to the downleads from existing Tower 4ZC005 into a new gantry in the substation, and a new shunt reactor and switches in the substation, the new infrastructure would be entirely below ground, or match in scale and form the existing structures in the substation.

5.4 Significance of Designated Historic Assets

Scheduled Monuments

Within 3 km of the Trawsfynydd Works Site

Hut Circle 800 m West of Moelfryn-Isaf (ME131)

- 5.4.1 The Hut Circle 800 m West of Moelfryn-Isaf (**ME131**) is approximately 2.93 km south-west of the Trawsfynydd works site. A large, well-preserved hut circle of the Iron Age or Romano-British period, measuring about 11 m in internal diameter, on an east-facing slope. It has been scarped into the hillside (the uphill side has been dug into the slope and the downhill side built up) and has an entrance facing towards the south-east. It is fairly well preserved, although there is little standing masonry. The line of the wall is marked by large stones, presumably facing stones, except on the south, where more

remains, including some core material. Some internal facing is visible but more is probably protected by fallen stone (possibly external facing too). It is significant that this is the side furthest from the nearby modern field wall. The monument is of national importance for its potential to enhance our knowledge of prehistoric settlement. It retains significant archaeological potential, with a strong probability of the presence of associated archaeological features and deposits. The structure itself may be expected to contain archaeological information concerning chronology and building techniques. The setting of the asset is the local Iron Age and Roman era landscape in which it is situated.

- 5.4.2 The asset holds a group association with the Enclosed Hut Group at Nurse Cae Du (**ME163**) and the Enclosed Hut Circle Settlement at Dolbelydr (**ME174**), as well as more explicitly Roman sites, namely the Roman military landscape at Tomen y Mur (**ME078**) and the Roman Practice Camp (**ME260**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Iron Age and Romano-British settlement landscape. This group value also contributes to its significance and combined these assets provide a rare example of a well-preserved and large Iron Age and Romano-British settlement in Wales.
- 5.4.3 The asset is shielded from the Trawsfynydd works site by woodland on the substation perimeter. The substation does not contribute to the understanding of the heritage interests of the asset.
- 5.4.4 The asset holds archaeological interest, with its value derived from its ability to inform on Iron Age and Romano-British settlement patterns. The asset is of high value.

Tomen y Mur (**ME078**)

- 5.4.5 Tomen y Mur is a Roman military landscape on upland slopes overlooking the Trawsfynydd basin, approximately 817 m east-north-east of the Trawsfynydd works site. The large scheduled area comprises two scheduled monuments (**ME002** and **ME078**) in four adjoining parts, containing several specific sites, although adjacent and intervening areas are also scheduled, approximately 1.1 km east-north-east of the Trawsfynydd works site. In summary, the main elements are as follows: a fort, earthworks south-east of the fort including a bath-house and a probable mansio (accommodation for travellers), a bridge abutment, a medieval motte (**ME002**), constructed over part of the Roman fort, a vicus (civilian settlement) north-east of the fort, a ludus or amphitheatre north-east of the fort, Roman burial barrows east-north-east of the amphitheatre, a parade ground east-north-east of the fort, a mound south-east of the parade ground, with other earthworks south-west of this, possible leats east of the parade ground, Roman burial barrows beside the road south-east of the fort, and in the same area, the remains of two possible marching camps, and lastly, a fort annexe, two practice camps and a medieval homestead enclosure to the north-west of the fort.
- 5.4.6 The monument is of national importance for its considerable potential to enhance our knowledge of Roman military organisation and fortification practices. The monument forms an important element in the wider context of the Roman occupation of Wales and retains significant archaeological potential. The structures and buried deposits may contain well preserved archaeological evidence concerning chronology, layout and building techniques, along with environmental evidence.
- 5.4.7 The asset holds a group association with the Roman Practice Camp (**ME260**), as well as Romano-British settlement sites, namely the Hut Circle 800m West of Moelfryn-Isaf (**ME131**), the Enclosed Hut Group at Nurse Cae Du (**ME163**) and the Enclosed Hut Circle Settlement at Dolbelydr (**ME174**). Based upon archaeological investigations in

the wider area surrounding these assets, these are likely part of a wider and much larger Romano-British settlement landscape. This group value also contributes to its significance and combined these assets provide a rare example of well-preserved Romano-British settlement in Wales

- 5.4.8 The asset is 817 m east-north-east from the Trawsfynydd works site and shielded from it by woodland on the substation perimeter. The substation does not contribute to the understanding of the heritage interests of the asset.
- 5.4.9 The asset holds archaeological interest, with its value derived from its ability to inform on Roman military and settlement activity. The asset is of high value.

Castell Tomen y Mur (ME002)

- 5.4.10 Castell Tomen y Mur is approximately 653 m north-east of the Trawsfynydd works site and is a motte about 10m high and surrounded by a ditch 4 m wide, with a counterscarp bank surmounted by a modern field wall. The top is uneven, with two principal hollows on the south-east and south-west which may represent the sites of original buildings (or possibly robbing). It is slightly oval, measuring approximately 14 m north-south by 19 m east-west. It was built on an earlier Roman fort (**ME078**), possibly using the earlier fortifications as a bailey, though there are slight earthwork traces of an inner bailey to the north-east of the motte as well.
- 5.4.11 The monument is of national importance for its considerable potential to enhance our knowledge of medieval fortification practices. The monument forms an important element in the wider context of the Norman occupation of Wales and retains significant archaeological potential. The structures and buried deposits may contain well preserved archaeological evidence concerning chronology, layout and building techniques, along with environmental evidence.
- 5.4.12 The asset holds a group association with a medieval enclosure in the former Tomen y Mur Roman military landscape (**ME078**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger medieval settlement landscape. This group value also contributes to its significance and combined these assets provide rare examples of well-preserved medieval settlement in Wales.
- 5.4.13 The asset is shielded from the Trawsfynydd works site by woodland on the substation perimeter, as well as further woodland areas to the east. The substation does not contribute to the understanding of the heritage interests of the asset.
- 5.4.14 The asset holds archaeological interest, with its value derived from its ability to inform on medieval settlement patterns. The asset is of high value.

Roman Practice Camp 440 m West-South-West of Braich Ddu (ME260)

- 5.4.15 This Roman Practice Camp is approximately 1.77 km east of the Trawsfynydd works site and survives as an earthen bank and ditch with well-defined central entrances and associated internal 'claviculae', or entrance shielding banks on all four sides. The camp is roughly square on plan with internal dimensions of 21 m by 23 m, with the earthworks most well-preserved on the north and east sides. The defensive banks survive to a maximum height of 0.7 m and are somewhat spread, to a width of approximately 3 m. Traces of a 1.5 m wide ditch survive on all four sides, with the best preservation being on the south-east side. The 'claviculae' survive on all four sides of the camp and

measure some 4 m in length with the 'clavicula' on the north-east side being the most well-preserved.

- 5.4.16 The monument is of national importance for its potential to enhance our knowledge of Roman military organisation. It forms an important element in the wider context of the Roman occupation of Wales and the structure itself may be expected to contain archaeological information concerning chronology and building techniques, together with a strong probability of environmental evidence. The importance of the monument is further enhanced by its group value due to its proximity to the Tomen-y-Mur Roman fort and amphitheatre (**ME002** & **ME078**).
- 5.4.17 The asset holds a group association with the Romano-British settlement sites, namely the Hut Circle 800 m West of Moelfryn-Isaf (**ME131**), the Enclosed Hut Group at Nurse Cae Du (**ME163**) and the Enclosed Hut Circle Settlement at Dolbelydr (**ME174**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Romano-British settlement landscape. This group value also contributes to its significance and combined these assets provide a rare example of well-preserved Romano-British settlement in Wales
- 5.4.18 The asset is shielded from the Trawsfynydd works site by woodland on the substation perimeter. The substation does not contribute to the understanding of the heritage interests of the asset.
- 5.4.19 The asset holds archaeological interest, with its value derived from its ability to inform on Roman fortification and military activity. The asset is of high value.

Enclosed Hut Group at Nurse Cae Du (**ME163**)

- 5.4.20 This settlement is approximately 518 m north-west of the Trawsfynydd works site. The monument comprises the remains of a small but substantial and undisturbed enclosed settlement, which probably dates to the late prehistoric or Romano-British periods. Two large circular huts and one long rectangular hut can be clearly seen, ranged around a central courtyard. Associated are field enclosures and paddocks, and a short distance away are the remains of a later rectangular structure also with associated paddock. Trackways can similarly be identified although their date is uncertain.
- 5.4.21 The monument is of national importance for its potential to enhance our knowledge of prehistoric settlement practices. It is an important relic of the prehistoric landscape and retains significant archaeological potential. There is a strong probability of the presence of environmental and structural evidence, including preserved internal and external floor levels. The archaeological potential of the area is further enhanced by the association with field boundaries, paddocks and the trackway while the more recent rectangular structure provides added interest.
- 5.4.22 The asset holds a group association with the Hut Circle 800 m West of Moelfryn-Isaf (**ME131**) and the Enclosed Hut Circle Settlement at Dolbelydr (**ME174**), as well as more explicitly Roman sites, namely the Roman military landscape at Tomen y Mur (**ME002** and **ME078**) and the Roman Practice Camp (**ME260**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Iron Age and Romano-British settlement landscape. This group value also contributes to its significance and combined these assets provide a rare example of a well-preserved and large Iron Age and Romano-British settlement in Wales.

- 5.4.23 The asset is shielded from the Trawsfynydd works site by woodland on the substation perimeter, as well as further woodland areas to the north. The substation does not contribute to the understanding of the heritage interests of the asset.
- 5.4.24 The asset holds archaeological interest, with its value derived from its ability to inform on Iron Age and Romano-British settlement patterns. The asset is of high value.

Enclosed Hut Circle Settlement at Dolbelydr (ME174)

- 5.4.25 This settlement is approximately 2.91 km east of the Trawsfynydd works site. The monument comprises the complete and well-preserved remains of a small, compact, enclosed settlement which probably dates to the Iron Age or Romano-British period. The settlement lies on a small, west-facing natural promontory, jutting out from the side of a small valley and overlooking a small stream and a wide stretch of better-quality land. The settlement consists of three buildings set within and forming part of an enclosure, possibly a single homestead.
- 5.4.26 The monument is of national importance for its potential to enhance our knowledge of prehistoric settlement practices. It is an important relic of the prehistoric landscape and retains significant archaeological potential. There is a strong probability of the presence of environmental and structural evidence, including preserved internal and external floor levels. The importance of the site is enhanced by its proximity to other contemporary small settlements and the Roman practice camps at Dolddinas.
- 5.4.27 The asset holds a group association with the Hut Circle 800 m West of Moelfryn-Isaf (**ME131**) and the Enclosed Hut Group at Nurse Cae Du (**ME163**), as well as more explicitly Roman sites, namely the Roman military landscape at Tomen y Mur (**ME002** and **ME078**) and the Roman Practice Camp (**ME260**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Iron Age and Romano-British settlement landscape. This group value also contributes to its significance and combined these assets provide a rare example of a well-preserved and large Iron Age and Romano-British settlement in Wales.
- 5.4.28 The asset is shielded from the Trawsfynydd works site by woodland on the substation perimeter. The substation does not contribute to the understanding of the heritage interests of the asset.
- 5.4.29 The asset holds archaeological interest, with its value derived from its ability to inform on Iron Age and Romano-British settlement patterns. The asset is of high value.

Conservation Areas

Within 3 km of the Trawsfynydd Works Site

- 5.4.30 There is one Conservation Area within 3 km of the Trawsfynydd works site. This is as follows:
- 5.4.31 Maentwrog Conservation Area (**WAL/SNOW/2**) is approximately 2.8 km north-west of the Trawsfynydd work site. The conservation area encompasses the area around 39 Grade II listed structures. All of these listed structures are outside the 3 km study area.
- 5.4.32 The Maentwrog Conservation Area and the listed buildings possess architectural and historic interest as surviving 19th century buildings associated with the Oakley quarrying dynasty, displaying a range of building types and materials. Its setting also contributes to its significance. The buildings and conservation area are of medium value.

Listed Buildings

Within 3 km of the Trawsfynydd Works Site

- 5.4.33 Following the approach taken for other components of the Scheme, all high value listed buildings (Grade I and Grade II* listed buildings) within the wider 3 km study area are considered, as well as all listed buildings within 500 m of the Trawsfynydd works site.
- 5.4.34 In the instance of Trawsfynydd Substation, there are a total of 23 listed buildings (Grade II) within the 3 km study area.
- 5.4.35 There are no Grade I and II* listed buildings within the 3 km study area.
- 5.4.36 None of the aforementioned Grade II listed buildings are within 500 m of the Trawsfynydd works site.
- 5.4.37 Consequently, there are no listed buildings to be considered in relation to the Trawsfynydd Substation.

Registered Historic Parks and Gardens

Within 3 km of the Trawsfynydd Works Site

The Dragon Square and Dame Sylvia Crowe Garden (PGW(Gd)64(GWY)) (Grade II*)

- 5.4.38 There is one registered park and garden within 3 km of the Trawsfynydd works site. The Dragon Square and Dame Sylvia Crowe Garden (**PGW(Gd)64(GWY)**) in the grounds of the Trawsfynydd Power Station, is approximately 70 m south-west of the works site.
- 5.4.39 In June 1959 Atomic Power Constructions Ltd was granted the contract for building the power station and work began on its buildings and landscaping. The architect was Basil (later Sir Basil) Spence, who worked closely with the landscape architect Sylvia (later Dame Sylvia) Crowe, who was responsible for the landscaping (on the design concept), siting and layout of the buildings.
- 5.4.40 The very fine, thoughtful landscaping ensured that the power station was sympathetically introduced into a wild and rugged landscape without harming its essential character. The work includes two discrete gardens, Dragon Square and the Dame Sylvia Crowe Garden, which make up the registered area, whilst the remaining landscaping forms the highly important landscaped setting. The registered park and garden is approximately 70 m south-west of the Trawsfynydd works site.
- 5.4.41 The two gardens were part of the wider landscaping of the whole site by Dame Sylvia Crowe. Dragon Square is to the east of the administrative block, at the south end of the turbine hall and workshop building. The Dame Sylvia Crowe Garden is on the south edge of the site, to the south of the reactor buildings.
- 5.4.42 Dragon Square is a small square garden bounded by a low, evergreen clipped hedge, within which is a gravel path. There are central entrances — simple gaps in the hedge — on all but the south side. Ten native alder trees (*Alnus glutinosa*) are evenly spaced around the north, east and west sides. The interior of the garden is largely taken up by an elaborate, swirling, Welsh dragon, delineated in dark grey stones and cream-coloured cobbles, and slightly raised above the surrounding, lighter grey gravel. Low shrubs, herbaceous plants and grasses are planted in the surrounding gravel

- 5.4.43 The Dame Sylvia Crowe Garden was designed as an area for staff recreation and relaxation. It did not have a formal name but came to be called the Dame Sylvia Crowe Garden. The east end of the garden is laid out with four curving drystone walled terraces on the slope. At the foot of the terraces is a gravel path, edged with stone on the outside. At the east end of the path is a small, circular pool: this is a natural spring. At the west end of the terraces, where the slope is eastward facing, there is a long flight of twenty-three steps, which runs diagonally from the foot of the slope to the top. The treads are of gravel and risers of slate. At the top of the main flight of steps the direction of the path turns to the west, with a small platform and then a small flight of three more, similar steps to the top of the slope. A gravel path then winds westwards along the top of the ridge, with natural rocks to its south and cherry trees to its north and a ground cover of heather and ferns. The path leads to an L-shaped rustic bench of two planks resting on four roughly squared and tapered stone blocks. It then continues westwards through birch trees and scrubby elder to a rocky promontory at the end of the garden; this is planted with pine and birch trees and on its north edge is a sheer drop to the roadway below.
- 5.4.44 Much thought went into the landscaping, layout and design of the power station to fit it as sympathetically as possible into the landscape. The construction of the power station was a sensitive issue, lying as it does in Snowdonia National Park and in a natural landscape of rugged beauty. The landscaping involved a large amount of earth-moving. The scale of the buildings was such that the only way to marry the landscape to them was to expand the scale of the surrounding landscape to fit the scale of the buildings. To this end Sylvia Crowe persuaded the Central Electricity Generating Board to buy large areas of land around the Trawsfynydd works site which she proceeded to afforest with spruce, beech, birch, rowan, sycamore and *Pinus contorta*. This gave the landscape greater scale and eased the transition between the wider landscape and the power station. As much use as possible was made of natural, local materials and local, indigenous plants in the landscaping.
- 5.4.45 The setting of Dragon Square and Dame Sylvia Crowe Garden comprises the power station and its surroundings. The setting of the garden features and their relationship to the nuclear power station and landscaping in the wider site contribute to their significance. The gardens are of high value.

5.5 Significance of Non-Designated Historic Assets

Within the Trawsfynydd Works Site

- 5.5.1 There are no known non-designated historic assets in the Trawsfynydd works site. Given that peat was identified during geotechnical investigations of the works site in 1958 before construction of the substation, there is a low potential for unknown archaeological remains to survive from the Palaeolithic, Mesolithic, Neolithic and Bronze Age.

Within the 500 m Study Area

- 5.5.2 There are 17 non-designated buildings and structures in the 500 m study area. These are associated with post-medieval upland farming and the nuclear power station at Trawsfynydd. The setting of these non-designated buildings and structures has been considered and, due to intervening distance and woodland, most of the buildings are in areas where there is no potential for them to be impacted by the proposed works. They are listed and described in **Volume 8, Appendix 6-B: Gazetteer of Historic Assets**

but they are not considered further in the assessment, and they are scoped out of assessment in the ES.

5.6 Assets Scoped Out of ES Assessment

5.6.1 The assessment of significance and setting outlined in the previous section allows for consideration of the potential for the proposed works to result in effects to designated and non-designated historic assets through change to their settings and/or physical impacts. It also allows for the identification of assets where there is no potential for the proposed works to result in such effects. Such assets can now be scoped out of further assessment. **Table 5-1** provides a summary of these assets and the rationale for scoping them out of further assessment.

Table 5.1 – Assets Scoped Out of Further Assessment

Reference	Designation and Grade	Name	Rationale for Scoping Out of Assessment
ME131	Scheduled Monument	Hut Circle 800 m West of Moelfyan-Isaf	There is no intervisibility between the Trawsfynydd works site and the asset, and the proposed works would not result in changes to the setting of the asset.
ME022 / ME078	Scheduled Monument	Castell Tomen y Mur / Tomen y Mur	There is no intervisibility between the Trawsfynydd works site and the asset, and the proposed works would not result in changes to the setting of the asset.
ME260	Scheduled Monument	Roman Practice Camp	There is no intervisibility between the Trawsfynydd works site and the asset, and the proposed works would not result in changes to the setting of the asset.
ME163	Scheduled Monument	Enclosed Hut Group at Nurse Cae Du	There is no intervisibility between the Trawsfynydd works site and the asset, and the proposed works would not result in changes to the setting of the asset.
ME174	Scheduled Monument	Enclosed Hut Circle Settlement at Dolbelydr	There is no intervisibility between the Trawsfynydd works site and the asset,

Reference	Designation and Grade	Name	Rationale for Scoping Out of Assessment
			and the proposed works would not result in changes to the setting of the asset.
WAL/SNOW/2	Conservation Area	Maentwrog Conservation Area	The closest point of the conservation area is approximately # km from the Trawsfynydd works site, separated by intervening buildings and woodlands to the east. The proposed works would not result in changes to the setting of the conservation area and the listed buildings within.
PGW(Gd)64(GWY)	Grade II* registered historic park and garden	The Dragon Square and Dame Sylvia Crowe Garden	The proposed works would not result in changes to the setting of the gardens. The surrounding woodland on the perimeter of the substation would screen the Trawsfynydd works site from view.
Historic Landscape Character	N/A	N/A	The Historic Landscape Character of the Trawsfynydd works site has been assessed as being of low value and having a low sensitivity to change. The proposed works would not result in changes to the historic landscape character of the area, following installation of a new shunt reactor, new 400kV cross site underground cables, and switch gear in the existing substation compound. The proposed works would form an extension to the existing modern industrial nature of the immediate landscape.

- 5.6.2 The potential for the proposed works to result in impacts to the assets, either through physical impacts or through change to their setting has been assessed in the assessment of the baseline.
- 5.6.3 Following the assessment of the baseline, there are no heritage assets to be scoped into further assessment in **Volume 5, Chapter 6: Historic Environment**.

6. Conclusion

- 6.1.1 There are no historic assets to be scoped into further assessment in **Volume 5, Chapter 6: Historic Environment**.
- 6.1.2 The assessment provided in this report allowed for consideration of the potential for the proposed works to result in effects to historic assets either through change to their settings and/or physical impacts. It also allowed for the identification for assets where there was no potential for the proposed works to result in such effects. Such assets, as detailed above, can be scoped out of further assessment.

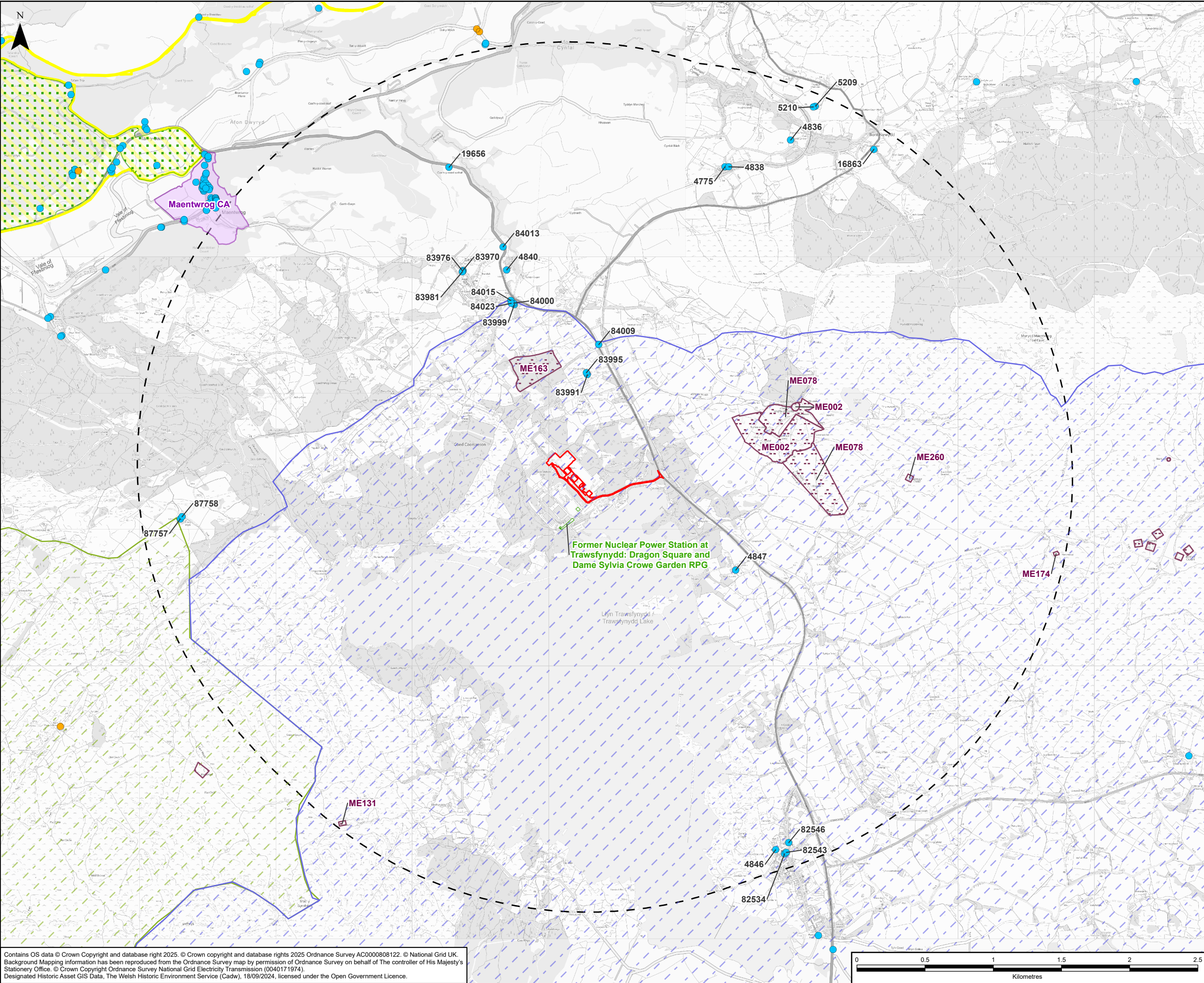
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TRAWSFYNYDD SUBSTATION WORKS ROUTE LEGEND

Legend

- Trawsfynydd Works Site Boundary
- 3km Buffer of Trawsfynydd Works Site Boundary
- Designated Historic Assets**
 - World Heritage Site (WHS)
 - Scheduled Monument
 - Registered Park and Garden (RPG)
 - Conservation Area (CA)
- Registered Historic Landscape**
 - Ardudwy
 - Transfynydd Basin and Cwm Prysor
- Listed Building**
 - Grade II*
 - Grade II

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Rev	Date	Description	GIS	Chk	App

nationalgrid

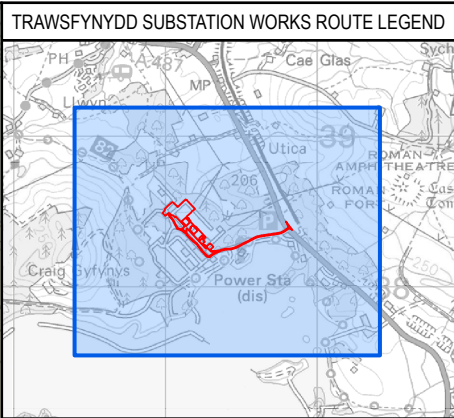
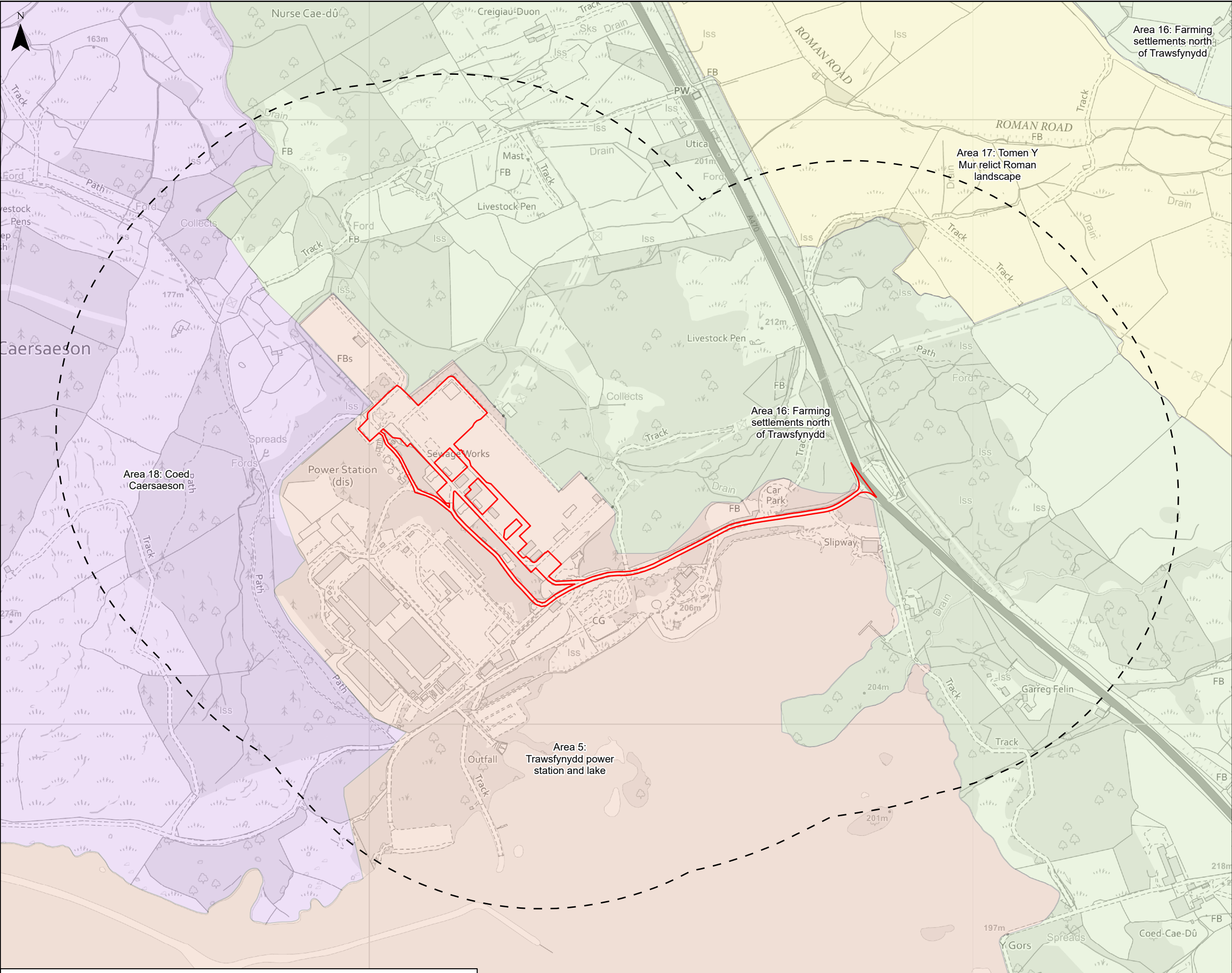
Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
TRAWSFYNYDD SUBSTATION WORKS

Document Title: FIGURE 5.6.A.1
DESIGNATED HISTORIC ASSETS WITHIN
3KM OF TRAWSFYNYDD WORKS SITE

Creator: LP	Date: 27/08/2025	Checker: JL	Date: 27/08/2025	Approver: AM	Date: 27/08/2025
Document Type: FIGURE	Scale: 1:26,000	Format: A3	Sheets: 1 OF 1	Rev: A	

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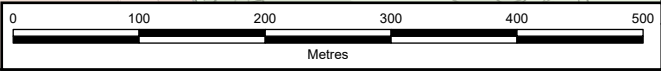


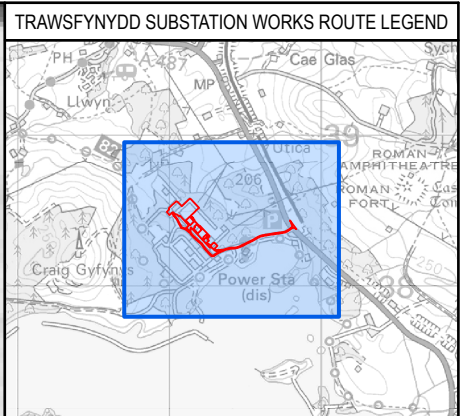
- Legend**
- Trawsfynydd Works Site Boundary
 - 500m Buffer of Trawsfynydd Works Site Boundary
- Heneb Historic Landscape Character (HLC)**
- Area 5: Trawsfynydd power station and lake
 - Area 16: Farming settlements north of Trawsfynydd
 - Area 17: Tomen Y Mur relict roman landscape
 - Area 18: Coed Caersaeson

A	28/08/2025	Environmental Statement	LP	JL	AM
Rev	Date	Description	GIS	Chk	App

nationalgrid					
Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT					
Volume: VOLUME 8: APPENDICES TRAWSFYNYDD SUBSTATION WORKS					
Document Title: FIGURE 5.6.A.3 HISTORIC LANDSCAPE CHARACTER AREAS WITHIN 500M OF TRAWSFYNYDD WORKS SITE					
Creator: LP	Date: 28/08/2025	Checker: JL	Date: 28/08/2025	Approver: AM	Date: 28/08/2025
Document Type: FIGURE	Scale: 1:6,000	Format: A3	Sheets: 1 OF 1	Rev: A	

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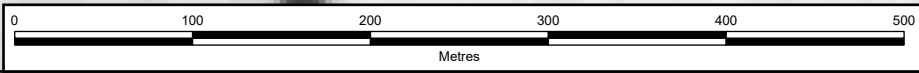


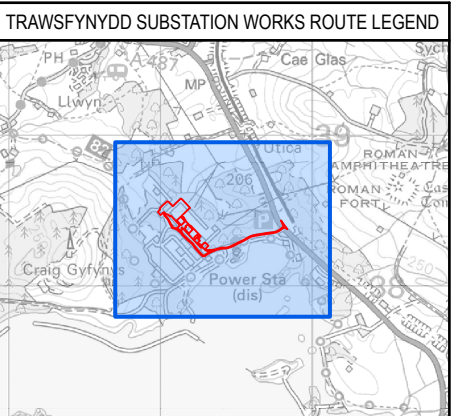
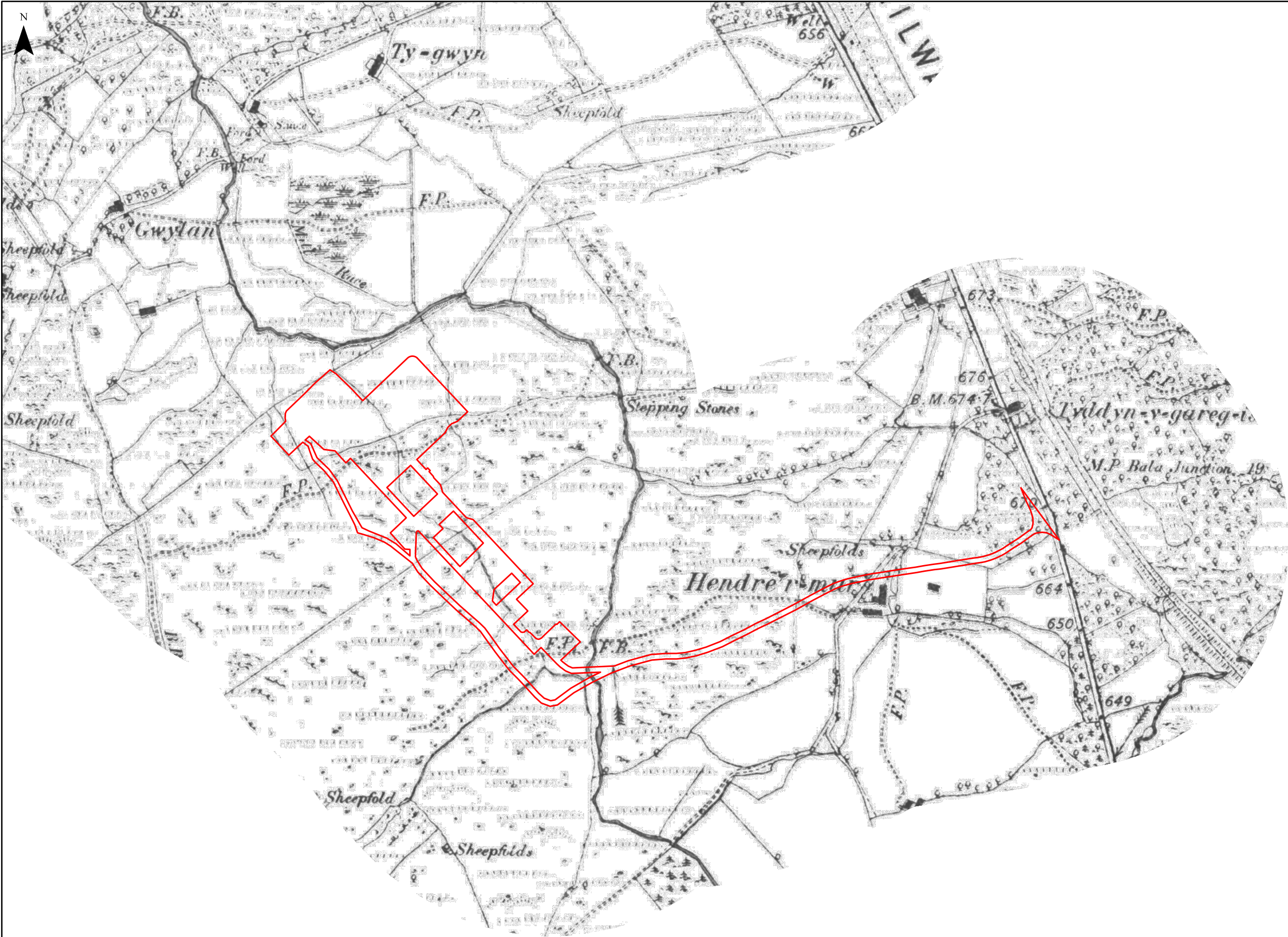
Legend

Trawsfynydd Works Site Boundary

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Rev	Date	Description	GIS	Chk	App
nationalgrid					
Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT					
Volume: VOLUME 8: APPENDICES TRAWSFYNYDD SUBSTATION WORKS					
Document Title: FIGURE 5.6.A.4 EXTRACT FROM TITHE SURVEY OF MAENTWROG PARISH IN THE COUNTY OF MERIONETH 1841					
Creator: ID	Date: 31/07/2025	Checker: JL	Date: 31/07/2025	Approver: AM	Date: 31/07/2025
Document Type: FIGURE	Scale: 1:4,250	Format: A3	Sheets: 1 OF 1	Rev: A	

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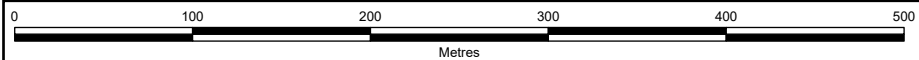




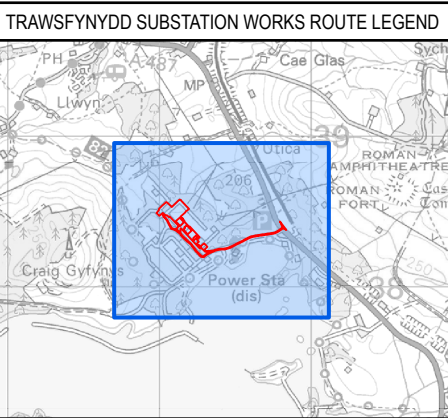
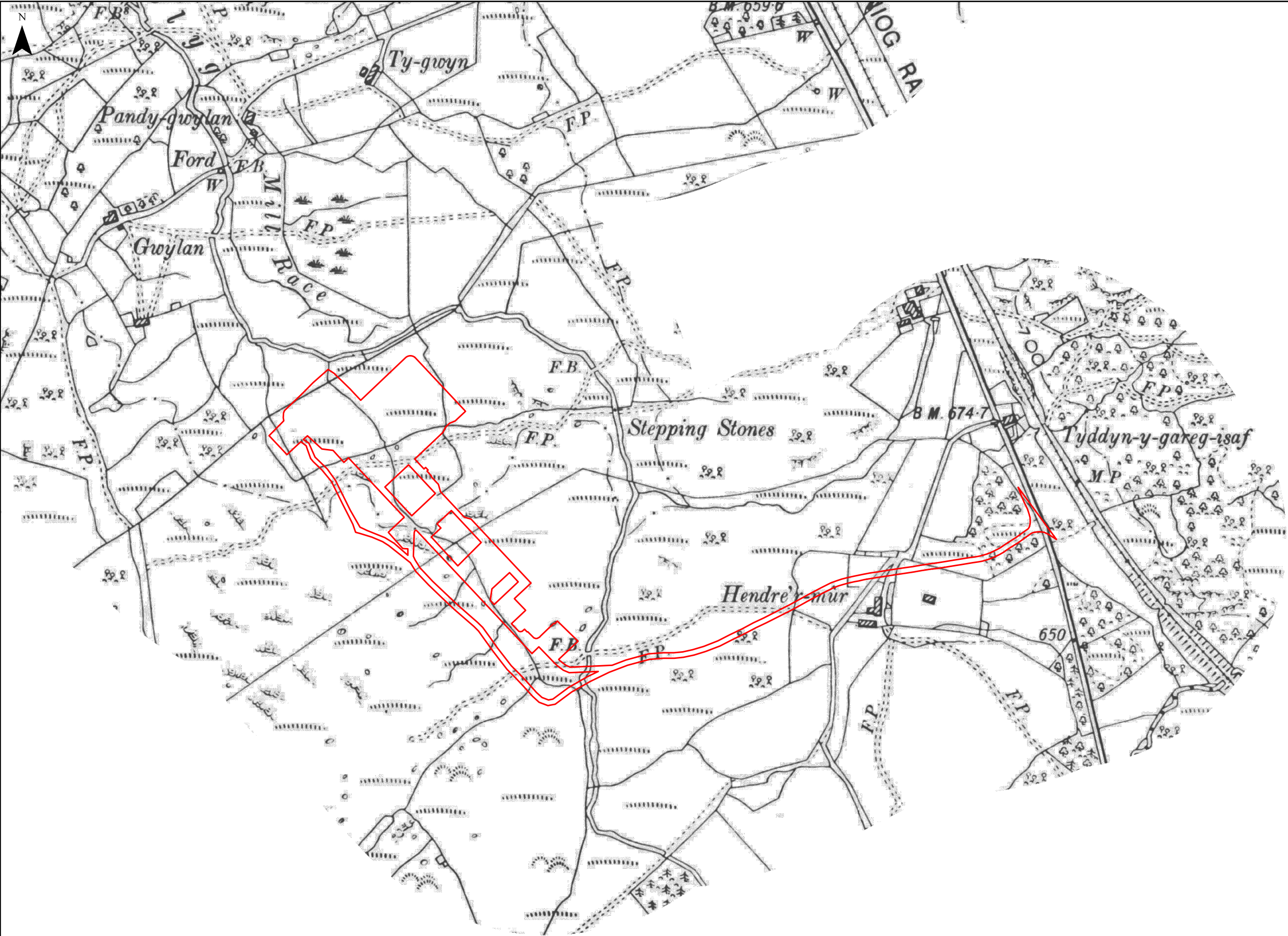
Legend

Trawsfynydd Works Site Boundary

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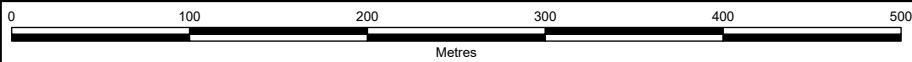
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Volume: VOLUME 8: APPENDICES TRAWSFYNYDD SUBSTATION WORKS					
Document Title: FIGURE 5.6.A.5 HISTORICAL OS MAP 1888					
Creator: ID	Date: 31/07/2025	Checker: JL	Date: 31/07/2025	Approver: AM	Date: 31/07/2025
Document Type: FIGURE	Scale: 1:4,250	Format: A3	Sheets: 1 OF 1	Rev: A	



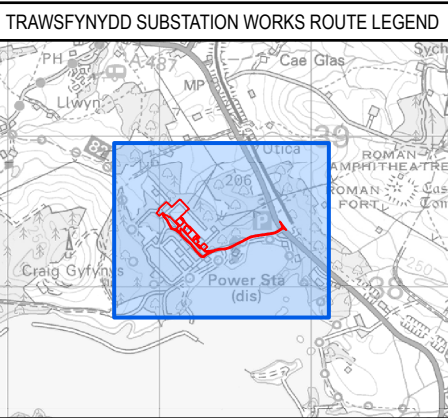
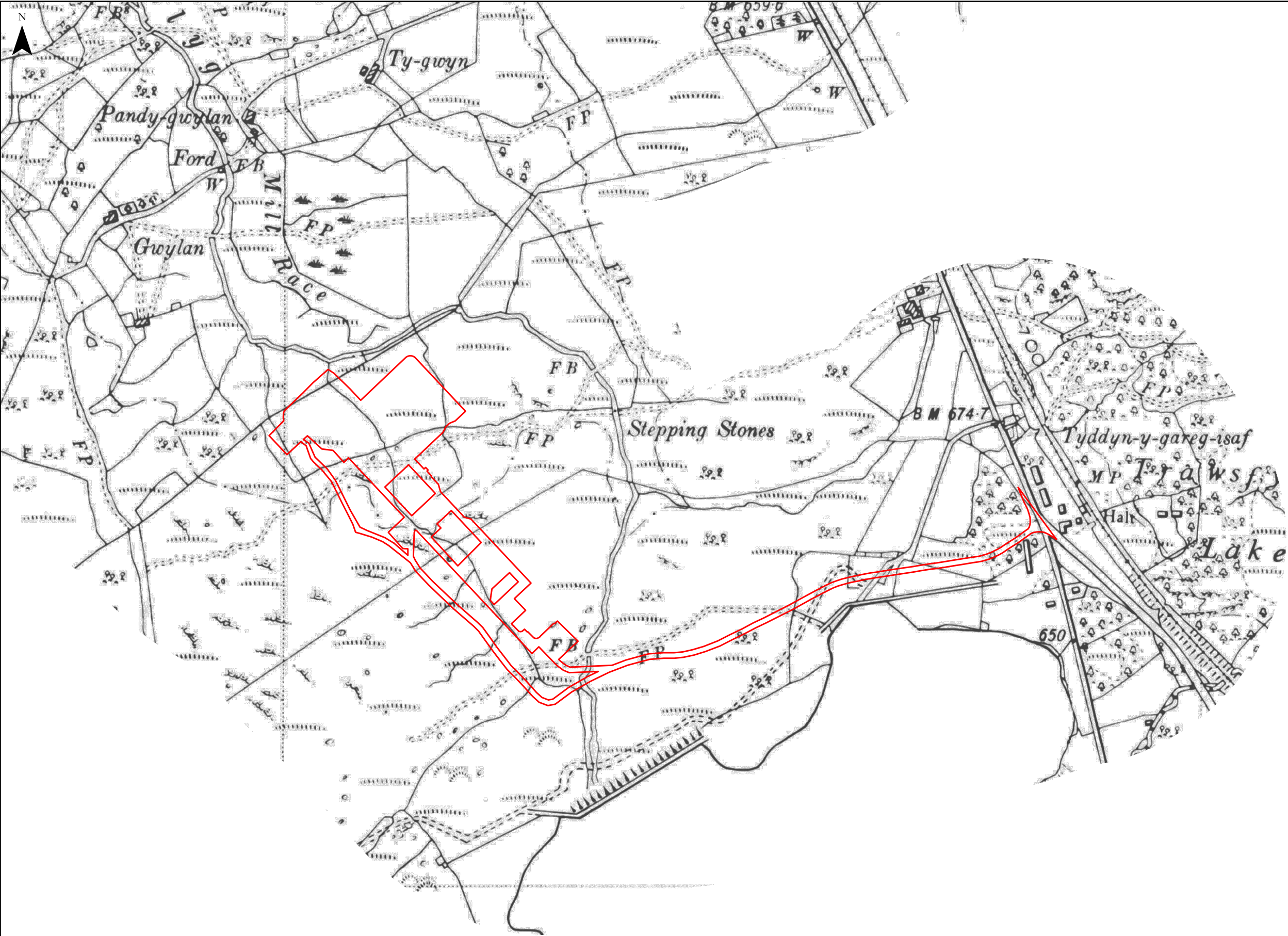
Legend

Trawsfynydd Works Site Boundary

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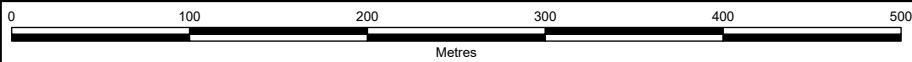
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Volume: VOLUME 8: APPENDICES TRAWSFYNYDD SUBSTATION WORKS					
Document Title: FIGURE 5.6.A.6 HISTORICAL OS MAP 1901					
Creator: ID	Date: 31/07/2025	Checker: JL	Date: 31/07/2025	Approver: AM	Date: 31/07/2025
Document Type: FIGURE	Scale: 1:4,250	Format: A3	Sheets: 1 OF 1	Rev: A	



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Trawsfynydd Works Site Boundary

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Volume: VOLUME 8: APPENDICES TRAWSFYNYDD SUBSTATION WORKS					
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Appendix 5.6.B: Gazetteer of Historic Assets and Archaeological Investigations (Trawsfynydd Substation)

Scheduled Monuments

SAM No.	Grade	Name	Description	Period	NGR
ME131	SM	Hut Circle 800m West of Moelfryn-Isaf	A large, well-preserved hut circle of the Iron Age or Romano-British period (c. 800 BC - AD 400), measuring about 11m in internal diameter, on an E-facing slope. It has been scarped into the hillside (the uphill side has been dug into the slope and the downhill side built up), and has an entrance facing towards the SE. It is fairly well preserved, although there is little standing masonry. The line of the wall is marked by large stones, presumably facing stones, except on the S, where more remains, including some core material. Some internal facing is visible but more is probably protected by fallen stone (possibly external facing too). It is significant that this is the side furthest from the nearby modern field wall.	Prehistoric	SH6748735846
ME163	SM	Enclosed Hut Group at Nurse Cae Du	The monument comprises the remains of a small but substantial and undisturbed enclosed settlement, which probably dates to the late prehistoric or Romano-British periods. Two large circular huts and one long rectangular hut can be clearly seen, ranged around a central courtyard. Associated are field enclosures and paddocks, and a short distance away are the remains of a later rectangular structure also with associated paddock. Trackways can similarly be identified although their date is uncertain.	Prehistoric	SH6889039182
ME174	SM	Enclosed Hut Circle Settlement at Dolbelydr	The monument comprises the complete and well-preserved remains of a small, compact, enclosed settlement which probably dates to the Iron Age or Romano-British period (c. 800 BC - AD 400). The settlement lies on a small, west-facing natural promontory, jutting out from the side of a small valley and overlooking a small stream and a wide stretch of better-quality land. The settlement consists of three buildings set within and forming part of an enclosure, possibly a single homestead. It is situated within an area believed to have been well settled during the Iron Age and Roman periods	Prehistoric	SH7271937839
ME078	SM	Tomen y Mur	In summary, the main elements are: A fort, at SH70603865. Earthworks SE of the fort including a bathhouse at SH70693855 and a probable mansio (accommodation for travellers) at SH70713857, and a bridge abutment, at SH70733852. A medieval motte, constructed over part of the Roman fort, at SH70553868. A vicus (civilian settlement) NE of the fort, at SH70693877. A ludus or amphitheatre NE of the fort, at SH70813890. Barrows ENE of the amphitheatre, at SH70893891. A parade ground ENE of the fort, at SH70813875. A mound SE of the parade ground at SH70893864, with other earthworks SW of this at SH70853865 and possible leats E of the parade ground. Barrows beside the road SE of the fort, at SH70953827, SH70923833 and SH71023816 and in the same area, the remains of two possible marching camps SH7098 3832. A fort annexe and two practice camps at SH70433878 and SH70423871 and a medieval homestead enclosure at SH70393881, to the NW of the fort.	Roman	SH7088638521
ME260	SM	Roman Practice Camp 440m WSW of Braich-Ddu	This well-preserved Roman practice camp survives as an earthen bank and ditch with well-defined centrally located entrances and associated internal 'claviculae', or entrance shielding banks on all four sides. The camp was constructed as part of a military training exercise by auxiliary soldiers from the primary fort at Tomen-y-Mur to the WNW. The camp demonstrates particular attention to the corners and entrances, which were the most difficult elements to build. The camp is roughly square on plan with internal dimensions of 21m x 23m, with the earthworks most well-preserved on the north and east sides. The defensive banks survive to a maximum height of 0.7m and are somewhat spread, to a width of c.3m. Traces of a 1.5m wide ditch survive on all four sides, with the best preservation being on the SE side. The 'claviculae' survive on all four sides of the camp and measure some 4m in length with the 'clavicula' on the north-east side being the most well-preserved.	Roman	SH7164538377
ME002	SM	Castell Tomen y Mur	In summary, the main elements are: A fort, at SH70603865. Earthworks SE of the fort including a bath-house at SH70693855 and a probable mansio (accommodation for travellers) at SH70713857, and a bridge abutment, at SH70733852. A medieval motte, constructed over part of the Roman fort, at SH70553868. A vicus (civilian settlement) NE of the fort, at SH70693877. A ludus or amphitheatre NE of the fort, at SH70813890. Barrows ENE of the amphitheatre, at SH70893891. A parade ground ENE of the fort, at SH70813875. A mound SE of the parade ground at SH70893864, with other earthworks SW of this at SH70853865 and possible leats E of the parade ground. Barrows beside the road SE of the fort, at SH70953827, SH70923833 and SH71023816 and in the same area, the	Roman	SH7067538687

SAM No.	Grade	Name	Description	Period	NGR
			remains of two possible marching camps SH7098 3832. A fort annexe and two practice camps at SH70433878 and SH70423871 and a medieval homestead enclosure at SH70393881, to the NW of the fort.		

Listed Buildings

NPRN No.	Grade	Name	Description	Period	NGR
4775	II	Cynfal-fawr	Farmhouse built of roughly coursed, mortared, rubble masonry with long stones in the build and as quoins and lintels. Slate roof with tall gable stacks with dripstones and capping. The main part of the house is the 'new' part, refaced circa 1800. A 2-storey with attic, 3-window range with central panelled door under a shallow overlight. Distinctive fenestration of 3-light casements with transoms, and gothic heads to lower lights, on each floor, including to close-spaced gabled dormers of attic storey. The older part of the house forms a single-storeyed gabled range at the left (E) end: this has a small 4-pane light in the apex under a series of (later) dove holes. Return range has doorway offset to R and 2 windows to L; the central window a 2-light casement and the window to far L a fixed light of 9-panes. Directly L of the doorway is the commemorative plaque to Morgan Llwyd and there is a single ridge stack offset to L of the central window. At right angles to the L (S) end of the older part of the house is a lofted agricultural range with added outshut along the N lateral wall. The entrance to the range is in the E gable, with pitching door above; the outshut has a boarded door to far R (N) an a fixed light of 2-panes to L.	Medieval	SH 70293 40661
4836	II	Bryn-yr-odyn	Sub-medieval house of probable late sixteenth century date, extended in the seventeenth century by the addition of a rear wing. Original dwelling is within the regional tradition as a storeyed, end-chimney house with internal cross passage. Recorded in the Tithe survey of 1840 as a substantial holding of over 132 acres (53.4hectares), owned by Reverend David Griffiths and occupied by Morris Griffiths. Two storey farmhouse with later block to rear added to form an L-shaped plan. Built of mortared rubble masonry, slate roof with stone gable stacks with dripstones and capping. The principal elevation faces the road to S and has the doorway offset to the R (E) end; a basket arched opening with radiating stones as the head. The windows are timber casements, the ground floor window to L end enlarged and of 3-lights; above is a 2-light window, with a similar window to R end,. Flanking the door is a small single paned light to L and a small window to R (obscured by vegetation).	Medieval	SH 70774 40855
4838	II	Stable to SE of Cynfal Fawr Farmhouse	Dated 1794 and inscribed "Joseph Bushman Esq.". The building was originally stone with slated roof. At the time of resurvey the structure was in poor condition without roof and deteriorating	Post-medieval	SH 70320 40660
4840	II	Holy Cross Church	Probably late C18 building, formerly a tannery and converted to use as a Roman Catholic church in mid C20. The area had experienced an influx of Irish workers, brought from County Cork to build the dams for the original Maentwrog hydo-electric scheme. Some were said to have stayed on in the area, and the Church is said to reflect this history. Extended by the addition of a gabled porch and a low extension built at right angles to the NW. Tall gable entry building, built of mortared rubble masonry; slate roof. The main part of the church is a 4-bay linear range with each bay articulated by a tall narrow window with slate sills. There is a stained-glass window set in the circular light in the SW gable apex below which is the entrance porch. The porch has a doorway in the L (NW) wall and a window of 4-lights with slate sill and lintel in the SW. The modern addition to NW is a single storey range of 3, 6-pane windows; slate roof and grit rendered elevations.	Post-medieval	SH 68692 39903
4846	II	Church of St Madryn	A double aisle parish church which may retain some medieval fabric but has been extensively restored. The N aisle represents the original church of continuous nave and chancel (extended to the W end), the S aisle and porch were added in C16. The church was extensively restored in 1853-4, all the windows were replaced at that time, the roof rebuilt using some C14 arch braced trusses and the timber arcade rebuilt. A fire destroyed the W end of the church in 1978, and the building had to be restored and has been re-roofed since that time. Double aisled parish church, built of mortared rubble masonry with freestone dressings. Modern slate roof with single bellcote at the W end of the N aisle. The porch is at the SW corner and has a wide arched entrance with a head of radiating narrow stones; there is also a simple flat headed doorway at the W gable of the N aisle. The windows are single and 2 light trefoil headed lights, most in rectangular frames, the E window of the N aisle has a shallow pointed head; lateral walls are of 4-bays and there is a blocked window at the E end of the N wall.	Post-medieval	SH 70664 35653
4847	II	Coed Cae-du Farmhouse	C16 farmhouse with later alterations. Later single storey wing to rear and single pitched roof addition to L (E). The farmhouse was the centre of an extensive holding of close to 300 acres (121.5 hectares) at the time of the Tithe Apportionment of the parish, 1849; owned by Reverend Robert Lloyd Annwyl Roberts and occupied by Ellis	Post-medieval	SH 70371 37703

NPRN No.	Grade	Name	Description	Period	NGR
			Humphreys. Two storey farmhouse with single storey wing to rear and single pitched roof addition at L (E) gable. Built of local mortared stone (part of the E gable rendered), with large stones as quoins and lintels. The house and rear wing have slate roofs and gable stacks with dripstones and capping. The stack to L (E) gable of the house is a broad, shouldered, external stack, rendered. The roof of the single pitched roof addition at the E end is of profiled material. The principal elevation faces NNW and is a 3-window range with the doorway offset to the R (W); the doorway is wide with an arched head of narrow radiating stones. Windows are timbers casements, first floor windows modern. The single pitched roof addition, probably a cowhouse, has the doorway offset to L and a pitching hole or loft opening to R.		
19656	II	Cae'n y Coed Uchaf	A sub-medieval farmhouse of regional end chimney type, probably C17. Remodelled in late C19 with central wooden stair and boarded partitions, and alterations to windows. The house is marked as a simple rectangle on the tithe map of the parish, 1840; owned by Louisa Jane Oakeley of Plas Tan-y-bwlch and occupied by John Roberts, farmer of a holding of just over 100 acres (40.5 hectares). Two-storey house with attached byre (R), and rear wing. Local rubble, slate roof under restoration at time of inspection. Two large square chimneys. Two window front faces W; wooden casement glazing, with upper windows at eaves. Roughly central doorway with deep stone lintel; boarded C19 door. To R of house, byre with roughly dressed roof trusses; loading door in R gable where ground rises. At N end, single-storey rear wing at right angles in matching materials. At S end, lean-tos at front (ruinous), and rear corner (roofless).	Post-medieval	SH 68269 40656
82534	II	Capel Moriah Fro	Late C19 chapel. Built to replace an earlier chapel on the site, itself rebuilt in 1839, recorded on a reset slate tablet set into the wall of the chapel yard. Romanesque style chapel. Built of grey rock-faced snecked masonry with pale freestone dressings; slate roof with shallow stone parapet copings and fleur de lys finials. Gabled entrance elevation has stepped decoration and an advanced centre which has paired round headed arched doorways with flanking Romanesque columns; triple arched window at first floor level over a moulded corbelled course, articulated by columns with Romanesque capitals and a small Venetian window in the apex. In the flanking outer bays, there is a round-headed window over square-headed window; the side elevations have square-headed ground and first floor windows to each of 5 bays. All windows are modern replacements of the original margin paned lights. The rear elevation is rendered and has scattered modern fenestration.	Post-medieval	SH 70730 35624
82543	II	Statue of Hedd Wyn	Early C20 commemorative memorial in the form of a figurative statue of the poet Hedd Wyn - Ellis Humphrey Evans. The figure stands on a rough stone stepped plinth into which a bronze plaque is set which reads: Hedd Wyn / Pri Fardd Eisteddrod Genedlaethol 1917 / Ganwyd Ef Ym Mhlwyf Trawsfynydd / A Syrthiodd Ar Esgair Pilkem Yn / Fflandrys Gorffennaf 31 1917 Yn 30 Oed / "Ei Aberth Nid A Heibio Ei Wyneb / Annwyl Nid An Ango / Er I'r Almaen Ystaenio / Ei Dwrn Dur Yn Ei Waedô" Leaning against the front face of the plinth is a slate tablet which bears the same inscription and set on the ground in front of the memorial is a further slate tablet which reads: Hedd Wyn / This Statue Commemorates The / Death Of The Winning Bard At The Birkenhead National Eisteddfod / August 1917 The Chair Was Awarded / Posthumously To Hedd Wyn Who Was / Killed In Action At Pilkim Ridge / Flanders On July 30th 1917.	Modern	SH 70742 35634
82546	II	White Lion Inn	Mid to late C19 public house. The village of Trawsfynydd developed as a quarrying community in the latter half of the C19. Two storey public house, built of coursed, roughly dressed local stones including extremely long stones forming a continuous lintel course across the ground floor openings. Slate roof with advanced eaves and rectangular stacks with dripstones and capping; there are gable stacks to either end and a single ridge stack offset to the R (S). The principal elevation faces the street to the W, the main door offset to the L (N) under a shallow overlight and is flanked by 4-pane horned sash windows; there is another (delivery) door at the far R (S) end and 3 similar first floor windows regularly spaced across the elevation.	Post-medieval	SH 70760 35705
83970	II	1 Gellilydan Terrace	Mid to late C19 terrace. Gellilydan is recorded in tithe apportionment as an area of over 85 acres, owned by Ellis Humphreys and occupied by Robert Pugh, the village was developed due to the expansion of the slate and quarrying industries in the area. Belongs to a group of: 1-3 Gellilydan Terrace. Two storey terrace of houses, built of roughly coursed mortared rubble masonry, with large stones as quoins and lintels. Slate roof with stone coping at NE gable and rectangular stone stacks with dripstones and capping. Located at the far R (NE) end of the terrace. The doorway is offset to L under a slate roofed open porch on timber piers and to R is a single ground and first floor horned sash window; a 12-pane sash at ground floor level and unequal sash of 9-panes set under the eaves above.	Post-medieval	SH 68372 39901
83976	II	Gellilydan Terrace	Mid to late C19 terrace. Gellilydan is recorded in tithe apportionment as an area of over 85 acres, owned by Ellis Humphreys and occupied by Robert Pugh, the village was developed due to the expansion of the slate and quarrying	Post-medieval	SH 68369 39895

NPRN No.	Grade	Name	Description	Period	NGR
			industries in the area. Belongs to a group of: 1-3 Gellilydan Terrace. Two storey terrace of houses, built of roughly coursed mortared rubble masonry, with large stones as quoins and lintels. Slate roof with stone coping at NE gable and rectangular stone stacks with dripstones and capping. Offset to the far R (NE) end of the terrace. The doorway is offset to R and to L is a single ground and first floor horned sash window of 12-panes; the first-floor window set under the eaves.		
83981	II	Gellilydan Terrace	Mid to late C19 terrace. Gellilydan is recorded in tithe apportionment as an area of over 85 acres, owned by Ellis Humphreys and occupied by Robert Pugh, the village was developed due to the expansion of the slate and quarrying industries in the area. Belongs to a group of 1-3 Gellilydan Terrace. Two storey terrace of houses, built of roughly coursed mortared rubble masonry, with large stones as quoins and lintels. Slate roof with stone coping at NE gable and rectangular stone stacks with dripstones and capping. The 3rd house in the row from the R (NE) end of the terrace. The doorway is offset to R and to L is a single ground and first floor horned sash window; a 12-pane sash at ground floor level and unequal sash of 9-panes set under the eaves above.	Post-medieval	SH 68367 39890
83991	II	Cartshed at Creigiau Duon	Lofted cartshed range built of mortared rubble masonry; slate roof. There is an external flight of slate and stone steps up to the loft door in the E gable apex; a single storey outshot built against the S wall of the flight, with doorway offset to R (N). A wide cartbay, with long stone lintel, at the L (S) end of the range has been partially blocked with brick and now has a boarded stable door to R and modern casement window to L; to R is an open fronted cartshed or storage area, of 2-bays with central stone pillar.	Post-medieval	SH 69283 39136
83995	II	Creigiau Duon	Two storey farmhouse and attached agricultural range. Built of coursed rubble masonry, the house faced with roughly dressed blocks of stone; large stones as quoins and lintels. Slate roof with stone gable stacks with capping. The principal elevation of the farmhouse faces the road to E, a 3-window range with central doorway and openings offset to R (N); windows are 2-light timber casements, the first-floor windows set under the eaves. To the rear (W) of the L (S) gable return there are 4-pane casement windows to ground and first floor and there is a single pitch roofed porch to the partially modernised service wing. Abutting the service wing is a linear agricultural range, probably a cowhouse, that has ventilation slits set under the eaves along the lateral walls. At the R (E) end there is a boarded door and pitching or loft door over in a gabled dormer, to L is another door and there is a 3rd door at the far L end of the range; a modern window has been set in a partially blocked doorway towards the centre of the range.	Post-medieval	SH 69276 39150
83999	II	Former dairy at Tafarn Helyg	Single storey outbuilding, formerly used as a dairy or creamery for the adjacent house or public house at Tafarn Helyg. Built of rubble masonry including some boulders; slate roof with stone copings and small rooflight in front (NW) pitch, stone gable stack with dripstones and capping to L (NE) gable. The principal elevation has a boarded stable door to R (SW) and a 4-light casement window to L.	Post-medieval	SH 68748 39650
84000	II	Former forge at Tafarn-helyg	Late C18 or early C19 outhouse, probably contemporary with the adjacent house at Tafarn Helyg and formerly used as a forge. Single storey outbuilding, originally in use as a forge. Built of rubble masonry including large boulders; slate roof with stone gable stack to R (SE) gable with dripstones and capping. The principal elevation faces the house to SW and has a boarded stable door to L, 2-light casement window to R; single window in NW gable.	Post-medieval	SH 68742 39660
84009	II	Milepost	Probably mid C19 milepost. Merioneth was the last of the Welsh counties to have turnpike roads and it was at a county meeting in Dolgellau in 1775 that it was resolved to convert the principal tracks of the county into turnpikes, in partnership with Caernarfonshire. By the end of the C18 most of the existing roads had been brought under the Trust under the Merioneth Turnpike Act of 1777, and the line of the modern road from Maentwrog to Dolgellau more or less follows the early turnpike and was certainly in place by the time of the Tithe Map of the parish of Trawsfynydd, 1849. Cast iron milepost with a triangular profile, wider at the top with a raking head and facing panels which bear the names and distances: TRAWSFYNYDD / 3 on the left-hand face and MAENTWROG / 2 on the right.	Post-medieval	SH 69367 39357
84013	II	Pandy Bach	Two storey house set into the hillside and aligned roughly NE-SW with the principal elevation facing NW; outshot to rear (SE) and single storey cowhouse to L (SW). Built of mortared rubble masonry including large stones as quoins and lintels and boulders to the base of the walls. Slate roof with tall square stone gable stacks with dripstones and capping. The house is a 2-window range with doorway offset to R (SW); windows are 2-light casements, the first-floor windows to front and rear in gabled half dormers that break the eaves line. To the rear the roof continues down over an outshot that has a boarded door set in the angle. The cowhouse has a boarded door to L (NE) of the front (NW) elevation and a pitching hole in the SW gable.	Post-medieval	SH 68665 40073

NPRN No.	Grade	Name	Description	Period	NGR
84015	II	Pont Tafarn-helyg	Probably mid C19 road bridge. Merioneth was the last of the Welsh counties to have turnpike roads and it was at a county meeting in Dolgellau in 1775 that it was resolved to convert the principal tracks of the county into turnpikes, in partnership with Caernarfonshire. By the end of the C18 most of the existing roads had been brought under the Trust under the Merioneth Turnpike Act of 1777, and the line of the modern road from Maentwrog to Dolgellau more or less follows the early turnpike and was certainly in place by the time of the Tithe Map of the parish of Trawsfynydd, 1849. The bridge across Afon Tafarn Helyg was probably contemporary with the main development of the village of Gellilydan in the mid C19. Probably mid C19 road bridge built of coursed rubble masonry. Comprising a single segmental arch of stone voussoirs and pendant keystone flanked by raking buttresses and with rectangular flood drain to L (E). Drip course to a low parapet wall, raised and extended to E at later date; raking stone slab coping.	Post-medieval	SH 68722 39679
84023	II	Tafarn-helyg	House in simple Georgian vernacular style. 2 storeyed, with storeyed wing to R (NW) end and single storey lean-to outbuilding at L gable. Built of mortared rubble masonry with large stones as quoins and lintels. Slate roof with overhanging eaves at the NW gable of the storeyed wing; stone gable stacks with dripstones and capping. The principal range faces NE, the main house a 3-window range with wide doorway towards the centre and the openings offset to the R (NW). The windows are 16-pane hornless sashes with slate sills; first floor windows are set under the eaves. The storeyed wing to R is in alignment, but with lower roof line. The doorway is to L and there is a single ground and 1st floor window to R; an equal sash to ground floor and 9-pane centrally hinged window set under the eaves above. The lean-to has a single doorway offset to R. There are small 4-paned horned sash windows to the rear of the house and a conservatory has been built against the rear wall.	Post-medieval	SH 68726 39659
87757	II	Llennyrch Farm	Farmhouse, squared rubble stone with stone gable chimney stacks, rough projecting eaves and slate roof. 2 storeyed, 3 window range offset, with entrance to left of centre. Windows replaced in original C19 openings. Right hand gable plain except for small deeply recessed 2-light timber mullion window high up on the right. 2 storey single bay kitchen wing attached to rear, with door at junction with house, wide window to ground floor, smaller window above. Small window to first floor in rear elevation of house. Plain gable and left-hand elevations to kitchen wing. Single bay cow house in line to left of house, with door to ground floor and window above, and upper doorway in left gable with external stone steps. Cat slide extension against rear with end door. Gap in between cat slide extension and kitchen wing with square windows to both ground and first floor. Group value with 'L' shaped barn and cart shed immediately to the north, which are also of special interest.	Post-medieval	SH 66299 38079
87758	II	Barn and Cart Shed at Llennyrch Farm	Barn aligned NW-SE with cart shed attached to SW. Constructed of large random stonework with massive stone lintels. Roof and doors replaced. Double doors to SW, double high loading door to SE, single ground floor door to NW. Formerly with lean-to against NE side, now partly demolished and replaced with modern shed. Single storey cart shed with wide door against barn, single loft door in gable.	Post-medieval	SH 66311 38094

Conservation Areas

Inspire ID	Grade	Name	NGR
WAL/SNOW/2	CA	Maentwrog	SH 66593 40290

Non-Designated Assets

PRNUID	Name	Description	Period	NGR
57332	Enclosure, NW of Trawsfynydd Power Station	Site identified using early Ordnance Survey Maps (McGuinness, 2014)	Post-medieval	SH 68718 38735
57331	Enclosure, W of Ty Gwyn	Site identified using early Ordnance Survey Maps (McGuinness, 2014)	Post-medieval	SH 68995 38907
99547	Hendre-mur, Trawsfynydd, Maentwrog	A post medieval farm.	Post-medieval	SH 69639 38307
99546	Outfarm, East of Hendre-mur, Maentwrog	A post medieval outbuilding.	Post-medieval	SH 69708 38314
99545	Outfarm, South of Hendre-mur, Maentwrog	A post medieval outbuilding.	Post-medieval	SH 69685 38075
1816	Settlement, NW of Trawsfynydd Power Station	Site consists of a number of conjoined structures with a main house surrounded by a number of outhouses and paddocks. The remains comprise of the following: A. A small structure 3m x 2m x 0.5m high with a lintel over an entrance on the east side. B. A long narrow (possibly originally roofed) enclosure with an entrance on the east side. C. A two roomed outbuilding with an in-situ lintel over the entrance. D. An outbuilding to central house with walls up to 2m high with no windows listed. E. Probably main room of the house 6-8m square with a doorway in the east wall reached by a narrow passageway except for over the doorway the walls stood up to 2m high and are fairly solid in construction. F. A substantial paddock terraced northeast of the corner of the remains of a much-ruined stone-built structure. This complex of structures represents a central dwelling house with a number of outhouses and paddocks probably post medieval in date.	Post-medieval	SH 6869 3865
99549	Tyddyn-y-gareg, Trawsfynydd, Maentwrog	A post medieval smallholding.	Post-medieval	SH 69700 38633
99548	Tyddyn-y-gareg-isaf, Trawsfynydd, Maentwrog	A post medieval smallholding.	Post-medieval	SH 69800 38506
90400	Building, South of, Gwylan, Trawsfynydd	Building located south of the building identified as 'Gwylan' on 1st edition OS mapping.	Undated	SH 68850 38616
90399	Gwylan, Trawsfynydd	Building identified as 'Gwylan' on 1st edition OS mapping.	Undated	SH 68818 38733
90396	Sheepfold, Northeast of Craig Gyfynys, Trawsfynydd	Sheepfold marked on the Ordnance Survey first edition map of 1889.	Undated	SH 68608 38572
90398	Sheepfold, South of Gwylan, Trawsfynydd	Sheepfold marked on the Ordnance Survey first edition map of 1889.	Undated	SH 68770 38686
90397	Sheepfold, Southwest of Gwylan, Trawsfynydd	Sheepfold marked on the Ordnance Survey first edition map of 1889.	Undated	SH 68687 38502
27441	Structure, Possible, Maentwrog	A structure or enclosure of unknown date first depicted on the 1st edition OS map of 1889.	Undated	SH 69810 38840
90395	Sheepfold, East of Craig Gyfynys, Trawsfynydd	Sheepfold marked on the Ordnance Survey first edition map of 1889.	Undated	SH 68611 38155

Roman Roads

PRNUID	Name	Description	Period	NGR
17821	Roman Road 5	Documentary evidence of Roman road of unknown condition or survival.	Roman	SH 5923 3829

Previous Archaeological Investigations

PRNUID	Name	Description	Organisation	NGR
40001	Uplands Survey Project: Trawsfynydd	N/A	Gwynedd Archaeological Trust (GAT)	N/A
40538	Roman Roads in North-West Wales	Gwynedd Archaeological Trust was grant aided by Cadw to undertake a project concerned with Roman roads in Northwest Wales between 2004-2005. The project was a continuation of the 2002 project in examining the Roman military road network across Northwest Wales.	Gwynedd Archaeological Trust (GAT)	SH 70 46
40542	Roman Roads in North-West Wales (Revision 4)	Not Applicable	Gwynedd Archaeological Trust (GAT)	N/A
40782	Hut Circle Settlement Survey	Thematic Survey Site visits from 1994-1998. No more refined information about date of visit on HER	Gwynedd Archaeological Trust (GAT)	N/A
44558	Glastir Private Woodland Management Polygonisation	Desk based assessment carried out by Gwynedd Archaeological Trust for the Glastir Private Woodland Management scheme. The project identified new sites within private woodlands in the Glastir scheme using historic Ordnance Survey digital mapping. The project output is a GIS table with metadata.	Gwynedd Archaeological Trust (GAT)	N/A
44878	Proposed Water Transfer Pipeline, Dolbenmaen to Cwmystadrillyn	Archaeological assessment completed by Gwynedd Archaeological Trust (GAT) along the route of a proposed new transfer main between Dolbenmaen Water Treatment Works and Cwmystadrillyn Water Treatment Works (WTW), Gwynedd. The transfer main will include a 450mm raw water main that will run between the two treatment works, a 50mm branch pipeline that runs from the Dolbenmaen WTW to Dolbenmaen village and several pipeline cross-connections that will run from the proposed transfer main to existing smaller diameter branch pipes. To accommodate the scheme groundworks a 21.8m wide easement is proposed along the transfer main route along with three site compounds at strategic locations. The compounds will be located just outside the easement corridor. The transfer main will be laid within a trench up to 3.8m in width.	Gwynedd Archaeological Trust (GAT)	SH 2524 3425
44907	Medieval and Post-Medieval Mills. Scheduling Enhancement 2012-13, Meirionnydd. Part 01: Report and Gazetteer.	GAT has been commissioned by CADW to identify the Medieval and Post Medieval sites in Meirionnydd, to assess their condition and, where appropriate, to recommend sites for scheduling. The project has identified 440 mill or potential mill sites, through archive, cartographic and documentary research. Those sites showing potential as sites suitable for scheduling were visited in the field. These sites vary in date from the Medieval period through to the 19th century, and consist of a variety of site types and technologies. A database was created recording each of the mill sites individually with a unique site number. It is clear from the work carried out on this project that the quantity of data and potential for research on Meirionnydd mills is cast. There are undoubtedly more mills of interest, and perhaps of Schedulable quality in Meirionnydd and these can only be assessed after further documentary research and field work.	Gwynedd Archaeological Trust (GAT)	N/A
45076	Gas Pipeline Replacement: Pwllheli to Blaenau Ffestiniog. Archaeological Desk Based Assessment and Field Reconnaissance Survey.	RSK Environment Ltd (RSK) has undertaken an archaeological desk-based assessment and field reconnaissance survey in 2010 for a proposed 38km-long pipeline between Pwllheli and Blaenau Ffestiniog in Gwynedd. The desk-based assessment (DBA) considered sources from the Gwynedd Archaeological Trust and Snowdonia National Park Historic Environment Records. Tithe maps, estate maps (where available) and 1st and 2nd edition Ordnance Survey mapping. The DBA was supported by an Archaeological Field Reconnaissance Survey (FRS), and a review of borehole data. In total, 618 archaeological sites or areas of interest were identified within the Study Area. These comprise 5 Scheduled Monuments, 189 Listed Buildings, four Conservation Areas, three Historic Parks and Gardens and 417 non-scheduled archaeological sites. Sites ranged from negligible to high archaeological importance and dated from the prehistoric to modern periods. Data was gathered for a study area of typically 1km based on the proposed pipeline centreline, referred to throughout this report as the Study Area.	RSK Environment	SH 53614 40751

PRNUID	Name	Description	Organisation	NGR
45108	CPAT Maentwrog to Trawsfynydd 33kV Powerline. Archaeological Watching Brief.	A watching brief was carried out by CPAT between February 25th and March 23rd, 2016, to monitor topsoil stripping carried out during the construction of a new underground 33kV power line from the Trawsfynydd Nuclear Power station towards Maentwrog within Snowdonia National Park.	Gwynedd Archaeological Trust (GAT)	SH 67638 39343
45251	Maentwrog to Trawsfynydd Powerlines. Cultural Heritage Assessment.	Clwyd-Powys Archaeological Trust was commissioned by Iberdrola Engineering and Construction in 2014 to undertake a cultural heritage assessment on the routes of two new underground electricity cables between Maentwrog and Trawsfynydd. The mitigation of five features by a combination of watching brief and avoidance was suggested.	Gwynedd Archaeological Trust (GAT)	SH 67360 39600
45447	Tir Gofal Management Plan: Coed Cae Du, Glyn Meibion Mawr, Tyddyn Cwper	Gwynedd Archaeological Trust carried out a desk-based assessment in 2008 as part of a Tir Gofal archaeological management plan at Coed Cae Du, Glyn Meibion Mawr, Tyddyn Cwper.	Gwynedd Archaeological Trust (GAT)	SH 70 38
45965	HER Evidence Data Cleansing Exercise	HER Staff at Gwynedd Archaeological Trust undertook an Evidence Data Cleansing Exercise for all existing Core records, between May and September 2020. The work focused on migrating form terms to evidence terms using agreed Historic Environment Data Standards terminology. 13615 records were assessed on an individual basis using a combination of the form field and descriptive information to create an evidence record.	Gwynedd Archaeological Trust (GAT)	Not Applicable
46608	Recording Traditional Farm Buildings and Historic Farmsteads: North Anglesey & West Meirionnydd	Gwynedd Archaeological Trust were grant aided by Cadw to undertake a project recording historic farmsteads in North Anglesey and West Meirionnydd, as part of a pan-Wales initiative to record surviving traditional farmsteads.	Gwynedd Archaeological Trust (GAT)	SH 36347 83379

Appendix 5.7.A Trawsfynydd: Initial Conceptual Site Model and Risk Assessment

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1. Initial Conceptual Site Model

1.1 Introduction

- 1.1.1 The initial Conceptual Site Model (iCSM) has been developed to identify potentially complete contaminant linkages that may require further investigation to assess their existence and/or potential significance. The potential sources of contamination on or in the vicinity of the site, receptors on or near the site, and pathways on or near the site are discussed in the following sub-sections.
- 1.1.2 Past and current potentially contaminative land uses have been considered. The iCSM is based on the works as set out in the Environmental Statement (ES) **Volume 5, Chapter 2: Trawsfynydd Substation Works**.

1.2 Assessment Framework

- 1.2.1 The Trawsfynydd works site, in terms of potential land contamination, will be regulated by the Eryri National Parks Authority under the Town and Country Planning Act 1990 (as amended) (0), taking account of the National Planning Policy Framework 2024 (0), with the Natural Resources Wales (Ref 1.3) and Cadw (Ref 1.4) acting as potential statutory consultees.
- 1.2.2 Environmental liabilities can arise through provisions contained in statutory legislation including Part 2A of the EPA 1990 (Ref 1.5), the Environmental Damage (Prevention and Remediation) Regulations 2015 (Ref 1.6), the Water Resources Act 1991 (0), the Groundwater (England and Wales) Regulations 2009 and the Water Act 2003 (0).
- 1.2.3 Current best practice recommends that the determination of health hazards due to contaminated land is based on the principle of risk assessment, as outlined in the Statutory Guidance to Part 2A (2012), Natural Resources Wales Development of Land Affected by Contamination: A Guide for Developers (Ref 1.9) and Land Contamination Risk Management (LCRM) (2023) (1.10).
- 1.2.4 The “suitable for use” approach is adopted for the assessment of contaminated land. Remedial measures are undertaken where unacceptable risks to human health or the environment are realised taking into account the use (or proposed use) of the land in question and the environmental setting. The proposed end-use for the site is an electricity substation.
- 1.2.5 The risk assessment process for environmental contaminants is based on a source-pathway-receptor analysis. These terms can be defined as follows:
- **Source:** hazardous substance that has the potential to cause adverse impacts.
 - **Pathway:** route whereby a hazardous substance may come into contact with the receptor: examples include ingestion of contaminated soil and leaching of contaminants from soil into watercourses.

- **Receptor:** target that may be affected by contamination: examples include human occupants/ users of site, water resources (surface waters or groundwater), or structures.
- 1.2.6 For a risk to be present, there must be a relevant and viable contaminant linkage, i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway.
- 1.2.7 The following sections detail the iCSM which has been developed for the site with a view to assessing the potential risks and liabilities and constraints associated with the site in its current condition prior to any proposed redevelopment. Risks associated with the proposed works at the site have also been assessed based on a commercial and industrial future land use scenario, including any potential sources of contamination, potential receptors and potential contaminant pathways identified during this desk-based assessment.

Sources of Potential Contamination

- 1.2.8 Based on the information obtained as part of the baseline for the **Chapter 7 Geology, Soils, Hydrogeology, Land Use and Agriculture (Soils)** in **Volume 5 of the ES, Table 1.1** indicates the contaminants of potential concern (CoPC) that may be associated with the current and previous land use.
- 1.2.9 CoPC have been identified using National House Building Council / Environment Agency/Chartered Institute of Environmental Health publication R&D 66 (NHBC/EA/CIEH, 2008), – ‘Guidance for the safe development of housing on land affected by contamination’, Volume 2 (Ref 11) and professional judgment.

Table 1.1 – Potential Sources of Contamination

Source	Description	CoPC
Trawsfynydd Substation	The works site is located in the existing Trawsfynydd Substation boundary. Further east of the main Trawsfynydd substation works (circa <500 m) lies a railway line. The rail line is approx. 50 m from the site where the site extends to the access road. In the western side of the Trawsfynydd substation works (approx. 20 m from the works site) there is a sewage works and beyond that the Trawsfynydd Power station (approx. 180 m).	Metals and metalloids, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), petroleum hydrocarbon (TPH), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs), pH and asbestos containing material (ACM) / asbestos.
Made Ground	Made Ground is anticipated in the vicinity of Trawsfynydd	Metals and metalloids, inorganics (such as sulphates, sulphides

Source	Description	CoPC
	<p>Substation, Trawsfynydd Nuclear Power Station and road works.</p> <p>The Groundsure data shows that the majority of the site is underlain by Made Ground.</p>	<p>cyanides, phenols), SVOCs, VOCs, TPH, PAH, PCBs, pH and ACM / asbestos. Ground gas</p>
Trawsfynydd Nuclear Power Station	<p>The Trawsfynydd Nuclear Power Station is located adjacent west of the site and consists of various on-site buildings, storage areas and an internal road network.</p> <p>The Trawsfynydd Nuclear Power Station is approximately 15.5 hectares and construction commenced in 1959. Generation ceased in 1991 and defueling was completed in 1997. The site is currently undergoing decommissioning.</p> <p>A historical landfill is mapped 120 m west of the site at the northern end of the power station which accepted inert, industrial, household and special liquid sludge waste between 1972 and 1993.</p>	<p>Radioactive waste, metals and metalloids, SVOCs, VOCs, TPH, PAH, PCBs, Polyfluoroalkyl substances (PFAS), sulphate, sulphide, pH and ACM / asbestos. Ground gases, vapours</p>
Agricultural Land	<p>The site is bounded to the north and east by a forest and possible agricultural land or pasture land. With agricultural land, there is a potential for pesticides to be used on the land, there is potential for spills and leaks from machinery used and the possibility of buried animal remains.</p>	<p>Metals and metalloids, SVOCs, VOCs, PAH, pesticides / herbicides, ammoniacal nitrogen, nitrate and pathogens</p>

- 1.2.10 A very low gas generation potential has been identified for made ground and Till based on guidance provided in BS8576, existing made ground used as engineered fill is unlikely to contain significant degradable organic content.
- 1.2.11 A landfill site is located c.120 m west of the site (at the closest point) at the northern end of the former Trawsfynydd Power Station. This was licensed to accept inert industrial, household and special liquid sludge waste from 1972 to 1993. No further information is available on the waste materials and, therefore, this has been classed as a high generation potential based on guidance in BS8576 for a landfill dating from the mid -1960s to early 1990s.

Potential Receptors

1.2.12 Potential receptors associated with the site are shown on **Table 1.2**.

Table 1.2 – Potential Receptors

Receptor Group	Receptor	Description
Human Health	Construction Workers	Construction workers could encounter contaminants during ground works, including excavations and stockpiling, during construction works. Similarly, maintenance workers could also be exposed if ground works are required.
	Site Users / Maintenance Workers	Future site users such as workers undertaking periodic routine maintenance works at and around the substation
	Adjacent Site Users	<p>Adjacent users include persons on agricultural land and agricultural buildings. A farmhouse is located approximately 400 m north of the works site.</p> <p>Adjacent users include site workers at the adjacent Trawsfynydd Nuclear Power Station during the decommissioning phase of the development.</p>
Controlled Waters	Secondary Undifferentiated Aquifer	A secondary undifferentiated superficial aquifer is mapped in a very small section in the north-west of the works site, associated with Devensian Till.
	Secondary B Aquifer	A secondary B bedrock aquifer is mapped in the northern extent of the site associated with the Hafotty Formation bedrock.
	Secondary A Aquifer	The majority of the site is mapped as a secondary A aquifer associated with the Rhinog Formation bedrock.
	Surface Waterbodies	<p>The entire site is in the Dwyryd – lower Water Framework Directive surface water catchment.</p> <p>At its closest point (south of the road in the east of the site), Llyn Trawsfynydd is approximately 25 m south of the site, although it is c.160 m from the substation area. The other main receptor comprises the Afon Tafarn-helyg and its tributaries to the north and east of the site which appears to flow northwards into the Afon Dwyryd (c.3 km distance).</p>
Property	Buildings & Infrastructure: Structures with enclosed spaces	Agricultural buildings including farms and the adjacent Trawsfynydd Nuclear Power Station

Receptor Group	Receptor	Description
Livestock	Animals within nearby farms	Livestock in fields surrounding the site. Note: livestock is classed as property within the Part 2A Statutory Guidance.
Ecology	Flora and Fauna	Flora and fauna surrounding the site could be affected by the presence of elevated concentrations of certain contaminants.

Potential Pathways

1.2.13 Potential pathways associated with the proposed works are shown in **Table 1.3**.

Table 1.3 – Potential Pathways

Pathway Group	Pathway	Description
Human Health	Ingestion of soil and soil-derived dust	Direct or indirect ingestion of soil and soil derived dust from on-site activities.
	Inhalation of dust - indoor and outdoor	Inhalation of soil derived dust, organic vapours or ground generated gas by indoor and outdoor receptors.
	Dermal contact - indoor and outdoor	Dermal contact with contaminated soils, soil derived dust by indoor and outdoor receptors.
	Vapour intrusion and inhalation – indoors and outdoors	Soil vapour migrating from the source to indoor and outdoor receptors through the underlying soils.
	Plant uptake and consumption of homegrown produce	Uptake of contaminants via the roots of plants.
	Gas Ingress	Ground gas migrating from the source to indoor and outdoor receptors through the underlying soils.
Controlled Waters	Leaching and vertical migration through unsaturated zone	Rainfall infiltration can generate and mobilise soil derived leachate impacting on surface water and groundwater. If perched groundwater is present, there may also be vertical migration into deeper pathways.
	Lateral and vertical migration in groundwater	As well as being a receptor, aquifers allow transportation of contaminants through the permeable strata.

Pathway Group	Pathway	Description
	Baseflow from groundwater to surface water	Surface waterbodies are adjacent to the site. Due to the proximity of these waterbodies, connectivity through baseflow on-site is likely.
	Direct run-off	Surface spills could migrate via surface run-off to off-site surface water bodies and drainage off-site.
Property	Gas intrusion – explosion.	Ground gas migrating from the source off-site property receptors.
Agricultural: Livestock	Direct contact with contaminants in soil or water or indirect contact due to dust.	Direct or indirect contact with contaminants due to migration offsite.
Ecology	Direct contact with contaminants in soil or water or indirect contact with dust	Direct or indirect contact with contaminants onsite or migration of contaminants offsite.

2. Risk Assessment Principles

- 2.1.1 Current best practice recommends that the determination of hazards due to contaminated land is based on the principle of risk assessment, as outlined in the Environment Agency guidance 'LCRM' (Ref 1.8) and the Welsh Government's Contaminated Land Statutory Guideline (Ref 2.1).
- 2.1.2 For a risk to be present, there must be a viable contaminant linkage; i.e. a mechanism whereby a source impacts on a sensitive receptor via a pathway.
- 2.1.3 Assessments of risks associated with each of these contaminant linkages are discussed in the following sections.
- 2.1.4 Using criteria broadly based on those presented in CIRIA C552(02.2), the magnitude of the risk associated with potential contamination at the Site has been assessed. To do this an estimate is made of:
- The magnitude of the potential consequence (i.e. severity); and
 - The magnitude of probability (i.e. likelihood).
- 2.1.5 The severity of the risk is classified according to the criteria in **Table 2.1**.

Table 2.1 – Description of Consequence

Consequence	Definition	Examples (as defined by C552)
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by Environmental Protection Act 1990, Part IIA. Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings or property. A short-term risk to a particular ecological system (or ecosystem), or organism forming part of such ecosystem (note: the definitions of ecological systems in the Draft Circular on Contaminated Land, DETR, 2000).	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health ("significant harm" as defined in DETR 2000). Pollution of sensitive water resources (note: Water Resources Act contains no for considering significance of	Concentrations of a contaminant from site exceed the generic, or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer.

Consequence	Definition	Examples (as defined by C552)
	pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem. (note: the definitions of ecological systems within Draft Circular on Contaminated Land, DETR, 2000).	Death of a species within a designated nature reserve.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ("significant harm" as defined in the Draft Circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings, structures, services or the environment.	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, Structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

2.1.6 The likelihood of the risk occurring is classified according to the criteria in Table 2.2.

Table 2.2 – Likelihood of Risk Occurrence

Likelihood	Definition	Examples (as defined by C552)
High	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.	The contaminant linkage exists or is very likely to exist in the short term, and/or may also be linked to visual or olfactory evidence of that linkage being present and active in some cases. The conditions are such that there is no foreseeable reason to suggest that a source-pathway-receptor linkage is not occurring and required mediums for a contamination source to

		pass through or in to to reach a receptor are all present.
Likely	There is pollutant linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.	The conditions are such that there are very few foreseeable reasons to suggest that a source-pathway-receptor linkage is not occurring, and that all or most of the required mediums for a contamination source to pass through or in to to each a receptor are present.
Low	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.	The source, pathway and receptor linkage may exist and it is possible that contamination could reach a receptor in certain circumstances. The site conditions indicate that there are limiting factors in the pathway mediums or generation potential of the source and/or presence of the receptor.
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.	The source, pathway and receptor may exist in certain circumstances, but the contaminant linkage is improbable in the short term and in the long term.

2.1.7 An overall evaluation of the level of risk is gained from a comparison of the severity and probability, as shown in **Table 2.3**.

Table 2.3 – Risk based on Comparison of Likelihood and Severity

		Severity			
		SEVERE	MEDIUM	MILD	MINOR
Likelihood	HIGH	Very High	High	Moderate	Low
	LIKELY	High	Moderate	Moderate/Low	Low
	LOW	Moderate	Moderate/Low	Low	Very Low
	UNLIKELY	Moderate/Low	Low	Very Low	Very Low

2.2 Preliminary Risk Assessment

2.2.1 An evaluation of the potential risks associated with the identified sources at the site to the various receptors is presented in **Table 2-4** and discussed in **Table 2-5**. The level of risk is determined based on the current condition of

the site, i.e., the effects of mitigation measures such as soil or groundwater treatment are not included but the level of risk takes into account the nature of the proposed works at the site.

Table 2-4. Contaminant Linkage Preliminary Risk Assessment

Source	Receptor		Pathway	Likelihood	Severity	Risk
On-Site Contamination Sources: Trawsfynydd Substation Made Ground	Human Health - onsite	Site Workers and Visitors	Ingestion of soil and soil-derived dust, Dermal contact - indoor and outdoor	Unlikely	Medium	Low
			Inhalation of dust - indoor and outdoor	Unlikely	Medium	Low
			Vapour intrusion and inhalation – indoors and outdoors	Unlikely	Medium	Low
			Gas Ingress	Unlikely	Medium	Low
	Human Health - offsite	Construction Workers or Maintenance Workers	Dermal contact with and ingestion of contaminants in soil, soil-derived dust or water. Inhalation of ground gas and contaminants in soil-derived dust	Likely	Medium	Moderate
		Adjacent Site Users	Inhalation of contaminants in	Unlikely	Medium	Low

Source	Receptor		Pathway	Likelihood	Severity	Risk
			soil, soil-derived dust, fibres and volatile vapours.			
	Water Environment / Controlled Waters	Secondary Undifferentiated Aquifer Secondary B Aquifer Secondary A Aquifer	Leaching and vertical migration through unsaturated zone	Likely	Medium	Moderate
			Vertical migration in groundwater	Low	Medium	Moderate/Low
			Lateral migration offsite in groundwater	Likely	Medium	Moderate
		Surface Waterbodies: Llyn Trasfynydd Afon Tafarn-helyg	Baseflow from groundwater to surface water	Low	Medium	Moderate/Low
			Direct run-off	Low	Medium	Moderate / Low
	Built Environment	Property: Buildings & Infrastructure: Structures with enclosed spaces	Gas intrusion – explosion	Low	Mild	Low

Source	Receptor		Pathway	Likelihood	Severity	Risk
		Existing and future structures, Public Water Supply	Direct contact of contaminants in soil and/or groundwater	Likely	Mild	Moderate/Low
	Livestock	Animals in nearby farms / fields	Direct or indirect contact with contaminants	Low	Minor	Very Low
	Ecology	Flora and Fauna	Direct or indirect contact of contaminants in soil and/or groundwater	Low	Mild	Low
Offsite Contamination Sources: Former Trawsfynydd Power Station Made Ground Historical Landfill Agricultural Land	Human Health - onsite	Site Workers and Visitors	Inhalation of dust, vapours or ground gas	Low	Severe	Moderate
		Construction Workers / Maintenance Workers	Dermal contact with and ingestion of contaminants in soil, soil-derived	Likely	Severe	High

Source	Receptor		Pathway	Likelihood	Severity	Risk
			dust or water. Inhalation of ground gas, vapours or contaminants in soil-derived dust			
	Water Environment or Controlled Waters	Secondary Undifferentiated Aquifer Secondary B Aquifer Secondary A Aquifer	Water Environment / Controlled Waters	Likely	Medium	Moderate
	Built Environment	Property: Buildings & Infrastructure: Structures with enclosed spaces	Gas intrusion – explosion	Likely	Mild	Moderate/Low
		Existing and future structures, Public Water Supply	Direct contact of contaminants in soil and/or groundwater	Likely	Mild	Moderate/Low

Table 2-5. Identified Risk to Receptors

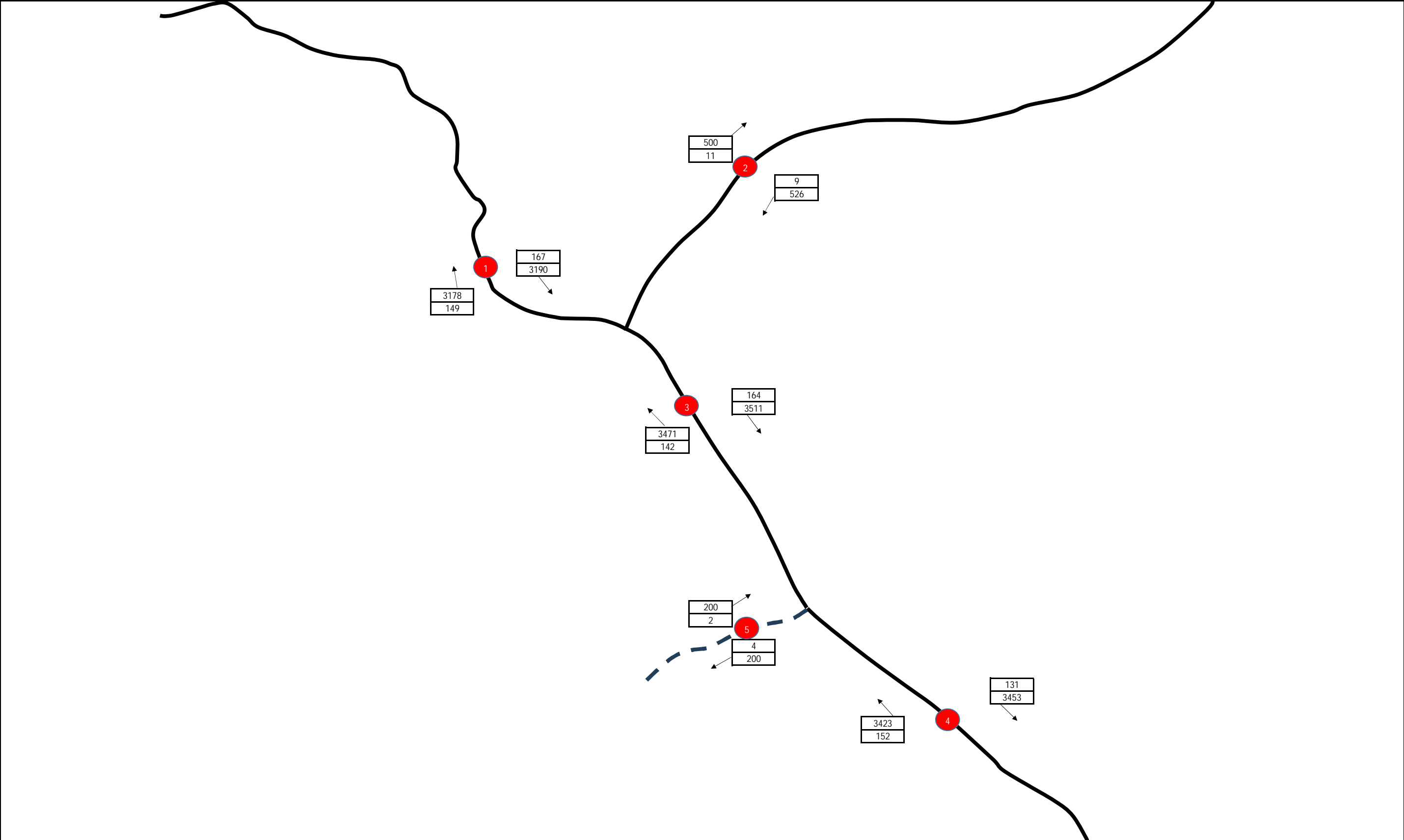
Receptor	Discussion
Human Health: Site Users and Maintenance Workers	<p>Potential onsite sources of contamination have been identified associated with the existing substation and made ground. Offsite sources relate to the former Trawsfynydd Power Station, associated made ground and historical landfill.</p> <p>The site is manned however, risk to site users from contamination is low as workers are not likely to come into contact with soil contaminants during general maintenance works. Site visitors would make infrequent visits of short duration.</p> <p>No potentially significant sources of ground gases or vapours have been identified onsite and therefore a medium consequence has been identified. However, a landfill site is located c.120 m from the site at the closest point. Low permeability superficial deposits (if present) such as Till could reduce the potential for migration of ground gases or vapours. However, a higher risk has been identified from ground gas ingress for this source based on a severe consequence based on the presence of the landfill.</p>
Human Health: Adjacent Site Users	<p>There are limited adjacent site users due to the rural location of the site. The adjacent land uses include farmland where farmers could be working outdoors although much of site is surrounded by woodland reducing the potential for frequent close access. There are less frequent residential dwellings in the vicinity of the site. It is unlikely that adjacent site users would be impacted by contaminants at the site. The construction works will be managed in accordance with Construction Design and Management (CDM) 2015 regulations (Ref 2.4) and mitigation measures would be implemented if required to mitigate dust and / or run-off for example, 'Environmental Good Practice on Site Guide', CIRIA Publication C811 to reduce this risk.</p>
Human Health: Construction Workers	<p>There is a potential risk to workers in terms of exposure to contaminants in soil or shallow groundwater, especially during ground works involving excavations and stockpiling, based on the historical and current land uses identified at the site and adjacent to the site including the former Trawsfynydd Power Station, associated made ground and historical landfill.</p> <p>Limited potential sources of gas and vapours have been identified onsite. However, a higher risk has been identified to workers from ground gas and vapours in confined spaces, including excavations, from offsite sources based on the proximity to the Trawsfynydd Power Station and presence of a historical landfill site located c.120 m from the site at the closest point. No information has been obtained on ground conditions, construction of the landfill or monitoring data and, therefore, a severe consequence has been assigned.</p> <p>The proposed development works will be undertaken in compliance with Construction Design and Management (CDM) 2015 regulations. Prior to work commencing, a health and safety risk assessment will need to be carried out by the appointed Principal Contractor or developed in</p>

Receptor	Discussion
	<p>accordance with current health and safety regulations. This assessment should cover potential risks to construction and maintenance staff. Based on the findings of this risk assessment, appropriate mitigation measures would be implemented during construction and maintenance works, including following general best practice, for example 'Environmental Good Practice on Site Guide', CIRIA Publication C811 to mitigate dust or run-off.</p> <p>Should gross or unexpected contamination be identified during excavations, it should be possible effectively manage this through good health and safety practices and protocols such as a provision of a discovery strategy.</p>
Controlled Waters: Secondary Undifferentiated Aquifer Secondary A Aquifer Secondary B Aquifer	<p>Superficial deposits are not shown within the site area on published mapping although they are shown adjacent to the northwestern site boundary. However, historical British Geological Survey (BGS) borehole logs for the existing substation area indicate the presence of some clayey sand and gravel which could be associated with Devensian Till. The Devensian Till is classified as a secondary undifferentiated superficial aquifer.</p> <p>The bedrock strata of the Rhinog Formation comprise sandstones and mudstones and is classified as Secondary A aquifer.</p> <p>A secondary B bedrock aquifer is mapped in the northern extent of the site associated with the Hafotty Formation which comprise sandstones and mudstones.</p> <p>The potential has been identified for contaminants in shallow soils to migrate vertically towards underlying groundwater and potentially to migrate offsite especially where superficial deposits are thin or absent. A potential risk has also been identified to groundwater quality at the site from the adjacent former power station and associated historical landfill.</p> <p>No records of any public or private groundwater abstractions have been obtained within 1 km of the site.</p>
Controlled Waters: Surface Water	<p>There are no surface water features onsite.</p> <p>Llyn Trawsfynydd is located approximately 25 m from the site at the closest point although 160 m from the existing substation area. The Afon Tafarn-helyg is also close to the site, approximately 45 m from the substation works area.</p> <p>The potential for offsite migration of contaminants in groundwater or run-off to surface water in the Llyn Trawsfynydd is considered low as this is located approximately 160 m from the substation works area, however, this could be higher for the Afon Tafarn-helyg as this is closer.</p> <p>Although there are areas of the site which are closer to surface water, these comprise parking and access roads where contamination is less likely.</p> <p>However, the risks could increase if contaminants were able to enter site drainage which outfalls into Llyn Trawsfynydd or Afon Tafarn-helyg.</p>
Property:	<p>Potential for aggressive ground conditions to be present associated with existing made ground or superficial deposits at the site which could</p>

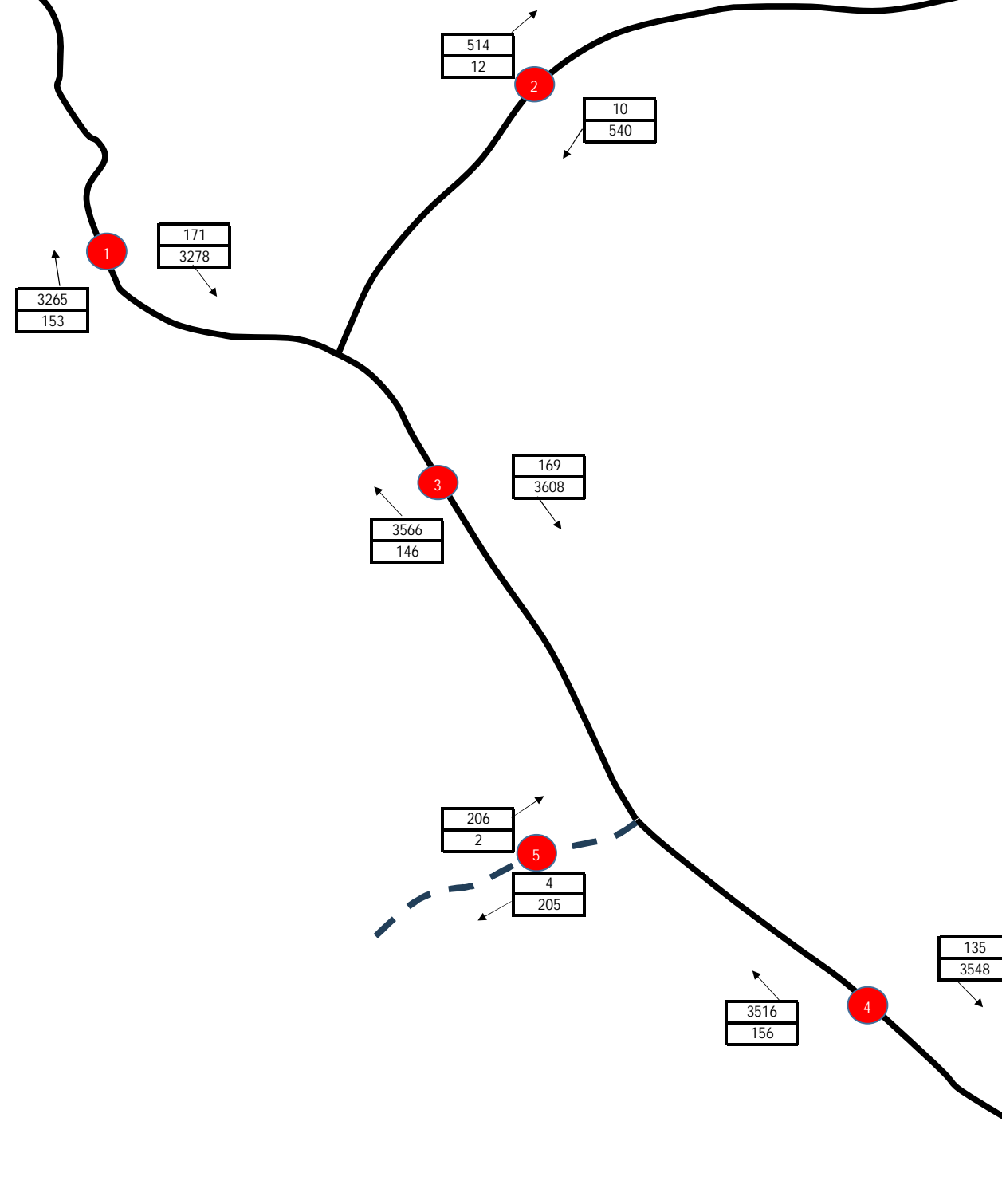
Receptor	Discussion
Buildings & Infrastructure: Buried concrete, drinking water pipes, structures	<p>require mitigation for buried concrete. Potential for contamination associated with the made ground and/or existing substation which could impact buried drinking water pipes.</p> <p>A landfill site is located c.120 m west of the site at the closest point which was licensed to accept inert industrial, household and special liquid sludge waste from 1972 to 1993. This landfill could represent a source of contamination in groundwater or from ground gas and vapours.</p>
Property: Livestock	There is a low potential that contaminants from the site would impact on livestock within nearby fields. Much of the substation site area is surrounded by woodland.
Ecology: Flora and Fauna	<p>The surrounding area comprises predominantly agricultural uses and woodland, and the site is not in an environmentally designated area.</p> <p>The potential for contamination to impact on flora and fauna on the site or surrounding area is considered low.</p>


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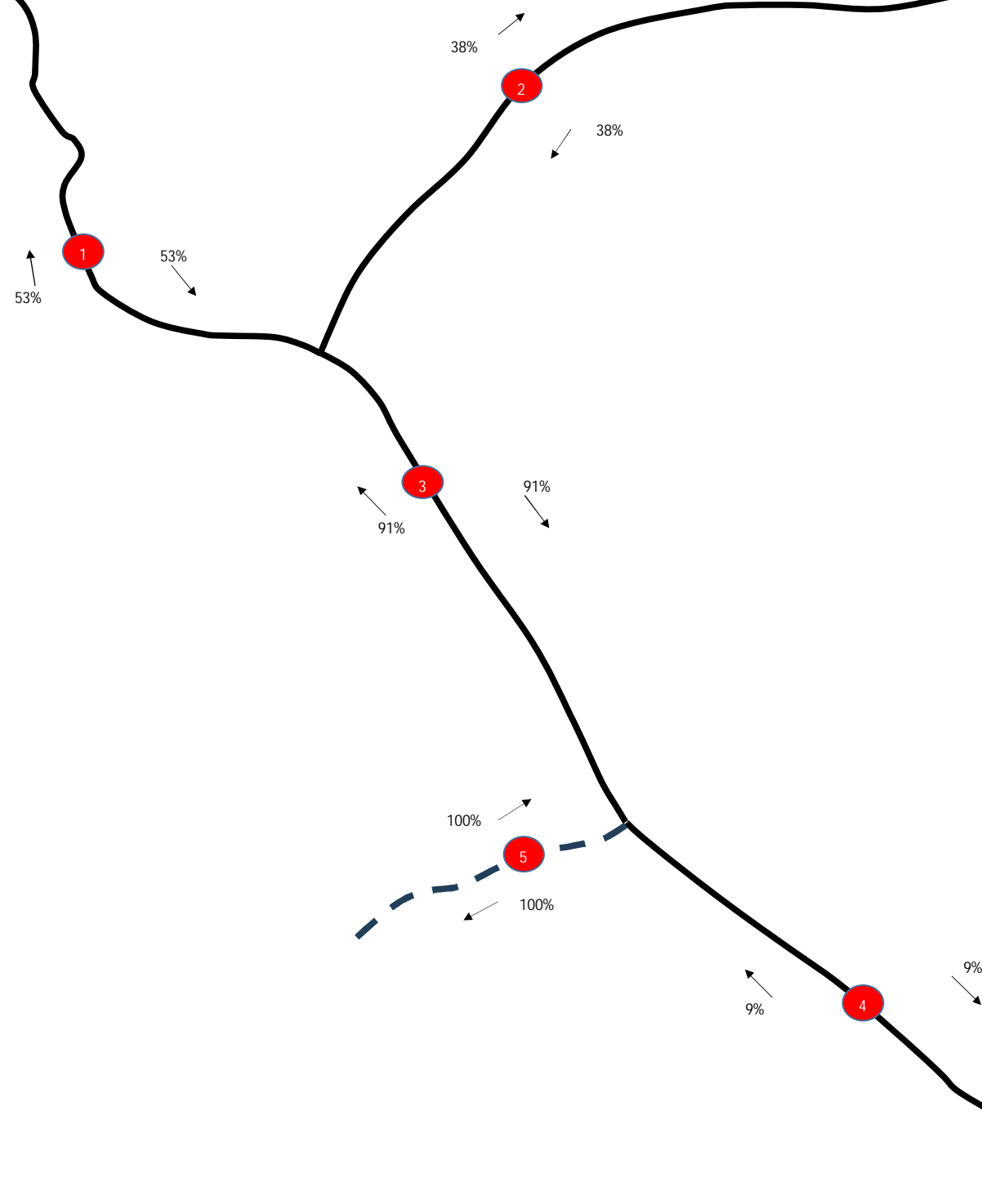
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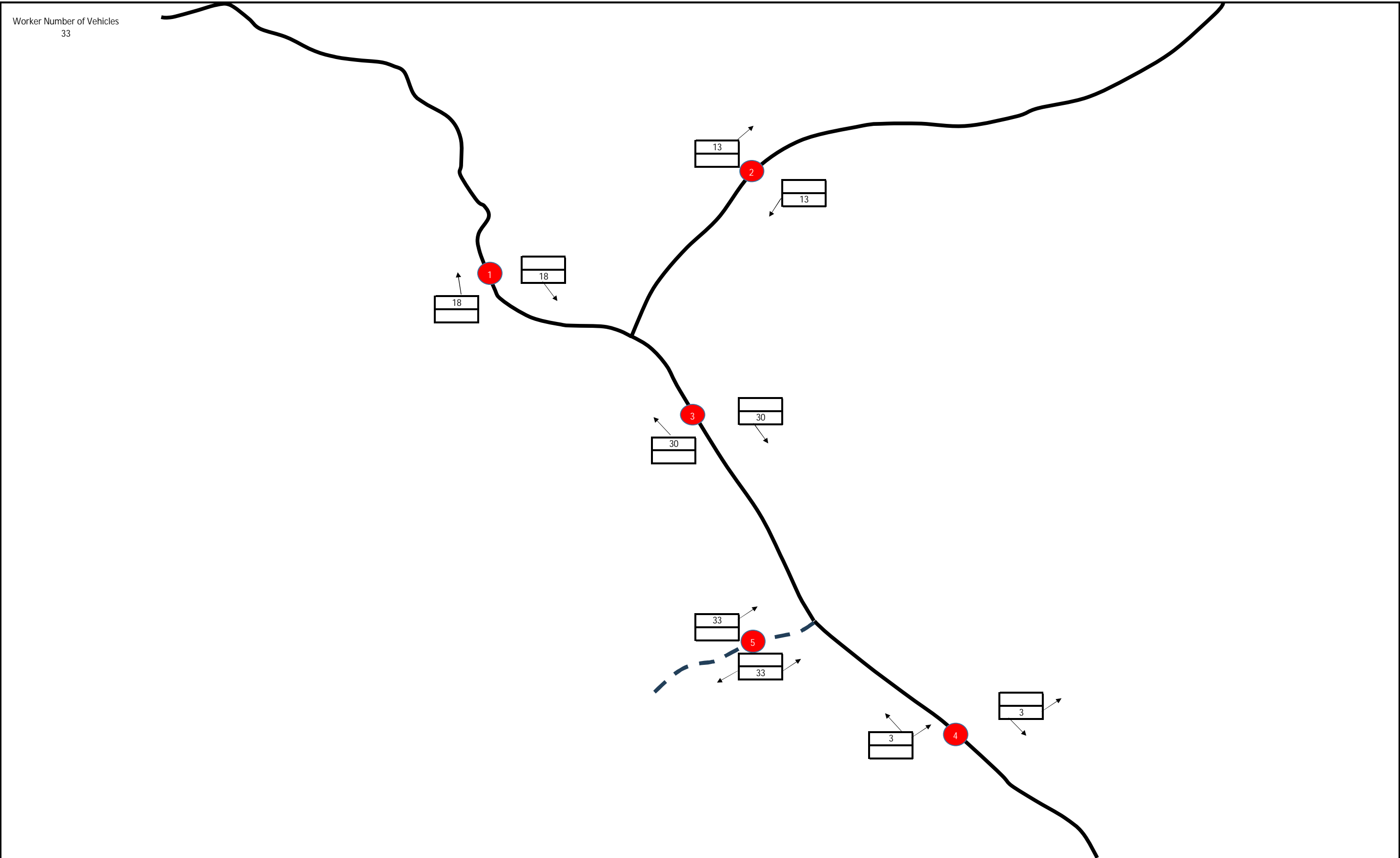
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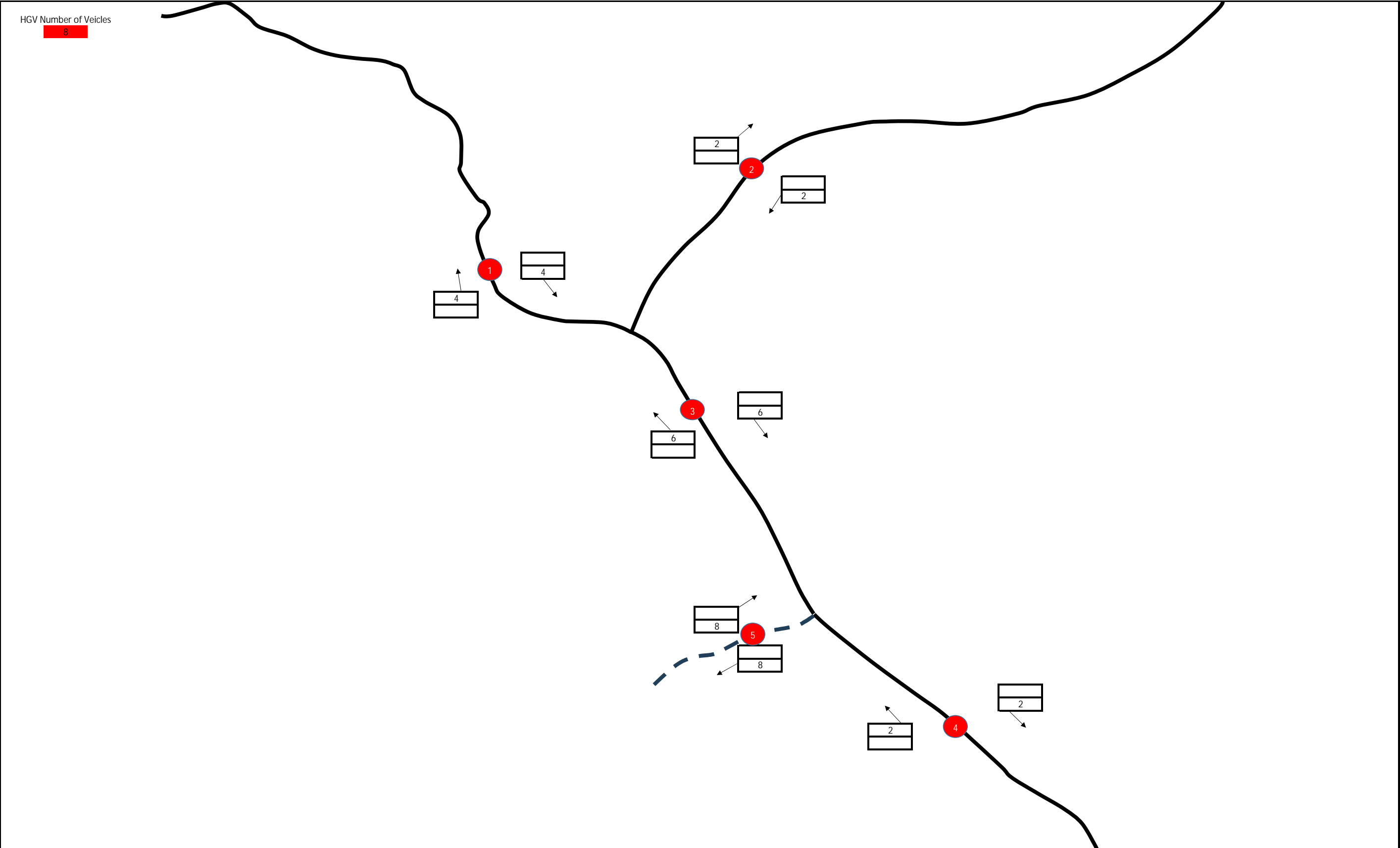
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National Grid	PTR - Trawsfynydd	Worker Distribution		60686216	A	Design	FM
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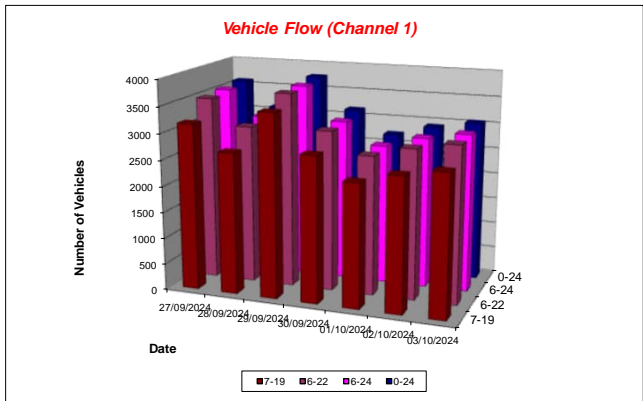
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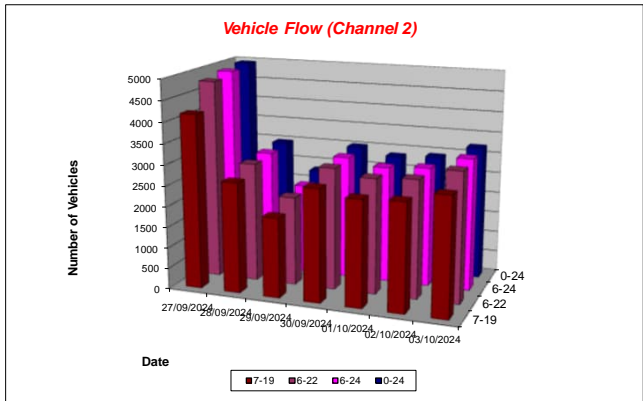
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Channel 1 - theastbound										Vehicle Flow		Week 1	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday	Weekday Average	Weekend Average				
1	8	8	13	5	5	3	5	5	7				
2	3	6	5	1	2	1	1	1	2				
3	4	5	5	5	12	3	5	5	5				
4	5	2	11	13	1	3	2	5	5				
5	7	3	10	8	12	9	10	9	8				
6	27	16	12	42	34	30	32	33	28				
7	103	39	29	132	139	147	127	130	107				
8	137	75	53	188	211	194	185	183	149				
9	226	148	116	250	223	246	252	239	209				
10	351	251	205	280	214	214	245	260	261				
11	409	325	362	339	207	200	229	277	298				
12	330	281	444	301	178	220	163	238	274				
13	274	245	490	231	163	197	208	215	258				
14	232	190	426	221	179	195	206	207	236				
15	276	194	355	203	198	222	222	224	239				
16	272	241	421	222	241	235	268	248	271				
17	299	286	266	235	228	260	303	265	268				
18	219	256	205	189	190	236	245	216	220				
19	146	197	144	113	121	126	148	131	142				
20	124	109	86	69	71	79	88	86	89				
21	57	96	53	49	56	35	55	50	57				
22	50	84	40	28	35	38	33	37	44				
23	24	40	10	16	12	22	13	17	20				
24	17	13	5	9	5	6	10	9	9				
7-19	3171	2689	3487	2772	2348	2545	2674	2702	2912				
6-22	3505	3017	3034	3050	2649	2944	2977	3005	3105				
6-24	3548	3071	3075	3075	2649	2977	3025	3032	3134				
0-24	3600	3110	3765	3156	2723	2923	3055	3091	3190				



Channel 2 - thwestbound										Vehicle Flow		Week 1	
	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday	Weekday Average	Average				
Hr Ending													
1	8	13	16	2	5	7	8	6	8				
2	12	3	18	2	5	3	7	6	7				
3	3	0	37	3	4	1	4	3	7				
4	8	8	39	1	5	5	2	4	10				
5	25	16	9	9	7	7	7	11	11				
6	11	12	29	21	18	17	11	16	18				
7	56	25	31	58	57	61	52	57	48				
8	121	54	40	141	135	140	138	135	110				
9	195	116	45	217	206	240	201	246	205	189			
10	196	210	112	173	177	211	227	197	205	169			
11	212	251	172	184	184	228	215	205	207				
12	316	337	199	211	206	199	248	236	245				
13	351	311	216	235	189	240	219	247	262				
14	344	300	198	285	238	207	286	260	257				
15	441	253	224	255	221	207	247	274	264				
16	517	253	216	264	243	225	290	308	287				
17	497	202	205	360	332	302	322	303	317				
18	563	223	154	300	285	288	344	300	300				
19	429	145	142	125	138	153	172	203	186				
20	298	81	81	95	86	98	103	136	120				
21	149	60	66	51	55	63	78	79	75				
22	96	44	43	27	32	29	58	49	47				
23	69	24	19	25	14	22	36	33	30				
24	30	26	16	6	10	8	17	14	16				
7-19	4185	2661	1923	2710	2554	2598	2838	2977	2781				
6-22	4785	2871	2144	2941	2784	2845	3129	3298	3072				
6-24	4885	2921	2175	2972	2834	2976	3182	3345	3118				
0-24	4951	2973	2323	3010	2852	2918	3221	3390	3178				



Channel 1 - iutheastbound							Average Speed		Week 1		
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday				
1	40.7	42.6	47.2	46.0	51.0	37.6	53.4				
2	37.0	35.4	39.4	34.9	33.6	73.6	67.7				
3	40.4	39.6	39.2	43.9	42.8	45.9	42.2				
4	44.7	37.5	33.8	43.7	41.8	42.7	38.3				
5	38.9	46.3	46.5	40.5	44.1	38.9	42.9				
6	41.2	46.9	42.3	41.7	36.6	40.7	44.6				
7	40.4	42.1	46.1	38.4	41.3	41.7	37.2				
8	39.8	41.1	41.8	38.6	37.0	40.4	37.7				
9	39.1	40.2	41.8	38.3	37.6	37.7	36.2				
10	36.1	38.4	40.1	36.8	35.2	37.2	37.6				
11	36.7	37.5	38.0	36.7	37.1	36.0	37.0				
12	37.7	38.8	38.1	36.1	37.3	37.0	38.7				
13	37.4	40.2	37.9	38.5	38.6	39.0	37.9				
14	38.9	38.9	37.1	38.4	39.6	40.0	39.4				
15	38.4	40.5	39.1	37.5	38.5	38.7	39.5				
16	39.1	39.8	38.0	31.0	39.4	38.8	38.8				
17	38.8	39.6	40.2	37.4	39.5	40.1	39.3				
18	40.7	39.4	39.8	40.4	41.0	41.0	40.2				
19	41.4	40.1	41.4	40.5	41.5	40.7	40.6				
20	40.9	41.0	41.0	40.7	38.4	41.8	39.0				
21	41.1	39.9	38.4	35.6	40.0	41.0	42.3				
22	39.8	39.1	42.4	42.2	43.5	42.7	42.9				
23	41.1	43.1	45.5	42.3	43.3	43.3	39.7				
24	42.8	45.3	38.9	42.7	42.1	42.0	44.7				
10-12	37.2	38.7	38.0	36.7	36.6	37.0	37.9				
14-19	38.2	38.7	38.0	36.7	36.6	37.0	37.9				
0-24	38.6	39.7	38.9	37.7	38.6	39.3	38.8				

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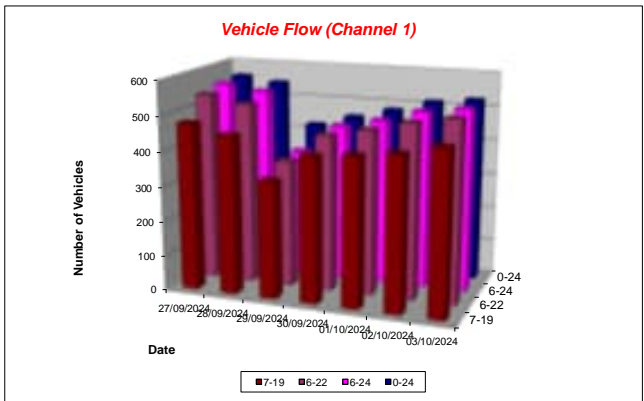
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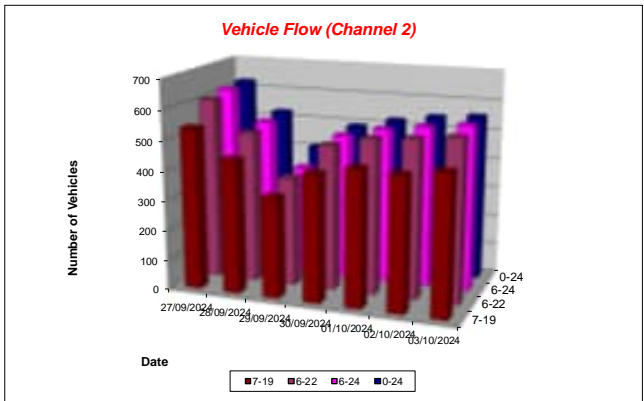
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Channel 1 - heastbound							Vehicle Flow		Week 1	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday	Weekday Average	Average	
1	1	3	10	1	1	1	1	1	1	3
2	0	0	5	0	1	1	2	1	1	1
3	0	0	18	0	1	0	0	1	1	1
4	0	0	17	2	2	1	0	0	1	3
5	2	4	2	0	1	1	1	1	2	1
6	1	0	4	1	1	2	2	0	1	1
7	5	3	4	3	8	10	9	6	8	6
8	10	13	4	15	16	19	13	15	13	15
9	23	20	8	21	31	24	35	27	23	24
10	34	28	14	21	18	24	27	24	25	24
11	35	36	25	35	33	28	26	30	31	31
12	43	40	30	33	32	30	40	36	35	35
13	36	51	37	40	34	32	32	35	37	37
14	38	44	41	30	24	46	38	36	37	36
15	52	58	54	39	42	23	41	39	44	39
16	55	46	45	42	39	48	51	47	47	47
17	63	52	31	59	67	72	72	67	59	67
18	56	40	29	61	59	57	58	58	58	51
19	34	24	17	18	30	33	36	30	27	27
20	33	25	18	12	15	25	27	22	22	22
21	9	21	5	8	14	13	11	11	12	11
22	13	15	3	5	6	12	7	9	8	8
23	7	11	2	3	3	4	2	4	5	5
24	6	8	1	1	1	5	3	3	3	3
7-19	479	452	335	414	425	430	466	445	430	
6-22	530	515	354	447	470	495	517	494	479	
0-24	558	544	423	454	482	513	526	507	500	



Channel 2 - hwestbound								Vehicle Flow		Week 1	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday	Weekday Average	Average		
1	3	1	5	0	0	1	0	1	1		
2	0	0	3	5	0	0	0	0	1		
3	0	0	0	7	0	1	0	2	1		
4	1	1	14	0	0	0	0	0	2		
5	0	0	0	9	0	1	0	0	1		
6	2	3	4	3	4	1	3	3	3		
7	18	8	8	31	29	36	29	29	23		
8	39	14	16	46	46	51	42	45	36		
9	50	26	11	54	62	59	71	59	48		
10	54	32	18	28	37	40	42	40	38		
11	55	50	25	41	37	37	38	41	42		
12	44	45	39	42	31	26	31	35	37		
13	37	31	35	32	35	34	28	33	33		
14	28	27	32	24	21	26	20	24	25		
15	45	46	34	31	31	32	30	34	36		
16	52	35	52	34	47	33	48	43	43		
17	47	52	27	29	34	32	34	35	36		
18	56	47	27	46	35	41	43	44	40		
19	33	41	19	18	37	37	33	38	32		
20	22	22	12	14	17	15	25	19	18		
21	18	10	6	7	11	23	14	15	13		
22	10	20	4	8	7	8	7	8	8		
23	8	8	1	3	1	8	6	6	6		
24	5	4	2	1	2	3	2	3	3		
7-19	540	446	335	425	453	445	467	466	444		
6-22	608	530	365	495	517	527	527	525	507		
0-24	627	526	411	493	523	544	555	548	526		



Channel 1 - rtheastbound								Average Speed		Week 1	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday				
1	42.3	59.8	43.0	45.9	34.6	56.5	49.4				
2	-	-	54.9	-	49.5	74.4	46.8				
3	42.5	-	56.6	-	52.9	59.3	46.8				
4	-	-	54.5	49.2	39.3	46.8	-				
5	44.9	49.4	58.9	-	47.6	47.2	47.1				
6	41.1	-	55.4	52.1	46.3	39.2	-				
7	47.6	47.3	44.7	46.0	47.2	47.2	44.3				
8	51.8	48.5	48.1	49.8	51.9	49.6	44.8				
9	51.0	47.3	55.5	49.1	50.6	46.3	47.3				
10	47.6	44.9	47.9	48.3	45.0	44.7	45.2				
11	46.1	46.4	49.2	47.3	45.9	43.8	46.2				
12	46.4	47.6	47.0	44.9	44.6	47.4	44.0				
13	48.9	50.1	48.7	44.9	45.8	44.2	46.0				
14	46.3	49.0	45.7	47.0	44.8	48.0	46.9				
15	46.7	47.2	48.7	46.0	48.7	47.1	47.2				
16	45.5	48.9	45.5	46.0	43.3	47.2	46.1				
17	48.4	49.4	46.3	49.2	49.5	50.3	49.0				
18	48.6	48.0	47.2	50.5	49.0	50.6	49.9				
19	49.8	47.0	46.2	47.7	47.8	49.6	47.7				
20	48.0	49.3	48.7	44.7	45.7	48.9	48.0				
21	49.5	47.0	48.4	47.0	46.1	45.8	47.7				
22	51.9	47.9	56.5	49.1	53.5	50.5	54.9				
23	45.8	46.6	40.2	46.4	45.5	53.7	58.7				
24	51.2	44.2	47.9	-	45.9	54.3	57.2				
10-12	46.3	47.0	48.0	46.1	45.3	45.6	44.9				
14-16	49.3	49.0	48.3	47.5	46.9	47.2	47.4				
0-24	47.8	48.0	48.3	47.5	47.3	48.1	47.4				
								Mean (ALL)	47.8		
								Weekday Inter Peak	46.1		
								85th Percentile	56.4		

Channel 1 - rtheastbound					85th Percentile				
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday		
1	62.5	62.7	-	-	-	-	-		
2	-	62.3	-	-	-	-	53.3		
3	45.7	-	67.5	-	-	-	-		
4	-	62.9	62.9	50.8	47.9	-	-		
5	46.8	57.0	62.5	-	-	-	-		
6	54.0	56.0	61.9	-	52.1	41.9	-		
7	54.0	46.3	62.2	56.1	51.1	50.4	-		
8	62.1	55.5	56.2	64.8	58.1	57.0	58.0		
9	59.4	57.4	66.1	55.3	56.2	54.3	56.6		
10	53.8	54.2	56.1	56.1	51.8	52.6	54.7		
11	53.4	57.0	54.1	53.7	52.3	52.3	52.3		
12	52.8	55.0	56.2	49.7	52.2	55.1	50.1		
13	54.2	58.9	57.0	50.2	53.1	52.3	54.3		
14	54.4	60.3	52.1	53.3	53.3	58.0	54.7		
15	53.0	56.3	58.3	55.4	53.5	53.5	57.5		
16	53.4	57.2	52.4	53.2	53.2	55.4	55.3		
17	55.6	58.1	54.7	56.8	57.5	59.0	58.4		
18	56.3	57.7	55.8	56.7	56.6	58.0	59.6		
19	58.7	59.2	52.7	55.4	55.8	56.0	58.4		
20	55.8	55.1	54.7	51.4	56.9	60.2	58.9		
21	57.0	55.6	51.9	52.6	52.9	53.5	55.5		
22	57.8	57.8	71.7	54.6	63.0	64.0	71.1		
23	55.6	58.5	44.5	47.2	49.1	57.9	59.1		
24	60.1	49.8	-	-	-	62.7	68.3		
10-13	53.2	53.3	56.7	52.1	53.0	54.0	52.6		
14-19	53.8	55.5	57.5	55.3	54.3	57.0	57.1		
0-24	55.6	57.1	57.1	55.3	55.3	57.0	57.2		

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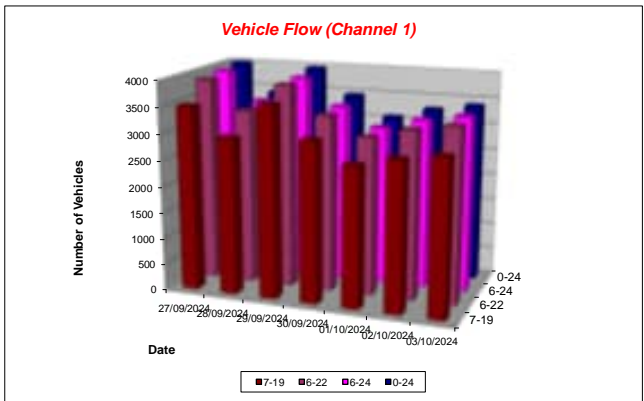
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Channel 1 - Southbound								Vehicle Flow		Week 1	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday	Weekday Average	Average		
1	10	9	15	5	5	4	5	6	8		
2	4	9	10	1	1	0	2	2	4		
3	4	5	9	12	6	5	6	7	7		
4	6	3	10	12	1	3	2	5	6		
5	6	3	15	9	9	8	10	10	8		
6	28	19	13	42	35	34	30	34	29		
7	117	85	35	154	168	181	163	157	123		
8	161	82	64	236	245	228	220	218	177		
9	288	162	124	284	271	296	302	294	244		
10	382	275	212	293	228	238	266	286	301		
11	467	362	366	356	235	229	246	307	323		
12	342	313	465	328	205	243	199	263	299		
13	284	277	498	263	179	210	223	232	276		
14	261	191	433	228	198	218	215	222	248		
15	288	233	355	225	221	228	235	239	265		
16	322	294	457	255	277	268	293	291	305		
17	324	315	284	245	236	275	301	276	283		
18	268	287	223	210	221	256	278	245	248		
19	166	218	152	123	144	139	176	150	159		
20	132	123	94	70	66	88	107	93	97		
21	66	98	55	45	65	50	61	60	63		
22	52	96	46	29	40	40	37	40	49		
23	30	42	11	21	12	27	18	22	23		
24	20	17	8	10	7	8	11	11	11		
7-19	3513	2967	3633	3046	2660	2828	2944	2998	3084		
6-22	3880	3320	3953	3344	2995	3180	3311	3344	3416		
0-24	3988	3436	3952	3456	3075	3277	3396	3436	3511		



Channel 1 - Southbound								Average Speed		Week 1	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday				
1	45.6	51.9	54.1	50.1	57.2	52.6	62.2				
2	40.2	43.6	48.2	54.1	47.8		63.7				
3	45.2	45.9	55.6	48.0	45.8	57.2	48.2				
4	49.6	45.3	49.1	48.2	48.5	48.8	51.0				
5	42.6	51.7	54.0	46.8	54.6	54.6	50.8				
6	45.5	49.5	48.8	49.6	43.8	46.4	51.9				
7	46.2	48.3	50.8	44.3	47.0	49.1	46.2				
8	47.5	49.2	49.4	46.3	45.5	48.6	46.2				
9	45.7	47.6	49.7	44.6	44.9	45.4	45.8				
10	41.0	45.1	47.9	42.8	40.6	45.7	44.8				
11	42.2	45.1	44.6	45.1	42.9	46.1	44.0				
12	44.1	49.2	43.9	43.4	43.5	44.1	45.9				
13	43.8	43.7	43.8	45.5	46.7	46.9	45.7				
14	45.6	47.5	43.1	46.0	47.7	48.2	46.2				
15	45.4	46.1	45.7	45.0	48.2	48.3	47.0				
16	46.1	48.0	44.3	44.1	46.7	47.3	47.3				
17	46.4	47.5	46.7	44.6	48.5	48.3	46.5				
18	48.9	47.7	47.3	49.3	49.3	48.3	50.6				
19	50.0	48.1	48.2	48.1	50.1	51.8	51.5				
20	47.5	49.6	48.6	49.3	49.2	49.6	46.3				
21	48.6	47.5	44.2	44.2	48.8	49.7	48.0				
22	48.5	48.0	46.5	53.2	52.1	51.9	51.3				
23	51.5	52.2	52.7	49.4	52.1	49.4	50.0				
24	49.7	53.4	43.3	50.8	56.4	51.8	50.5				
10-12	43.0	45.2	44.2	44.3	43.2	45.1	44.8				
14-18	45.2	46.7	45.5	45.4	46.5	47.6	46.9				
0-24	45.3	46.7	45.5	45.4	46.5	47.6	46.9				
								Mean (ALL)		46.7	
								Weekday Inter Peak		45.2	
								85th Percentile		54.9	

Channel 1 - Southbound				85th Percentile			
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday
1	56.3	60.4	65.1	55.7	63.4	62.7	69.2
2	49.0	55.3	52.4	56.3	63.4	62.7	66.4
3	51.2	52.1	65.1	56.5	50.6	75.2	52.1
4	59.2	52.2	55.6	54.9	65.1	52.0	57.8
5	47.2	63.9	62.5	57.6	65.1	65.1	60.6
6	54.7	58.9	54.6	61.2	54.1	59.6	65.1
7	55.3	56.5	58.4	54.8	56.6	58.2	58.6
8	54.7	58.3	58.0	56.3	55.1	56.8	56.7
9	53.4	55.3	57.1	54.0	53.8	55.6	56.2
10	49.1	52.5	57.0	52.5	50.7	54.0	54.0
11	48.5	51.2	52.3	51.5	50.7	54.3	53.4
12	50.4	53.2	51.3	51.1	53.2	52.6	54.5
13	50.2	53.2	51.0	53.9	53.8	55.8	53.8
14	52.8	55.8	52.4	53.9	56.9	55.9	55.4
15	52.9	55.3	52.9	53.7	57.6	56.7	55.0
16	52.7	54.8	50.6	53.1	54.8	56.3	56.4
17	52.4	53.9	53.9	53.1	56.3	56.3	54.2
18	55.3	54.4	54.7	56.9	59.8	57.3	58.5
19	58.1	56.4	57.1	56.7	60.0	61.6	62.3
20	55.0	56.2	57.3	57.5	55.6	58.2	54.7
21	59.0	56.6	55.4	53.4	59.0	62.6	54.9
22	59.6	57.2	52.3	61.4	61.1	62.0	59.6
23	62.3	60.9	57.8	54.5	59.7	58.2	57.3
24	54.3	61.9	52.2	60.6	65.6	55.0	56.8
10-12	49.3	52.6	51.2	51.4	52.0	53.9	53.9
14-18	54.8	56.3	51.8	59.3	58.4	59.3	59.3
0-24	53.0	54.8	53.5	54.3	55.9	56.8	56.4

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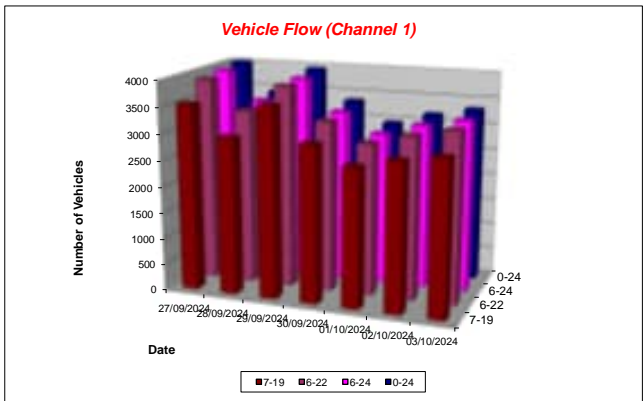
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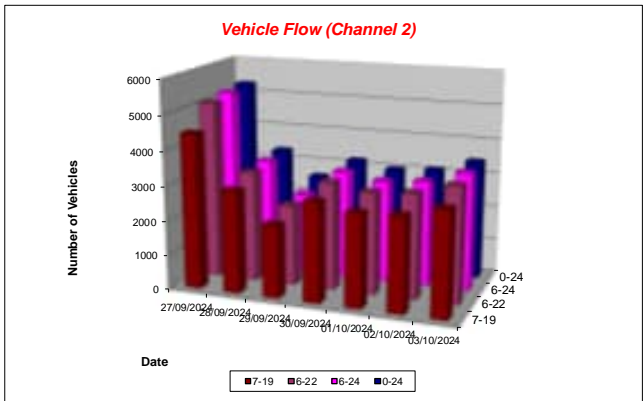
Trawsfynydd ATC 4, A470

Produced by Road Data Services Ltd.

Channel 1 - Southbound								Vehicle Flow		Week 1	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday	Weekday Average	Average		
1	10	9	14	4	5	4	5	6	7		
2	4	8	9	2	1	0	2	2	4		
3	4	6	8	14	4	4	9	7	6		
4	6	3	9	15	1	4	2	6	6		
5	6	3	16	8	9	8	8	8	8		
6	31	19	13	33	33	35	32	33	28		
7	89	43	31	110	83	104	97	87	80		
8	151	80	61	150	195	165	155	163	137		
9	271	171	120	270	263	281	303	278	240		
10	379	265	203	281	210	234	270	275	263		
11	473	353	380	356	239	224	239	348	323		
12	355	320	461	339	207	241	206	270	304		
13	293	268	501	268	183	210	219	235	277		
14	265	199	413	219	209	221	208	222	246		
15	285	216	373	219	214	240	242	240	260		
16	327	261	457	251	275	295	298	292	304		
17	331	326	285	273	259	304	315	296	299		
18	261	290	220	228	229	276	299	259	258		
19	166	221	143	121	144	146	173	160	159		
20	127	127	95	81	70	93	112	97	101		
21	70	99	58	44	61	47	59	56	63		
22	52	95	46	27	40	39	38	39	48		
23	33	45	11	23	11	27	18	23	24		
24	20	18	8	10	9	8	11	12	12		
7-19	3547	2969	3617	2975	2627	2800	2927	2975	3066		
6-22	3885	3333	3847	3237	2381	3083	3233	3264	3357		
0-24	3999	3444	3933	3346	2954	3174	3321	3359	3453		



Channel 2 - Northbound								Vehicle Flow		Week 1	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday	Weekday Average	Average		
1	10	17	20	3	6	7	8	7	11		
2	11	2	27	2	5	3	9	6	8		
3	5	0	87	9	5	1	3	3	15		
4	12	8	55	2	7	6	2	6	13		
5	25	20	10	9	10	7	12	13	13		
6	13	12	30	25	21	12	12	18	19		
7	68	24	32	73	74	89	66	73	60		
8	124	77	44	166	178	159	165	158	130		
9	202	141	56	198	224	230	273	225	189		
10	220	238	129	185	182	217	231	211	203		
11	224	272	188	193	203	235	225	218	221		
12	355	356	206	228	222	219	276	260	268		
13	366	348	240	276	215	255	231	269	276		
14	383	331	269	312	260	224	265	285	281		
15	480	283	253	273	250	218	278	290	290		
16	534	268	241	282	252	249	318	327	306		
17	537	240	230	335	317	297	304	358	323		
18	594	240	169	272	228	265	277	329	281		
19	445	153	126	135	144	159	189	214	193		
20	317	102	86	90	83	115	123	146	131		
21	154	69	69	53	63	64	72	81	78		
22	109	51	48	29	38	35	62	55	53		
23	73	33	22	23	14	24	31	34	32		
24	34	33	15	7	12	12	19	17	19		
7-19	4474	2947	2081	2885	2675	2715	3018	3188	2989		
6-22	5100	3193	2328	3199	2333	3018	3341	3594	3291		
0-24	5303	3318	2598	3183	3013	3100	3443	3608	3423		



Channel 1 - Southbound							Average Speed		Week 1		
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday				
1	51.9	59.4	58.0	59.9	62.2	64.0	68.6				
2	55.1	59.2	57.1	52.2	53.5		77.7				
3	54.6	52.7	58.4	56.6	57.6	63.2	54.7				
4	57.3	51.8	60.1	52.3	53.8	53.1	49.3				
5	56.7	58.7	60.2	53.7	59.1	61.6	56.9				
6	55.5	54.5	55.9	60.1	54.8	54.4	56.7				
7	54.9	54.3	58.7	53.2	54.8	54.4	53.1				
8	53.7	55.8	55.1	54.5	52.8	53.8	53.6				
9	52.0	53.5	54.4	52.1	51.9	52.0	49.7				
10	47.2	50.6	52.9	49.3	51.2	50.5	51.0				
11	47.5	49.7	49.6	49.8	49.1	49.5	50.9				
12	49.8	51.3	49.7	49.5	51.6	50.2	50.4				
13	50.2	52.1	49.1	50.3	50.6	50.5	50.1				
14	50.9	52.1	47.9	50.9	52.6	51.3	51.8				
15	50.1	51.8	50.6	50.5	52.8	50.5	52.0				
16	51.2	51.9	49.7	50.8	51.5	50.8	51.6				
17	52.4	51.5	52.2	49.2	53.0	50.0	51.5				
18	52.6	52.9	53.1	51.3	55.2	52.1	52.9				
19	55.5	52.7	54.1	53.8	55.4	54.2	54.1				
20	53.1	55.0	52.9	55.7	54.1	54.6	53.8				
21	55.2	53.3	51.1	55.9	56.1	53.7	54.5				
22	55.9	54.8	51.7	58.0	58.3	54.2	58.6				
23	56.9	58.3	53.5	52.6	57.4	57.8	59.2				
24	56.5	62.9	49.1	54.0	56.9	54.2	55.2				
10-12	48.5	50.5	49.1	49.2	50.3	49.5	50.6				
14-16	51.2	52.3	50.7	51.0	52.6	51.6	51.9				
0-24	51.0	52.3	50.7	51.0	52.6	51.6	51.9				
								Mean (ALL)		51.2	
								Weekday Inter Peak		50.3	
								85th Percentile			

Channel 1 - Southbound				85th Percentile			
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday
1	62.3	66.7	65.9	67.1	72.7	74.6	80.4
2	58.6	66.5	61.2	57.5	-	-	83.8
3	60.7	69.1	66.0	62.2	62.7	74.9	59.6
4	64.5	53.2	69.6	59.0	-	59.6	55.5
5	59.2	70.1	69.7	60.1	67.9	69.9	63.6
6	64.1	64.1	62.8	69.8	64.1	62.3	68.5
7	61.1	61.3	68.0	58.9	61.8	61.7	59.6
8	60.2	63.9	61.8	62.6	60.1	62.1	61.3
9	57.4	61.0	60.7	59.7	59.4	58.6	58.3
10	53.6	57.1	60.1	56.4	57.4	55.9	56.9
11	53.1	55.5	58.2	55.1	55.6	56.1	57.8
12	55.8	59.4	54.8	55.7	58.8	56.1	57.2
13	55.5	59.5	54.8	57.2	56.7	59.0	56.5
14	56.7	60.3	56.3	57.6	58.5	57.8	59.9
15	56.2	59.2	57.1	56.8	59.6	57.7	58.6
16	57.0	58.6	55.6	58.5	57.6	57.6	58.3
17	59.0	58.3	58.6	57.3	59.6	57.6	57.4
18	58.1	59.9	61.9	62.5	58.2	58.8	58.8
19	61.3	60.1	61.3	61.0	63.2	61.4	62.9
20	69.7	63.4	61.4	64.0	61.6	61.7	61.1
21	63.6	62.5	59.1	64.4	64.3	63.3	62.9
22	63.0	63.3	61.4	64.2	63.8	63.0	62.7
23	67.2	68.6	58.4	59.2	67.0	66.4	70.0
24	65.8	72.6	58.3	59.0	59.1	59.6	61.6
10-13	64.4	57.8	58.5	65.4	57.2	55.7	57.6
14-19	64.3	58.3	57.9	58.7	59.4	57.9	57.6
0-24	57.7	59.9	57.9	58.7	59.8	58.9	59.4

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ices Ltd.

Trawsfynydd ATC 5, Trawsfynydd Power Station Access

Produced by Road Data Services Ltd.

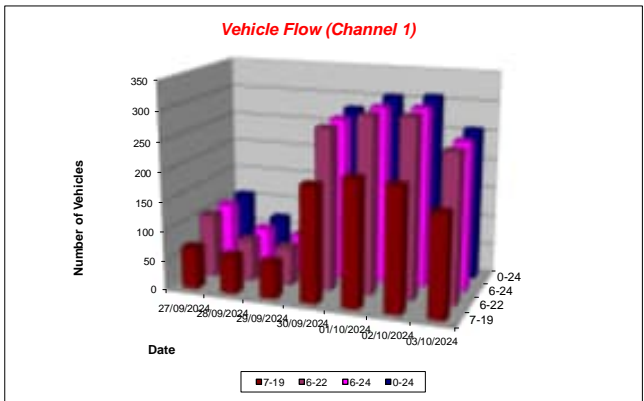
Trawsfynydd ATC 5, Trawsfynydd Power Station Access

Produced by Road Data Services Ltd.

Trawsfynydd ATC 5, Trawsfynydd Power Station Access

Produced by Road Data Services Ltd.

Channel 1 - Westbound								Vehicle Flow		Week 1	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday	Weekday Average	Average		
1	0	0	0	0	0	0	0	0	0		
2	0	0	0	0	0	0	0	0	0		
3	0	0	0	0	0	0	0	0	0		
4	0	0	0	0	0	0	0	0	0		
5	0	0	0	0	1	0	0	0	0		
6	0	0	1	5	5	7	5	4	3		
7	34	3	3	5	73	82	91	78	71	52	
8	19	1	6	9	33	36	36	25	24	54	
9	1	5	3	25	19	22	14	14	16	13	
10	3	4	4	13	10	12	15	11	8	8	
11	6	7	9	8	10	7	10	8	8	8	
12	11	7	5	10	15	14	9	12	10	10	
13	9	5	6	13	14	23	20	14	11	11	
14	6	8	5	10	8	20	9	11	9	11	
15	4	3	8	3	13	9	9	9	8	7	
16	0	8	6	8	13	4	18	14	6	6	
17	3	6	3	3	3	5	7	4	4	4	
18	5	7	3	5	2	2	4	4	4	4	
19	4	3	3	5	10	5	5	6	5	6	
20	2	3	0	1	1	1	3	1	1	1	
21	0	0	0	2	1	1	3	1	1	1	
22	1	1	0	1	1	0	0	0	1	1	
23	0	0	0	0	1	1	1	1	1	0	
24	0	0	0	2	0	0	0	0	0	0	
7-19	71	64	61	196	213	208	172	172	141	141	
6-22	108	71	65	273	295	301	251	248	195	195	
6-24	108	71	67	280	305	309	257	252	200	200	



Channel 1 - Westbound					Average Speed			Week 1	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday		
1	-	-	-	-	-	-	-		
2	-	-	-	-	-	-	-		
3	-	-	-	-	-	-	-		
4	-	-	-	-	-	-	-		
5	-	-	-	-	15.2	-	-		
6	-	-	19.8	23.1	26.5	21.7	22.4		
7	22.1	27.8	28.2	20.3	20.1	20.8	20.5		
8	24.7	33.5	24.5	19.4	19.4	20.6	19.3		
9	12.5	25.5	27.6	23.2	20.5	21.0	21.3		
10	25.8	18.0	23.4	23.3	18.2	22.8	21.5		
11	22.8	23.0	19.6	20.6	20.0	21.8	22.5		
12	20.0	21.4	15.9	20.4	19.7	19.2	19.5		
13	21.0	19.3	19.5	20.3	20.5	22.9	17.8		
14	21.1	20.0	18.5	20.8	20.1	22.4	21.0		
15	31.5	15.0	23.7	22.8	19.0	17.6	21.9		
16	-	-	20.3	21.6	19.9	19.9	19.5		
17	21.3	20.0	15.9	28.6	17.7	24.5	21.2		
18	23.9	18.7	17.0	22.7	24.1	23.5	27.6		
19	27.1	30.2	28.6	32.2	19.0	20.6	24.7		
20	21.5	19.2	-	23.6	17.1	23.9	20.7		
21	-	-	-	24.0	23.8	17.7	15.9		
22	16.8	19.2	-	21.4	17.4	-	-		
23	-	-	-	-	17.6	18.1	14.5		
24	-	-	-	-	20.0	-	-		
10-12	20.8	22.2	18.3	20.5	19.8	20.1	21.1		
14-16	22.8	21.3	21.7	20.9	19.7	21.0	20.4		
0-24	22.8	21.3	21.7	20.9	19.7	21.0	20.4		

Channel 1 - Westbound								85th Percentile	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday		
1	-	-	-	-	-	-	-		
2	-	-	-	-	-	-	-		
3	-	-	-	-	-	-	-		
4	-	-	-	-	-	-	-		
5	-	-	-	-	-	-	-		
6	-	-	-	27.9	29.9	29.0	26.8		
7	28.0	35.9	32.6	24.7	24.3	25.5	26.2		
8	33.0	-	33.4	23.3	24.7	25.9	23.7		
9	33.0	33.0	33.2	31.6	27.1	26.8	25.7		
10	33.3	23.4	26.1	30.4	20.5	26.3	27.9		
11	34.1	30.2	28.1	26.3	23.9	26.8	29.4		
12	26.5	26.5	21.1	24.9	25.8	23.0	23.7		
13	26.7	23.3	23.4	24.9	26.2	29.5	22.9		
14	26.8	22.3	21.7	25.8	23.9	27.8	25.0		
15	39.9	16.6	27.4	28.7	26.2	22.1	26.2		
16	25.1	25.7	22.9	22.8	28.4	24.4	24.4		
17	29.6	25.7	21.1	32.9	25.5	32.8	29.7		
18	30.8	25.0	25.3	26.6	29.1	23.6	31.1		
19	32.2	34.0	41.0	38.6	21.3	22.5	31.3		
20	23.0	21.1	-	-	-	-	-		
21	-	-	-	24.4	-	-	19.3		
22	-	-	-	-	-	-	-		
23	-	-	-	-	-	-	-		
24	-	-	-	24.3	-	-	-		
10-12	29.8	23.4	26.0	25.0	25.1	24.9	27.1		
14-16	28.8	25.3	25.4	24.9	24.9	24.9	25.8		
0-24	30.3	27.9	29.1	26.3	24.8	26.4	25.9		

Channel 2 - Eastbound					Average Speed		Week 1	
Hr Ending	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	03/10/2024 Thursday	
1	-	-	-	-	-	-	-	
2	-	-	-	-	-	-	-	
3	-	-	-	-	-	-	-	
4	-	-	-	-	-	-	-	
5	-	-	-	-	-	-	-	
6	-	-	-	-	-	-	-	
7	28.5	36.1	30.4	31.2	33.2	22.5	22.9	
8	20.3	29.0	29.0	20.4	19.6	21.1	21.3	
9	19.0	-	19.7	-	19.6	22.6	19.0	
10	18.0	26.0	20.9	16.6	24.8	21.5	15.9	
11	22.0	19.2	22.2	24.1	27.9	19.1	23.6	
12	21.4	27.4	14.0	23.7	23.7	22.5	23.1	
13	20.5	18.2	20.0	21.0	18.8	24.3	20.0	
14	22.4	18.0	17.0	22.5	18.5	26.1	27.5	
15	22.6	17.5	18.5	22.5	21.0	21.1	21.6	
16	22.1	18.9	25.4	21.7	21.4	21.4	24.4	
17	22.5	18.0	19.0	24.0	24.0	24.8	25.7	
18	22.8	22.8	20.4	25.8	22.7	21.8	21.8	
19	36.1	32.1	24.6	28.4	25.1	25.1	28.7	
20	20.2	16.9	-	26.0	28.1	28.8	20.1	
21	22.5	-	-	42.8	-	-	-	
22	-	10.4	-	-	-	-	5.8	
23	14.7	-	-	14.4	12.6	12.4	22.1	
24	-	-	-	17.7	-	-	-	
10-13	21.6	23.3	18.1	26.7	23.8	21.7	23.4	
14-17	22.2	20.7	21.3	22.0	22.9	21.2	21.6	
18-24	24.6	26.7	21.3	22.0	22.9	23.3	23.6	



Uwchraddio'r Grid

Pentir i Drawsfynydd

Pentir to Drawsfynydd Reinforcement Project

Trawsfynydd Operational Noise Impact Assessment
September 2025

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1. Introduction

1.1 Overview

- 1.1.1 WSP has been appointed by National Grid Electricity Transmission plc (NGET) to undertake a noise assessment to accompany the planning application for the Trawsfynydd works as a component of the Pentir to Trawsfynydd Reinforcement Project (the 'Project'). This report presents the findings of the operational noise assessment for the proposed new shunt reactor at the existing Trawsfynydd substation.
- 1.1.2 The purpose of this assessment is to quantify the impact of operational noise associated with the proposed works on the nearest noise sensitive receptors.
- 1.1.3 An environmental noise survey has been undertaken to establish the existing background sound levels in which noise associated with the development are assessed against. Predicted noise levels for this development have then been calculated and assessed in accordance with British Standard (BS) 4142:2014+A1:2019.
- 1.1.4 A summary of technical terminology used in this report is in Appendix B.
- 1.1.5 Limitations to this assessment are set out in Appendix C.

1.2 Site Location

- 1.2.1 The existing Trawsfynydd substation site is in Eryri National Park off the A470, Gwynedd, in a sparsely populated rural area. The site is surrounded by agricultural lands interspersed with dense areas of woodland and dispersed housing. The site is bounded to the south by a large artificial reservoir, Llyn Trawsfynydd, and a recreational site and to the southwestern site boundary lies a former nuclear power station which is currently undergoing decommissioning. The nearest noise-sensitive receptors identified are approximately 305 metres (m) to the north of the site. The site location is shown in **Figure 1.1** and a summary of the receptor locations is presented in **Table 1.1**.

Figure 1.1: Plan showing the site location and nearest noise-sensitive receptors

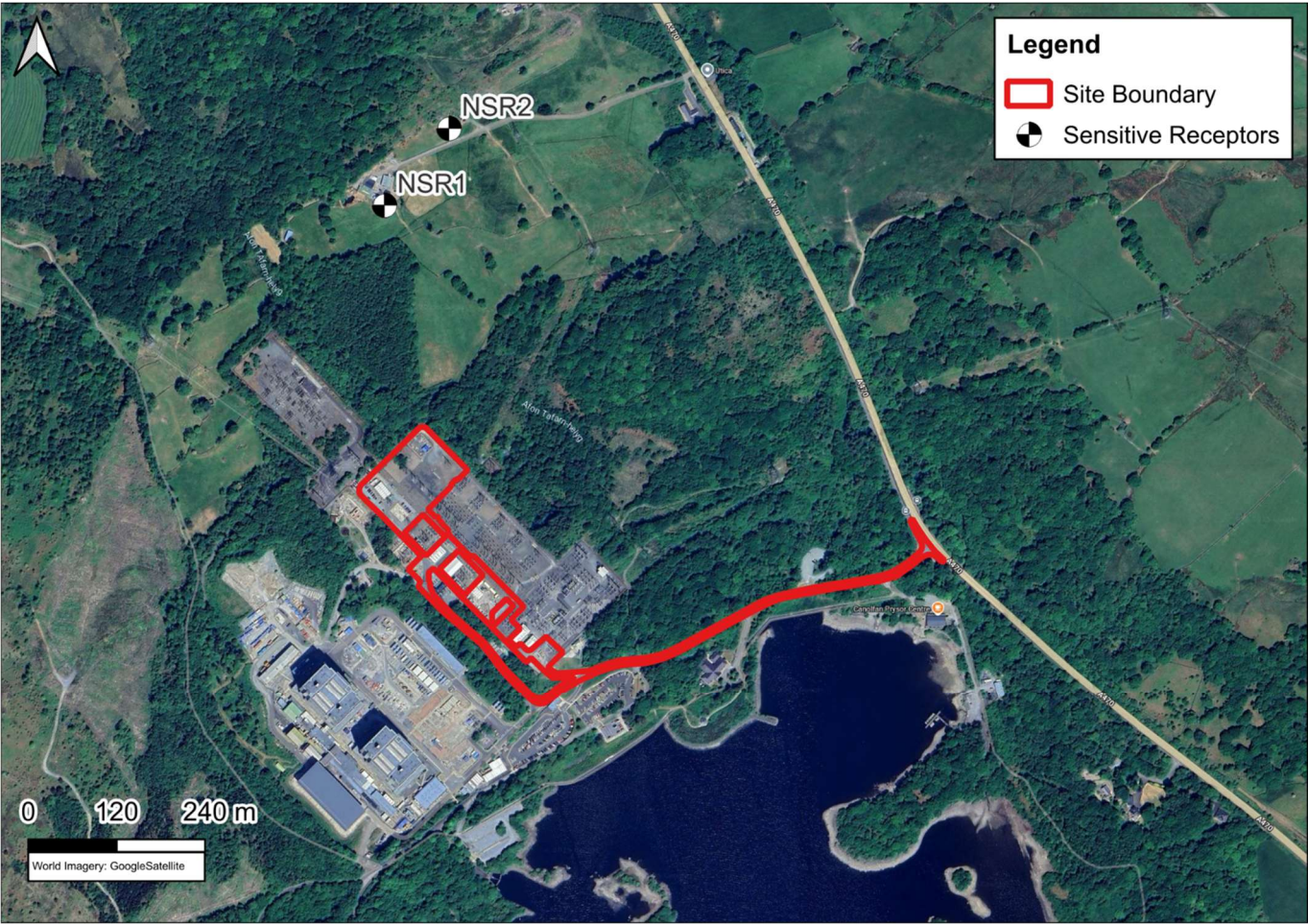


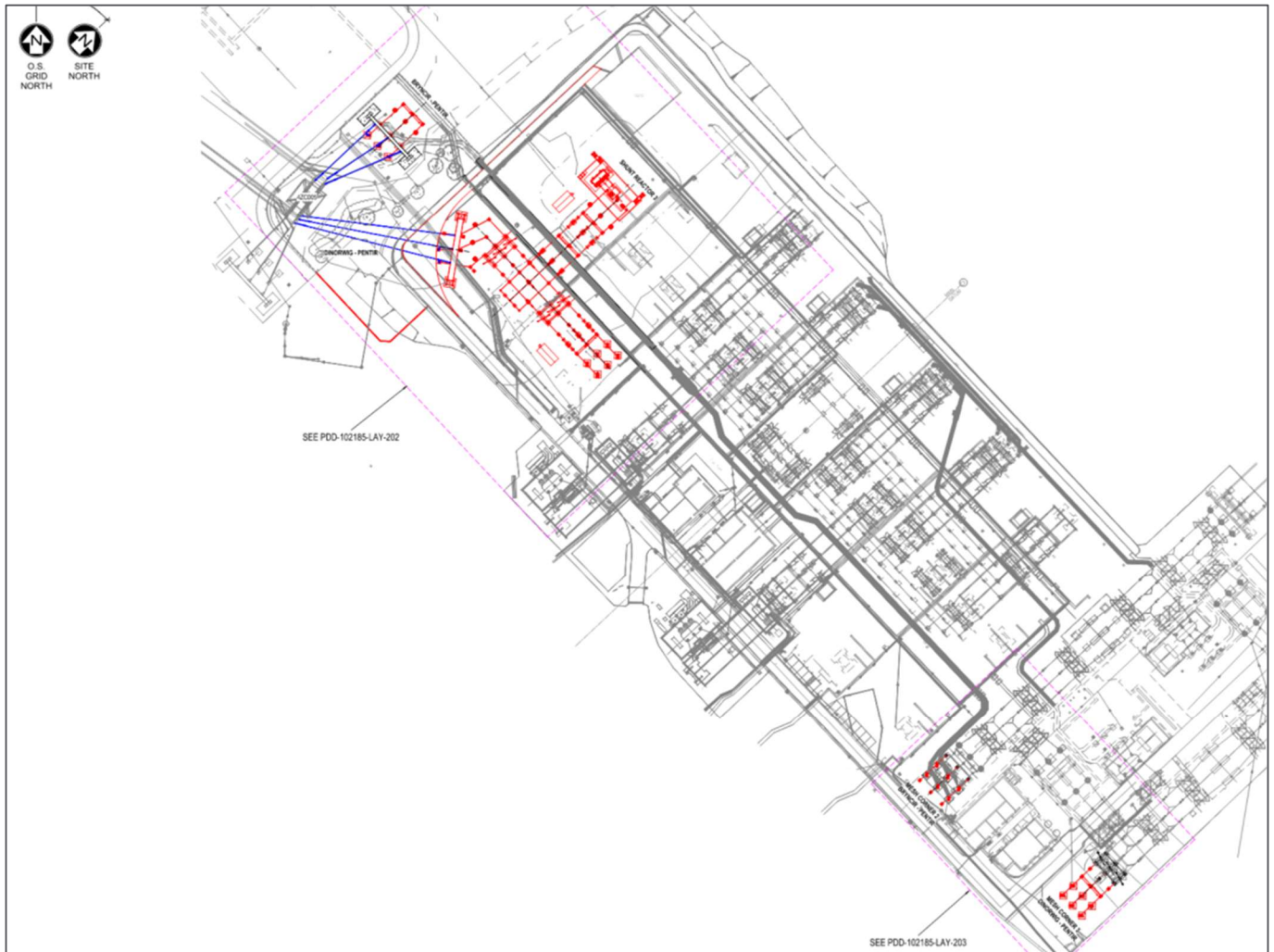
Table 1.1: Summary of sensitive receptor locations

Receptor	Description	Coordinates (British National Grid)		Approximate distance from site boundary (m)
		X	Y	
NSR1	Ty Gywn	269090	338878	305
NSR2	Ty Gywn	269182	338982	405

1.3 Proposed Works

- 1.3.1 The proposed change to the existing substation includes a new shunt reactor to the north of the site.
- 1.3.2 A plan showing the proposed layout of the proposed works is presented in **Figure 1.2** below.

Figure 1.2: Plan showing proposed layout of the development (drawing PDD-102185-LAY-201 Rev P0 07/07/2025)



2. Policy, Guidance and Criteria

2.1 National Policies

2.1.1 Future Wales: The National Plan 2040 (Ref. 1-1) and Planning Policy Wales (PPW) (Ref. 1-2) set out the land use planning policies of the Welsh Government. They are supplemented by a series of Technical Advice Notes (TANs), including Technical Advice Note 11 (Ref. 1-3) which relates to Noise, Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. 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, as required by the Planning (Wales) Act 2015, the Well-being of Future Generations (Wales) Act 2015 and other key legislation.

2.1.2 Paragraph 6.7.4 of PPW states:

“The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure¹⁶¹ to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so.

Footnote 161 – The number of people exposed to the pollutant as well as the levels to which they are exposed.”

2.1.3 TAN 11 provides advice on how the planning system can be used to minimise the adverse impacts of noise without placing unreasonable restrictions on development or adding undue costs and administrative burdens on businesses. In relation to noise from industrial and commercial developments. TAN 11 states:

“B17. The likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS 4142: 1990. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the "rating level" defined in BS 4142. This "rating level" should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard states that, 'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance'. Since background noise levels vary throughout a 24 hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week. In addition, general guidance on acceptable noise levels within buildings can be found in BS 8233: 1987.”

- 2.1.4 TAN 11 refers to a superseded version of BS 4142 (Ref. 1-4 and Ref. 1-7) and BS 8233 (Ref. 1-5 and Ref. 1-12), and it is appropriate to adopt the most recent editions of the guidance.

2.2 Local Policies

Eryri National Park

- 2.2.1 The Eryri Local Development Plan 2016 – 2031 sets standards and policies for development within Eryri National Park.

- 2.2.2 Development Policy 1 of the LDP states the following in relation to noise:

“To conserve and enhance the ‘Special Qualities’ and purposes of the National Park, development will only be permitted where all the following apply:

...

xii. The development is compatible with, and does not cause significant harm, to the environment, neighbouring residential amenity or the amenity of the Park by way of noise, dust, vibration, odour, light pollution, hazardous materials or waste production.”

2.3 Consultation with the Local Authority

- 2.3.1 WSP engaged with the Public Protection team at Gwynedd Council, which undertakes environmental health functions in the national park, to seek confirmation and agreement on the noise survey and assessment methodologies. This was undertaken via email on 17 July 2025.
- 2.3.2 The noise survey was undertaken in accordance with BS 7445-1:2003 (Ref. 1-6) and BS 4142:2014+A1:2019 (Ref. 1-7) at locations representative of the nearest noise-sensitive receptors to establish the existing noise climate. The baseline noise survey data is used to assess the likely noise impact arising from the operation of the proposed development in accordance with guidance in BS 4142.
- 2.3.3 Consultation with the Public Protection team at the Gwynedd Council on the noise survey methodology is ongoing.

2.4 BS 4142:2014+A1:2019

- 2.4.1 BS 4142:2014+A1:2019 provides methods for rating and assessing sound arising from commercial sources, including external plant and on-site vehicle movements, and unloading, at residential receptors. It uses a relative assessment approach whereby the predicted commercial sound level (suitably penalised for annoyance character if appropriate) is compared with the prevailing background sound level.
- 2.4.2 Where the source under assessment includes acoustic characteristics, then a series of corrections are added to the specific sound level ($L_{Aeq,T}$) in the determination of the rating level ($L_{Ar,Tr}$). The specific sound level is rated using the following penalties:
- Tonality up to 6 Decibels (dB)
 - Impulsivity up to 9 dB
 - Other sound characteristics up to 3 dB

- Intermittency 3 dB

- 2.4.3 Where the source does not include any acoustic features, such as tonality, impulsivity or intermittency etc., the rating level equals the specific sound level.
- 2.4.4 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level as described in Clause 11 of BS 4142.
- 2.4.5 Comparing the rating level with the background sound level, the Standard states:
“Typically, the greater this difference, the greater the magnitude of impact.
A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”
- 2.4.6 The final impact is determined using the context of the existing noise climate measured during the baseline noise survey. The change in the ambient noise levels due to the proposed development is assessed.
- 2.4.7 The Institute of Environmental Management & Assessment (IEMA) stated in the 2014 Guidelines for Environmental Noise Impact Assessment (Ref. 1-8):
“For broad band sounds which are very similar in all but magnitude, a change or difference in noise level of 1 dB is just perceptible under laboratory conditions, 3 dB is perceptible under most normal conditions, and a 10 dB increase generally appears to be twice as loud.”
- 2.4.8 A change of 3 dB(A) corresponds to a doubling of the sound power or intensity.
- 2.4.9 The noise survey included assessment of the sound level in the 1/3 octave frequency band, particularly within the 100 Hertz (Hz) band. A limit of 30 dB at this frequency band typically has been used as a criterion by some Local Planning Authorities across the UK in relation to similar development types. However, this criterion is not derived from any specific guidance.
- 2.4.10 BS 4142 states that where the initial estimate of the impact needs to be modified due to the context, there are pertinent factors which will need to be considered such as:
“Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.
Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.”
- 2.4.11 The Association of Noise Consultants (ANC) published a technical note in 2020 for the current version of the BS 4142 guidance (Ref. 1-9). In this technical note, it is

emphasised that BS 4142 does not define what 'low' background and rating sound levels may be. However, the note to the Scope of the 1997 (Ref. 1-10) version of BS 4142 defined very low background sound levels as being less than about 30 dB L_{A90} , and low rating levels as being less than about 35 dB $L_{Ar,Tr}$.

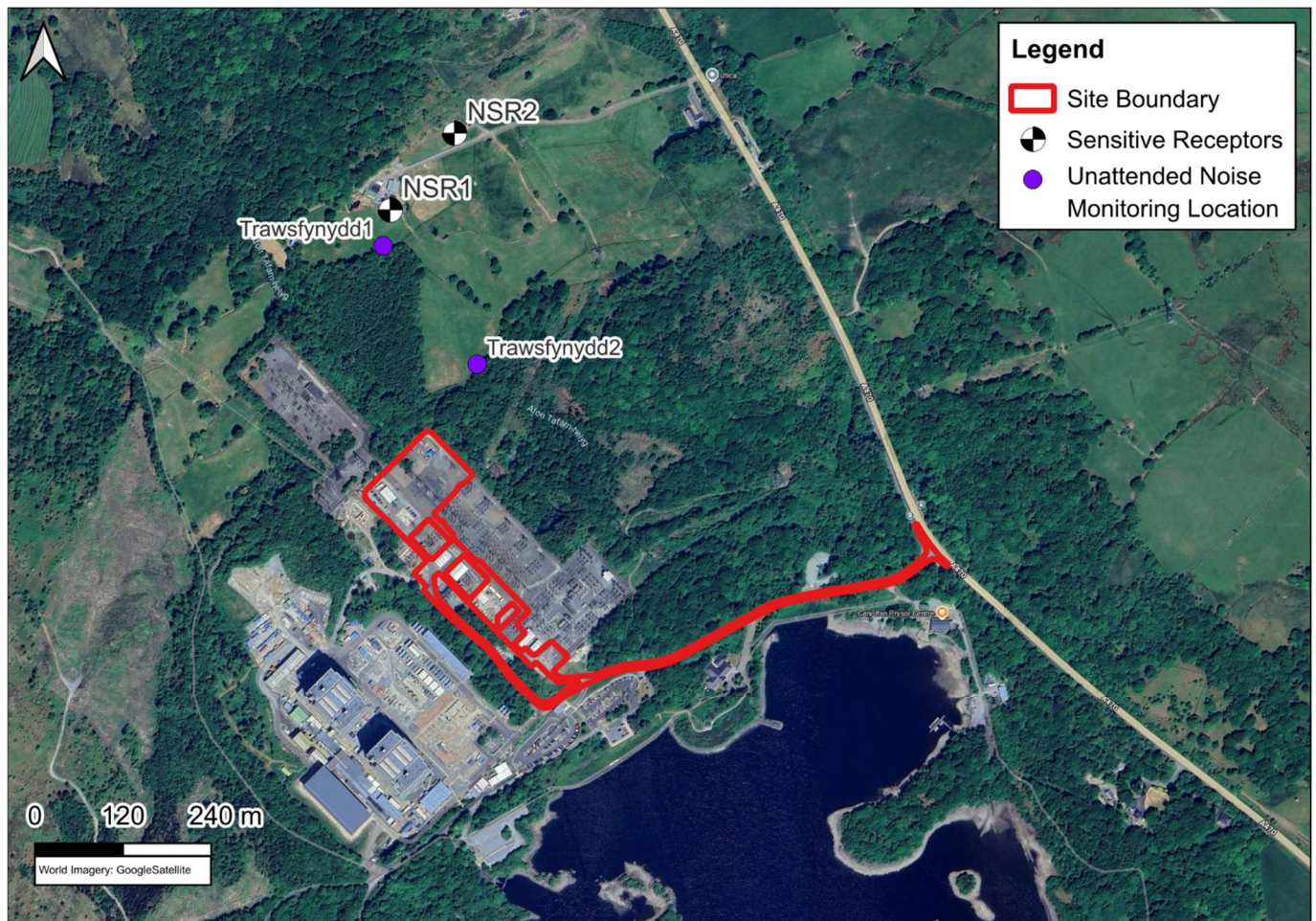
- 2.4.12 The Good Practice Working Group of the ANC suggested that similar values would not be unreasonable in the context of BS 4142, but that the assessor should make a professional judgement and justify it where appropriate.

3. Baseline Noise Survey

3.1 Survey Methodology

- 3.1.1 An environmental noise survey was undertaken between 18 June 2025 and 25 June 2025. Unattended noise monitoring was carried out at two locations representative of the nearest residential receptors. These locations are shown in **Figure 3.1**.

Figure 3.1: Noise monitoring locations and sensitive receptor locations



- 3.1.2 The background sound levels measured at the two locations above would likely be influenced by the existing substation site noise. As the substation cannot be switched off for the duration of the monitoring period, an alternative location has been selected to be representative of the area without the substation. The alternative location is south of Bryncir, in a predominantly rural setting and approximately 20 kilometres (km) northwest from the Trawsfynydd site. The alternative monitoring location is shown in **Figure 3.2**.
- 3.1.3 The alternative location is representative of the identified receptors due to the similarity of the location setting – a farm site for livestock with residential buildings and proximity to an 'A' road.
- 3.1.4 Unattended noise monitoring at the alternative location was carried out during the same period as above.

Figure 3.2: Alternative noise monitoring location



3.1.5 All measurements were taken at a height of 1.3 m above ground and in free-field measurement conditions using Class 1 sound level meters.

3.1.6 A summary of the equipment used is presented in **Table 3.1**.

Table 3.1: Noise monitoring equipment

Measurement position	Equipment description	Manufacturer & Type No.	Serial No.
Trawsfynydd1 (BNG: 269086, 338830)	Sound level meter	Rion NL-53	230086
	Pre-amplifier	Rion NH-25	32706
	Microphone	Rion UC-59	22965
	Calibrator	Rion NC-75	35292145
Trawsfynydd2 (BNG: 269211, 338670)	Sound level meter	Rion NL-53	1130791
	Pre-amplifier	Rion NH-25	33682
	Microphone	Rion UC-59	25172
	Calibrator	Rion NC-75	35292145
Bryncir1 (BNG: 248246, 342817)	Sound level meter	Rion NL-53	1130788
	Pre-amplifier	Rion NH-25	33679
	Microphone	Rion UC-59	25169
	Calibrator	Rion NC-75	35292145

- 3.1.7 All sound level meters had been calibrated to traceable standards within the previous 24 months, and the calibrator within the previous 12 months. A field calibration was performed for all sound level meters on site at the beginning and end of the monitoring periods. Any drifts in calibration level were within acceptable tolerances (± 0.1 dB).
- 3.1.8 A record of the meteorological conditions such as wind speed, rainfall and temperature has been taken from nearby weather stations. Any sound levels measured during periods of adverse weather conditions such as rain, or wind speeds greater than 5 metres per second (m/s), have been excluded from the study. These exclusion periods are indicated on the time history plots provided in Appendix D by gaps in the graphs. In summary, up to 86.5 hours of data from each location were omitted from analysis due to adverse weather conditions of which up to 26.8 hours were night-time period and up to 59.8 hours were daytime period. The data omitted were largely in the period between 21 June 2025 and 24 June 2025.
- 3.1.9 Existing noise sources observed at the Trawsfynydd locations consisted of farm animals, bird song and a constant low hum from the substation site.
- 3.1.10 Existing noise sources observed at location Bryncir1 consisted of wind rustling through foliage, bird song and farm animals.

3.2 Survey Results

- 3.2.1 BS 4142 states that the background sound level is measured in $L_{A90,T}$, the A-weighted sound pressure level exceeded 90% of the time over reference period T.

- 3.2.2 BS 4142 requires the reference period to be 1 hour during the daytime (07:00 – 23:00) and 15 minutes during the night-time (23:00 – 07:00). As the night-time levels are lower than the daytime, they will inform the worst-case scenario in terms of noise impact.
- 3.2.3 To establish the representative background sound levels at the assessment locations, the cumulative frequency histograms of the measured night-time $L_{A90,15mins}$, rounded to the nearest whole numbers for all measurement locations are presented in **Figure 3.3** to **Figure 3.5**. The daytime cumulative frequency histograms are included in Appendix D of this report.

Figure 3.3: Trawsfynydd1 – Range of background sound levels measured over night-time periods

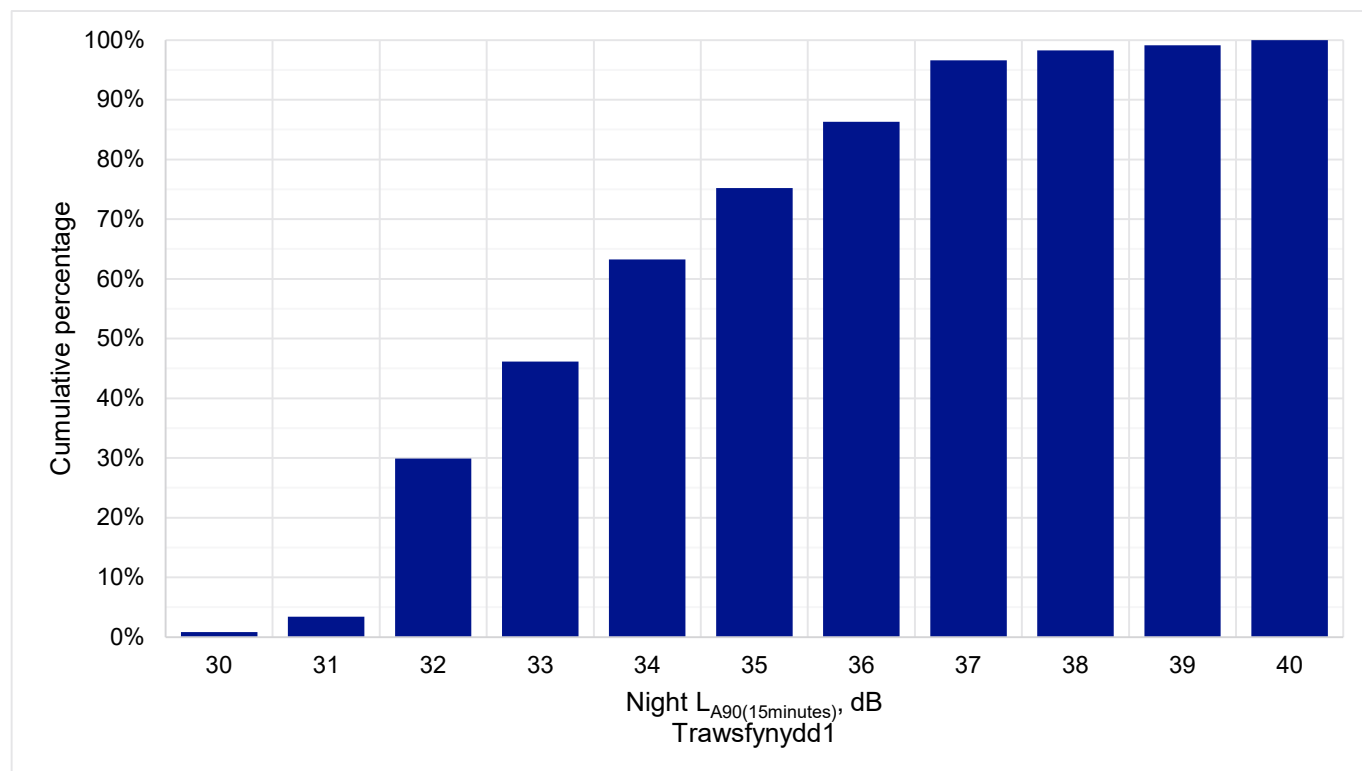


Figure 3.4: Trawsfynydd2 – Range of background sound levels measured over night-time periods

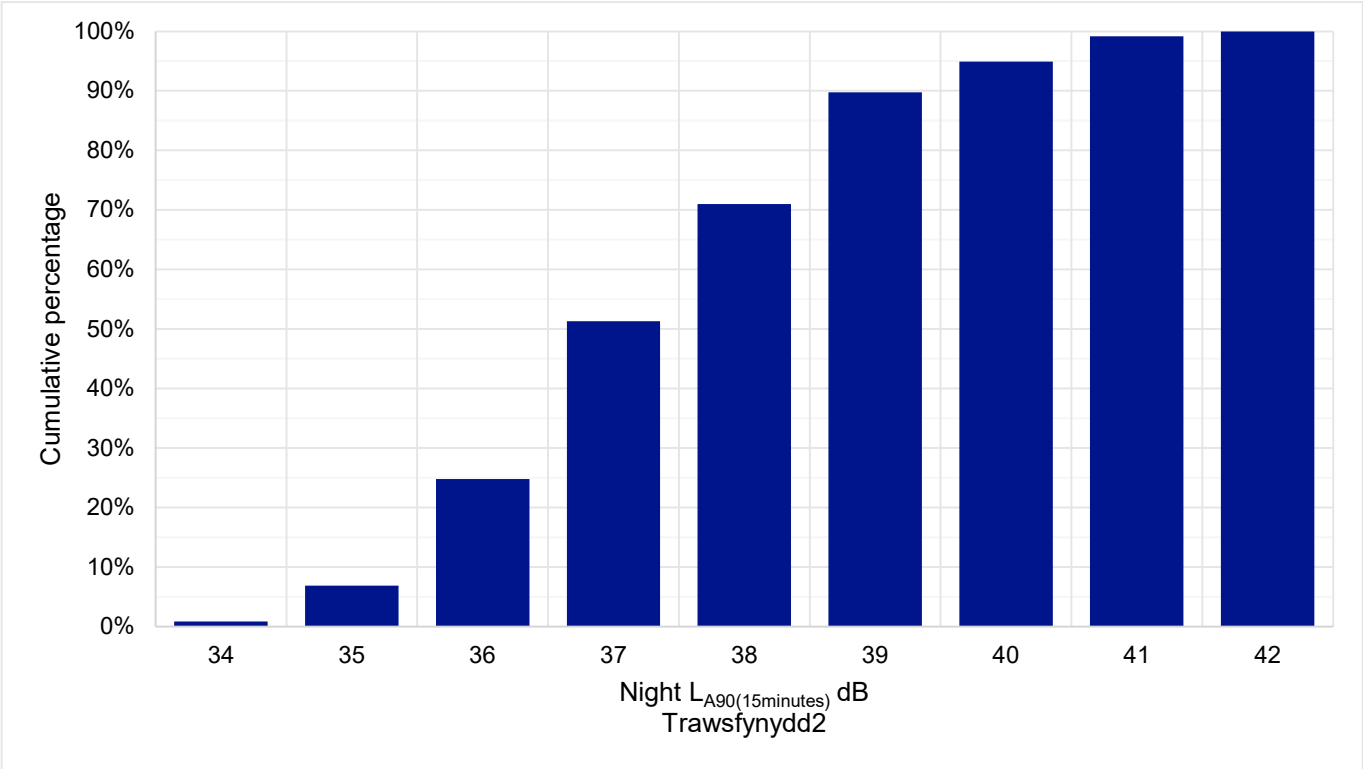
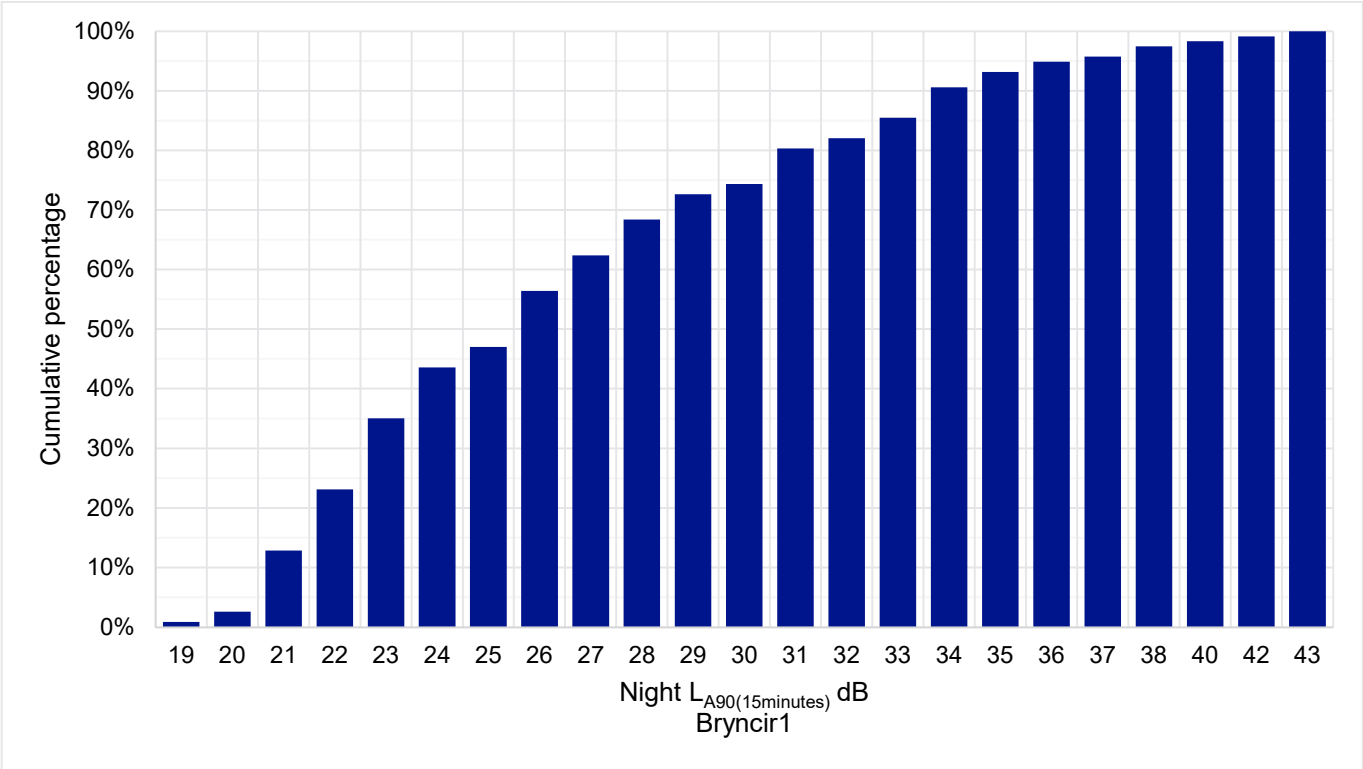


Figure 3.5: Bryncir1 – Range of background sound levels measured over night-time periods



- 3.2.4 **Table 3.2** presents the $L_{A90,15\text{minutes}}$ which for this assessment is the representative background sound levels and the average L_{Aeq} for the monitoring duration which represents the ambient sound.
- 3.2.5 The representative background sound levels are chosen based on the $L_{A90,15\text{minutes}}$ that is exceeded by 70% of the time as shown in the cumulative frequency histograms.

Table 3.2: Representative background and ambient sound levels

Receptor location	Representative measurement position	Representative background sound level, $L_{A90,15\text{mins}}$ (dB)		Ambient sound level, L_{Aeq} (dB)	
		Daytime	Night-time	Daytime	Night-time
NSR1 – NSR2	Trawsfynydd1	34	32	47	44
N/A*	Trawsfynydd2	36	37	45	42
NSR1 – NSR2	Bryncir1	29	23	48	46

* Trawsfynydd2 is closer to the substation and further from the receptors. This location is not representative of the receptors.

4. Operational Noise Impact Assessment

4.1 Overview

- 4.1.1 A computerised noise model of the site and the surrounding area was created using the CadnaA noise prediction software (version 2025 MR 1), which implements calculations to predict the effects on noise propagation of geometric spreading, topography, screening, meteorological conditions, based on information provided by the user regarding the sources of noise. Calculations were carried out in accordance with International Organization for Standardization (ISO) 9613-2:2024 (Ref. 1-11) which assumes a moderate downwind condition in all calculations, as recommended in Section 5 of the same standard.

4.2 Modelling Settings

- 4.2.1 The following modelling settings and source data were incorporated:
- Default ground absorption: $G=0.8$ (representing acoustically absorbent agricultural land);
 - Two orders of reflection;
 - ISO 9613-2:2024 propagation model;
 - Ground topography based on Ordnance Survey (OS) Terrain® 50;
 - Residential receptors located at 1.5m and 4.0m above ground to represent the ground and first floor respectively of each façade facing the site but the worst-case level from either floor is presented in the assessment;
 - Predicted levels are free-field;
 - On-site structures are based on the proposed layout, shown in **Figure 1.2**;
 - Off-site building locations are derived from OS OpenMap; and
 - Heights of dwellings are assumed to be 4.0 m for single-storey and 7.0 m for two-storeys.

4.3 Source Data

- 4.3.1 The noise assessment is undertaken based on the sound level data provided by NGET for indicative equipment to be installed at the site as well as the existing equipment such as Super Grid Transformers (SGT).
- 4.3.2 Both the existing and proposed scenarios are modelled to enable comparison of noise levels from the site. An additional 400 kilovolt (kV) shunt reactor is also included in the “future baseline” scenario of the Trawsfynydd substation. This shunt reactor is a part of the Eryri Visual Impact Provision (EVIP) scheme which will be installed before the proposed shunt reactor.
- 4.3.3 The modelled equipment at the site is as follows.

Table 4.1: Modelled equipment

Item		Number of items	Sound power level per unit, dB L _{WA}
Existing*	SGT1A	1	87.7
Existing*	SGT1B	1	97.1
Existing*	SGT2A	1	78.7
Existing*	SGT2B**	1	78.7
Existing*	SGT3	1	105.8
Existing*	SGT4	1	107.2
Future Existing	400kV / 200MVar shunt reactor (EVIP)	1	91.0***
Proposed	400kV / 200MVar shunt reactor	1	91.0***

*The sound power of all existing assets was determined via calculation following noise measurements undertaken on site on 07/02/2024 by National Grid.

**SGT2B was out of operation when the measurements were undertaken. The sound power level is assumed to be the same as SGT2A. It should be noted that these two SGTs would not operate simultaneously and therefore only one of the two has been included in the noise model.

***As taken from National Grid TS 2.03 Technical Specification – maximum sound power level of main unit for a shunt reactor with a power rating of 200 MVar.

Notes:

1. The sound power level data provided do not include octave band levels. The levels are modelled at 125 Hz octave band frequency for the SGT and shunt reactor as this is likely to be the dominant audible frequency.
2. The SGT sources and shunt reactor are modelled as point sources at 5.0 m and 5.7 m above ground respectively.

- 4.3.4 The proposed shunt reactor is modelled with an acoustic enclosure which provides a minimum sound attenuation of 15 dB at 125 Hz octave band frequency. This sound attenuation has been included in the assessment as a means of noise mitigation embedded in the design.

4.4 Modelling Results

- 4.4.1 The results of the noise modelling at the receptor locations are shown in **Table 4.2**.
- 4.4.2 The existing scenario has been modelled based on the above sound level data. When compared against the average daytime and night-time L_{Aeq} measured at the monitoring location Trawsfynydd2, the modelled noise levels are 3 dB higher than the measured levels indicating that the noise model has been suitably verified for the existing scenario.

Table 4.2: Noise modelling results at the receptor locations

Scenario	Specific sound level (dBA)	
	NSR1	NSR2
Existing (without EVIP shunt reactor)	41	40
EVIP shunt reactor	24	22
Future existing (with EVIP shunt reactor)	41	40
Proposed	13	10
Existing + Proposed	41	40
Future existing + Proposed	42	40

4.5 Rating Corrections

- 4.5.1 The predicted specific sound levels from the proposed works are 13 dB and 10 dB at the identified receptors. These levels are very low and would unlikely be audible especially against the existing noise climate.
- 4.5.2 However, as a conservative measure, it has been assumed that the specific sound from the sound sources features characteristics which may be perceptible during the very quietest periods of the night. Therefore, an acoustic feature correction of 3 dB has been applied.

4.6 BS 4142 Initial Impact Assessment

- 4.6.1 Based on the background sound levels adopted and the specific sound levels predicted in the noise model from the proposed works only, the initial impact indications are presented in **Table 4.3**.

Table 4.3: Summary of BS 4142 assessment – Proposed works

Calculation step	NSR1	NSR2
Predicted specific level, dB L_{Aeq}	13	10
Rating correction, dB	3	3
Predicted rating level, dB $L_{Ar,Tr}$	16	13
BS 4142 assessment against the representative background level		
Representative background sound level, dB L_{A90}	23	23
Predicted rating level minus background sound level, dB	-7	-10
Impact indication	Low impact	Low impact

4.7 Change in Ambient Noise Level

- 4.7.1 To provide further context to the initial BS 4142 impact assessment above, the change in ambient noise level assessment is also undertaken and presented in **Table 4.4** below.
- 4.7.2 This assessment compares the measured ambient noise levels at the monitoring location Trawsfynydd1 to the new proposed ambient noise levels contributed by the proposed shunt reactor.
- 4.7.3 Only the night-time assessment has been presented as this is the worst-case period.

Table 4.4: Summary of change in ambient noise level assessment

Receptor	Specific sound level, dB L_{Aeq}	Measured Existing ambient sound level, dB L_{Aeq} Night-time	Predicted ambient sound level*, dB L_{Aeq} Night-time	Change in ambient sound level, dB Night-time
NSR1	13	44	44	0
NSR2	10	44	44	0

* The predicted ambient sound level is the logarithmic sum of the existing ambient and the predicted specific level from the proposed change. $[=10 \log (10^{L_{p1/10}} + 10^{L_{p2/10}})]$

- 4.7.4 The proposed works to the existing site is not predicted to increase the ambient noise levels.
- 4.7.5 The future existing scenario shown in **Table 4.2** indicates that the addition of the EVIP shunt reactor will not change the existing baseline noise levels. Noise impact on the nearby receptors from the cumulative future baseline and the proposed shunt reactor is not expected to be significant.

4.8 Third-octave Band Noise Levels

- 4.8.1 The predicted external noise levels of the proposed shunt reactor at the receptors at the following third-octave band frequencies are shown in **Table 4.5**.

Table 4.5: Summary of third-octave band assessment

Location	Third-octave band sound pressure level, dB (external levels)		
	100 Hz	125 Hz	160 Hz
NSR1 (predicted)	28	25	22
NSR2 (predicted)	25	22	19

- 4.8.2 As demonstrated above, the predicted third-octave band sound pressure levels at 100 Hz to 160 Hz are below 30 dB.

4.9 Discussion

- 4.9.1 The initial BS 4142 impact assessment shows that the estimated impact is predicted to be low at all identified receptors.
- 4.9.2 This is further supported by the results of the change in ambient noise levels assessment where it is predicted that the proposed works to the existing development would not change the existing ambient noise levels.
- 4.9.3 The predicted external noise levels at the receptors from the proposed works at the 100 Hz third-octave band frequency are below 30 dB.
- 4.9.4 The noise impact from the proposed works on the nearby sensitive receptors is expected to be low.

5. Conclusion

- 5.1.1 WSP has been appointed by NGET to undertake a noise assessment to support the planning application for the Trawsfynydd works as a component of the Pentir to Trawsfynydd Reinforcement Project. This report presents the findings of the operational noise assessment for the proposed new shunt reactor at the existing Trawsfynydd substation, Gwynedd.
- 5.1.2 The purpose of this assessment is to quantify the impact of operational noise associated with the proposed works on the nearest noise sensitive receptors.
- 5.1.3 A baseline noise survey was undertaken between 18 June 2025 to 25 June 2025 at two unattended noise monitoring locations representative of the existing nearby sensitive receptors with an additional alternative location approximately 20 km from the site to establish the background sound levels in the absence of the existing substation.
- 5.1.4 Noise levels from the existing and proposed works have been calculated at the nearest noise sensitive receptors using a computerised 3D noise model of the site and the surrounding area.
- 5.1.5 An acoustic enclosure with a minimum sound attenuation of 15 dB for the proposed shunt reactor is included within the calculations as a means of noise mitigation embedded in the design.
- 5.1.6 The results of the initial BS 4142 impact assessment demonstrates that the proposed works would have a low impact with regards to noise.
- 5.1.7 Further assessments show that there would be a negligible impact on the existing ambient noise levels from the proposed works and the predicted external noise levels at the receptors from the proposed works at the 100 Hz third-octave band frequency are below 30 dB.
- 5.1.8 The proposed Trawsfynydd works are not expected to result in any significant adverse noise impact at the nearby sensitive receptors.

Appendix A

References

- Ref. 1-1 Welsh Government. (2021). Future Wales: The National Plan 2040. United Kingdom.
- Ref. 1-2 Welsh Government. (2024). Planning Policy Wales. United Kingdom.
- Ref. 1-3 Welsh Government. (1997). Technical Advice Note (TAN) 11: Noise. United Kingdom.
- Ref. 1-4 British Standards Institute (BSI). (1990). BS 4142:1990 Method for rating industrial noise affecting mixed residential and industrial areas (Withdrawn). United Kingdom.
- Ref. 1-5 British Standards Institute (BSI). (1987). BS 8233:1987 Code of practice for sound insulation and noise reduction of buildings (Withdrawn). United Kingdom.
- Ref. 1-6 British Standards Institute (BSI). (2003). BS 7445-1:2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures. United Kingdom.
- Ref. 1-7 British Standards Institute (BSI). (2014). BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. United Kingdom.
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- Ref. 1-9 Association of Noise Consultants (ANC). (2020). BS 4142:2014+A1:2019 Technical Note Version 1.0. United Kingdom.
- Ref. 1-10 British Standards Institute (BSI). (1997). BS 4142:1997 Method for rating industrial noise affecting mixed residential and industrial areas (Withdrawn). United Kingdom.
- Ref. 1-11 International Organization for Standardization (ISO). (2024). ISO 9613-2:2024 Acoustics – Attenuation of sound during propagation outdoors – Part 2: Engineering method for the prediction of sound pressure levels outdoors. Switzerland.
- Ref. 1-12 British Standards Institute (BSI). (2014). BS 8233:2014 Guidance on sound insulation and noise reduction for buildings. United Kingdom.

Appendix B

Glossary of Acoustics Terminology

Ambient Sound	The totally encompassing sound in a given situation, at a given time, including sound from any source in any direction.
A-Weighting	The human ear can detect a wide range of frequencies, from 20Hz to 20kHz, but it is more sensitive to some frequencies than others. Generally, the ear is most sensitive to frequencies in the range 1 to 4 kHz. The A-weighting is a filter that can be applied to measured results at varying frequencies, to mimic the frequency response of the human ear, and therefore better represent the likely perceived loudness of the sound. Sound pressure level (SPL) readings with the A-weighting applied are represented in dB(A).
Background sound	A component of the ambient and residual sound, comprising the steady sounds underlying sources that fluctuate in level within a period of consideration. This can be evaluated using the L_{A90} metric.
Decibel (dB)	The decibel scale is used in relation to sound because it is a logarithmic rather than a linear scale. The decibel scale compares the level of a sound relative to another. The human ear can detect a wide range of sound pressures, typically between 2×10^{-5} and 200 Pa, so the logarithmic scale is used to quantify these levels using a more manageable range of values.
Equivalent Continuous Level ($L_{eq,T}$)	The Equivalent Continuous Level represents a theoretical continuous sound, over a stated time period, T, which contains the same amount of energy as a number of sound events occurring within that time, or a source that fluctuates in level.
L_{10} , L_{90} and other L_n percentile-based measures	Percentile measures express statistical measures of noise: L_{10} represents the SPL exceeded for 10% of the time period considered; L_{10} is often used to describe typical noise levels of road traffic. L_{90} represents the SPL which is exceeded for 90% of the time, expressed in dB or dB(A); L_{A90} is used to quantify underlying 'background sound' levels. Other percentile-based measures are sometimes used for various types of noise assessment. These include L_{01} , L_{50} , L_{99} .
Maximum Sound Level (L_{max})	The maximum sound level, L_{max} (or L_{Amax} if A-weighted) is the highest SPL that occurs during a given event or time period.
Noise	A noise can be described as an unwanted sound. Noise can cause nuisance.
Noise Sensitive Receptors (NSRs)	Any identified receptor likely to be affected by noise. These are generally human receptors, and may include residential dwellings, work places, schools, hospitals, community facilities, places of worship and recreational spaces.

Octave Band / Third Octave Bands	A sound made up of more than one frequency can be described using a frequency spectrum, which shows the relative magnitude of the different frequencies within it. The possible range of frequencies is continuous, but can be split up into discrete bands, often an octave or third-octave in width. Each octave band is referred to by its centre frequency, generally 63Hz, 125Hz, 250Hz, 500Hz, 1kHz etc.
Sound Power Level (SWL)	The Sound Power Level defines the rate at which sound energy is emitted by a source, and is also expressed in dB.
Sound Pressure Level (SPL)	The Sound Pressure Level has units of decibels and compares the level of a sound to the smallest sound pressure generally perceptible by the human ear, or the reference pressure.
Specific Sound	A component of the ambient sound, associated with a specific source/s under consideration.
Residual Sound Level	The Ambient Sound Level in the absence of the industrial source noise under consideration, measured in $L_{Aeq,T}$.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.

Appendix C

Limitations

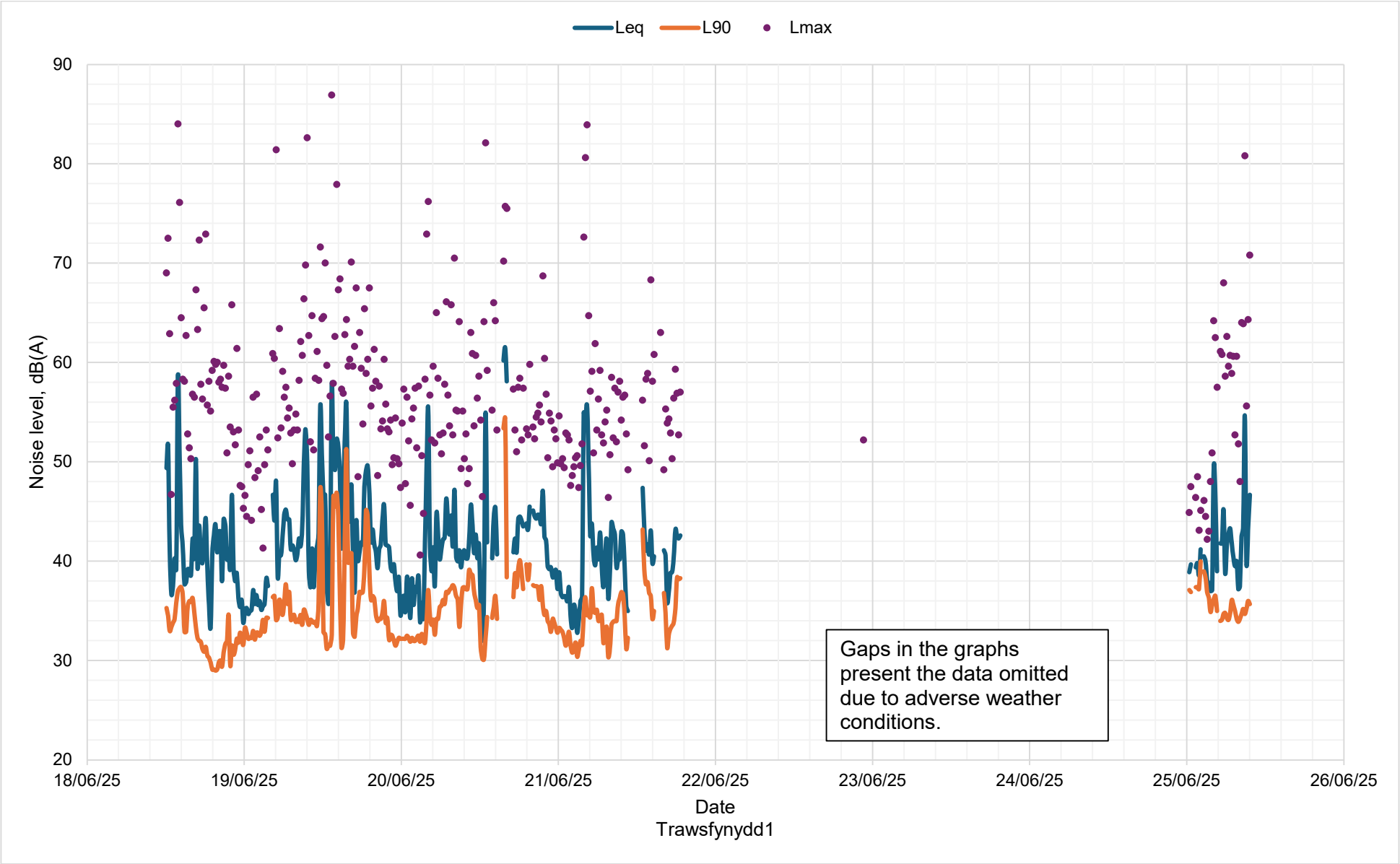
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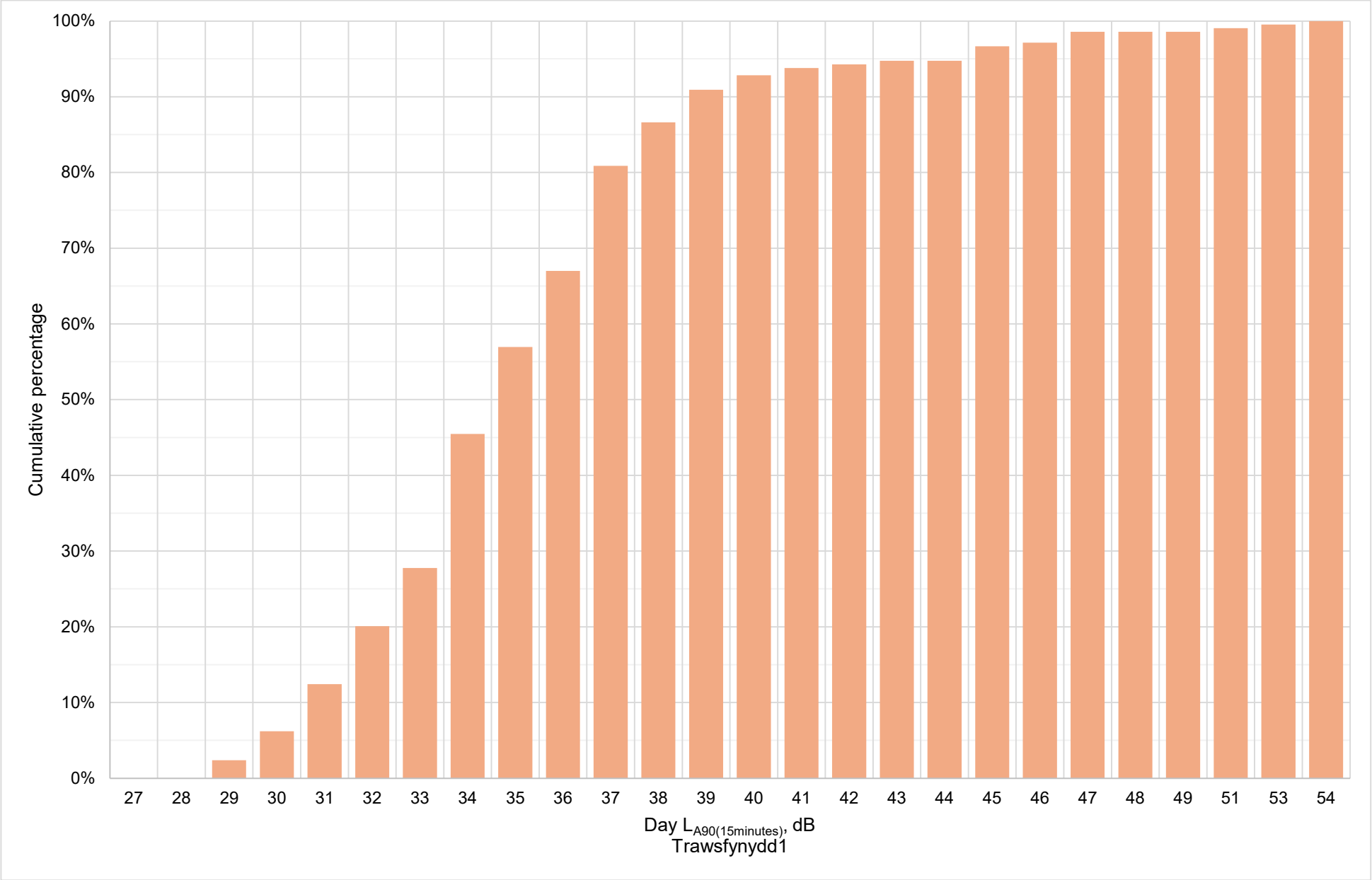
Appendix D

Noise Survey Results

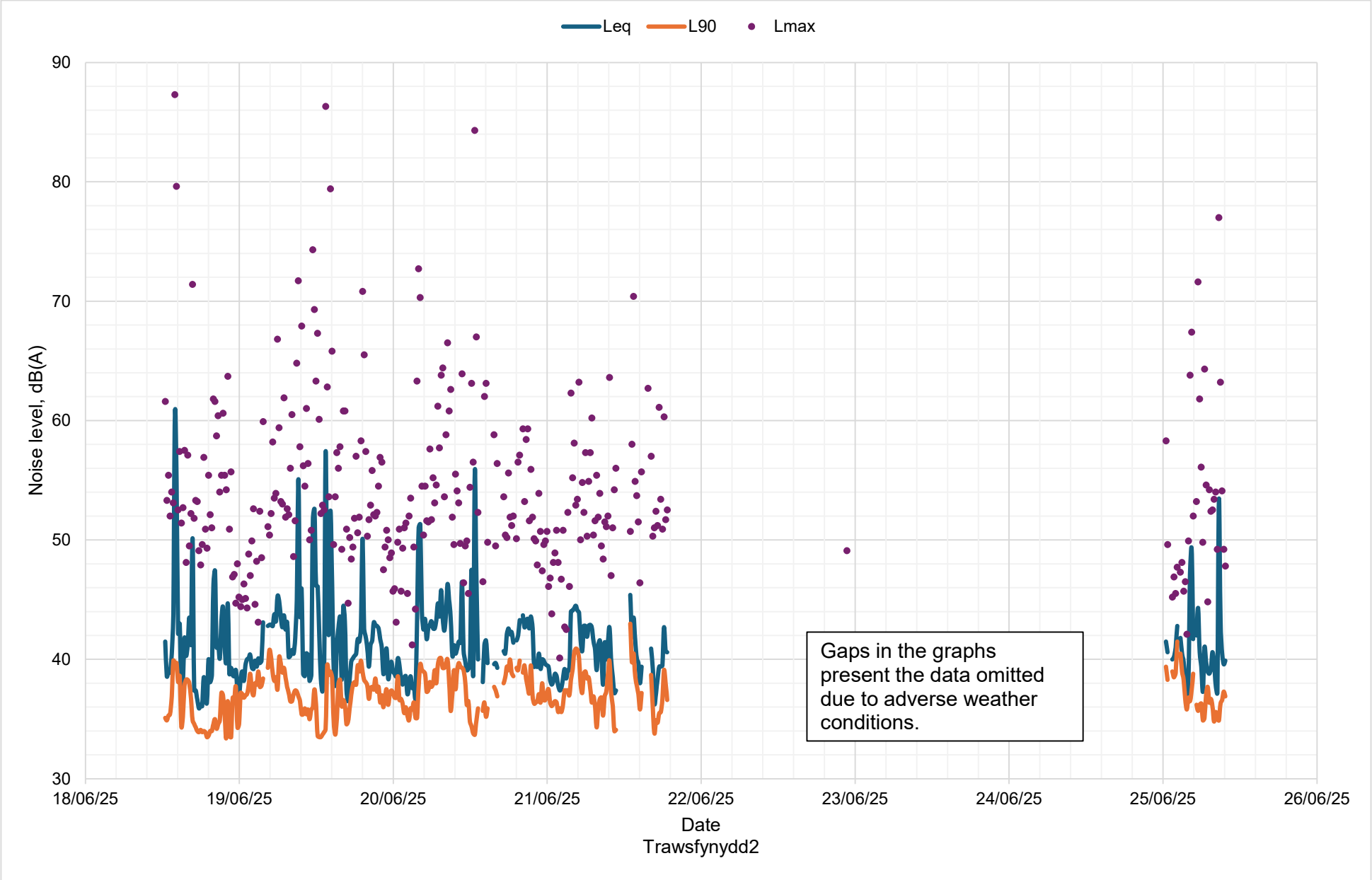
Trawsfynydd1 – Time history plot



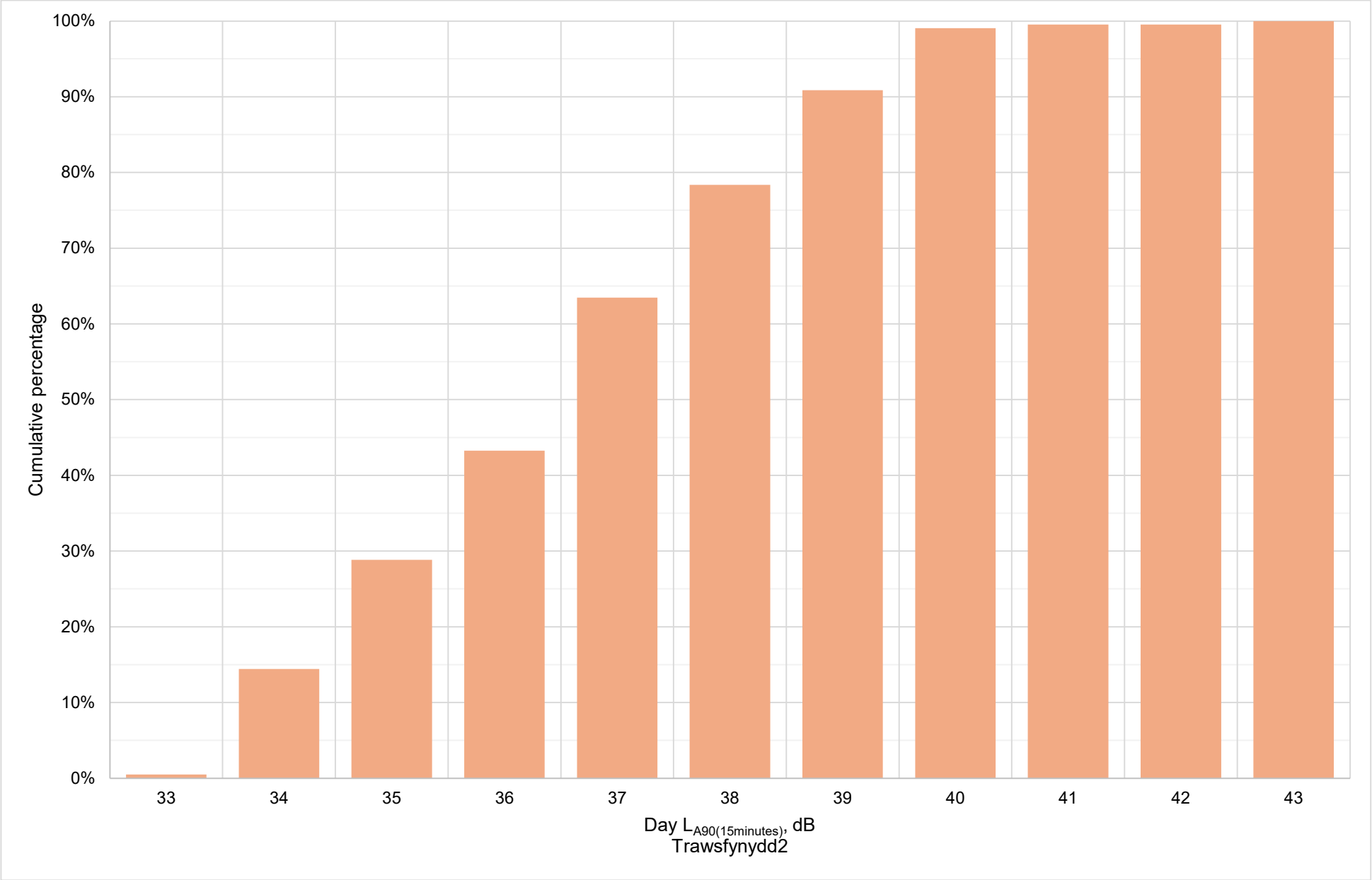
Trawsfynydd1 – Range of background sound levels measured over daytime periods



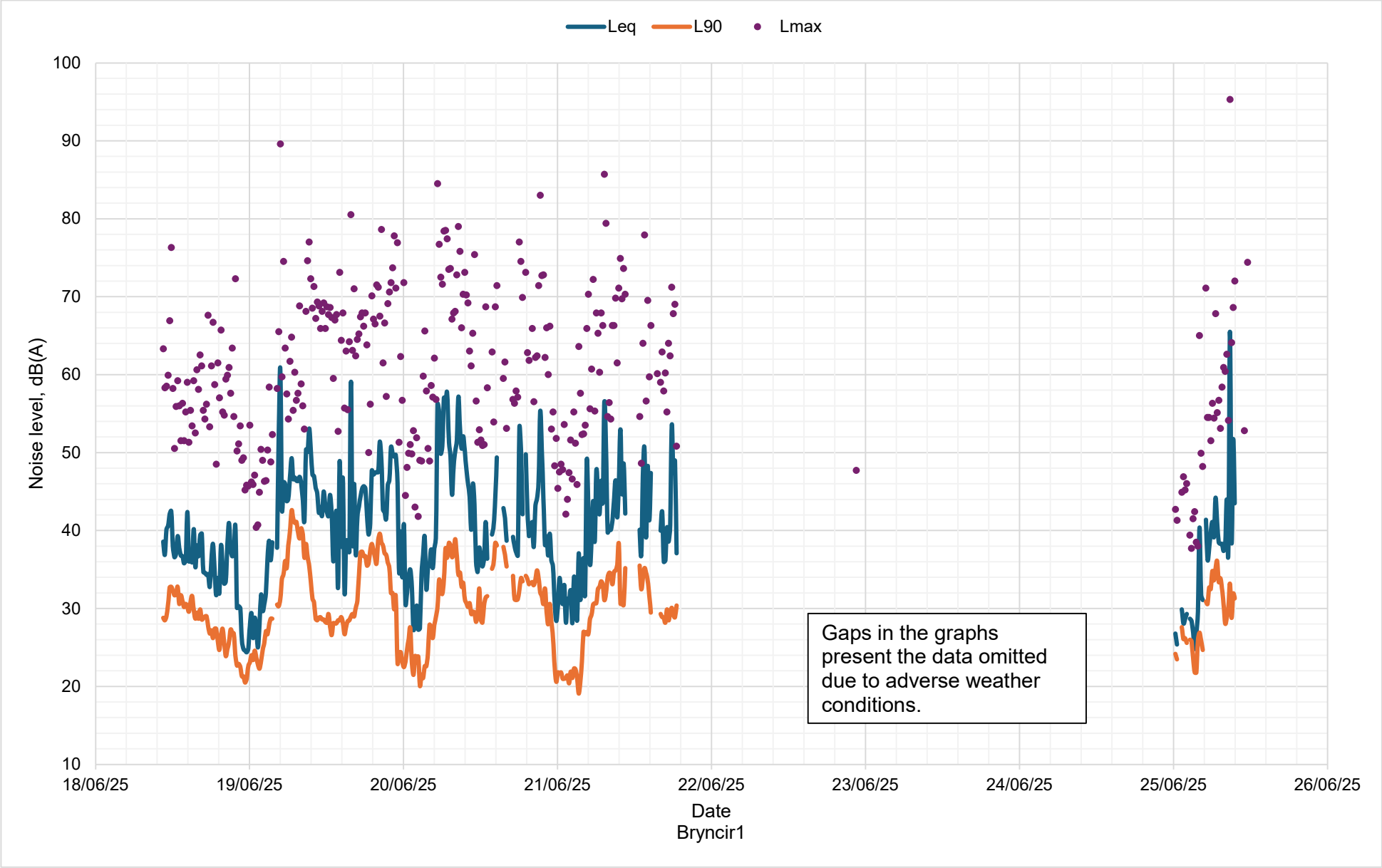
Trawsfynydd2 – Time history plot



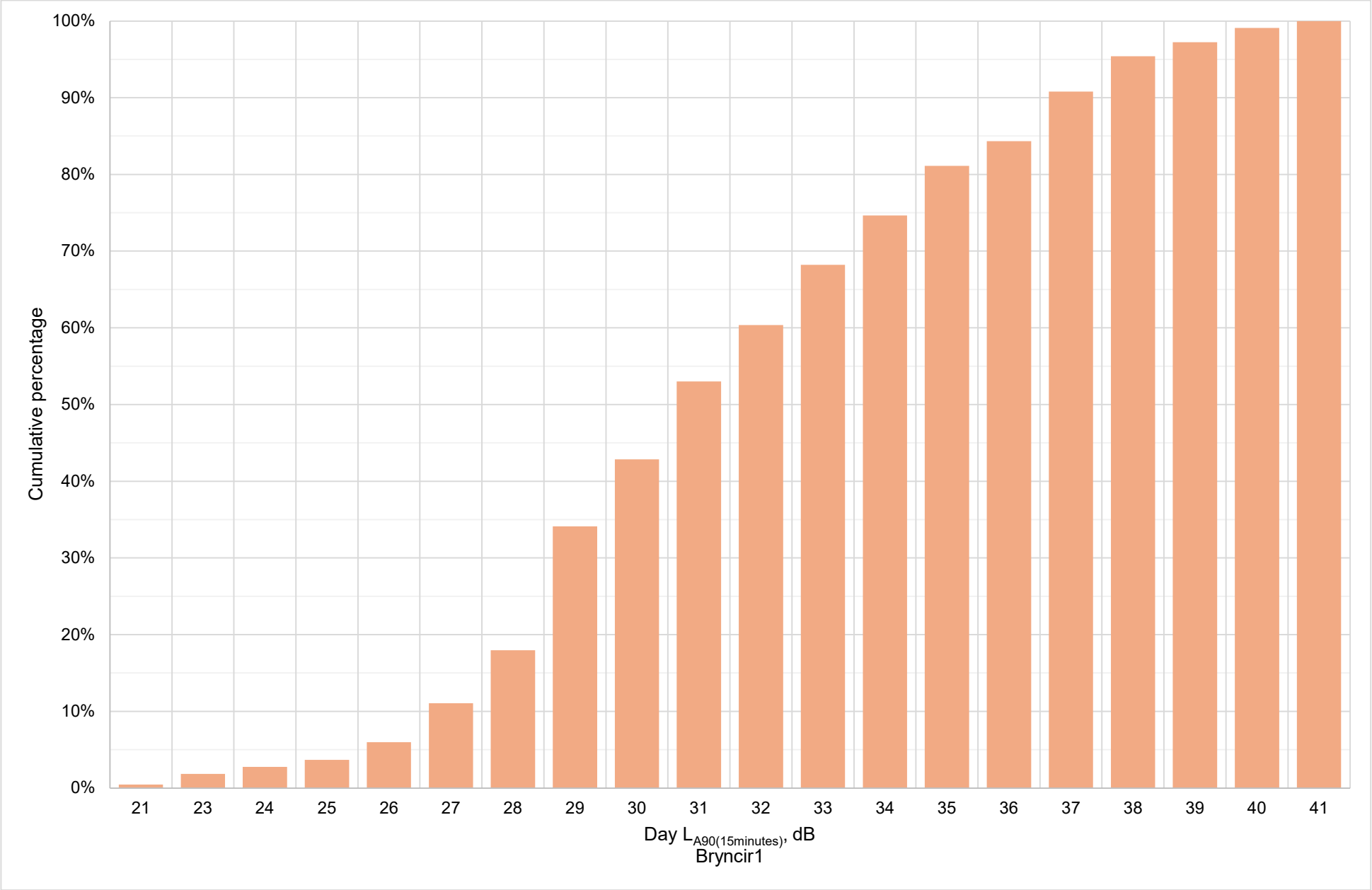
Trawsfynydd2 – Range of background sound levels measured over daytime periods



Bryncir1 – Time history plot



Bryncir1 – Range of background sound levels measured over daytime periods



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Appendix 5.13A Trawsfynydd Works Climate Change Risk Assessment

1. Trawsfynydd Climate Change Risk Assessment (CCRA)

- 1.1.1 The Climate Change Risk Assessment (CCRA) Risk Register identifies and assesses the likelihood and consequences of climate-related impacts on the proposed Trawsfynydd Works. The methodology and the criteria used to inform the CCRA are detailed in **Environmental Statement, Volume 8: Appendix 1.4.A Topic Methodology**.

Table 1-1: Climate Change Risk Assessment Risk Register for the Trawsfynydd Works

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
Construction						
Extreme Heat	<p>Extreme heat days result in ambient temperatures to rise above optimal design temperatures of construction equipment.</p> <p>This can cause the overheating of construction equipment, resulting in delay to construction programme, repairs, additional project costs and/or safety risks.</p>	Construction equipment & site.	<p>A Construction Environmental Management Plan (CEMP) will be prepared by the contractor and will outline measures for managing environmental impacts during construction.</p> <p>To inform specific mitigation measures, the contractor will prepare a high-level risk assessment of severe weather impacts on the construction process. This assessment will consider any receptors and/or construction-related operations and activities that may be sensitive to heatwaves.</p> <p>The contractor will monitor weather forecasts to support short- to medium-term programme management, enabling the planning of works and timely</p>	Unlikely	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
			<p>implementation of mitigation measures to protect workers and resources from extreme weather conditions.</p> <p>Health and safety plans will include all necessary and appropriate measures to manage severe weather events, safeguarding staff and reducing risks to construction operations.</p> <p>The contractor should also consider the use of construction materials and equipment with enhanced durability and resilience to climate extremes</p>			
Extreme Heat	Extreme heat events cause health and safety risks to the construction workforce, which could lead to sun stroke and dehydration, or in a worst-case scenario death.	Human health and safety (staff and visitors)	<p>A CEMP will be prepared by the contractor and will outline measures for managing environmental impacts during construction. The contractor will monitor weather forecasts to support short- to medium-term programme management, enabling the planning of works and the timely implementation of mitigation measures to protect workers and resources from extreme weather conditions.</p> <p>Supportive measures for working in high temperatures may include the provision of sunblock, sun hats, lightweight clothing, scheduled refreshment breaks, and access to a cooled water supply.</p> <p>Health and safety plans will include all necessary and appropriate measures to manage severe weather events,</p>	Unlikely	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
			<p>safeguarding staff and reducing risks to construction operations.</p> <p>Adequate cooling and ventilation systems are essential in the design of temporary office buildings and worker welfare facilities, to accommodate hotter and more extreme temperatures</p>			
Changes in precipitation (Extreme rainfall)	Extreme rainfall events result in damage to construction equipment and/or unsafe working conditions resulting in a delay in the construction programme.	Construction equipment & site.	<p>A CEMP will be prepared by the contractor and will outline measures for managing environmental impacts during construction.</p> <p>The contractor will monitor weather forecasts and subscribe to flood alerts issued by Natural Resources Wales. Construction activities will be planned accordingly, using internal procedures to manage workers and resources during extreme weather events, such as extreme rainfall.</p> <p>Health and safety plans will include all necessary and appropriate measures to manage severe weather events, safeguarding staff and reducing risks to construction operations.</p>	Moderate	Minor	Medium (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
Changes in precipitation (Extreme rainfall)	Extreme rainfall events can cause surface water flooding at the construction site which can cause disruption and damage to the site and sources of power supply. Flooding on the site can damage critical infrastructure, which can increase costs and lead to delays in the construction programme.	Construction equipment & site.	The contractor will monitor weather forecasts and receive Natural Resources Wales flood alerts. The contractor will plan works accordingly with internal methodologies to manage workers and resources in extreme weather conditions such as storms and flooding. Health and safety plans will be implemented to include all necessary and appropriate measures to manage severe weather events, ensuring staff safety and minimising risks to construction operations.	Moderate	Minor	Medium (Not Significant)
Wildfire Event	Increased heatwaves and dry periods heighten the risk of wildfires, which could damage construction equipment and disrupt site activities. This may lead to asset damage, plant downtime, and the need for machinery repair or replacement. The risk could be further exacerbated by combustible materials present on-site, such as generator fuel.	Construction equipment & site.	A CEMP will be prepared by the contractor and will outline measures for managing environmental impacts during construction. Weather forecasts should be monitored so that periods of elevated wildfire risk, such as those associated with extreme heat and dry conditions, can be anticipated in advance. This allows contingency measures to be implemented to minimise disruption to construction activities and reduce fire risk Health and safety plans should be in place and incorporate all necessary and appropriate measures to manage the risk of wildfires, including protocols for high-risk periods and emergency response procedures.	Rare	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
			Where feasible, construction materials and equipment with enhanced fire resistance or reduced flammability should be used, and flammable materials should be stored appropriately to reduce potential fuel sources.			
Wildfire Event	<p>Increased heatwaves and dry periods raise the risk of wildfires, which could result in injury or fatality to personnel.</p> <p>The presence of combustible materials on-site, such as generator fuel, could further exacerbate this risk.</p> <p>.</p>	Human health and safety (staff and visitors)	<p>A CEMP will be prepared by the contractor and will outline measures for managing environmental impacts during construction.</p> <p>Weather forecasts should be monitored so that periods of elevated wildfire risk, such as those associated with extreme heat and dry conditions, can be anticipated in advance. This allows contingency measures to be implemented to minimise disruption to construction activities and reduce fire risk.</p> <p>Health and safety plans should be in place and incorporate all necessary and appropriate measures to manage the risk of wildfires, including protocols for high-risk periods and emergency response procedures.</p> <p>Where feasible, construction materials and equipment with enhanced fire resistance or reduced flammability should be used, and</p>	Rare	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
			flammable materials should be stored appropriately to reduce potential fuel sources.			
Temperature-related (Extreme cold)	Construction workers are at risk of hypothermia due to low temperatures.	Human health and safety (staff and visitors)	<p>A CEMP will be prepared by the contractor and will outline measures for managing environmental impacts during construction.</p> <p>The contractor will monitor weather forecasts to support short- to medium-term programme management, enabling the planning of works and the timely implementation of mitigation measures to protect workers and resources during periods of extreme cold.</p> <p>Health and safety plans will be implemented to incorporate all necessary and appropriate measures for managing cold weather events, with the aim of protecting staff and minimising risks to construction operations.</p> <p>All outdoor construction workers should have access to indoor facilities with adequate heating and opportunities to take regular warm breaks.</p>	Moderate	Minor	Medium (Not Significant)
Temperature-related (Extreme cold)	<p>Low temperatures can lead to ground areas becoming frozen.</p> <p>This can lead to delays and disruption to construction activities, as</p>	Construction equipment & site.	<p>A CEMP will be prepared by the contractor and will outline measures for managing environmental impacts during construction.</p> <p>The contractor will monitor weather forecasts to support short- to medium-term programme management, enabling the</p>	Moderate	Minor	Medium (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
	the areas will need to be de-iced.		<p>planning of works and the timely implementation of mitigation measures to protect workers and resources during periods of extreme cold.</p> <p>Health and safety plans will be implemented to incorporate all necessary and appropriate measures for managing cold weather events, with the aim of protecting staff and minimising risks to construction operations.</p> <p>All outdoor construction workers should have access to indoor facilities with adequate heating and opportunities to take regular warm breaks.</p>			
Storm Events	Storm events create an unsafe environment for construction workers. Workers in outdoor or unstable environments face increased physical risks during storms, including injuries from falling debris, flooding, or high winds.	Human health and safety (staff and visitors)	<p>A CEMP will be prepared by the contractor and will outline measures for managing environmental impacts during construction.</p> <p>Health and safety plans will be put in place to include all necessary and appropriate measures to manage severe weather events, with the aim of protecting staff and minimising risks to construction operations.</p> <p>The contractor will implement stop-work protocols and change management procedures. Work will pause during unsafe conditions (e.g. strong winds) and resume once appropriate controls are in place.</p>	Moderate	Minor	Medium (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
Storm Events	<p>Storms and severe weather can disrupt the construction of the proposed works and access to the site.</p> <p>Impacts include delays, damage to construction materials, and machinery. Flooding and blocked roads can also affect material delivery and personnel movement.</p>	Construction equipment & site.	<p>A CEMP will be prepared by the contractor and will outline measures for managing environmental impacts during construction.</p> <p>Health and safety plans will be established to incorporate all necessary and appropriate measures for managing severe weather events, with the aim of protecting staff and minimising risks to construction operations.</p> <p>The contractor will monitor weather forecasts to support short- to medium-term programme management, enabling the planning of works and the timely implementation of mitigation measures to safeguard workers and resources from extreme weather conditions.</p> <p>Where feasible, the contractor should consider the use of construction materials and equipment with enhanced durability and resilience to climate extremes.</p>	Moderate	Minor	Medium (Not Significant)
Operation						
Extreme temperatures (heat)	Heatwaves result in heat stress for building occupants and outdoor workers, causing health and safety incidents e.g. sunstroke & dehydration.	Human health and safety (staff and visitors)	The Operational Environmental Management Plan (OEMP) for the Trawsfynydd Substation will be reviewed to ensure measures to minimise flood impacts of heatwaves during operation are appropriate to cover the proposed works.	Unlikely	Minor	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
Changes in Precipitation (Flooding)	Extreme rainfall events could result in damage to on-site electrical equipment, and underground cables leading to power outages and potential equipment damage.	Trawsfynydd Substation. Electrical Equipment. Underground Cables.	<p>The Operational Environmental Management Plan (OEMP) for the Trawsfynydd Substation will be assessed to ensure measures to minimise the impacts of heatwaves during operation are appropriate to cover the proposed works</p> <p>The site does not have a direct hydraulic connection to the broader water environment. Minor works will be carried out in the existing Trawsfynydd Substation, over 100 metres from the nearest watercourse. The site lies outside any mapped flood extents for fluvial, coastal, surface water, or small watercourses. The works will not result in any increase in impermeable surface area.</p> <p>The existing Trawsfynydd Substation has an operational drainage system in place, and access to the site will be maintained via the current substation access road. No new watercourse crossings or culverting will be required to support the works.</p>	Moderate	Minor	Medium (Not Significant)
Wildfire Event	Increased heatwaves and prolonged dry periods elevate the risk of wildfires, which could cause considerable damage to underground cables and electrical equipment. This may result in asset damage, plant downtime, and the need for	Trawsfynydd Substation. Electrical Equipment. Underground Cables.	<p>The Operational Environmental Management Plan (OEMP) for the Trawsfynydd Substation will be reviewed to ensure measures to minimise flood impacts during operation are appropriate to cover the proposed works</p> <p>Monitoring weather forecasts and emergency response planning should be integrated into health and safety plans to</p>	Rare	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
	<p>machinery repair or replacement.</p> <p>The presence of combustible materials on-site could further increase this risk</p> <p>.</p>		<p>support preparedness for potential fire incidents.</p> <p>Vegetation around key assets will be regularly monitored, pruned, and maintained to reduce the risk of fire, damage, and operational disruption.</p>			
Wildfire Event	<p>Increased heatwaves and prolonged dry periods elevate the risk of wildfires. If a wildfire reaches the site, it could pose a serious risk of injury or fatality to workers and others nearby.</p>	Human health and safety (staff and visitors)	<p>The Operational Environmental Management Plan (OEMP) for the Trawsfynydd Substation will be reviewed to ensure measures for mitigation and emergency response for wildfire events during operation are appropriate to cover the proposed works.</p> <p>Monitoring weather forecasts and emergency response planning should be integrated into health and safety plans to support preparedness for potential fire incidents.</p> <p>Vegetation around key assets will be regularly monitored, pruned, and maintained to reduce the risk of fire, damage, and operational disruption.</p>	Rare	Insignificant	Low (Not Significant)
Temperature-related (Extreme cold)	Ice accumulation on above ground electrical equipment the overhead line equipment can add additional weight to these	Trawsfynydd Substation. Electrical Equipment.	The Operational Environmental Management Plan (OEMP) for the Trawsfynydd Substation will be assessed to ensure measures for mitigation and emergency response for periods of cold	Rare	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
	structures leading to damage.	Underground Cables.	<p>weather during operation are appropriate to cover the proposed works.</p> <p>The asset will either be designed to accommodate the climatic conditions projected for the end of its design life, using appropriate design guidance where available, or adaptive capacity will be incorporated into the design.</p>			
Temperature-related (Extreme cold)	Low temperatures can lead to ground areas becoming frozen, which can impact the health and safety of workers. Freezing conditions can also cause hypothermia.	Human health and safety (staff and visitors)	<p>The Operational Environmental Management Plan (OEMP) for the Trawsfynydd Substation will be assessed to ensure measures for mitigation and emergency response for periods of cold weather during operation are appropriate to cover the proposed works.</p> <p>The Operator will monitor weather forecasts to support short- to medium-term programme management, enabling the planning of works and the timely implementation of mitigation measures to protect workers and resources from cold weather.</p> <p>Buildings should be equipped with HVAC systems capable of responding to cold temperatures, providing adequate heating and preventing occupant discomfort.</p>	Rare	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
Storm Events	Storm events create an unsafe environment for on-site operational workers and contractors. Workers in outdoor or unstable environments face increased physical risks during storms, including injuries from falling debris, flooding, or high winds.	Human health and safety (staff and visitors)	<p>The Operational Environmental Management Plan (OEMP) for the Trawsfynydd Substation will be assessed to ensure measures for mitigation and emergency response for storm events during operation are appropriate to cover the proposed works.</p> <p>The Operator will monitor weather forecasts to support short- to medium-term programme management, enabling the planning of works and the timely implementation of mitigation measures to protect workers and resources from extreme weather conditions.</p> <p>The Proposed Works will either be designed to accommodate the climatic conditions projected for the end of its design life—using appropriate design guidance where available—or adaptive capacity will be incorporated into the design.</p>	Moderate	Minor	Medium (Not Significant)
Storm Events	Storms and severe weather can disrupt the operation of the Proposed Development due to damage to overhead line equipment, resulting in power outages. Flooding and blocked roads can also affect site access for operational workers and contractors preventing	Trawsfynydd Substation. Electrical Equipment. Underground Cables.	<p>The Operational Environmental Management Plan (OEMP) for the Trawsfynydd Substation will be assessed to ensure measures for mitigation and emergency response for storm events during operation are appropriate to cover the proposed works.</p> <p>The Operator will monitor weather forecasts to support short- to medium-term programme management, enabling the</p>	Moderate	Minor	Medium (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
	necessary maintenance and repairs.		<p>planning of works and the timely implementation of mitigation measures to protect workers and resources from extreme weather conditions.</p> <p>The Proposed Works will either be designed to accommodate the climatic conditions projected for the end of its design life—using appropriate design guidance where available—or adaptive capacity will be incorporated into the design.</p>			