2.2.A Outline Construction Environmental Management Plan

Contents

1.	**INTRODUCTION**	**1**
1.1	Background	1
1.2	The Proposed Works	2
1.3	Purpose of Outline Construction Environmental Management Plan	5
1.4	Objectives	5
1.5	Supporting Plans	6
1.6	Structure of the Outline CEMP	6
2.	**ENVIRONMENT MANAGEMENT**	**7**
2.1	Conformance with Corporate and Project EMS	7
2.2	Conformance with Planning Conditions	7
2.3	Compliance with Legislation, Standards and Guidance	7
2.4	Consent and Licenses	8
2.5	Roles and Responsibilities	8
2.6	Environmental Procedures	10
3.	**ENVIRONMENT MANAGEMENT OF SITE CONSTRUCTION**	**13**
3.1	Introduction	13
3.2	General	13
3.3	Working Hours	13
3.4	Lighting	14
3.5	Security	15
3.6	Welfare	15
3.7	Pollution Prevention/Storage and Plant	15
3.8	Material/Resource and Waste Management	20
3.9	Geology, Hydrogeology, Land Use and Agriculture (Soils)	20
3.10	Water Quality, Resources and Flood Risk	23
3.11	Historic Environment	27
3.12	Traffic and Transport	28
3.13	Air Quality and Emissions	29
3.14	Noise and Vibration	30
3.15	Ecology and Nature Conservation	31
3.16	Climate Change	32

3.17 Landscape and Visual 33
3.18 Major Accidents and Disasters 34

4. CONSTRUCTION MANAGEMENT AND MITIGATION 35

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') to construction and operate 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.

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

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

1.4.1 A detailed CEMP shall be prepared and shall need to be submitted for acceptance to Gwynedd Council by National Grid in consultation with the relevant stakeholders prior to construction. The detailed CEMP is to include a Pollution Incident Plan which shall state

[1] Pentir to Trawsfynydd Reinforcement Project (Environmental Statement; Volume 2: Pentir Substation)

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.

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

1.2 The Proposed Works

1.2.1 Pentir Substation is an existing substation, in North West Wales approximately 4.5 kilometres (km) south-west of Bangor, in the Gwynedd Local Authority area ('Pentir works site') (see **Figure 1-1**). The works will be centred on Grid Reference SH 559677 within the existing Pentir Substation compound (the 'Pentir works site').

1.2.2 The Pentir works site covers an area of approximately 1.5 hectares (ha); however, the permanent works will be entirely contained in the existing Pentir Substation boundary. The Pentir works site includes part of the existing Pentir Substation, the access road, a compound (comprising office and welfare facilities), laydown storage and car parking.

1.2.3 The Proposed Works site lies at approximately 110 metres (m) Above Ordnance Datum (AOD) on relatively flat topography. There is a single access road from the B4547 into the southern extent of the existing Pentir Substation compound. The remainder of the compound is bounded by the Pentir Substation Candidate Wildlife Site (cWS) with an area of ancient woodland to the west. The wider area comprises agricultural land which the Agricultural Land Classification (ALC) data identifies as a mixture of Grade 3a (good to moderate), 3b (moderate) and 5 (very poor quality).

1.2.4 The Scottish Power Energy Network (SPEN) 132 kV Substation compound abuts the existing Pentir Substation compound boundary to the south. Pentir Substation is the northernmost point of the 4ZC route, the existing 4ZC overhead line exits the existing Pentir Substation to the south. The 4ZA overhead line leaves Pentir Substation to the north; and the 4ZB overhead line leaves the Pentir Substation to the east. The pylons are visible from many views in the vicinity of the Pentir works site due to the flat topography.

1.2.5 The existing Pentir Substation is accessed from the west via the B4547, which runs in a north-west to south-east direction immediately west of the Pentir works site. There is an unnamed, single tracked road 50 m east of the existing Pentir Substation compound. The Pentir Substation cWS heavily screens the substation and views are very restricted from the road network.

1.2.6 There are a number of isolated farms and residential properties in vicinity of the Proposed Works site, the closest being approximately 400 m to the west. The Rhos Fawr Camping site (only open in August to September) is approximately 350 m north-west of the Pentir works site. The closest Public Right of Way (PRoW) is Footpath Pentir No 14,730 m north-west of the Pentir works site at its nearest point.

1.2.7 The Proposed Works are summarised below:

- Removal of existing redundant oil-filled cables and associated electrical equipment.
- Reconfigure cable terminations.
- Install replacement and new 400 kV cables.

- Reinstatement of the working areas within the exiting Pentir substation compound.

2.8.1 The Proposed Works includes the following principal elements which are described in detail in the Environmental Statement[2] and have been described in **Table 1-1**.

Table 1-1: Proposed Works of Project (Pentir Works Site)

Proposed Works	Description
Removal of Existing Equipment	The existing electrical apparatus to be removed is the existing cable sealing ends and associated steel structures; which will be disconnected and dismantled; all dismantled equipment would be disposed of into designated recycling waste skips in the Pentir works site. Also to be removed is a section of busbar and overhead line downdropper. Existing above and below ground earth tape would be temporarily removed and permanently reinstated on completion of the works. The old existing redundant oil filled 400 kV cables and associated plant i.e. three 225 litre tanks (one per phase) will be drained, decommissioned and dismantled. All waste material would be disposed offsite to designated licenced waste and recycling sites. Redundant concrete foundations would be broken down and the resultant arisings would be disposed of in a designated waste skip in the Pentir works site.
Electrical Equipment	The new replacement electrical apparatus to be installed is new cable sealing ends and associated steel structures. Existing Capacitive Voltage Transformers with support structures will be relocated from the present location to the other side of the circuit (in order to accommodate the additional set of cable sealing ends). There will also be a replacement section of busbar, replacement overhead line downdropper and earth switch and above and below ground earthing.
Cables	New 2,500 millimetres squared (mm^2) single core 400 kV cables comprising a segmented copper conductor, semi-conducting polymer conductor screen, extruded cross-linked polyethylene insulation, extruded semi-conducting polymer insulated screen, smooth welded aluminium sheath and high-density polyethylene outer sheath will be installed. A complete cable outer diameter is approximately 145 millimetres (mm). The new cables would pass beneath the existing electrical high voltage circuit busbar, requiring power outages for this part of the works. The cables would be in ducts in

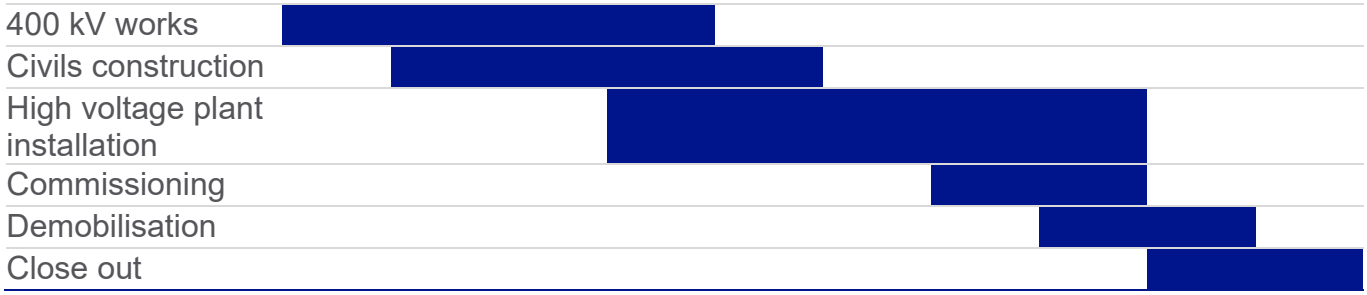
[2] Pentir to Trawsfynydd Reinforcement Project, Environmental Statement, Volume 2: Pentir Substation

	either a single trench or separate trenches approximately 1 m deep.
Reinstatement	All working areas in the existing Pentir Substation compound would be reinstated with 300 mm of type 1 and 75 mm of 10 mm limestone chippings. All scaffolding used for cable termination and mounting to structures would be removed.
Installation Activities	• Foundations for the new structures (cable sealing ends and associated steel structures) and relocated equipment (existing Capacitive Voltage Transformers) would be constructed from reinforced concrete delivered to the Pentir works site by truck mixer from the nearest supplier; • Stone and aggregate would be delivered to the Pentir works site as required; • Steel structures and associated electrical infrastructure would be erected using a combination of mobile cranes, mobile elevated work platforms (MEWPs) and telehandlers. Mobile cranes will be used for any heavy equipment; HV plant equipment, MEWPs will be used for bolting, fixing, busbars and telehandlers will be used for small lifts and traversing the site.; • The ducts and cable drums would be securely stored in the compound area. A combination of hydraulic winches and a crane would be used to install the cables into the ducts; 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.

2.9.1 The Proposed Works are planned to be undertaken over a period of approximately 24 months from the start of 2027 to the end of 2029. Construction will occur in phases as indicated in **Table 1-2**, which will include activities summarised below:

Table 1-2 Construction Programme

	2027				2028				2029	
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Site mobilisation										
Civils enabling works										



- Site mobilisation – site set up for cabins, 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 plan installation;
- Commissioning – commissioning test, starting with testing the individual items of plant and culminating with testing the installed system as a whole before being brought into operation;
- 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 Outline Construction Environmental Management Plan

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

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

1.4 Objectives

4.1.1 The objectives of the CEMP are to:

- Provide a mechanism for ensuring the delivery of mitigation measures, to reduce environmental effects identified in the environmental assessment phase;
- Ensure compliance with legislation and identify where it will be necessary to obtain authorisation from relevant statutory bodies;
- Provide a framework for compliance auditing and inspection to ensure the agreed environmental aims are being met; and

- Ensure a prompt response to any non-compliance with legislative and planning conditions, including reporting, remediation and any additional mitigation measures required to prevent a recurrence.

1.5 Supporting Plans

5.1.1 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.

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

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

1.6 Structure of the Outline CEMP

6.1.1 **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.

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

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

2. ENVIRONMENT MANAGEMENT

2.1 Conformance with Corporate and Project EMS

1.1.1 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.

1.2.1 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**.

1.3.1 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.

1.4.1 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 their environmental impact. National Grid will approve the Contractor's EMS prior to construction.

2.2 Conformance with Planning Conditions

2.1.1 The Proposed Works encompasses the planning jurisdictions of Gwynedd Council. National Grid Electricity Transmission plc (NGET) is submitting a planning application under the Town and Country Planning Act 1990 (TCPA) to Gwynedd Council for the construction and operation of the Pentir works which forms part of Project. The Planning Application will allow for construction compounds associated with these works.

2.2.1 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

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

2.4 Consent and Licenses

4.1.1 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

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

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

Table 2-1: Responsibilities of the Contractor

Role	Responsibility
Project Manager	• Overall responsibility for ensuring conformance with the Outline CEMP; and • Incident investigation.
Safety, Health, Environment, Security and Quality (SHESQ) Manager	• Reviewing risk assessments and method statements (RAMS); • Manager of the Safety, Health and Environment (SHE) Plan; • Reviewing, updating and issuing the detailed CEMP; • Incident investigation; • Liaison with the emergency services; • Site inspection; • Reviewing applications for environmental consents and permits; and • Sensible monitoring.
Environmental Manager	• Ensure management plans are implemented; • Oversee environmental mitigation; • Site inspection; • Preparing and submitting applications for environmental consents and permits; • Maintaining a consents register; • Liaison with third parties and licensing authorities; • Organising environmental surveys; and • Progress monitoring.
Ecological Clerk of Works (ECoW)	• Oversee ecological mitigation works.

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

Table 2-2: Management Plans to be prepared

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

5.4.1 The plans above will be accessible on site and made available to any person working on the Proposed Works where required.

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

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

5.7.1 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.

5.8.1 National Grid will convene regular meetings with the Consultees where applicable. These will be open discussions and will be attended by relevant members of staff. The Contractor shall also liaise closely with Natural Resources Wales (NRW) and other key

stakeholders throughout the construction phase of the Proposed Works where necessary.

2.6 Environmental Procedures

Audits and Inspections

6.1.1 The Contractor shall undertake site inspections at a frequency that is relevant to the risk, which will include monitoring conformance with the Outline CEMP. Where inspections are undertaken assessment forms will be completed. 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 and signage;
- 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;
- Equipment with potential to leak oils and other liquids, for example, compressors and transformers;
- Daily risk assessment forms;
- Faults and defects to be identified and rectified; and

  Data for performance monitoring.

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

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

6.4.1 All monitoring reports will be made available to statutory and non-statutory bodies on request.

6.5.1 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)

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

Incident Response

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

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

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

- Related works will stop;
- If the incident is controllable by staff on Site, remedial action will be taken immediately in accordance with the PICP;
- The Environmental Manager and SHESQ Manager will be contacted;
- The size of the incident will be assessed; and
- 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.

6.10.1 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 detailed CEMP, PICP and SHE Plan will be updated (and any other plans as appropriate) and all workers will be notified.

Training

6.11.1 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.

6.12.1 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.

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

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

3. ENVIRONMENT MANAGEMENT OF SITE CONSTRUCTION

3.1 Introduction

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

3.2 General

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

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

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

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

2.4.1 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.

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

2.6.1 Site inspections will be recorded, incorporating all environmental areas.

3.3 Working Hours

3.1.1 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

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

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.

3.2.1 There may be some periods of extended or 24-hour working, however this would be by agreement with the Local Planning Authority.

3.3.1 The following operations may take place outside the core working hours referred to above:

- 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

4.1.1 Temporary lighting would be required in low light conditions during the construction working hours to ensure safe pedestrian passage from the working area to the site welfare facilities as well as task lighting at the working area. Lighting will be used only when required and will comprise lighting of work areas and access and egress with low level directional lighting.

4.2.1 Contractor shall provide and maintain all lighting for the construction works and the site welfare and site security cabins shall include low level lighting. Motion sensor lighting shall be used in areas of high security risk and access and egress. Construction lighting will follow BS EN 12464 (Parts 1 and 2), Institute of Lighting Professionals Guidance Note 08/23 Bats and Artificial Lighting at Night[4] and Institute of Lighting Professionals Guidance Note 1 for the Reduction of Obtrusive Light[5].

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

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

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

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

4.4.1 The Contractor will ensure that construction works will be restricted to daylight hours wherever practicable, to remove the need for artificial lighting, with focused 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

5.1.1 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

6.1.1 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.

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

6.3.1 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.

6.4.1 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.

6.5.1 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.

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

6.7.1 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

7.1.1 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 unnamed watercourse, and ditch proposed areas of temporary and permanent works there is the potential to cause pollution, transfer non-native species and can impact on the bed and banks of a watercourse.
PPG 6: Working at construction and demolition sites.	An overarching document providing best practise principles and examples to be used as guidance on how to prevent pollution.
PPG 7: Safe Storage – the safe operation of refuelling facilities	Including guidance on small scale liquid refuelling of plant and machinery on site to prevent damage to surface waters, ground water, land and air.
GPP8: Safe storage and disposal of used oils.	The correct handling of waste during the construction period and during ongoing maintenance, including waste oils, must be safe and secure. Waste minimisation is the preferred option. Waste is regulated under the Duty of Care Regulations. Oil storage is regulated under the Oil Storage Regulations (see GPP2).
GPP13: Vehicle washing and cleaning.	Effluent and run-off from vehicle washing and cleaning can damage the environment and pollute rivers, streams, burns and ground water. It may be a legal requirement to arrange the collection and disposal of effluent and run off. If vehicle wash areas are required on site these should be managed appropriately.
GPP19: Vehicles: Service and Repair.	The repair and maintenance of machinery and plant must be conducted in an appropriate location and properly managed.
PPG 20: Dewatering underground ducts and chambers	Protection of controlled waters during any dewatering works to avoid pollution.
GPP21: Pollution incident response planning.	Production of a plan will help to prevent or reduce environmental damage of such an incident occurs. A template is available to assist the production.
PPG 26: Safe Storage – drums and intermediate bulk containers (IBCs)	Good practice guidance for the safe storing and handling of small containers and IBCs to reduce the risk of pollution from sites to land, surface waters and ground water.

7.2.1 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.

7.3.1 The Contractor shall make provisions for access to more sophisticated containment/clean-up equipment such as absorbent 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

7.4.1 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.

7.5.1 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 bulk containers (IBCs);
    - Mobile bowsers - containers designed to store and dispense oil that can be moved between locations but not under their own power; and
    - Some types of generators 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 tray, that are to be checked and emptied daily in accordance with the Pollution Prevention 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

7.6.1 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.

7.7.1 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

7.8.1 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

7.9.1 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

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

- Site-specific procedures are in place for bulk deliveries;
- Delivery points and vehicle routes are clearly marked;
- Emergency procedures are displayed, and a suitably sized spill kit is available at all delivery points, and staff are trained in these procedures and the use of spill kits;
- Suitable facilities (for example, drip trays, drum trolleys, funnels) meet the sites specific dispensing needs and are maintained and used;
- Tank capacities and current contents levels are checked prior to accepting a delivery to ensure that they are not overfilled;
- All deliveries are supervised throughout the delivery operation;
- Spill prevention equipment is used during dispensing activities; and
- All spillages occurring during dispensing and handling activities are cleared up and reported via the SHESQ Manager and are dealt with in accordance with **Section 2.6** of this Outline CEMP.

Vehicles and Plants

7.11.1 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;
- 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

7.12.1 Highways will be monitored, and road sweeping will be undertaken as required to remove deposits of silt from roads to reduce the risk of silt being washed into surface water gullies and watercourses.

3.8 Material/Resource and Waste Management

8.1.1 There are no allocated/safeguarded mineral or waste sites are located within the Pentir 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.

8.2.1 Best working practices and measures to manage the wastes produced during the construction phase of Proposed Works have been provided below.

8.3.1 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).

8.4.1 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.

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

8.6.1 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)

9.1.1 The existing Pentir Substation and access road in the Pentir works site comprises Made Ground. Ground stability classifies most of the Pentir works site as stable, with some compressibility hazards. There is a mineral safeguarding area for sand and gravel 205 m south-east of the Pentir works site. The Pentir works site is in a non-coal mining area for Vein Minerals.

9.2.1 The Proposed Works have the potential to cause geological and hydrogeological impacts, including potential damage to bedrock and risks associated with Alluvium, such as compressibility and uneven settlement. Construction activities could affect groundwater flow, quality, and levels, and create contamination risks from accidental spills, leaks, and the disturbance of existing contaminants. There is also a risk of importing potentially contaminated materials and exposing workers to harmful substances. However, if contamination is identified post-construction, remediation

measures will be implemented, likely resulting in beneficial effects. No effects are anticipated for land use, agriculture and soils therefore they have been scoped out of the assessment.

9.3.1 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 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.

9.5.1 The Contractor shall ensure that the contaminated materials are segregated and stockpiled 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.

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

9.7.1 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).

9.8.1 Where there is a requirement to dispose of surplus excavated materials off-site as waste, the material will be characterised to determine firstly whether it is Hazardous or Non-Hazardous waste in accordance with the Technical Guidance WM3 and then once this is established, the appropriate disposal facility will be determined through Waste Acceptance Criteria analysis, as required.

9.9.1 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.

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

Use of Support Fluids

9.11.1 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).

9.12.1 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

9.13.1 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.

9.14.1 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. The key construction mitigation and control measures are provided in **Table 4-1**.

9.15.1 Ground investigation will be undertaken to consider the potential for ground instability and requirement for mitigation during construction and mitigation. Mitigation will be implemented in accordance with the detailed CEMP, such as during excavations and dewatering.

9.16.1 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.

9.17.1 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.

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

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

9.20.1 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.

9.21.1 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

10.1.1 The closest watercourse to the Pentir works site is an unnamed watercourse approximately 70 m south and passes below the Pentir Substation access road flowing in an east – west direction. A ditch is also present approximately 400 m south-west of the Pentir Works Site, which runs beneath the Pentir Substation access road. The Pentir works site is in the Nant-y-Garth River Waterbody Catchment, though the Nant-y-Garth waterbody is 1.5 km to the west of the Pentir works site. The Pentir works site, and surrounding area lies above the Llyn and Eyri Water Framework Directive (WFD) groundwater body which retains a Poor overall status under the WFD.

10.2.1 It has been assessed within Environmental Statement, that the Proposed Works are not anticipated to have significant impacts on water quality, resources and flood risks in the immediate vicinity of local area. Therefore, appropriate industry best practice and published guidelines will be followed to reduce pollution and sediment movement during construction as detailed in **Table 4-1**.

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

10.4.1 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).

10.5.1 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.

10.6.1 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.

10.7.1 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.

10.8.1 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

10.9.1 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.

10.10.1 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 10 m of a watercourse or 50 m of a well, spring or borehole.

Groundwater Compliance

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

10.12.1 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

10.13.1 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.

10.14.1 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.

10.15.1 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.

10.16.1 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.

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

Drainage

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

- The measures in **Section 3.9** of this Outline CEMP (Soil Management) will be prepared in advance of construction to ensure protection, conservation and reinstatement of soil material, its physical and chemical properties and functional capacity for agricultural use;
- Permanent surface water/ agricultural drains will be re-installed to reinstate any pre-existing field drainage systems to pre-construction condition;
- Extended excavations will be arranged so as not to create preferential drainage pathways with the potential to cause flooding of lower land;
- Appropriate measures will be implemented such as the introduction of baffles or creation of sumps to reduce the risk of preferential drainage paths being created;
- Where drains are encountered they will be either repaired or diverted to ensure that preferential pathways are not created; and
- Ensure that all reinstated surfaces have the same runoff properties and are at the same elevation as existing as far as practically feasible.

Permitted Discharges

10.19.1 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;
- Ensure that the consenting body is advised if results indicate that limits are being exceeded and report the occurrence as an incident in accordance with the Outline CEMP. Take immediate steps to rectify the situation; check receiving water for pollution resulting from exceedance; and
- Carry out any remediation works necessary.

Flooding

10.20.1 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
- Where possible access roads / routes, parking bays, hardstanding areas (i.e. those that may be required for temporary access, maintenance or repairs) are laid at existing elevations and not raised compared to existing or surrounding ground levels.

3.11 Historic Environment

11.1.1 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.

11.2.1 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

12.1.1 The Study Area is the likely catchment area for construction traffic, which includes likely routes to the Pentir works site from the strategic road network and from local and regional population centres between a 30 – 45 minute drive time of the Pentir works site. Access to the Pentir works site via PRoW, buses and rail is limited and it has been assumed that staff would gain access to the Pentir works site via private vehicles. There are no PRoWs within 500 m of the Pentir works site.

12.2.1 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.

12.3.1 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**.

12.4.1 The Proposed Works has looked to mitigate by design issues in relation to traffic and transport. The detailed CTMP shall ensure that all traffic associated with the construction works operate in a safe and compliant manner at all times and shall be signed by the Contractor and the relevant highway authority.

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

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

- Ensure the effects on local residents, properties, businesses and schools caused by construction traffic, where practicable, are kept to an absolute minimum;
- Maximise safety in all aspects of the 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.

12.7.1 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.

12.8.1 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.

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

3.13 Air Quality and Emissions

13.1.1 There are three ancient woodlands and two Candidate Local Wildlife Sites (Pentir Substation Candidate Wildlife Site and Near Breaker's Yard Candidate Wildlife Site) within 250 m of Pentir works site, which would be sensitive to the impacts of dust settling either directly or indirectly. There are no residential properties or recreational activities within 250 m of the Pentir works site.

13.2.1 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.

13.3.1 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 (section-wise) during works and not all at once.

13.4.1 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

14.1.1 There is one sensitive receptor within 300 m of the Pentir works site; the residential receptor comprising Gamekeepers Cottage, Rhos Fawr. Residential receptors are considered to have medium sensitivity to noise.

14.2.1 The enabling, trench digging and reinstatement works would generate the highest levels of noise. During enabling works, noise levels would arise from breaking of concrete, trench digging works and reinstatement works involving compaction to the nearest residential receptor. All activities are expected to cause temporary, low to negligible impacts on a medium sensitivity residential receptor, with no significant effects.

14.3.1 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.

14.4.1 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.

14.5.1 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.

14.6.1 All powered equipment in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum required.

14.7.1 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.

14.8.1 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.

14.9.1 The Contractor shall undertake to keep site noise to a minimum and must carry out all works with the local community in mind.

14.10.1 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.

14.11.1 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. Site-specific measures recommended on assessment for Proposed Works will be implemented during the construction works and have been detailed within **Table 4-1**.

3.15 Ecology and Nature Conservation

15.1.1 The Pentir works site is entirely hardstanding. Habitats within 50 m of the Pentir works site include various types of woodland, scrub, grassland, heath, hedgerows and water features including standing and running water, ditches and a balancing pond. Nine statutory designated sites (Site of Special Scientific Interest, National Nature Reserve and Local Nature Reserves) are present within 5 km. There are 35 non-statutory sites designated for nature conservation within 2 km, five of which are within 500 m. There are 47 Ancient Woodland sites within 2 km, the closest located 30 m to the west. Habitats of Principal Importance identified within 1 km include lowland dry acid grassland, purple moor grass and rush pastures and traditional orchards. A number of protected and notable species were identified within 2 km of the Pentir works site.

15.2.1 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.

15.3.1 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.

15.4.1 Measures contained in The Environment (Wales) Act 2016 and best practice guidance on the control and removal of invasive weed species will be implemented.

15.5.1 Contractors and site staff will receive a toolbox talk on the various ecological sensitivities of the development as part of their site induction.

15.6.1 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.

15.7.1 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.

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

3.16 Climate Change

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

16.2.1 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.

16.3.1 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

17.1.1 The Pentir Works Site is largely flat, with a gently undulating surrounding area consisting of agricultural land, woodland and watercourses. Visual receptors are limited to a small number of scattered agricultural and residential properties.

17.2.1 The Proposed Works will be restricted to the existing Pentir Substation. Effects on landscape character and visual amenity would be temporary and barely discernible in the context of existing Pentir Substation infrastructure and screened by existing vegetation.

17.3.1 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) 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

18.1.1 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.

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

18.3.1 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.

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

18.5.1 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

1.1.1 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.

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

Table 4-1: Construction Management and Mitigation

Unique Reference	Action/Commitment/Mitigation (including Monitoring Requirements)	Objective	Organisation/Individual Delivering Measure
Description of the TCPA Proposed Development			
P-PD-001	All working areas in the existing Pentir Substation compound would be reinstated with 300 mm of type 1 and 75 mm of 10 mm limestone chippings. All scaffolding used for cable termination and mounting to structures would be removed.	To return the Site to its original state and minimise adverse impacts in operation.	Construction Contractor
P-PD-002	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 and the Outline CEMP. 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.	Construction Contractor
P-PD-003	Temporary lighting would be required in low light conditions during the construction working hours to ensure safe pedestrian passage from the working area to the site welfare facilities as well as task lighting at the working area. 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 safety and reduce disturbance to nocturnal and crepuscular species.	Construction Contractor
P-PD-004	Foundations for the new structures (cable sealing ends and associated steel structures) and relocated equipment (existing Capacitive Voltage Transformers) would be constructed from reinforced concrete delivered to the Pentir works site by truck mixer from the nearest supplier.	To minimise distances materials are transported.	Construction Contractor

	Stone and aggregate would be delivered to the Pentir works site as required.		
P-PD-005	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. There may be some periods of extended or 24-hour working, however this would be by agreement with the Local Planning Authority.	To minimise construction impacts on sensitive receptors.	Construction Contractor
Geology, Hydrology, Land Use and Agriculture (Soils)			
P-GH-001	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 to minimise the risk to construction workers, and pollution of uncontaminated strata and controlled waters (groundwater and surface waters). Measures contained in the detailed CEMP will limit the potential for dispersal and accidental releases of potential contaminants, soil derived dusts and uncontrolled run-off to occur during construction. For example, the detailed CEMP will set out how material is to be excavated, segregated, and stockpiled to minimise the potential for run-off, soil quality degradation and wind dispersal of dusts. The detailed CEMP will also establish procedures for dealing with unexpected soil or groundwater contamination if encountered during construction.	To ensure mitigation and management measures are followed correctly during the construction stage of works.	Construction Contractor
P-GH-002	An appropriate intrusive ground investigation of selected areas of the Pentir works site will be undertaken in accordance with the relevant guidance including Eurocode 7 (BS EN 1997-2:2007)[6], BS 5930	To determine the ground condition, assess the nature, extent and magnitude of contamination, assess the risks from potential contaminants to human health/controlled	Construction Contractor

[6] British Standards Institution. Eurocode 7 Geotechnical design. Ground properties (BS EN 1997-2:2007)

	(2015 + A1 2020)[7] and BS 10175 (2011 + A2 2017)[8] and using the UK Specification for Ground Investigation (2022)[9]. The ground investigation will be designed to target the potentially contaminative sources identified in the site associated with the existing Pentir Substation. There will also be a need to obtain geotechnical information to inform the Proposed Works including on the potential for ground instability. If areas of the Pentir works site are shown to pose a risk, infrastructure could be moved to a different location if feasible. However, if it is not possible to move the infrastructure in contact with the ground, remedial measures would be identified and implemented.	waters and assess the ground gas regime to allow design and construction of foundations and structures.	
P-GH-003	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. 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 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,	To mitigate unacceptable contaminated land related risks to the environment and construction workers and ensure works are legally compliant.	Construction Contractor

[7] BS 5930 (2015 + A1:2020). Code of Practice for Site Investigations.

[8] BS 10175 (2011 + A2:2017). Investigation of Potentially Contaminated Sites - Code of Practice.

[9] ICE (2022). UK Specification for Ground Investigation. 3rd edition.

	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.		
P-GH-004	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 in the Contaminated Land Application in the Real Environment (CL:AIRE) Definition of Waste: Development Industry Code of Practice[10] to ensure that excavated materials are re-used appropriately, sustainably and remain outside the waste hierarchy. Materials which need to be removed from the Pentir works site will be disposed of to an appropriately permitted facility. A Materials Management Plan will be prepared along with a qualified person declaration to CL:AIRE prior to the construction works commencing.	Limit permanent removal of soils during construction phase, re-use excess material and to reduce adverse impacts on land and soil.	Construction Contractor
P-GH-005	Any material imported to the Pentir works site, such as for supporting foundations, will be natural quarried stone or, if recycled, the material will undergo chemical testing. The suite of contaminants and site use criteria will be agreed with regulatory authorities to demonstrate that the material is suitable for use on the Pentir works site and does not pose a risk to human health or the environment.	To ensure that contaminants do not enter the ground.	Construction Contractor
P-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	To minimise risk of site workers coming into contact with asbestos on site.	Construction Contractor

[10] CL:AIRE (2011). Definition of Waste: Development Industry Code of Practice

	asbestos and clearly describe how disturbance and spread of asbestos will be minimised or prevented.		
P-GH-007	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 Pentir works site or on other sites. Where there is a requirement to dispose of surplus excavated materials off-site as waste, the material will be characterised to determine firstly whether it is Hazardous or Non-Hazardous waste in accordance with the Technical Guidance WM3 and then once this is established, the appropriate disposal facility will be determined through Waste Acceptance Criteria analysis, as required.	To ensure that contaminants do not enter the ground and minimise the quantities of waste.	Construction Contractor
P-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)[11]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
P-GH-009	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.	To reduce the potential effects associated with fuels, oils and chemicals required during construction.	The Applicant/ Construction Contractor
P-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 drains to prevent any uncontrolled discharge (and take into consideration	To reduce the potential effects associated with fuels, oils and chemicals required during construction.	Construction Contractor

[11] Department for Environment, Food and Rural Affairs (Defra). Construction Code of Practice for the Sustainable Use of Soils on Construction Sites 2009. Available at: https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites. Accessed January 2025.

	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.		
P-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 in 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
P-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 such assessment will consider the effects of any draw down or impacts on nearby abstractions or resources along with ground instability. Dewatering will be developed in consultation with NRW and other stakeholders if appropriate.	To minimise the risk of groundwater flooding and impacts from dewatering to groundwater receptors.	Construction Contractor
Water Quality, Resources and Flood Risk			

P-WR-001	The detailed CEMP will set out a variety of control measures for managing the potential environmental effects of construction works including control and management of surface water runoff and pollution control and set out responsibilities for the preparation and implementation of the plan.	To minimise the impacts of surface water quality, groundwater and flood risk.	Construction Contractor
Traffic and Transport			
P-TT-001	Swept path analysis for 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
P-TT-002	HGVs will follow the designated routes. There are anticipated to be 10 two-way trips associated with cable deliveries to the substation.	Maintain the safe and effective flow of traffic on the road network.	Construction Contractor
P-TT-003	Utilising internal routes in the Pentir works site to avoid using the existing road network where practicable.	Maintain the safe and effective flow of traffic on the road network.	Construction Contractor
P-TT-004	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 should generally give priority to other road users.	Maintain the safe and effective flow of traffic on the road network.	Construction Contractor
P-TT-005	Restricting HGV movements to certain routes as follows: A5 – A4244 – B4547; A487 – B4547; A4087 – B4547.	Maintain the safe and effective flow of traffic on the road network.	Construction Contractor
P-TT-006	Restricting HGV movements to ensure arrivals and departures between 9.00 am and 5.00 pm to avoid increasing traffic levels on the surrounding highway network during the typical weekday peak hours.	Maintain the safe and effective flow of traffic on the road network.	Construction Contractor
P-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	Maintain the safe and effective flow of traffic on the road network.	Construction Contractor

	delivery slots, as well as to monitor compliance with HGV routing. In addition, adequate space would be made available in the Pentir works site to ensure no queuing back onto the surrounding road network occurs.		
P-TT-008	Implementing a monitoring system to record the route of all HGVs travelling to and from the Pentir works site, to record any non-compliance with the agreed routing strategy and 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
P-TT-009	Construction staff (e.g. non-HGV vehicles) would be directed to take the most direct route to the Pentir 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
P-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 environmental impact. A car share system should be implemented to match potential sharers and to help staff identify any colleagues who could potentially be collected along their route to and from the Pentir works site.	Maintain the safe and effective flow of traffic on the road network and encourage sustainable behaviour.	Construction Contractor
P-TT-011	Providing limited (but sufficient) on-site car and cycle parking to accommodate the expected parking demand of workers on the Pentir works site.	Maintain the safe and effective flow of traffic on the road network	Construction Contractor
P-TT-012	A specialised haulage service would be employed to allow AILs to transport components with the necessary escort, permits and traffic management, with the contractor consulting the relevant highways authorities to ensure the correct permits are obtained. The police will 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			

P-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
P-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 or environmental engineer or the site manager.	To ensure the proposed works air quality contacts are known.	Construction Contractor
P-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
P-AQ-004	Make the complaints log available to the local authorities when asked.	To minimise air quality impacts.	Construction Contractor
P-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 logbook.	To minimise air quality impacts.	Construction Contractor
P-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
P-AQ-007	Carry out regular site inspections to monitor compliance with the Outline 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
P-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

P-AQ-009	Ensure all vehicles switch off engines when stationary - no idling vehicles.	To minimise air quality impacts.	Construction Contractor
P-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
P-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
P-AQ-012	Ensure an adequate water supply on the site for effective dust and 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
P-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
P-AQ-014	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	To minimise impacts associated with track out.	Construction Contractor
P-AQ-015	Avoid site runoff of water or mud.	To minimise air quality impacts.	Construction Contractor
P-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
P-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
Noise and Vibration			

P-NV-001	All appropriate processes, procedures and measures will be in place to minimise noise before works begin and throughout the construction programme.	To minimise noise and vibration impacts.	Construction Contractor
P-NV-002	All contractors to be made familiar with current legislation and the guidance in BS 5228 (Parts 1 and 2) which should form a prerequisite of their appointment	To minimise noise and vibration impacts.	Construction Contractor
P-NV-003	Noise and vibration will be controlled at source (e.g. the selection of inherently quiet plant and low vibration equipment) through a review of the construction programme and methodology to consider quieter methods and consideration of the location of equipment on-site and control of working hours.	To minimise noise and vibration impacts.	Construction Contractor
P-NV-004	Modern plant that comply with applicable UK noise emission requirements will be used.	To minimise noise and vibration impacts.	Construction Contractor
P-NV-005	Hydraulic techniques for breaking concrete will be used in preference to percussive techniques	To minimise noise and vibration impacts.	Construction Contractor
P-NV-006	Drop heights of materials will be minimised	To minimise noise and vibration impacts.	Construction Contractor
P-NV-007	Plant and vehicles will be sequentially started up rather than all together	To minimise noise and vibration impacts.	Construction Contractor
P-NV-008	Off-site pre-fabrication where reasonably practicable	To minimise noise and vibration impacts.	Construction Contractor
P-NV-009	Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturer's specifications	To minimise noise and vibration impacts.	Construction Contractor

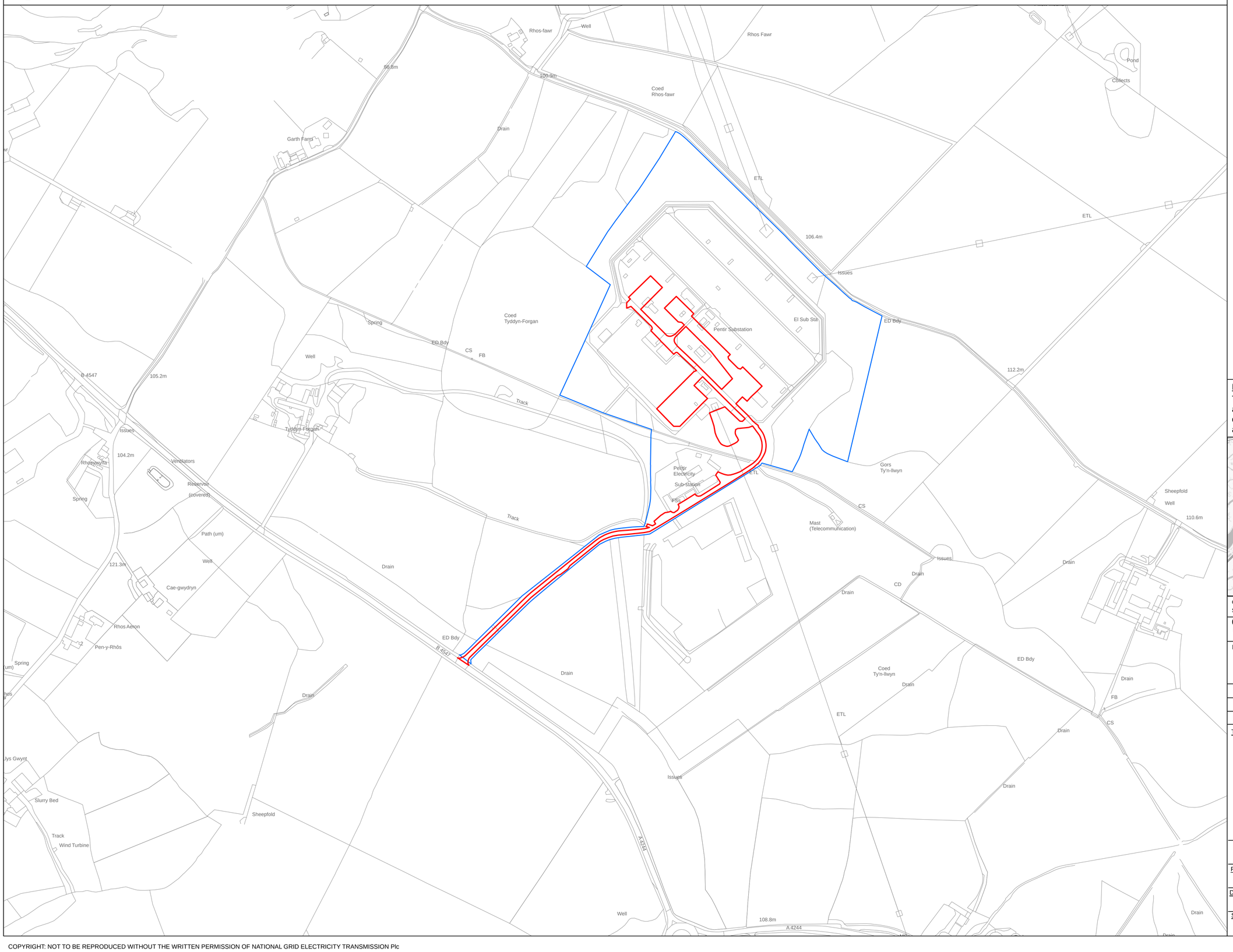
P-NV-010	All construction plant and equipment to be properly maintained, silenced where appropriate, operated to prevent excessive noise and switched off when not in use	To minimise noise and vibration impacts.	Construction Contractor
P-NV-011	Loading and unloading of vehicles, dismantling of site equipment or moving equipment or materials around the Pentir works site to be conducted in such a manner as to minimise noise generation	To minimise noise and vibration impacts.	Construction Contractor
P-NV-012	All vehicles used on-site shall incorporate reversing warning devices as opposed to the typical tonal reversing alarms to minimise noise disturbance	To minimise noise and vibration impacts.	Construction Contractor
P-NV-013	Provision of information to the relevant local authority and local residents to advise of potential noisy works that are due to take place	To minimise noise and vibration impacts.	Construction Contractor
P-NV-014	Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use	To minimise noise and vibration impacts	Construction Contractor
P-NV-015	Plant will always be used in accordance with manufacturers' instructions. Care will be taken to site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be carried out away from such areas	To minimise noise and vibration impacts.	Construction Contractor
Ecology and Nature Conservation			
P-EC-001	The Proposed Works have been designed to avoid key nature conservation and ecological features present in or adjacent to the Pentir works site as far as practicable. The following minimum buffers from key habitat features are applied where practicable, for the Pentir works site excluding use of the laydown and storage area on existing hardstanding, and the use of the unmodified existing access road and car parking areas which may fall in these buffers: • 15 m from woodlands.	To avoid and minimise adverse impacts to habitats.	Construction Contractor

	• 10 m from hedgerows increasing to 15 m where there are hedgerow trees. • 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 soil 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.		
P-EC-002	The detailed CEMP will provide the measures required to mitigate construction related effects on biodiversity, including those associated with construction dust deposition, air pollution, pollution incidents, water quality, light, noise and vibration. The implementation of the detailed CEMP will manage the environmental effects of the Proposed Works and demonstrate compliance with environmental legislation.	To minimise ecology impacts.	Construction Contractor
P-EC-003	The Pentir works site is comprised entirely of hardstanding areas and vegetation clearance will not be required. Any habitat features in such areas which may conceal sheltering reptiles and amphibians (e.g. rubble mound bunds, any other debris) will be subject to a hand search by an Ecological Clerk of Works (ECoW) and will not be dismantled during their inactive season (i.e., November to February inclusive).	To minimise adverse impacts on reptiles and amphibians.	Construction Contractor
P-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

P-EC-006	Where lighting is required, it will conform to best practice guidelines with respect to minimising light spill into adjacent habitats and prevent disturbance to bats and other species, including Institute of Lighting Professionals Guidance Notes (in particular GN08/23 Bats and Artificial Lighting at Night which 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: • 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
P-EC-007	To comply with relevant wildlife legislation, pre-construction surveys, such as updated Phase 1 and badger walkovers, and bat roost assessments of any affected trees near the Proposed Works, will be undertaken to support the baseline findings. The purpose of these pre-construction surveys is to ensure mitigation during construction is based on the latest protected species information. 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

P-EC-008	During construction (and maintenance), Reasonable Avoidance Measures (RAMs), including appropriate buffers (up to 30 m) around any identified badger setts, or trees with bat roost suitability (buffer of 15 m) (as detailed in Habitat Avoidance Measures) in proximity to the Proposed Works area will be implemented, should any be found during preconstruction surveys.	To avoid adverse impacts to protected species and comply with conservation legislation.	Construction Contractor
P-EC-009	Implementation of measures to avoid animals being injured or killed in 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.	To avoid adverse impacts to protected species and comply with conservation legislation.	Construction Contractor
P-EC-010	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
P-EC-011	Ongoing monitoring of habitats and species will be carried out throughout construction of the Proposed Works, overseen by an appointed 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 could occur.	To avoid adverse impacts to protected species and comply with conservation legislation.	Construction Contractor

SITE LOCATION PLAN

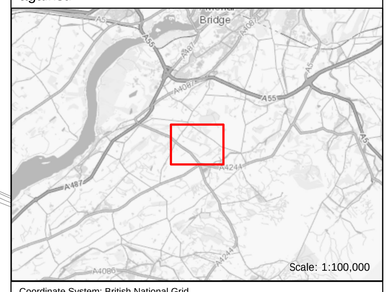


Legend

- Boundary of the Proposed Works
- Land in control of the applicant

Notes

This drawing is scaled at paper size A1, therefore any prints taken at smaller sizes will affect accuracy of the measurement units and should not be scaled against.



Coordinate System: British National Grid

Sheet X Centroid Coordinate: 255764.63E Sheet Y Centroid Coordinate: 367562.52N

0 125 250 Metres

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Issue	Date	Remarks	Drawn	Checked	Approved
P01	JUL 25	FIRST	PN	SB	RW

Title

FIGURE 1-1: SITE LOCATION PLAN

nationalgrid

Figure Number

PTC1/PTNO - PENTIR

Drawing Reference

PTNO-WSP-SS52-C00484-DRW-CP-000001

Scale	Sheet Size	Sheet	Issue
1:2,500	A1	SHEET 1 OF 1	1

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2.5.A Aquatic Ecology 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 Pentir 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 in this appendix has been used to inform the assessment in the Environmental Statement (ES) **Volume 2, 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 2, Chapter 2: Pentir Works** of the ES.

1.1.3 This appendix is supported by **Figure 2.5.A.1**: Aquatic Survey Locations (Annex 1).

1.2 Project Description

1.2.1 The Project consists of the following works:

- **Volume 2: Pentir Works.**
- **Volume 3: Bryncir Works.**
- **Volume 4: Glaslyn Cables Works.**
- **Volume 5: Trawsfynydd Works.**
- **Volume 6: Wider Works**.

1.2.2 This appendix of the ES covers the Pentir works site only (as shown in ES **Volume 2, Pentir Works, Figure 2.2.2**):

- The Pentir Substation is an existing substation in north-west Wales approximately 4.5 kilometres (km) south-west of Bangor, in the administrative boundary of Gwynedd Council.
- The proposed works will comprise:
  - Replacement of existing cross site underground cables within the Pentir Substation
  - Installation of new cross site underground cables within the existing compound.
- 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 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 relevant 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).

1.3.2 Recommendations for any avoidance, mitigation and enhancement for aquatic species are provided in ES **Volume 2**, **Chapter 5: Ecology and Nature Conservation**.

1.4 Study Area

1.4.1 The Study Area was defined to include ecological features likely to be at risk from direct and indirect impacts that might arise from the proposed works and is the initial basis for determining a Zone of Influence (ZoI). CIEEM guidance (Ref 1.1) defines a ZoI as: "…*the area over which biodiversity features may be affected by biophysical changes as a result of the proposed project and associated activities*".

1.4.2 The ZoI is based on the:

- Nature of the proposed works, activities, and the potential for effects at the construction, operation and maintenance phases.
- Nature of the land use and habitats in the vicinity, the number of watercourses and waterbodies, their connectivity within and outside of the proposed works area and how they may be used by different species or species groups.
- Habitats, behaviours and preferences of different species or species groups and whether these could be affected both spatially and temporally.

1.4.3 In determining the extent of the ZoI in this assessment, consideration has been given to the fact that these works form a component of a larger overall Project.

1.4.4 All designated sites, sensitive habitats, and protected and notable species that occur within the ecological ZoI of the proposed works have been considered in this assessment.

2. Legislation

2.1.1 This assessment has been undertaken in the context of the following legislative instruments, planning policies and guidance documents:

- Convention on the Conservation of Migratory Species (CMS) of Wild Animals 1979 (or Bonn Convention) (Ref 2.1);
- 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); and
- 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 Pentir 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 Pentir 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 Pentir 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 Pentir 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 Pentir 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 Pentir 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 where watercourses in the works area would be crossed by the proposed works and have the potential to be affected. Eight sites were selected to be surveyed (**Table 3-1** - Pentir aquatic survey sites and **Figure 2.5.A.1**: Aquatic Survey Locations). The survey sites comprised five running water sites along the Afon Cegin and its tributaries. The remaining two were scoped out due to being dry during the terrestrial ecology Phase 1 surveys. Surveys were not deemed

necessary on the surrounding ditches of the Pentir substation as these were categorised as ephemeral or dry during the Terrestrial Phase 1 surveys representing sub-optimal or unsuitable aquatic habitat.

3.2.2 Access to the sixth site (3AG) was not possible due to cattle in the field representing a potential health and safety risk during the attempted surveys. However, this was categorised as a dry ditch during the Terrestrial Phase 1 surveys and therefore represents unsuitable aquatic habitat.

3.2.3 All surveys where access was possible were completed in their respective optimal survey seasons (see subsequent sections) in 2024.

Table 3-1 - Pentir aquatic survey sites

Site ID	National Grid Reference	Aquatic Scoping	Macroinvertebrates
3AB	SH 55610 65085	✓	✓
3AC	SH 55697 65184	✓	✓
3AD	SH 55919 65483	✓	✓
3AE	SH 56122 65946	✓	✓
3AF	SH 56221 66820	✓	✓
3AG	SH 56020 67353	No access	

Aquatic Scoping Surveys

3.2.4 During the initial visit to each survey site, aquatic scoping surveys were completed. This involved a qualified aquatic ecologist completing a walkover to assess the site for its suitability for notable aquatic species (protected and invasive) and the requirement for additional species surveys. This is based on expert judgement and involves assessing hydromorphological features of a watercourse, water quality, and the surrounding riparian environment.

Aquatic Macrophyte Surveys

3.2.5 Aquatic macrophyte surveys were scoped out as the Terrestrial Ecology Phase 1 surveys highlighted that the ditches crossed by the existing Pentir substation infrastructure were dry and would likely only hold water during large pluvial events, therefore representing unsuitable aquatic habitat. In addition, the proposed works are being completed within the existing hard standing of the substation with no direct impacts on watercourses proposed.

Fish Surveys

3.2.6 Fish surveys were scoped out as the Terrestrial Ecology Phase 1 surveys highlighted that the ditches crossed by the existing Pentir substation infrastructure were dry and would likely only hold water during large pluvial events, therefore representing unsuitable aquatic habitat. In addition, the proposed works are being completed within the existing hard standing of the substation with no direct impacts on watercourses proposed.

Aquatic Macroinvertebrate Surveys

3.2.7 Aquatic macroinvertebrate surveys were undertaken at six sites in Autumn 2024, where the exact crossing location could not be reached, proxy sites were identified the location of these are shown in **Table 3-2**. The specific locations and dates of the surveys are shown in **Table 3-2.**

Table 3-2 Aquatic macroinvertebrate survey locations and dates

Water crossing reference ID	Watercourse	Site name	National grid reference	Survey date	Season	Distance from the Works Site
Crossing at Afon Cegin	Afon Cegin	3AB	SH 55610 65085	30/10/2024	Autumn	2.20 km south-east
Crossing at Unnamed trib. of Afon Cegin	Unnamed trib. of Afon Cegin.	3AC	SH 55697 65184	30/10/2024	Autumn	2.11 km south-east
Crossing at Afon Cegin	Afon Cegin	3AD	SH 55919 65483	30/10/2024	Autumn	1.84 km south-east
Crossing at Afon Cegin Trib.	Afon Cegin Trib.	3AE	SH 56122 65946	29/10/2024	Autumn	1.46 km south-east
Crossing at Afon Cegin 4	Afon Cegin	3AF	SH 56221 66820	30/10/2024	Autumn	0.81 km south-east
Crossing at Afon Cegin 5	Afon Cegin Trib.	3AG	SH 56020 67353	29/10/2024	Autumn	0.22 km east

3.2.8 The aquatic macroinvertebrate surveys were undertaken by suitably qualified and experienced aquatic ecologists. Sampling procedures followed those standardised by the Environment Agency (Ref 3.8), which conform to British Standard-European Standard-International Organisation for Standardisation (BS-EN-ISO) 10870:2012 Water Quality – Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters (Ref 3.9). These methods allow characterisation of aquatic macroinvertebrate communities and can be used to determine whether rare or notable species or communities are present. The samples were taken using a standard Freshwater Biological Association (FBA) (Ref 3.10) pattern kick net (mesh size: 1 millimetres (mm)). The habitats present were proportionally sampled through a combination of kick sampling and sweep sampling for three minutes followed by a one-minute active search of larger substrates in accordance with the standard methods. Collected samples were subsequently preserved in Industrial Methylated Spirit (IMS) for laboratory processing. No surveys were undertaken during or immediately following periods of high flow in accordance with best practice guidance.

3.2.9 Each of the samples collected was sorted and analysed in a laboratory setting by suitably trained and experienced aquatic ecologists. Lists of the aquatic macroinvertebrate taxa present were produced in line with Environment Agency guidance (Ref 3.8). The samples were identified to 'mixed-taxon level' using a stereo-microscope and identified to species level (where practicable), except for the following:

- Worms (*Oligochaeta*), which were identified to sub-class;
- 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.

3.2.10 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)

3.2.11 A Community Conservation Index (CCI) (Ref 3.12) was calculated for each site as detailed in **0**. 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)

3.2.12 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 **0**. 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)

3.2.13 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 **0** 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)

3.2.14 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 **0**. 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.

3.2.15 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)

3.2.16 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).

3.2.17 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.

3.2.18 Analysis using RICT is only suitable for freshwater (not estuarine or marine) sites on rivers or streams that are naturally permanently flowing. RICT analysis was not undertaken for those sites identified as ditches due the nature (i.e., not naturally permanently flowing condition).

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 Access to site 3AC and 3AF was limited due to steep-sided banks and consequently assessments were predominantly undertaken from the bank tops. This meant that sweep sampling instead of kick sampling was completed at this site.

3.3.3 Access to site 3AG was not possible due to the presence of cattle in the field representing a potential health and safety risk during the attempted surveys. These site access constraints are not believed to represent a limitation to the subsequent Environmental Impact Assessment (EIA) given that the Terrestrial Ecology Phase 1 surveys highlighted that this watercourse was a dry ditch, representing unsuitable aquatic habitat.

3.3.4 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 **Table 4-1** provides details of the four statutory designated sites up to 10 km of the Proposed Scheme boundary with aquatic ecology features. The closest was the Eryri/Snowdonia SAC 2.97 km south-east.

Table 4-1 Statutory designated sites located up to 10 km of the Proposed Works Site that contain aquatic features

Statutory designation	Site name	Description	Approximate distance from Works Site
SAC	Eryri (Snowdonia)	Annex I habitats that are a primary reason for selection of this site: Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea* Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: Northern Atlantic wet heaths with *Erica tetralix* Blanket bogs, Petrifying springs with tufa formation (*Cratoneurion*) Alkaline fens Annex II species that are a primary reason for selection of this site: Slender green feather-moss *Drepanocladus*	2.89 km south-east

		(Hamatocaulis) vernicosus Floating water-plantain Luronium natans	
SSSI	Llyn Padarn	Supports a population of Arctic charr (*Salvelinus alpinus*), one of three remaining natural populations. The lake also supports notable aquatic plants including floating water-plantain (*Luronium natans*) and small quillwort (*Isoetes echinospora*).	4.88 km south
SAC	Afon Gwyrfai A Llyn Cwellyn	Annex I habitats that are a primary reason for selection of this site: Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea;* and Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. Annex II species that are a primary reason for selection of this site: Atlantic salmon (*Salmo salar*); and Floating water-plantain (*Luronium natans*). Annex II species present as a qualifying feature, but not a primary reason for site selection: Otter (*Lutra lutra*).	8.76 km south
SAC	Coedydd Aber	The site is designated for many features,	10.07 km east

		including the Afon Rhaedr Fawr which supports brown trout (*Salmo trutta*), European eel (*Anguilla anguilla*), Atlantic salmon, and locally uncommon stoneflies.	

4.1.2 A total of four non-statutory designated sites were identified within the Study Area (Table 4-2).

Table 4-2 - Non-statutory designated sites located within 2 km from the Proposed Works Site that contain aquatic features

Designation	Site name	Description	Approximate distance from Works Site
LWS	Coed Nant y Garth	Mixed lowland woodland, stream	0.50 km north-west
cLWS	Glan-rhyd reservoir	Standing water; semi-improved neutral grassland; marshy grassland	0.54 km south-east
cLWS	Ty'n y Rhos	Marshy grassland; broadleaved woodland; standing water	1.18 km south-west
cLWS	Vaynol Park woodlands and lake	Broadleaved woodland; standing water	1.84 km north-west

Water Framework Directive Status

4.1.3 There are two Water Framework Directive (WFD) waterbodies in the Study Area, these are outlined in **Table 4-3**.

Table 4-3 - Water Framework Directive (WFD) waterbodies located within 2 km of the Works Site

Water body	WFD water body ID	Ecological status	Approximate distance from the Works Site
GB110065058540	Cegin	Moderate	0.72 km east

GB110065058490	Nant-y-Garth (Menai Strait)	Good	1.38 km west

Cegin

4.1.4 Cegin (WFD waterbody ID: GB110065058540) is a natural river classified as 'Moderate' Ecological Status, with 'High' Status for invertebrates and 'Good' Status for macrophytes in Cycle 3. It is currently not classified for fish. The years when the Cycle 3 classifications were completed are not available on DataMapWales website.

Nant-y-Garth (Menai Strait)

4.1.5 Nant-y-Garth (Menai Strait) (WFD waterbody ID: GB110065058490) is a natural river classified as 'Good' overall Ecological Status, with 'High' Status for invertebrates and 'Good' Status for macrophytes in Cycle 3. It is currently not classified for fish. The years when the Cycle 3 classifications were completed are not available on DataMapWales website.

Habitats of Principal Importance (HoPI)

4.1.6 Rivers are HoPI listed under Section 7 of the Environment (Wales) Act 2016 (Ref 2.9). The Afon Cegin and smaller tributaries are adjacent the Pentir works site.

Notable Species Identified in the Desk Study

Aquatic Macroinvertebrates

4.1.7 No notable aquatic macroinvertebrate species were recorded in the Study Area from all data sources.

Aquatic Macrophytes

4.1.8 The northern yellowcress (*Rorippa islandica*) was the only notable aquatic macrophyte species identified within 2 km of the works area. Table **4-4** provides details about its designation and number of records.

Table 4-4 - Notable macrophyte species identified in the Study Area

Species	Conservation designation (S)	Number of records	Most recent record	Location of the closest record	Data source
Northern yellowcress (*Rorippa islandica*)	Nationally scarce, Global red list (Ref 2.3) post-2001 – Least Concern	1	2018	1.56 km north-west	Cofnod

Fish

4.1.9 Brook lamprey (*Lampetra planeri*) was the only notable and protected fish species recorded in the Study Area (**Table 4-5**).

Table 4-5 - Notable fish species identified in the Study Area

Common name (Scientific name)	Conservation designation (S)	Number of records	Most recent record	Location of the closest record	Data source
Brook lamprey (*Lampetra planeri*)	Appendix III of the Bern Convention (Ref 2.4), Annex II of the Habitats Directive (Ref 2.5)	1	2015	1.35 km south-east	Cofnod

INNS and Non-Native Species

4.1.10 Two invasive non-native species (INNS) and two non-native species were identified within 2 km of the works area. These were the INNS Himalayan balsam (*Impatiens glandulifera*) and Japanese knotweed (*Fallopia japonica*), and the non-native New Zealand mud snail (*Potamopyrgus antipodarum)* and *Gammarus pulex/fossarum*. Their respective legislation is summarised below in **Table 4-6**. Although Himalayan balsam and Japanese knotweed are not directly aquatic species, these are commonly found in the riparian zone, and specifically in the case of Himalayan balsam, rivers help to facilitate their dispersal.

Table 4-6 - 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
Himalayan balsam (*Impatiens glandulifera*)	Wildlife and Countryside Act 1981 Schedule 9 (Ref 2.12)	30	2023	0.14 km north-west	Cofnod
Japanese knotweed (*Fallopia japonica*)	Wildlife and Countryside Act 1981 Schedule 9 (Ref 2.12)	14	2022	0.64 km west	Cofnod
New Zealand mud snail (*Potamopyrgus antipodarum*)	Non-native	2	2019	1.32 km east	NBN
Gammarus pulex/fossarum agg.	Non-native	2	2019	1.27 km east	NRW

4.2 Aquatic Surveys

Aquatic Macroinvertebrate Surveys

4.2.1 The full aquatic macroinvertebrate taxa list is in **0**. A description of the macroinvertebrate community at each site is provided below. Field surveys at macroinvertebrate sites (Table **3-1**) revealed the presence of the notable leech *Dina lineata* at Site 3AF and the non-native *Crangonyx pseudogracilis/floridanus* at Sites 3AB, 3AC and 3AD.

Site 3AB

4.2.2 This survey was taken from the Afon Cegin south-west of Pentir. The small channel (average width: 1.0 m; average depth: 0.30 m) was unshaded. The substrate was dominated by sand (40%) and clay (38%), with gravel (15%), pebble (2%) and cobble (5%) also present and characterised entirely by a glide flow pattern. During the walkover surveys, macrophytes covered 1% of the channel, whilst woody debris, tree roots, moss nor algae were present.

4.2.3 Site 3AB's autumn macroinvertebrate community was mostly constituted by crustaceans (56%), followed by a minor abundance of true flies (13%) and limpets and mussels (11%). Most crustaceans were composed of by the freshwater shrimp, though three counts of the non-native, non-invasive, *Crangonyx pseudogracilis*/*floridanus* were also identified. The true fly taxa were particularly diverse, though each taxon group was not very abundant.

Site 3AC

4.2.4 3AC was a tributary of the Afron Cegin south-west of Pentir. The channel (average width: 1.0 m; average depth: 0.40 m) was unshaded, with the substrate entirely composed of silt (100%). Macrophytes were observed during the walkover covering 90% of the channel, however, no woody debris, tree roots nor algae were present during the invertebrate surveys.

4.2.5 The autumn macroinvertebrate community was dominated by limpets and mussels (63%), predominantly comprised of Pisidium/Euglesa group specimen. The next dominant group were crustaceans (31%), including the non-native, non-invasive, *Crangonyx pseudogracilis/floridanus*.

Site 3AD

4.2.6 Reach 3AD was on the Afon Cegin south-west of Pentir. The channel (average width: 3 m, average depth: 0.20 m) was unshaded, with the substrate dominated by gravel (50%), followed by boulder (20%), sand (10%), pebbles (10%) and cobbles (10%). The reach was dominated by runs and glides. No woody debris, tree roots, moss nor algae were present during the walkover surveys, although macrophytes covered 2% of the channel.

4.2.7 The autumn community at Site 3AD was dominated by crustaceans (73%), followed by 19% of mixed orders and a minor abundance of worms (9%). Of the crustaceans, most were accounted for by the freshwater shrimp (*Gammarus pulex/fossarum agg*. and *G. pulex*), however, five counts of the non-native *Crangonyx pseudogracilis/floridanus* were also identified.

Site 3AE

4.2.8 Reach 3AE was on an unnamed tributary of the Afon Cegin running south-west of Pentir. The channel (average width: 2.0 m, average depth: 0.4 m) was unshaded. The substrate was dominated by gravel (60%), with cobbles (30%) and clay (10%) also present. The reach was characterised by runs, glides and marginal deadwater. No woody debris, tree roots, moss nor algae were present during the walkover surveys, although macrophytes covered 4% of the channel.

4.2.9 The autumn community at Site 3AE was dominated by crustaceans (42%), followed by worms (27%) and true flies (18%). Most crustaceans were identified as freshwater shrimp (*Gammarus pulex and G. pulex/fossarum agg.*) and most true flies were identified as Tanytarsini, a sub-family taxa of non-biting midges (chironomidae).

Site 3AF

4.2.10 Reach 3AF was on the Afon Cegin, west of Pentir. The watercourse (average width: 0.4 m; average depth: 0.6 m) was unshaded, with the substrate comprising of pebbles (35%), cobbles (33%), gravel (30%), and a small amount of sand (2%). The reach had variable flow patterns including runs and glides. No woody debris, tree roots, moss nor algae were present during the walkover surveys, although macrophytes covered 15% of the channel.

4.2.11 The autumn community at Site 3AF was dominated by freshwater shrimp (39%), followed by limpet and mussels (29%) with a further quarter of the community being composed of freshwater mussels and the river limpet *Ancylus fluviatilis*. A single count of *D. lineata* was recorded, a Regionally Notable leech, according to its CCI score.

Macroinvertebrate Index Results

4.2.12 **Table 4-7** provides a summary of the macroinvertebrate indices WHPT NTAXA, WHPT ASP, CCI score, LIFE score (species) and PSI score (species) for each survey site.

Table 4-7 - Macroinvertebrate index scores

Site name	Season	WHPT-NTAXA	WHPT-ASPT	CCI score - interpretation	LIFE score (species) - interpretation	PSI score (species) - interpretation
3AB	Autumn	17	5.05	9.3 - Moderate conservation value	6.83* - Moderate sensitivity to reduced flows	44.44 - Moderately sedimented
3AC	Autumn	15	4.42	1.0 -Low conservation value	5.92* - Low sensitivity to reduced flows	15.00 - Heavily sedimented
3AD	Autumn	15	5.11	10.0 – Fairly High	7.08* - Moderate sensitivity	61.90 – Slightly sedimented

				conservation value	to reduced flows	
3AE	Autumn	16	4.85	3.9 – Low conservation value	7.09 – Moderate sensitivity to reduced flows	36.00 - Sedimented
3AF	Autumn	9	4.79	9.3 – Moderate conservation value	7.17 – Moderate sensitivity to reduced flows	46.67 – Moderately sedimented

**Lack of scoring species may result in inaccurate scores, consequently family level scores have been presented.*

4.2.13 The LIFE scores for all but one site (3AC) during the autumn survey season represented moderate sensitivity to reduced flows. Site 3AE had the highest LIFE score (7.09) and Site 3AC had the lowest (5.92).

4.2.14 The PSI score for the autumn sites indicated that the sites have a different degree of sedimentation, ranging from slightly sedimented (Site 3AD) to heavily sedimented (Site 3AC).

4.2.15 The WHPT-ASPT score of all sites other than 3AF reflected good, clean but slightly impacted conditions. By contrast, the WHPT-ASPT score of 3AF reflected poor, polluted or impacted conditions.

4.2.16 The CCI score for Site 3AF and 3AB was interpreted as Moderate conservation value whereas the CCI score for Sites 3AE and 3AC represented a Low conservation value. A 'Fairly High' conservation value was recorded for Site 3AD.

4.2.17 The highest CCI scoring species was the leech, *Dina lineata* (CCI: 6) observed at Site 3AF. This species achieved a conservation score attributed as regionally notable. The next highest CCI-scoring species were the local caddisfly, *Beraeodes minutus* and the stonefly *Protonemura meyeri* (CCI: 5) identified at Sites 3AD and 3AB, respectively.

RICT Results

4.2.18

4.2.19 **Table 4-8** displays the Ecological Quality Ratio (EQR) and WFD macroinvertebrate status for the WHPT-ASPT and NTAXA indices for all autumn sites, Site 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). Note that whilst MINTA should be based on the combination of spring and autumn EQR values, MINTA for these sites is based on a single season value and is included for interpretative purposes only.

4.2.20 Analysis using RICT is only suitable for freshwater (not estuarine or marine sites) rivers or streams that are permanently flowing. All survey sites met this criterion and were considered for RICT analysis classification.

Table 4-8 - Macrophyte WFD metrics

Index	Season	3AB	3AC	3AD	3AE	3AF
WHPT-NTAXA Ecological Quality Ratio (EQR)	Autumn	0.74 (Good)	0.92 (High)	0.68 (Moderate)	0.72 (Good)	0.72 (Good)
WHPT-ASPT Ecological Quality Ratio (EQR)	Autumn	0.81 (Moderate)	0.76 (Moderate)	0.77 (Moderate)	0.72 (Poor)	0.71 (Poor)
MINTA most probable WFD invertebrate classification	Autumn	Moderate†	Moderate†	Moderate†	Poor†	Poor†

† 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 field surveys were undertaken to help inform the proposed works for Pentir. This included a review of designated sites and species information of aquatic ecological features. Additional surveys were completed to compliment this desk study to provide a holistic assessment of the baseline conditions of the site.

5.2 Designated Sites

5.2.1 There are four statutory and four non-statutory designated sites that require consideration due to associated aquatic ecology features present at these sites.

5.2.2 Two WFD waterbodies have been identified within the Study Area, Cegin (WBID: GB110065058540) and Nant-y-Garth (Menai Strait) (WBID: GB110065058490), which have Moderate and Good Ecological Status, respectively.

5.3 Aquatic Macroinvertebrates

5.3.1 No notable species were identified within the desk study, however, the non-native non-invasive species New Zealand mud snail and *Crangonyx pseudogracilis/floridanus* was identified within the Study Area.

5.3.2 The surveys highlighted that the survey points comprised a macroinvertebrate community adapted to different levels of sedimentation (slightly to moderate) with low to moderate sensitivity to reduced flows.

5.3.3 Analysis of RICT demonstrated that these sites retained poor water quality (Site 3AF and Site 3AE) and moderate water quality (3AB, 3AC, 3AD). Moderate ASPT EQRs, indicated that a water quality pressures alone are likely impacting.

5.3.4 Surveys at site 3AC and 3AE indicated that the communities here were of low conversation status, whilst sites 3AB and 3AF were of moderate conservation value. Site 3AD was of fairly high conservation value. At all sites, all species were of very common to local conservation status (CCI: 1 – 5), except for *Dina lineata* at site 3AF which has a conservation score of 6: Regionally Notable.

5.3.5 The non-native *Crangonyx pseudogracilis/floridanus* was observed during field surveys at Sites 3AB, 3AC, 3AD and 3AE.

5.4 Aquatic Macrophytes

5.4.1 The desk study revealed the presence of the notable Northern yellowcress within 2 km of the works site which is nationally scarce.

5.4.2 Records of the invasive Himalayan balsam and Japanese knotweed were identified in the desk study.

5.5 Fish

5.5.1 Records of the notable brook lamprey were found in the desk study within the Afon Cefin.

5.5.2 No invasive and/or non-native fish species were identified during the data search.

5.6 Mitigation Measures

5.6.1 Given the presence of protected and non-native species, to inform the ecological impact assessment, mitigation measures have been identified below. That said, the proposed works for Pentir Substation will be completed on existing hard standing, and where works are crossing watercourses, the associated infrastructure is already in place and these watercourses are deemed unsuitable for aquatic receptors i.e. dry ditches. The mitigation measures proposed below are in relation to potential indirect construction effects should these ditches be wet at the time of construction, as these may provide an impact pathway through their hydrological connection to the Afon Cegin:

- Preconstruction surveys of all watercourses proposed to be crossed or culverted to inform mitigation for permanent and temporary watercourse crossings. These surveys will inform the presence of INNS and potential spawning habitat of protected fish species.
- Construction Environmental Management Plan (CEMP) to be adhered to prevent pollution spills from construction or temporary site drainage. This will also cover appropriate biosecurity measures for INNS.
- No works should be carried out within at least 10 m of watercourses which is considered sufficient to mitigate for potential hazards such as chemical spills to avoid potential direct impacts to watercourses.
- Any lighting as part of the construction/operation to be directed away from watercourses.

Should the construction methodology change and there would be a risk of watercourses being directly or indirectly affected, 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 brook lamprey (March to May inclusive).

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Appendix A - Community Conservation Index (CCI)

5.6.3 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 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 (Ref 3.12)

CCI score	Description	Interpretation
0 to 5.0	Sites supporting only common species and/or community of low taxon richness	Low conservation value
> 5.0 to 10.0	Sites supporting at least one species of restricted distribution and/or a community of moderate taxon richness	Moderate conservation value
> 10.0 to 15.0	Sites supporting at least one uncommon species, or several species of restricted distribution and/or a community of high taxon richness	Fairly high conservation value
> 15.0 to 20.0	Sites supporting several uncommon species, at least one of which may be nationally rare and/or a community of high taxon richness	High conservation value
> 20.0	Sites supporting several rarities, including species of national importance and/or a community of very high taxon richness	Very high conservation value

Appendix B - Lotic-Invertebrate Index of Flow Evaluation (LIFE)

The Lotic-Invertebrate Index for Flow Evaluation (LIFE) provides an assessment of the impact of variable flows on benthic macroinvertebrate communities (Ref 3.13). Under the assessment, individual species of aquatic macroinvertebrates are assigned to a flow group varying from I to VI, as detailed on the **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) system[1] (Ref D.1) previously used in the UK.

The WHPT system assigns a numerical value to about 100 different taxa (known as the WHPT-scoring taxa) according to their sensitivity to organic pollution. In addition to the presence of macroinvertebrate taxa at a sampling Reach, as in the BMWP scoring system, the WHPT system also uses another type of information, this being the abundances of different scoring taxa.

Taxa abundances are classified in four categories (Class 1: 1 to 10 individuals, Class 2: 11 to 100 individuals, Class 3: 101 to 1,000 individuals, and Class 4: > 1,000 individuals). A score (Pressure Sensitivity Scores (PSs)) is then assigned to each taxa, depending of the taxa sensitivity and abundances recorded.

The total WHPT score for a sample corresponds to the sum of PSs of scoring taxa recorded. The Average Score Per Taxon (ASPT) values are calculated as the Sum PSs divided by the number of scoring taxa (NTAXA). 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 of 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.

[1] Hawkes, H., (1997). Origin and development of the Biological Monitoring Working Party score system. Water Research, pp. 32(3): 964-968.

Appendix E - Macroinvertebrate Taxa Lists

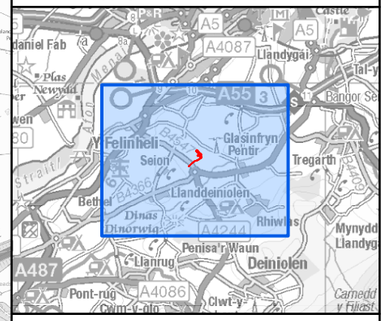
Table E-1 - Macroinvertebrate taxa lists in Autumn 2024.

Family	Species	3AD	3AE	3AF
Snails				
Lymnaeidae	*Ampullaceana balthica*	0	0	1
Limpets and mussels				
Anyclidae	*Ancylus fluviatilis*	0	2	1
Sphaeriidae	*Pisidium/Euglesa/Odhneripisidium*	4	6	7
Worms				
Oligochaeta	*Oligochaeta*	22	112	0
Leeches				
Glossiphoniidae	*Helobdella stagnalis*	0	6	0
Erpobdellidae	*Erpobdellidae (juvenile/damaged)*	1	4	0
Erpobdellidae	*Erpobdella sp.*	0	2	0
Erpobdellidae	*Erpobdella octoculata*	1	7	0
Erpobdellidae	*Dina lineata*	0	0	1
Crustaceans				
Ostracoda		0	11	0
Gammaridae	*Gammarus pulex/fossarum agg.*	98	61	2
Gammaridae	*Gammarus pulex*	68	88	11
Crangonyctidae	*Crangonyx floridanus/pseudogracilis*	5	0	0
Asellidae	*Asellus aquaticus*	8	13	1
Mayflies				
Baetidae	*Baetidae (juvenile/damaged)*	0	0	1
Baetidae	*Baetis sp.*	4	1	0

Baetidae	*Baetis rhodani/atlanticus*	6	1	1
Stoneflies				
Nemouridae	*Nemouridae (juvenile/damaged)*	1	0	0
Leuctridae	*Leuctra sp.*	1	0	0
Leuctridae	*Leuctra hippopus*	1	0	0
Leuctridae	*Leuctra fusca*	0	1	0
Damselflies				
Coenagrionidae	*Coenagrionidae (juvenile/damaged)*	1	0	0
Dragonflies				
Cordulegasteridae	*Cordulegaster boltonii*	0	1	0
Beetles				
Gyrinidae	*Orectochilus villosus*	0	0	1
Elmidae	*Elmis aenea*	4	6	0
Alderflies				
Sialidae	*Sialis lutaria*	0	3	0
Caddisflies				
Limnephilidae	*Limnephilidae (juvenile/damaged)*	5	8	0
Beraeidae	*Beraea pullata*	1	0	0
Beraeidae	*Beraea maurus*	0	0	0
Beraeidae	*Beraeodes minutus*	4	0	0
Sericostomatidae	*Sericostomatidae (juvenile/damaged)*	0	1	0
True flies				
Chironomidae	*Tanypodinae*	1	9	0
Chironomidae	*Orthocladiinae*	3	4	0
Chironomidae	*Chironomini*	0	7	0
Chironomidae	*Tanytarsini*	1	49	0
Chironomidae	*Prodiamesinae*	0	4	0

Simuliidae	*Simuliidae (damaged/juvenile)*	5	0	0
Simuliidae	*Simulium sp.*	0	0	1
Simuliidae	*Simulium ornatum group*	1	0	0
Dixidae	*Dixella sp.*	0	0	0
Ceratopogonidae				

PENTIR SUBSTATION WORKS ROUTE LEGEND



Legend

- Pentir Works Site Boundary
- Main River
- Macroinvertebrate Survey Location

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

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
PENTIR SUBSTATION WORKS

Document Title: FIGURE 2.5.A.1
AQUATIC SURVEY LOCATIONS

Creator:	Date:	Checker:	Date:	Approver:	Date:
MH	01/08/2025	RC	01/08/2025	JS	01/08/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:18,000	A3	1 OF 1	A

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2.5.B. Pentir Statutory Designated Sites Citations

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1. Statutory sites designated for nature conservation

1.1.1 This document concerns the section of the Pentir to Trawsfynydd Reinforcement Project relating to Pentir Substation and is a Technical Appendix to the Environment Statement (ES) **Volume 2 Pentir 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 Pentir works site, as described below and in **Section 5.3** of ES **Volume 2, 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 kilometre (km) of the Pentir works site (extended to 30 km for SACs designated for bats), and their respective reasons for designation. These sites are shown in ES **Volume 2 Pentir Works, Figures 2.5.1 and 2.5.2**.

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 Pentir works site, and their respective reasons for designation. These sites are shown in ES **Volume 2 Pentir Works, Figure 2.5.2**.

1.1.5 There are four international statutory sites designated for nature conservation in the 10 km Study Area. There are three further SAC designated for bats within 30 km of the Pentir works site. Eight 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 Pentir 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 Pentir works site
Eryri/Snowdonia SAC	Annex I habitats that are a primary reason for selection of this site: • Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea.* • Siliceous alpine and boreal grasslands. • Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels. • Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*). • Calcareous rocky slopes with chasmophytic vegetation. • Siliceous rocky slopes with chasmophytic vegetation. Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • Northern Atlantic wet heaths with *Erica tetralix.* • European dry heaths. • Alpine and Boreal heaths. • Alpine and subalpine calcareous grasslands. • Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe) *Priority feature. • Blanket bogs (*if active bog) **Priority feature*. • Depressions on peat substrates of the *Rhynchosporion.*	2.89 km south-east

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Pentir works site
	• Petrifying springs with tufa formation (*Cratoneurion*). • Alkaline fens. • Alpine pioneer formations of the *Caricion bicoloris-atrofuscae* *Priority feature. • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles. Annex II species that are a primary reason for selection of this site: • Slender green feather-moss *Drepanocladus* (*Hamatocaulis*) *vernicosus*. • Floating water-plantain (*Luronium natans*).	
Y Fenai a Bae Conwy/Menai Strait and Conwy Bay SAC	Annex I habitats that are a primary reason for selection of this site: • Sandbanks which are slightly covered by sea water all the time. • Mudflats and sandflats not covered by seawater at low tide. • Reefs. Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: • Large shallow inlets and bays. • Submerged or partially submerged sea caves.	3.11 km west
Traeth Lafan/Lavan Sands Conway Bay SPA	Over winter the area regularly supports: • Eurasian oystercatcher (*Haematopus ostralegus*): 1.4% of the population in Great Britain five-year peak mean. • Eurasian curlew (*Numenius arquata*) (Europe breeding); 1.1% of the population in Great Britain five-year peak mean. On passage the area regularly supports:	6.06 km north-east

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Pentir works site
	• Great crested grebe (*Podiceps cristatus*). No count period specified.	
Afon Gwyrfai a Llyn Cwellyn SAC	Annex I habitats that are a primary reason for selection of this site: • Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*. • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. Annex II species that are a primary reason for selection of this site: • Atlantic salmon (*Salmo salar*). • Floating water-plantain (*Luronium natans*). Annex II species present as a qualifying feature, but not a primary reason for site selection: • Otter (*Lutra lutra*).	8.76 km south-west
Glynllifon SAC	The Annex II species that is a primary reason for selection of this site is lesser horseshoe bat (*Rhinolophus hipposideros*). Glynllifon is both a maternity and hibernation site for a large population of lesser horseshoe bats.	13.62 km south-west
Coedydd Derw a Safleoedd Ystlumod Meirion/Meirionnydd Oakwoods and Bat Sites SAC	Annex I habitats that are a primary reason for selection of this site: • Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles. • Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) **Priority feature*. Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site are: • Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. • Northern Atlantic wet heaths with *Erica tetralix.*	17.09 km south-east

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Pentir works site
	• European dry heaths. • *Tilio-Acerion* forests of slopes, screes and ravines *Priority feature. • Bog woodland **Priority feature*. The Annex II species that is a primary reason for selection of this site is lesser horseshoe bat. This large composite site includes most of the known maternity roosts in Meirionnydd and some hibernacula and comprises the centre of distribution for lesser horseshoe bats in Wales. The sheltered river valleys provide excellent tree cover and numerous suitable maternity roosts.	
Mwyngloddiau Fforest Gwydir/Gwydyr Forest Mines SAC	The Annex I habitat that is a primary reason for selection of this site is Calaminarian grasslands of the *Violetalia calaminariae.* The Annex II species present as a qualifying feature, but not a primary reason for site selection is lesser horseshoe bat.	21.06 km east
Eryri SSSI	This site is of special interest for its upland habitats including lichen and bryophyte heath, montane heath, dry heath, wet heath, blanket bog, flush and spring, calcareous grassland, tall herb and fern ledges, vegetated scree and broadleaved woodland communities and for its inland rock exposures with crevice vegetation and low nutrient lakes, with a mixture of other habitats including acid and neutral grasslands, fen, rush pasture and marshy grassland, swamp, bracken and scrub along with a large number of streams and rivers.	2.89 km south-east
Eithinog SSSI	The site largely supports unimproved or semi-improved dry neutral grassland. Eithinog is of special interest for the presence of a Red Data List fairy club fungus (*Ramariopsis crocea*) at its only location in Wales and for its diverse assemblage of grassland fungi, including 21 species of pinkgill (*Entoloma* spp.), making it one of the best sites in Wales for this group, and ten species of fairy club (*Clavaria* spp.), together with species of waxcap (*Hygrocybe* sp.) and earthtongue (*Geoglossum* sp). At the western end of the site, the nationally scarce greater broomrape (*Orobanche rapum-genistae*) is associated with an area of gorse (*Ulex* sp.).	2.93 km north

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Pentir works site
Moelyci a Chors Ty'n y Caeau SSSI	Moelyci a Chors Ty'n y Caeau is of special interest for its diverse assemblage of grassland fungi, including over 26 species of waxcaps (*Hygrocybe* spp.), 10 species of *Clavarioids* (clubs, spindles and corals), five species of *Geoglossids* (earthtongues), 14 species of *Entoloma* (pink-gills) and three species of *Dermoloma* (crazed caps, fanvaults and meadowcaps), and for its neutral grassland and mire habitats. Greater butterfly orchid (*Platanthera chlorantha*) is found in several locations across Moelyci. The locally uncommon ferns, moonwort (*Botrychium lunaria*) and adder's-tongue fern (*Ophioglossum vulgatum*) and the nationally uncommon ivy-leaved bellflower (*Wahlenbergia hederacea*) also occur in small numbers.	3.09 km east
Coedydd Afon Menai SSSI	Coedydd Afon Menai is a representative example of an ivy-oak/ash (*Hedera Helix - Quercus/Fraxinus*) type woodland. Wild service tree (*Sorbus torminalis*), a rarity in Gwynedd, occurs here. Various whitebeams are present, including the nationally rare *Sorbus porrigentiformis.*	3.30 km north-west
Glannau Porthaethwy SSSI	The site is of special interest because it supports the greatest diversity of marine plant and animal communities on this type of shore in this area. The shore is also important for the presence of five marine communities of restricted national distribution, five diverse rockpool and overhang communities, and for exhibiting the most comprehensive community zonation characteristic of sheltered rocky shores. The site is close to Traeth Lafan, an internationally important site for wading birds and wildfowl and relatively undisturbed parts of this shore provide important high tide roost areas for waders that feed at Traeth Lafan and elsewhere in the Menai Strait.	3.61 km north
Caeau Tyddyn Dicwm SSSI	This site is selected for its biological interest as a habitat example and is one of the few remaining examples of traditionally managed, enclosed pastures and hayfields in Arfon which has not been agriculturally improved by ploughing and reseeding in recent times. Two sub-communities of *Centaurea Nigra - Cynosurus Cristatus* grassland are represented. A conspicuous element of the sward is greater butterfly-orchid (*Platanthera Chlorantha*) which occurs in large numbers. Other notable species include common spotted-orchid (*Dactylorhiza Fuchsii*) and northern marsh-orchid (*Dactylorhiza Purpurella*).	4.62 km east

Site Name and Designation	Description	Approximate distance (km) and direction from closest point to the Pentir works site
Llyyn Padarn SSSI	Supports a population of Arctic charr (*Salvelinus alpinus*), one of three remaining natural populations. The lake also supports notable aquatic plants including floating water-plantain and small quillwort (*Isoetes echinospora*).	4.88 km south
Coed Cyrnol LNR	This site is an area of mixed woodland and foreshore close to the Menai suspension bridge providing views of wading birds.	3.68 km north

2.5.C Pentir Arboricultural Impact Assessment

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Contents

1. Introduction 4
1.1 Background 4
1.2 Trees and the Planning Process 4
1.3 Methodology 5

2. General Arboricultural Principles 7
2.1 General Principles 7
2.2 Below ground constraints 7
2.3 Above ground constraints 8
2.4 Trees and Risk in the Context of Development 8
2.5 Trees and Wildlife 8
2.6 Tree Works 8

3. Statutory and Non-Statutory Designations 10
3.1 Statutory Designations 10
3.2 Non-Statutory Designations 10

4. Field Work Observations 12
4.1 The Site 12
4.2 The Trees 12

5. The Proposed Works 14

6. Arboricultural Impact Assessment 15
6.1 Purpose 15
6.2 Trees to be Removed 15
6.3 Incursions within the RPA or Canopy Spread 15
6.4 Tree Works 15
6.5 The Future Impact of Trees 15
6.6 Tree Protection 16
6.7 Site Organisation, Storage and Use of Materials, Plant and Machinery 16
6.8 Services 17

7. Conclusion 18

Bibliography 19

Appendix A Tree Constraints Plan 20

Appendix B Tree Survey Schedule 23

Appendix C Tree Protection Plan 32

Appendix D Planning Policy Extracts 35

Appendix E Site Photography 38

Appendix F Outline Tree Protection Measures 39

Appendix G Tree Protection Signage 42

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 Pentir works site ('the Site') covers an area approximately 1.5 hectares (ha); however, the permanent development will be entirely within the existing substation footprint. The land in the Site will comprise the existing Pentir Substation access road, laydown areas, welfare and office compounds and staff car parking.

1.1.3 The survey area comprises of the substation access road and verges from the B4547 to the substation, areas around the National Grid office and car park area and the wooded areas surrounding Pentir Substation.

1.1.4 The proposed works are:

- Decommissioning and removal of redundant electrical equipment including existing cable sealing ends and associated steel structures, a section of busbar and overhead line downdropper.
- draining and decommissioning of the 400 kilovolt (kV) oil filled cables; and removal of concrete foundations.
- Install replacement and new 400 kV cables.
- Replacement of cables installed above or below the existing services. New infrastructure would include reinforced concrete foundations, steel structures, and 400 kV cables. The cables to pass beneath the existing high voltage circuit busbar

1.1.5 This report identifies preliminary information in relation to the nature and level of constraints posed by existing trees on and adjacent to the Site in the survey area and considers the likely direct and indirect impacts of proposed works. The Tree Protection Plan (TPP) (**Appendix C**) 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 Site is in Gwynedd Council's administrative boundary.

1.2.4 The Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026, (Ref 1.2) adopted 31 July 2017, sets out the policies that the LPAs use to guide development and use of land in their area. It outlines the long-term vision for the area, including how it will be developed, what types of development will be permitted, and how the local environment and community needs will be addressed. It illustrates how important trees, woodland and hedgerows are to the character of the area and the environment and outlines the policies of the two local authorities with regards to the protection of trees.

1.2.5 Extracts from the Local Authority 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 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 Tree Constraints Plan (TCP) showing the above and below ground constraints associated with trees. The tree constraints information 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 proposed works and a TPP is prepared to identify trees to be removed or retained and to illustrate how retained trees are to be protected.

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 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 in the survey area. During the fieldwork, dimensional data and observational information were collected. A diameter tape measure was used to measure stem diameters, where feasible. The survey was otherwise conducted in accordance with the requirements of BS5837 (Ref 1.3).

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 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.

1.3.5 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. The RPA of all surveyed trees is depicted as a circle and no RPAs have been amended.

1.3.6 The RPA of ancient woodland has been amended to increase the buffer zone in accordance with standing advice from Natural England and the Forestry Commission (Ref 1.4) which requires the RPA to be a radius equivalent to 15 metres (m).

1.3.7 ATCP 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**.

1.3.8 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 which provide essential benefits to society and the wider environment. Any proposed development 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 located 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 RPAs of significant trees in the survey area are 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 in 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 the 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 and 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 be required for access or clearance, it is 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 Gwynedd Council in January 2025 and was informed that there were no TPOs or Conservation Area designations 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.

3.2 Non-Statutory Designations

Ancient Woodland

3.2.1 AECOM checked the DataMap Wales website (Ref 3.1) on 7th January 2025 to look for ancient woodlands. This non-statutory designation is an irreplaceable natural resource that is afforded a high priority in the planning process.

3.2.2 Ancient Woodland and ancient and veteran trees should be protected from development in accordance with Chapter 6 of Planning Policy Wales Edition 12 (2024) (Ref 1.1): *"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."*

3.2.3 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.

3.2.4 NRW advice to planning authorities in relation to ancient woodland states (Ref 3.2) *"The BS 5837 Tree Survey, PEA and/or EcIA assessments should be used to inform the stand-off or protection zone for each individual woodland and veteran and ancient trees. Some zones may only require a root protection area to prevent negative impacts on individual trees or groups of trees, and others are likely to extend further."*

3.2.5 NRW does not provide guidance on the extent of a buffer to be provided between works and ancient woodland. The 15 m buffer is based on the Natural England and Forestry Commission guidelines for ancient woodland in England (Ref 1.4), which state that the proposal should have a buffer zone of at least 15 m from the boundary of the woodland

to avoid root damage. Ancient woodland buffers are included on the TCP (included as **Appendix A**) and the TPP (**Appendix C**).

3.2.6 The default is that no works will be undertaken within this buffer. Beyond the buffer, works that could influence factors such as soils, water and air quality within the buffer must also be carefully considered, with the objective to maintain existing conditions (e.g. no changes to local drainage patterns where this could impact on the buffer zone).

3.2.7 There are three areas of ancient semi natural woodland around the perimeter of Pentir substation shown in Plate 3-1 and in the TCP in **Appendix A.** The Site is outside of the 15 m buffer zone of these woodlands.

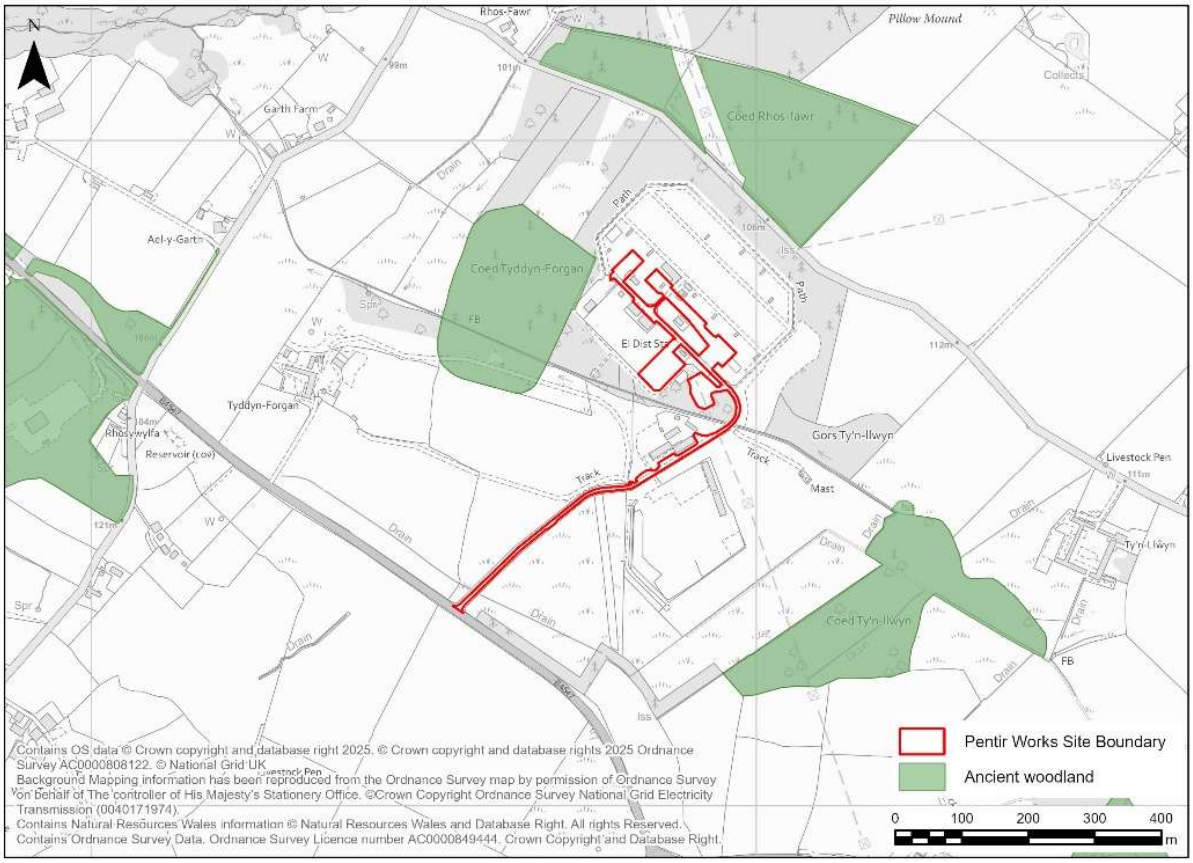


Plate 3-1 – Map of the works site showing Ancient Woodland Inventory records of ancient woodland within the surrounding landscape.

3.2.8 The woodlands and their buffer zones are shown in the TCP in **Appendix A** and in the TPP in **Appendix C**.

3.2.9 The Site is screened on all sides by a mixture of mixed mainly broadleaf woodland, newly planted woodland and conifer plantation which is recorded in the National Forest Inventory.

3.2.10 AECOM also checked the Woodland Trust Ancient Tree Inventory (3rd January 2025) (Ref 3.3) for the presence of any notable, veteran or ancient trees within or adjacent to the Site and none were identified.

4. Field Work Observations

4.1 The Site

4.1.1 The Site is on relatively flat ground and is accessed via a single access road from the B4547 to the south-east corner of the substation compound.

4.1.2 The substation grounds are largely flat with treed banks along its eastern and western boundaries. The surrounding area is gently undulating and consists of areas of agricultural land, woodland and watercourses.

4.1.3 The Site covers an area approximately 1.5 ha; however, the proposed works will be entirely contained within the existing substation footprint.

4.2 The Trees

4.2.1 A combined total of 61 tree features were recorded during the survey of Pentir survey area formed of 32 individual trees, 16 tree groups and 13 woodland groups.

4.2.2 No veteran or ancient trees were identified during the detailed tree survey fieldwork.

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	7	34	13	7

Summary of tree features in each quality category

4.2.4 Although individual trees have been recorded along the boundary of the substation, the surrounding tree cover is best described as a mix of woodland types. The woodland varies between established conifer plantation to young, newly established woodland blocks and includes areas of mixed, mainly broadleaf woodland with mature individuals and groups of conifer species planted either as a crop to enhance the landscape or to screen the substation (or a combination of these purposes).

4.2.5 There are three woodland areas close to the Site, two to the north and one to the south-west, which are recorded on the Ancient Woodland Inventory (Ref 3.2). These woodlands form part of a naturalistic landscape and contribute to the visual amenity of the rural location by providing a screen to the built form of the substation.

4.2.6 The surveyed trees range from unsuitable for retention (Category U) to high (Category A) value. However, the majority of tree features across the Site are moderate (Category

B) value, which is consistent with largely semi mature and early mature trees growing in a woodland setting.

4.2.7 Site photography is in **Appendix E**.

5. The Proposed Works

5.1.1 The proposed works are detailed on the TPP included as **Appendix C.**

5.1.2 The Pentir works site covers an area of approximately 1.5 ha; however, the permanent works will be entirely contained in the existing Pentir Substation compound. The land in the Pentir works site includes part of the existing Pentir Substation, the access road, a compound (comprising office and welfare facilities), laydown storage and car parking.

5.1.3 The proposed works would be contained within the existing Pentir Substation compound, including:

- Replacement of existing cross site underground cables within Pentir Substation.
- Installation of new cross site underground cables within the existing compound.

6. Arboricultural Impact Assessment

6.1 Purpose

6.1.1 This impact assessment sets out the likely principal direct and indirect impacts of the proposed works on the trees on or adjacent to the Site and, if required, suitable mitigation measures to allow for the successful retention of significant trees or to compensate for trees to be removed, where appropriate.

6.1.2 No trees need to be removed or pruned to facilitate the proposed works and there will be no incursions into exclusion zones.

6.2 Trees to be Removed

6.2.1 There will be no requirement to remove trees to facilitate the proposed works. All of the recorded trees can be retained and protected.

6.3 Incursions within the RPA or Canopy Spread

6.3.1 Construction traffic access will be required in the RPAs of W2, T4 and T5. However, this represents no additional incursion to the current usage as it is within existing hard surfacing. Access to RPAs of retained trees in soft ground will be prevented by the installation of tree protection fencing.

6.4 Tree Works

6.4.1 No tree surgery works are anticipated to be required to facilitate the proposed works. Should the requirement for additional tree works be identified, this will be discussed with an arboriculturist and no works will be undertaken without the consent of the Local Planning Authority (LPA).

6.5 The Future Impact of Trees

6.5.1 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 works and future use of the Site.

6.5.2 The retained trees are outside the Site 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 in and adjacent the existing substation 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.

6.5.3 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 6.1) 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 etc…."

6.6 Tree Protection

6.6.1 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 where no access will be permitted. Where access is necessary in this area special measures, such as the use of ground protection and arboricultural supervision, are generally required.

6.6.2 Outline tree protection measures are considered in **Appendix F** of this report. An AMS is often required as a condition of planning consent to set out the phasing of site operations, the finalised tree protection measures for the Site and to provide detail on how sensitive elements of work are to be achieved near retained trees. Issues to be addressed by the AMS are listed in the conclusion of this report.

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

6.7.1 All construction site facilities, including site huts, staff and contractor parking and areas for storage, will be outside the RPA or crown spread of retained trees, including those not specifically covered in this report. Space is likely to be constrained on the Site and will need to be carefully considered. The Construction Exclusion Zones identified on the

TPP must be fully respected and their location and significance will be highlighted to all site staff and contractors during the formal site briefing.

6.7.2 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.

6.7.3 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.

6.7.4 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.

6.7.5 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.

6.7.6 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.

6.8 Services

6.8.1 The decommissioning of the high voltage cables and other identified services will occur outside of the RPAs and canopies of retained trees, in the existing substation. The new high voltage cables will also be installed within the substation boundary and outside of all tree RPAs and canopies.

6.8.2 A specialist Contractor will be appointed to drain, decommission and dismantle the old existing redundant oil filled 400 kV cables and associated plant. All waste material would be disposed of off-site to designated licenced waste and recycling sites.

7. Conclusion

7.1.1 In total, 61 tree features were identified in the survey area comprising 32 individual trees, 16 tree groups and 13 woodland groups. Seven of these identified tree features are of high quality (category A); 34 of moderate quality (category B); 13 of low quality (category C); and seven identified as unsuitable for retention as living trees for more than ten years in the context of the current land use (category U).

7.1.2 The most significant tree features identified near the Site are the woodlands W27 and W38.

7.1.3 There are three ancient semi natural woodlands near the existing substation. All proposed works are outside the buffers for these woodlands. No trees in these designations will be impacted by the proposed works.

7.1.4 There are no Tree Preservation Order (TPO) designations in or near the Site.

7.1.5 There are no Sites of Special Scientific Interest in or immediately near the Site.

7.1.6 No trees are to be removed to facilitate the proposed works in accordance with BS3998:2010 Tree Work – Recommendations (Ref 2.6).

7.1.7 Existing access routes will be utilised for construction traffic and pruning is not anticipated to be necessary to enable the proposed works. Where minor pruning is required to maintain clearance, this will be undertaken to the recommendations in BS3998:2010 Tree Work – Recommendations (Ref 2.6). Such works would not constitute a change of use as the pruning works would be required regardless of the proposed works.

7.1.8 Construction access is required in the RPA of a small number of tree features. However, the access will be restricted to the existing hard surface. Areas of soft ground within RPAs will be protected with tree protection fencing.

7.1.9 The proposed works are expected to have a negligible impact on the health and amenity value of the trees on Site. Accordingly, no tree replacement will be necessary.

7.1.10 Issues to be addressed by an AMS:

- Conditions of planning consent.
- Pre commencement meeting and site briefing.
- Order and phasing of operations.
- Tree protection fencing.
- Movement of people, plant and materials.
- Removal of tree protection measures.

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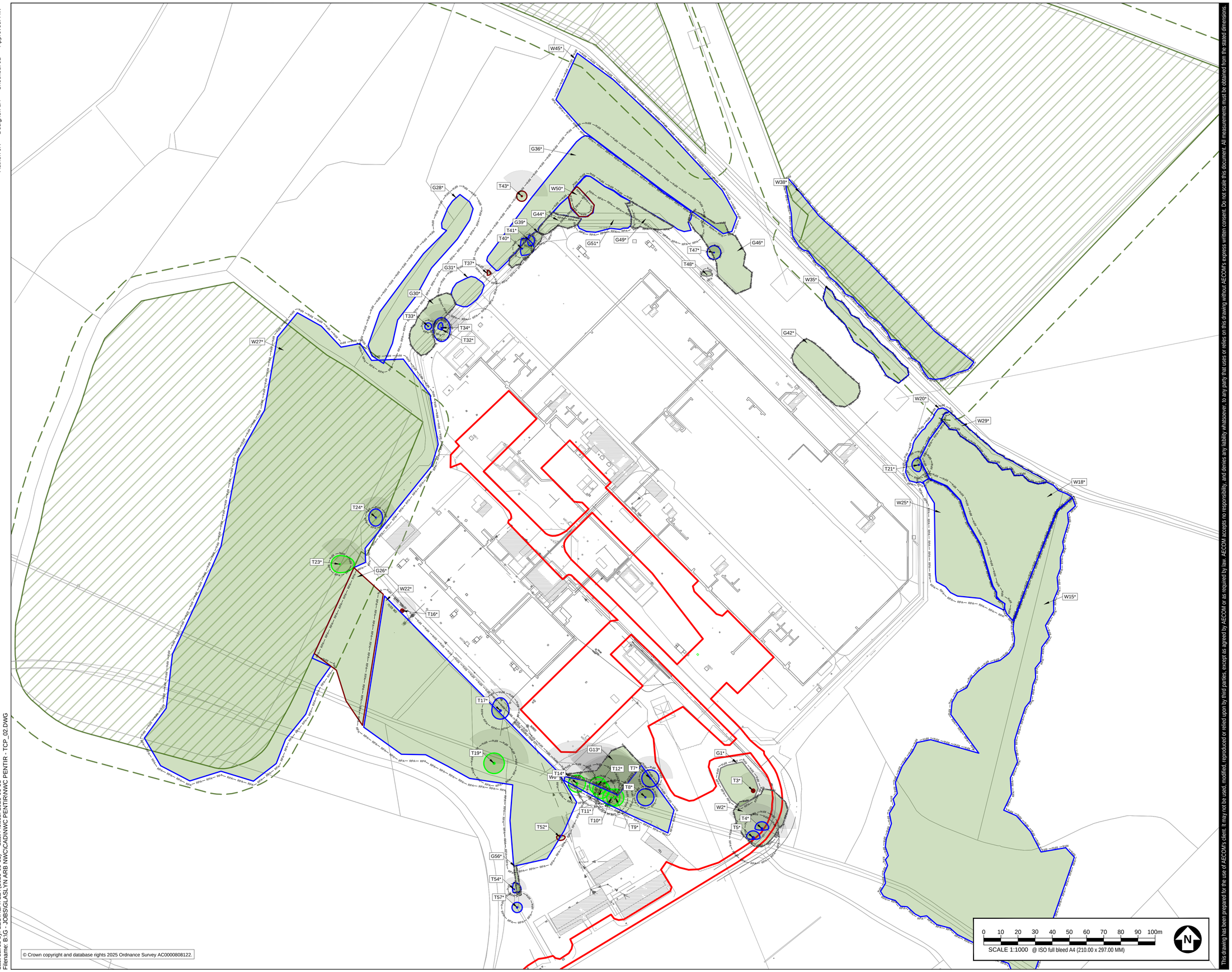
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Ref 6.1 - National Joint Utilities Group (NJUG) Volume 4, Issue 2, (2007). NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees.

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Appendix A Tree Constraints Plan

Author: JR Designer: LH Checked: JB Approved: AW



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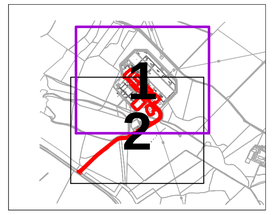
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GENERAL NOTES

1. TREE CATEGORIES AS DEFINED BY BS 5837:2012
2. TREE LOCATIONS ARE BASED ON THE 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.
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   PTNOPTC1-BH-ENG-DWG-00845-Pentir -Structural.dwg

KEY PLAN



KEY

T#
FEATURE ID TAGS
(A PREFIX OF 'T' DENOTES A SINGLE TREE, 'G' A GROUP, 'H' A HEDGE, 'W' A WOODLAND, 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)

RPA
ROOT PROTECTION AREAS (RPA)
(AS DEFINED BY BS 5837:2012)

APPROXIMATE CURRENT AND MATURE SHADING ARCS
(AS DEFINED BY BS 5837:2012)

ANCIENT WOODLAND (W/15 Buffer)
(AREA CLASSIFIED AS AN ANCIENT WOODLAND)

ISSUE/REVISION

P03	01.04.25	TREE FEATURE AMENDS
P02	24.02.25	RLB UPDATE
P01	23.01.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

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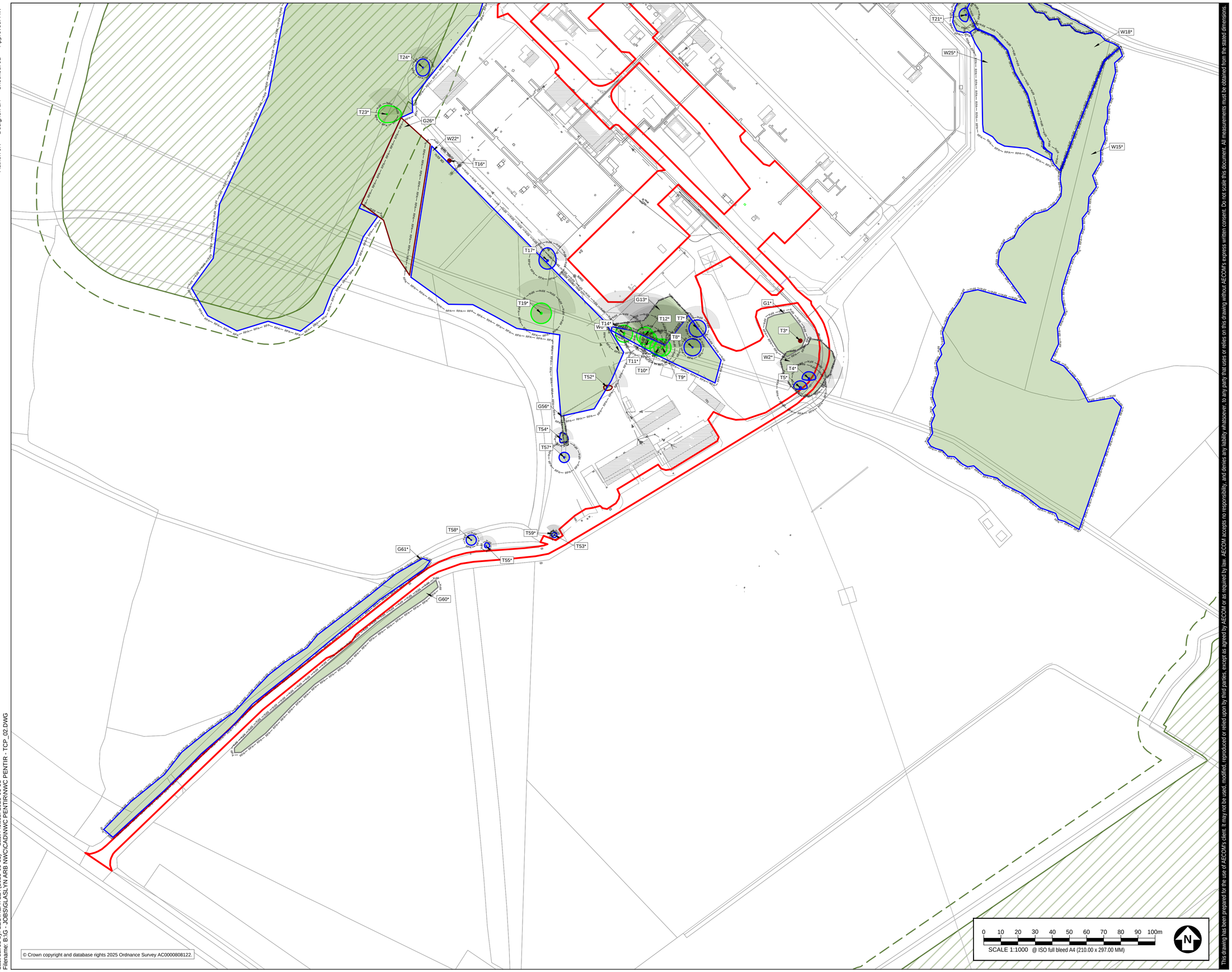
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TREE CONSTRAINTS PLAN (SHEET 01)

SHEET NUMBER **REV.**

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PROJECT

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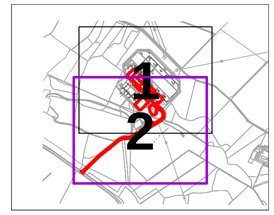
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KEY PLAN



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PROJECT NUMBER

60686216

SHEET TITLE

TREE CONSTRAINTS PLAN (SHEET 02)

SHEET NUMBER **REV.**

60686216-ACM-XX-XX-AB-TCP-002 P02

Appendix B Tree Survey Schedule

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Estimated Remaining Contribution (years)	Category	RPA Radius (m)
G1*	Silver Birch (*Betula pendula*), Common Alder (*Alnus glutinosa*), Sycamore (*Acer pseudoplatanus*), Grey willow (*Salix cinerea*)	6	<200#	1	1	1	1	n/a	n/a	Good - Fair	Y-SM	Good - Fair	Thicket. Ivy. Dense brambles at base. Alder stumps with minor regenerative growth adjacent to access road.		10+	C2	2.4
W2*	Grey willow (*Salix cinerea*), Downy Birch (*Betula pubescens*), Whitebeam species (*Sorbus sp*)	7	180	2	2	2	2	n/a	n/a	Good - Dead	Y	Good - Dead	Small wooded area. Some standing dead within. Mainly willow with smaller number of birch and occasional Sorbus.		10+	C2	2.16
T3*	Oak (*Quercus sp*)	11	550#	1	1	1	1	n/a	n/a	Dead	EM	Dead	Root plate failure. Canopy hung-up in adjacent trees. Previously reduced limbs, large stubs remaining.		<10	U1	6.6
T4*	Leyland Cypress (*X Cupressocyparis leylandii*)	20	820	4	1	4	4	3.0/N	5	Good	M	Good	Historically crown raised over road leaving open wound. No occlusion and no visible decay.		20+	B2	9.84
T5*	Leyland Cypress (*X Cupressocyparis leylandii*)	20	1200	4	1	4	4	3.0/N	5	Good	M	Good	Historically crown raised over road. Profuse vertical growth from base.		20+	B2	14.4
W6*	Common Oak (*Quercus robur*), Common Alder (*Alnus glutinosa*), Silver Birch (*Betula pendula*), Grey willow (*Salix cinerea*), Sycamore (*Acer pseudoplatanus*), Holly (*Ilex aquifolium*), Rowan (*Sorbus aucuparia*), Sessile Oak (*Quercus petraea*)	9	<200#	1	1	1	1	n/a	n/a	Good - Poor	Y-SM	Good - Poor	Mixed species woodland group, high canopy of birch, occasional oak and sycamore. Understory of predominantly willow and alder. Mature species within group have been recorded on an individual basis.		20+	B2,3	2.4
T7*	Sycamore (*Acer pseudoplatanus*)	13	540	5	5	5	5	n/a	n/a	Fair	EM	Good	Ivy clad. Deadwood in crown.		20+	B2	6.48
T8*	Sycamore (*Acer pseudoplatanus*)	13	530	5	5	5	5	n/a	n/a	Good	EM	Good	Ivy clad. Deadwood in crown. Bat box at circa 3m.		20+	B2	6.36

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Estimated Remaining Contribution (years)	Category	RPA Radius (m)
T9*	Austrian Pine (*Pinus nigra*)	25	850	5	5	5	5	n/a	9	Good	M	Good			40+	A2	10.2
T10*	Austrian Pine (*Pinus nigra*)	25	800	5	5	5	5	n/a	9	Good	M	Good			40+	A2	9.6
T11*	Austrian Pine (*Pinus nigra*)	25	680	5	5	5	5	n/a	10	Good	M	Good			40+	A2	8.16
T12*	Austrian Pine (*Pinus nigra*)	25	1040	5	5	5	5	n/a	10	Good	M	Good			40+	A2	12.48
G13*	Silver Birch (*Betula pendula*), Common Alder (*Alnus glutinosa*), Grey willow (*Salix cinerea*), Elder (*Sambucus nigra*), Sycamore (*Acer pseudoplatanus*)	5	<85#	1	1	1	1	n/a	n/a	Good - Fair	Y-SM	Good - Fair	Thicket. Predominantly saplings and young trees.		10+	C2	1.02
T14*	Austrian Pine (*Pinus nigra*)	25	950	5	5	5	5	n/a	10	Good	M	Good	Ivy clad. Adjacent ditch. Deadwood in crown.		40+	A2	11.4
W15*	Sycamore (*Acer pseudoplatanus*), Norway Spruce (*Picea abies*), European Larch (*Larix decidua*)	20	<250#	2	2	2	2	n/a	n/a	Good - Dead	SM	Good - Dead	Unmanaged conifer plantation with etiolated individuals and areas of windthrow and scalloped areas felled.		20+	B2	3
T16*	Pine (*Pinus sp*)	8	400	1	1	1	1	n/a	n/a	Dead	EM	Poor	Dead stem hung up in adjacent sycamore. Fell (ASAP)		<10	U1	4.8
T17*	Sycamore (*Acer pseudoplatanus*)	13	900	7.5	5	5	5	n/a	5	Good	M	Good	Ivy clad. 2m wound at circa 3m, sapwood exposed. Adjacent culvert.		20+	B2	10.8
W18*	European Larch (*Larix decidua*), Sitka Spruce (*Picea sitchensis*)	18	<250#	2	2	2	2	n/a	5	Good - Dead	SM	Good - Dead	Dense, closed canopy mixed conifer plantation with occasional windthrow with understory of fern and nettle. Small number of dead trees but largely in good health. Requires light thin or if left will self thin and be less at risk of further windthrow.		20+	B2	3
T19*	Austrian Pine (*Pinus nigra*)	20	1090	6	6	6	6	3.0/S	4	Good	M	Good - Fair	Locally dominant. Fungal fruiting body southeast approx., 300mm from base, likely Sparassis crispa. Within sheltered location with low target within falling distance.	If land use changes consider resurvey for condition assessment and safety.	40+	B1	13.08
W20*	Grey willow (*Salix cinerea*), Downy Birch (*Betula pubescens*),	7	<300	2	2	2	2	n/a	n/a	Good	SM	Good	Willow dominant with occasional birch and elder and regen of pedunculate oak and rowan in the understory.		20+	B2	3.6

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Estimated Remaining Contribution (years)	Category	RPA Radius (m)
	Elder (*Sambucus nigra*), Sessile Oak (*Quercus petraea*), Rowan (*Sorbus aucuparia*)																
T21*	Grey willow (*Salix cinerea*)	8	640 (over ivy)	4	4	1.5	4	1.5/W	2	Good	M	Good	Single stem to 1.5m and favouring south and west due to tall competition from plantation trees to east. Ivy clad from base. DBH is large for the species, measured over ivy and no ancient features present so considered to be mature.		20+	B2	7.68
W22*	Sycamore (*Acer pseudoplatanus*), Common Alder (*Alnus glutinosa*), Turkey Oak (*Quercus cerris*), Sessile Oak (*Quercus petraea*), Silver Birch (*Betula pendula*), Elder (*Sambucus nigra*), Ash (*Fraxinus excelsior*), European Larch (*Larix decidua*), Willow (*Salix sp*), Sitka Spruce (*Picea sitchensis*), Norway Spruce (*Picea abies*), Scots Pine (*Pinus sylvestris*), Austrian Pine (*Pinus nigra*), Holly (*Ilex aquifolium*)	15	<400#	1	1	1	1	n/a	n/a	Good - Poor	EM	Good - Poor	Mixed species woodland group. Culverts within group. Previously pruned to clear perimeter footpath.		20+	B2,3	4.8
T23*	Silver Birch (*Betula pendula*)	15	530	5	5	8.5	5	3.0/E	2	Good	M	Good	Locally dominant. Cleared woodland area southeast for access.		40+	A1	6.36
T24*	Silver Birch (*Betula pendula*)	12	390,310	5	5	4	4	4.0/W	5	Good	M	Fair	Included union at circa 500mm, moderate adaptive growth.		20+	B1	5.98
W25*	Scots Pine (*Pinus sylvestris*), Downy Birch (*Betula pubescens*), Grey willow (*Salix*	15	<450	2	2	2	2	n/a	4	Good	EM	Good	Woodland edge group of mainly Scot's pine and downy birch with occasional willow and holly. Understory of gorse with self seeded birch,		20+	B2	5.4

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Estimated Remaining Contribution (years)	Category	RPA Radius (m)
	cinerea), Sessile Oak (*Quercus petraea*), Gorse (*Ulex sp.*), Holly (*Ilex aquifolium*)												oak and pine coming through. Pines leaning north into plantation woodland.				
G26*	Unknown	0	400	1	1	1	1	n/a	n/a	Stump	SM	Stump	Clear felled area. Stumps throughout. Partial track construction.		<10	U1	4.8
W27*	Sessile Oak (*Quercus petraea*), Silver Birch (*Betula pendula*), Scots Pine (*Pinus sylvestris*), Turkey Oak (*Quercus cerris*), Rhododendron (*Rhododendron sp.*), Grey willow (*Salix cinerea*), Sycamore (*Acer pseudoplatanus*), Holly (*Ilex aquifolium*)	20	<600#	5	5	5	5	n/a	0	Good - Dead	Y-M	Good - Poor	Regular structure. Underwood Rhododendron dominant. Canopy of pine, edge species predominantly birch.	Fell and manage Rhododendron. (When funds allow)	20+	B1,2,3	7.2
G28*	European Larch (*Larix decidua*)	16	<500#	1	1	1	1	n/a	8	Good	EM	Good	No access. Ivy clad stems.		20+	B2	6
W29*	Grey willow (*Salix cinerea*), Hawthorn (*Crataegus monogyna*), Sessile Oak (*Quercus petraea*), Rowan (*Sorbus aucuparia*)	6	<180#	2	0.2	0.2	0.2	n/a	2	Good	SM	Good	Woodland edge group next to lane behind plantation.		20+	B2	2.16
G30*	Downy Birch (*Betula pubescens*), Gorse (*Ulex sp.*), Silver Birch (*Betula pendula*), Sycamore (*Acer pseudoplatanus*), Turkey Oak (*Quercus cerris*), Oak (*Quercus sp*), Ash (*Fraxinus excelsior*), Pine (*Pinus sp*)	8	<150#	3	3	3	3	n/a	0	Good - Poor	Y-SM	Good - Poor	Some dead stems within the stand.		10+	C2	1.8
G31*	Leyland Cypress (*X*	16	<700#	1	1	1	1	n/a		Good	M	Good	No access, viewed from perimeter footpath.		20+	B2	8.4

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Estimated Remaining Contribution (years)	Category	RPA Radius (m)
	Cupressocyparis leylandii)												Mature row of x3 Cypress.				
T32*	Turkey Oak (*Quercus cerris*)	15	500#	7	7	5	5	0.5/N	1	Good	EM	Fair	Ivy to circa 4m.		20+	B1	6
T33*	Hawthorn (*Crataegus monogyna*)	5	300#	2	2	2	2	n/a	0	Good	EM	Good	Ivy clad.		20+	B2	3.6
T34*	Scots Pine (*Pinus sylvestris*)	10	350#	3	1	1	2	4.0/S	4	Good	SM	Fair	Structurally suppressed by Turkey oak south.		20+	B1	4.2
W35*	Grey willow (*Salix cinerea*), Sessile Oak (*Quercus petraea*), Downy Birch (*Betula pubescens*)	6	<180#	2	2	2	2	n/a	4	Good	SM	Good	Linear feature comprised mainly of oak, birch and willow. Valuable visual amenity softening view of substation.		20+	B2	2.16
G36*	Leyland Cypress (*X Cupressocyparis leylandii*)	16	<700#	1	1	1	1	n/a	n/a	Good	M	Good	No access, viewed from perimeter footpath. Mature row of Cypress.		20+	B2	8.4
T37*	Sycamore (*Acer pseudoplatanus*)	5	100#	2	1	2	0	1.0/E	1	Poor - Dead	Y	Poor	Dieback of branch ends. Small tree, low risk.		<10	U1	1.2
W38*	Grey willow (*Salix cinerea*), Sessile Oak (*Quercus petraea*), Downy Birch (*Betula pubescens*), Sitka Spruce (*Picea sitchensis*), Holly (*Ilex aquifolium*)	6	<240#	2	2	2	2	n/a	4	Good	SM	Good	Young woodland dominated by birch with occasional oak and ash on edge and holly, oak and spruce regeneration apparent in understory.		20+	B2,3	2.88
G39*	Silver Birch (*Betula pendula*), Grey willow (*Salix cinerea*), Gorse (*Ulex sp.*)	7	<150#	2	2	2	2	n/a	0	Good - Fair	Y-SM	Good - Fair	Previous management - partial removal of stems. Typical edge species.		10+	C2	1.8
T40*	Silver Birch (*Betula pendula*)	10	450#	6	4	7	1	0.5/E	4	Good	M	Good			20+	B1,2	5.4
T41*	Silver Birch (*Betula pendula*)	10	300#	3	3	3	1	5.0/S	4	Good	M	Good	Emergent in edge group, sub-dominant to cypress.		20+	B1	3.6
G42*	Grey willow (*Salix cinerea*), Sessile Oak (*Quercus petraea*), Downy Birch (*Betula pubescens*), Sitka Spruce (*Picea sitchensis*)	5	<120#	1.5	1.5	1.5	1.5	n/a	0	Good	Y	Good	Young group likely self seeded with bramble field layer.		10+	C2	1.44

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Estimated Remaining Contribution (years)	Category	RPA Radius (m)
T43*	Leyland Cypress (*X Cupressocyparis leylandii*)	15	650#	3	3	3	3	n/a	n/a	Good	M	Poor	Adjacent tree failure. Likely caused heave of root plate, leaning into adjacent Cypress. Considered low risk area due to limited access, and leaning away from the Site.		<10	U1	7.8
G44*	Silver Birch (*Betula pendula*), Grey willow (*Salix cinerea*)	5	150	3	3	3	3	n/a	0	Good - Fair	Y-SM	Good - Fair	Partial limb failures throughout.		10+	C1,2	1.8
W45*	Sessile Oak (*Quercus petraea*), Silver Birch (*Betula pendula*), Grey willow (*Salix cinerea*), Ash (*Fraxinus excelsior*), Rowan (*Sorbus aucuparia*), Norway Maple (*Acer platanoides*), Hawthorn (*Crataegus monogyna*), Holly (*Ilex aquifolium*), Sycamore (*Acer pseudoplatanus*)	15	<450#	4	4	4	4	n/a	0	Good - Fair	Y-M	Good - Fair			20+	B1,2	5.4
G46*	Grey willow (*Salix cinerea*), Sycamore (*Acer pseudoplatanus*), Norway Maple (*Acer platanoides*), Hawthorn (*Crataegus monogyna*)	7	<90#	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair			10+	C2	1.08
T47*	Sessile Oak (*Quercus petraea*)	6	350	4	4	4	4	0.5/S	1	Good	SM	Good			20+	B1	4.2
T48*	Grey willow (*Salix cinerea*)	6	220,180	2	1	3	3	1.0/E	1	Good	SM	Fair	Three stems removed 150mm, 140mm and 100mm.		10+	C1	3.41
G49*	Gorse (*Ulex sp.*), Rowan (*Sorbus aucuparia*), Broom (*Cytisus scoparius*), Sessile Oak (*Quercus petraea*)	5	<100#	1	1	1	1	n/a	0	Good	Y-SM	Good - Fair	Scrub with saplings/young trees.		10+	C2	1.2

Tree ID	Species	Height (m)	Stem Diameter (mm)	Canopy Spread (N)	Canopy Spread (S)	Canopy Spread (E)	Canopy Spread (W)	First Significant Branch (m)	Canopy Clearance (m)	Physiological Condition	Life Stage	Structural Condition	Condition Comments	Preliminary Management Comments	Estimated Remaining Contribution (years)	Category	RPA Radius (m)
W50*	Scots Pine (*Pinus sylvestris*)	18	<380#	3	3	3	3	n/a	3	Good	EM	Good	Small woodland group of pines. Spacing has allowed wolf growth in many with other possible matured regeneration displaying more etiolated form.		20+	B2	4.56
G51*	Sycamore (*Acer pseudoplatanus*)	15	<500#	6	6	6	6	n/a	4	Poor - Dead	EM-M	Poor	Two moribund sycamore.	Fell if land use changes.	<10	U2	6
T52*	Sitka Spruce (*Picea sitchensis*)	12	500#	1	2	3	2	1.0/E	0	Dead	EM	Poor	Dead tree.	Fell (< 3 months)	<10	U1	6
T53*	Whitebeam species (*Sorbus sp*)	6	200#	1.5	1.5	1.5	1.5	1.0/E	2	Good	EM	Good			20+	B2	2.4
T54*	Rowan (*Sorbus aucuparia*)	7	150,100,200,100,90#	4	2	4	1	1.0/N	1	Good - Fair	M	Fair	No access. Significant stool, estimated at circa 1m in diameter. Previous stem failure from stool. Holly growing through central crown.		20+	B3	3.61
T55*	Sessile Oak (*Quercus petraea*)	6	180,140#	2	1	2	1	1.0/E	2	Good	EM	Good			20+	B2	2.74
G56*	Grey willow (*Salix cinerea*), Common Alder (*Alnus glutinosa*)	4	<30#	1	1	1	1	n/a	0	Good	Y	Good			10+	C2	0.36
T57*	Sessile Oak (*Quercus petraea*)	10	750#	3	3	3	3	n/a	n/a	Fair	M	Fair	No access, dense brambles and ivy at base. Previously pollarded. Exposed secondary limb with split at circa 7m, exudate. Rip wounds, poor pruning.		20+	B3	9
T58*	Grey willow (*Salix cinerea*)	7	350#	3	3	3	3	1.0/E	1.5	Good	M	Fair	Open wound to stem in north running from ground to ca 1.5m.		20+	B2	4.2
T59*	Silver Birch (*Betula pendula*)	5	120#	1.5	1.5	1.5	1.5	2.0/E	2	Good	SM	Good	Ivy clad.		10+	C1	1.44
G60*	Silver Birch (*Betula pendula*), Gorse (*Ulex sp.*)	5	200	1	1	1	1	n/a	0	Good - Fair	Y-SM	Good - Fair			10+	C2	2.4
G61*	Silver Birch (*Betula pendula Youngii*), Rowan (*Sorbus aucuparia*)	5	<200#	1.5	1.5	1.5	1.5	n/a	4.5	Good	SM	Good	Linear tree feature on driveway mainly comprised of birch with occasional *Sorbus aucuparia.*		20+	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 *italics*	
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	**Good:** No significant structural defects **Fair:** Structural defects which can be resolved via remedial works. **Poor:** Structural defects which cannot be resolved via remedial works. **Dead:** Dead.
Physiological condition	**Good:** Normal vitality including leaf size, bud growth, density of crown and wound wood development. **Fair:** Lower than normal vitality, reduced bud development, reduced crown density, reduced response to wounds. **Poor:** Low vitality, low development and distribution of buds, discoloured leaves, low crown density, little extension growth for the species. **Dead:** Dead **Fair/Good** = Indicates an intermediate condition **Fair – Good** = Indicates a range of conditions (e.g. within a group)
Preliminary management recommendations	Works identified during the tree survey as part of sound arboricultural management, based on the current context of the Site (where relevant reference has been made to tree management based on the potential future context of the site).
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

Author: JR Designer: LH Checked: JB Approved: AW



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Last saved by: LEO.HEATLEY (2025-03-31) Last Plotted: 2025-03-31
Filename: B:\G - JOBS\GLASLYN ARB NWC\CAD\NWC PENTIR\NWC PENTIR - TPP-03.DWG

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PROJECT

PENTIR SUBSTATION

CLIENT

NATIONAL GRID

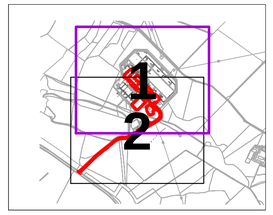
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GENERAL NOTES

1. TREE CATEGORIES AS DEFINED BY BS 5837:2012
2. TREE LOCATIONS ARE BASED ON THE 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:
   PTNOPTC1-BH-ENG-DWG-0081-EP-LAY-0001-Pentir Cable Route Model.dwg
   PTNOPTC1-BH-ENG-DWG-0084-Pentir Primary Model.dwg
   PTNOPTC1-BH-ENG-DWG-00845-Pentir -Structural.dwg
   20290124 Glaslyn 4ZC NTM.dwg

KEY PLAN



KEY

FEATURE ID TAGS
(A PREFIX OF 'T' DENOTES A SINGLE TREE, 'G' A GROUP, 'H' A HEDGE, 'W' A WOODLAND, AND AN ASTERISK SUFFIX '' MEANS THE FEATURE WAS PLOTTED INDICATIVELY)*

SITE BOUNDARY

EXISTING TREE, GROUP, WOODLAND, OR HEDGE TO BE RETAINED

EXISTING TREE, GROUP, WOODLAND, OR HEDGE TO BE REMOVED

ROOT PROTECTION AREA OF RETAINED TREES
(AS DEFINED BY BS 5837:2012)

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)

ANCIENT WOODLAND (W/15 Buffer)
(AREA CLASSIFIED AS AN ANCIENT WOODLAND)

PROPOSED CABLE LAYOUT
(BASED UPON DRAWING REFERENCES LISTED IN THE GENERAL NOTES SECTION)

PROPOSED CDM AREA

PROPOSED LAYDOWN AND STORAGE AREA

ISSUE/REVISION

P01	31.03.25	FIRST ISSUE
I/R	DATE	DESCRIPTION

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

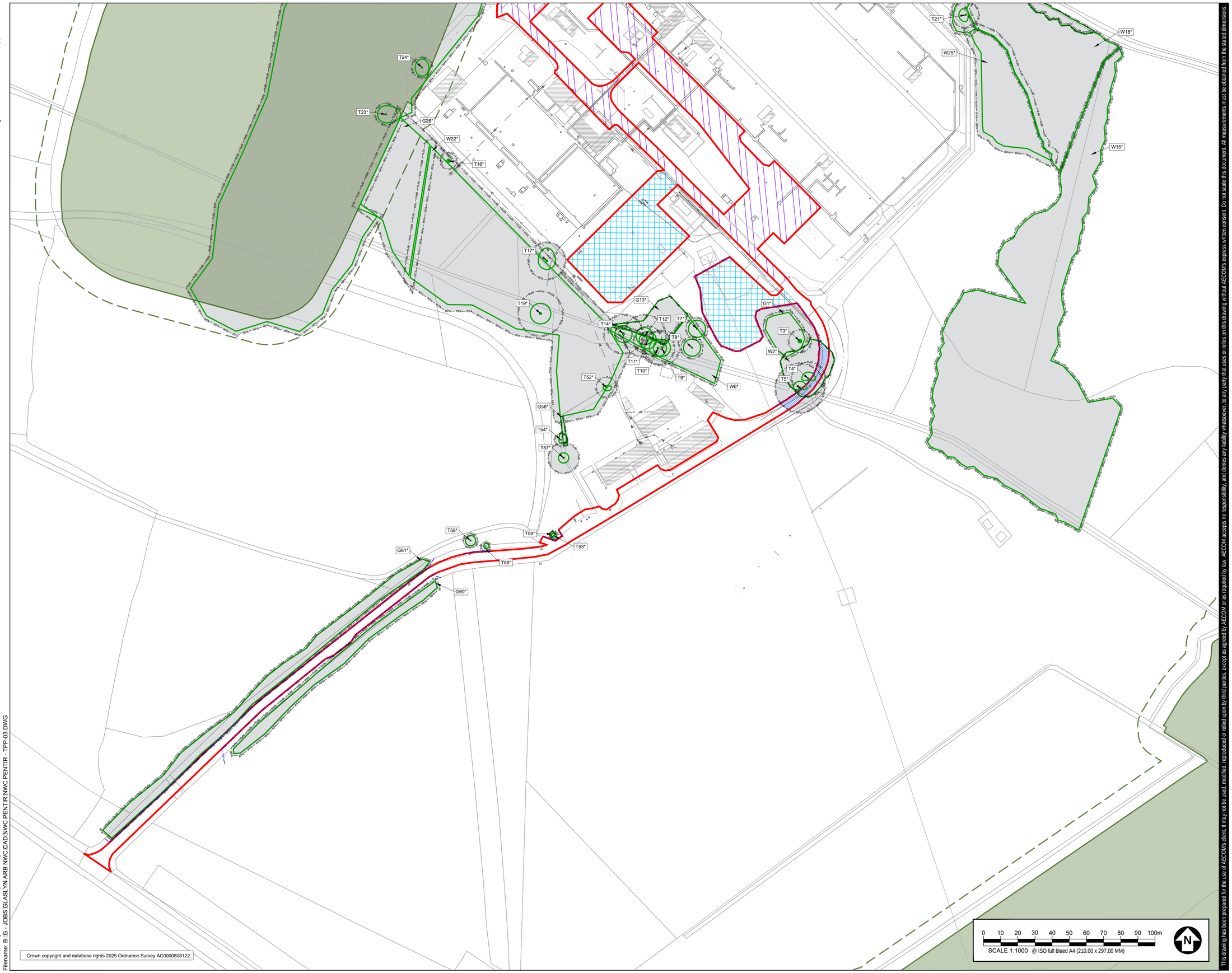
SHEET TITLE

TREE PROTECTION PLAN (SHEET 01)

SHEET NUMBER **REV.**

60686216-ACM-XX-XX-AB-TPP-001 P01

Author: JR Designer: LH Checked: JB Approved: AW



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PROJECT

PENTIR SUBSTATION

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   PTNOPTC1-BH-ENG-DWG-0084-Pentir Primary Model.dwg
   PTNOPTC1-BH-ENG-DWG-00845-Pentir -Structural.dwg
   20290124 Glaslyn 4ZC NTM.dwg

KEY PLAN



KEY

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- **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)*
- **TREE PROTECTION FENCING**
- **CONSTRUCTION EXCLUSION ZONE** *(TRACKING OF PLANT, MATERIALS STORAGE, EXCAVATION AND ALL OTHER CONSTRUCTION ACTIVITIES ARE EXCLUDED WITHIN THESE AREAS FOR THE PURPOSES OF PROTECTING TREE HEALTH)*
- **CONSTRUCTION WORKING ZONE** *(MANAGED CONSTRUCTION PROCESSES PERMITTED IN ACCORDANCE WITH THE PRINCIPLES SET OUT WITHIN THE ARBORICULTURAL IMPACT ASSESSMENT)*
- **ANCIENT WOODLAND (W/15 Buffer)** *(AREA CLASSIFIED AS AN ANCIENT WOODLAND)*
- **PROPOSED CABLE LAYOUT** *(BASED UPON DRAWING REFERENCES LISTED IN THE GENERAL NOTES SECTION)*
- **PROPOSED CDM AREA**
- **PROPOSED LAYDOWN AND STORAGE AREA**

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P01	31.03.25	FIRST ISSUE

DRAWING STATUS

ISSUE

PROJECT NUMBER

60686216

SHEET TITLE

TREE PROTECTION PLAN
(SHEET 02)

SHEET NUMBER **REV.**

60686216-ACM-XX-XX-AB-TPP-002 P01

Last saved by: LEO.HEATLEY(2025-03-31) Last Plotted: 2025-03-31
Filename: B:\G - JOBS\GLASLYN ARB NWC\CAD\NWC PENTIR\NWC PENTIR - TPP-03.DWG

Appendix D Planning Policy Extracts

D.1 Planning Policy Wales

Planning Policy Wales (PPW) (Edition 12, 2024) seeks to ensure that new development is sustainable and underlines the importance of Green Infrastructure, of which trees form an integral part. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well being of Wales.

PPW contains specific policies in relation to trees, woodlands and hedgerows and these are set out below:

6.4.37 Trees, hedgerows, groups of trees and areas of woodland are of great importance for biodiversity. They are important connecting habitats for resilient ecological networks and make an essential wider contribution to landscape character, culture, heritage and sense of place, air quality, recreation and local climate moderation. They also play a vital role in tackling the climate emergency by locking up carbon, and can provide shade, shelter and foraging opportunities, wider landscape benefits such as air and diffuse pollution interception, natural flood management, and building materials. The importance of trees, in particular urban trees, in creating distinctive and natural places which deliver health and well being benefits to communities, now and in the future should be promoted as part of plan making and decision taking.

Planning authorities must promote the planting of new trees, hedgerows, groups of trees and areas of woodland as part of new development.

6.4.38 Welsh native tree and hedge species, characteristic of the local area, provide a strong ecosystem resilience function, and they provide resources for local wildlife, particularly other native plants and species. Native tree and hedge species can also complement opportunities for natural regeneration. Alongside broader woodland habitat types, such as wood pasture, parkland and traditional orchards, native tree and hedge species help to define our cultural heritage and landscape, creating a strong sense of place and connection to the past.

6.4.39 Planning authorities must protect trees, hedgerows, groups of trees and areas of woodland where they have ecological value, contribute to the character or amenity of a particular locality, or perform a beneficial green infrastructure function. Planning authorities should consider the importance of trees and woodland, particularly native woodland and valued trees, and should have regard to local authority tree strategies or SPG and the Green Infrastructure Assessment. Planning authorities should adopt appropriate, locally relevant, time sensitive, minimum tree canopy cover targets for their authority area to guide the protection and where appropriate the expansion of canopy cover. The Green Infrastructure Assessment and tools such as NRW's Tree Cover in Wales' Towns and Cities study and Forest Research's i Tree Eco tool will help establish a baseline of canopy cover and guide the identification of appropriate and measurable canopy targets.

6.4.40 Where trees, woodland and hedgerows are present, their retention, protection and integration should be identified within planning applications. Where surveys identify trees, hedgerows, groups of trees and areas of woodland capable of making a significant contribution to the area, these trees should be retained and protected. The provision of services and utilities infrastructure to the application site should also avoid the loss of trees, woodlands or hedges

and must be considered as part of the development proposal; where such trees are lost, they will be subject to the replacement planting ratios set out below.

6.4.41 Whilst most focus within the planning system is targeted at urban trees, planning authorities should recognise the importance of trees within the countryside, either as woodlands, within hedgerows and hedgebanks, or free standing trees in fields, or as wood pasture. This is particularly important as the effects of climate change are leading towards pests and diseases that are damaging many of our native species in the rural landscape. Positive mechanisms of rural tree retention should be considered, and measures taken to replace them in an effective and economic manner, either with new planting or by allowing them to grow to their full potential.

6.4.42 Permanent removal of trees, woodland and hedgerows will only be permitted where it would achieve significant and clearly defined public benefits. Where individual or groups of trees and hedgerows are removed as part of a proposed scheme, planning authorities must first follow the step wise approach as set out in paragraph 6.4.15. Where loss is unavoidable developers will be required to provide compensatory planting (which is proportionate to the proposed loss as identified through an assessment of green infrastructure value including biodiversity, landscape value and carbon capture). Replacement planting shall be at a ratio equivalent to the quality, environmental and ecological importance of the tree(s) lost and this must be preferably onsite, or immediately adjacent to the site, and at a minimum ratio of at least 3 trees of a similar type and compensatory size planted for every 1 lost. Where a woodland or a shelterbelt area is lost as part of a proposed scheme, the compensation planting must be at a scale, design and species mix reflective of that area lost. In such circumstances, the planting rate must be at a minimum of 1600 trees per hectare for broadleaves, and 2500 trees per hectare for conifers. The planting position for each replacement tree shall be fit to support its establishment and health, and ensure its unconstrained long term growth to optimise the environmental and ecological benefits it affords.

6.4.43 Ancient woodland, semi natural woodlands, individual ancient, veteran and heritage trees and ancient hedgerows are irreplaceable natural resources, and have significant landscape, biodiversity and cultural value. Such trees, woodlands and hedgerows are to be afforded protection from development which would result in their loss or deterioration unless very exceptionally there are significant and clearly defined public benefits; this protection must prevent potentially damaging operations and their unnecessary loss. In the case of a site recorded on the Ancient Woodland Inventory, authorities should consider the advice of NRW. Planning authorities should also have regard to the Ancient Tree Inventory, work to improve its completeness and use it to ensure the protection of trees and woodland and identify opportunities for more planting as part of the Green Infrastructure Assessment, particularly in terms of canopy cover.

6.4.44 The protection and planting of trees and hedgerows should be delivered, where appropriate, through locally specific strategies and policies, through imposing conditions when granting planning permission, and/or by making Tree Preservation Orders (TPOs). They should also be incorporated into Green Infrastructure Assessments and plans.

D.2 Local Policy Context

Local Planning Authorities (LPA) in the UK have a statutory duty to consider both the protection and planting of trees when considering planning applications. The potential impact of development on all trees (including those not protected by a TPO or other statutory designation) is a material consideration. The Site is in Gwynedd Council's administrative boundary.

The Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026,[1] adopted 31 July 2017, illustrates how important trees, woodland and hedgerows are to the character of the area and outlines the policies of the two local authorities with regards to the protection of trees:

Strategic Policy PS 19: Conserving and Where Appropriate Enhancing the Natural Environment

6.5.3 *There are valuable biodiversity assets to be found in both the rural and urban settings of the Plan area, which are outside the formally designated areas. Vacant brownfield land can provide an ideal habitat in which wildlife can thrive. Parks, green spaces, roadside verges and rivers are examples that can cumulatively create a green/blue infrastructure network of biodiversity sites and 'corridors'/stepping stones in which wildlife can both reside and travel through. Therefore, there is a need to ensure that development within both rural and urban areas does not damage valuable habitats or encroach upon land forming part of the wider network of wildlife corridors. Trees, woodland, copses, hedgerows and traditional field boundaries such as cloddiau are important wildlife habitats as well as contributing to the character and beauty of the landscape.*

Policy AMG 3: Protecting and Enhancing Features and Qualities That Are Distinctive to the Local Landscape Character

Proposals that would have significant adverse impact upon landscape character as defined by the Landscape Character Areas included within the current Landscape Strategy for the relevant authority, must demonstrate through a landscape assessment how landscape character has influenced the design, scale, nature and site selection of the development. A proposal will be granted provided it doesn't have significant adverse impact upon features and qualities which are unique to the local landscape in terms of visual, historic, geological, ecological or cultural aspects. Measures should be taken to ensure that the development does not: 1. Cause significant adverse impact to the character of the built or natural landscape; 2. Fail to harmonise with, or enhance the landform and landscape; 3. Lose or fails to incorporate traditional features, patterns, structures and layout of settlements and landscape of both the built and natural environment. Particular emphasis will be given to the landscapes identified by the Landscape Character Areas as being of high and outstanding quality because of a certain landscape quality or a combination of qualities. Additional consideration will also be given to development that directly affect the landscape character and setting of the AONBs or the National Park.

6.5.13 Protecting, conserving and enhancing the unique landscape features and character of the Plan Area are essential for maintaining the unique scenery and sense of place. Although protection is afforded to some of the features in question (e.g. trees and hedgerows, through Tree Preservation Orders and the Hedgerows Regulations), some of the other features that are not afforded protection have features that are unique to the local landscape. These contribute to local distinctiveness, and where appropriate should be protected.

[1] Current Joint Local Development Plan (gov.wales)

Appendix E Site Photography



Plate E-1: W18 has areas of windthrow



Plate E-2: W38 is a newly replanted ancient woodland site adjacent to the northern border of the Site



Plate E-3: Previous works have removed a swath of trees to create access through W22



Plate E-4: W15 is comprised of mainly Norway spruce which are etiolated from competition and being lost to windthrow

Appendix F Outline Tree Protection Measures

F.1 Outline Tree Protection Measures

The default position as set out by BS5837 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 Figure 2 (included below as **Plate F-1**). Vertical support poles and bracing poles must be located with care to avoid underground utility services and will be sited to avoid the structural roots of retained trees.

Alternative equivalent robust and immovable fencing specification including site hoarding will also be appropriate.

Suitable all weather signage will be fixed to fencing to notify site staff and visitors of the construction exclusion zone and its purpose (example included as **Appendix G**).

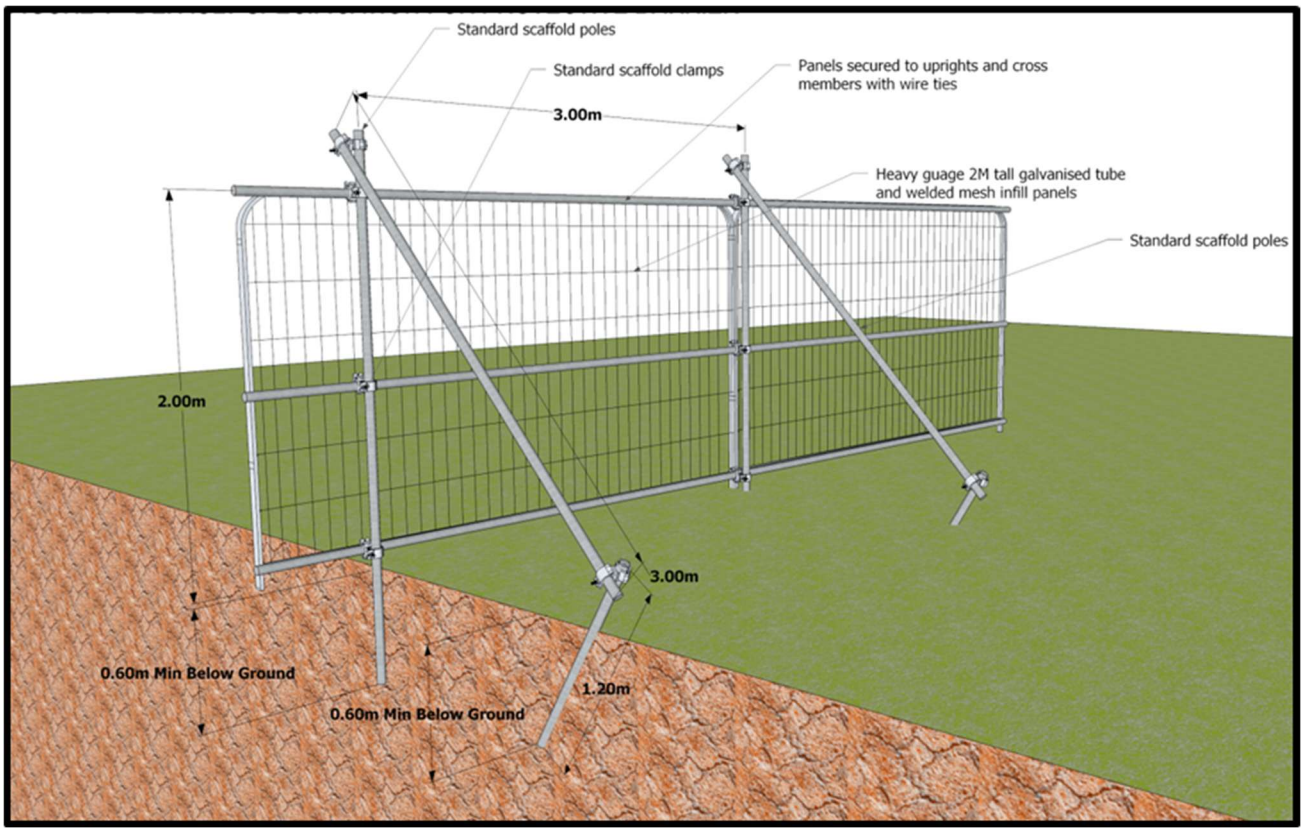


Plate F-1 Default specification for protective barrier

When entering and exiting the Site the fencing contractor must avoid the production of ruts on the unprotected surface of the ground.

Protective fencing and ground protection shall stay in place until all development operations have been completed and the prior consent of the LPA Tree Officer and/or an arboriculturist has been obtained.

F.2 Ground Protection

Should access be unavoidable within the RPA of a retained tree, fit for purpose ground protection must be in place which is sufficient to protect the structure of the soil from damage based on the heaviest anticipated load.

As set out in section 6.2.3.3 of BS5837 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 g per cm^3 (grams per cubic centimetre) for clay soils, to 1.75 g per cm^3 for sandy soils.

Tree protective measures shall stay in place until all construction operations are completed and removal is agreed with the Site arboriculturist and/or the Local Authority Tree Officer as appropriate.

F.3 General Guidance for the Management of Exposed Roots

Excavation must only take place within the RPA of a retained tree with the prior agreement of an arboriculturist and the Local Authority Tree Officer. All excavation must be undertaken using hand tools or compressed air (such as an air spade).

The following general principles will apply:

- Individual or small groups of roots less than 25 mm in diameter will be retained where possible but can be severed with a sharp tool such as secateurs or pruning saws to leave a clean cut end (ideally 100 mm back from the face of the excavation to account for future regrowth) where they pose an obstruction.
- Where roots are encountered which are larger than 25 mm in diameter or where significant groups of smaller roots are found, the advice of an arboriculturist must be sought to decide an appropriate course of action (following consultation with the Local Authority Tree Officer where appropriate).

- Roots must only be exposed for the minimum period possible. In the interim period any exposed roots must be completely covered with dampened hessian sacking (which may require ongoing re wetting) to avoid drying out and exposure to light (which can result in the death of roots). Backfill for excavations should utilise the parent material and must not be significantly compacted.

F.4 Storage, Use and Mixing of Materials

The use, mixing and washing of materials can lead to run-off or inadvertent spillage into tree root zones. Many substances often used on construction sites can be toxic to tree roots (such as concrete, fuels, salts, builders sand and herbicides), can result in the death of tree roots and beneficial soil organisms; and have a significant impact on the future health and appearance of trees.

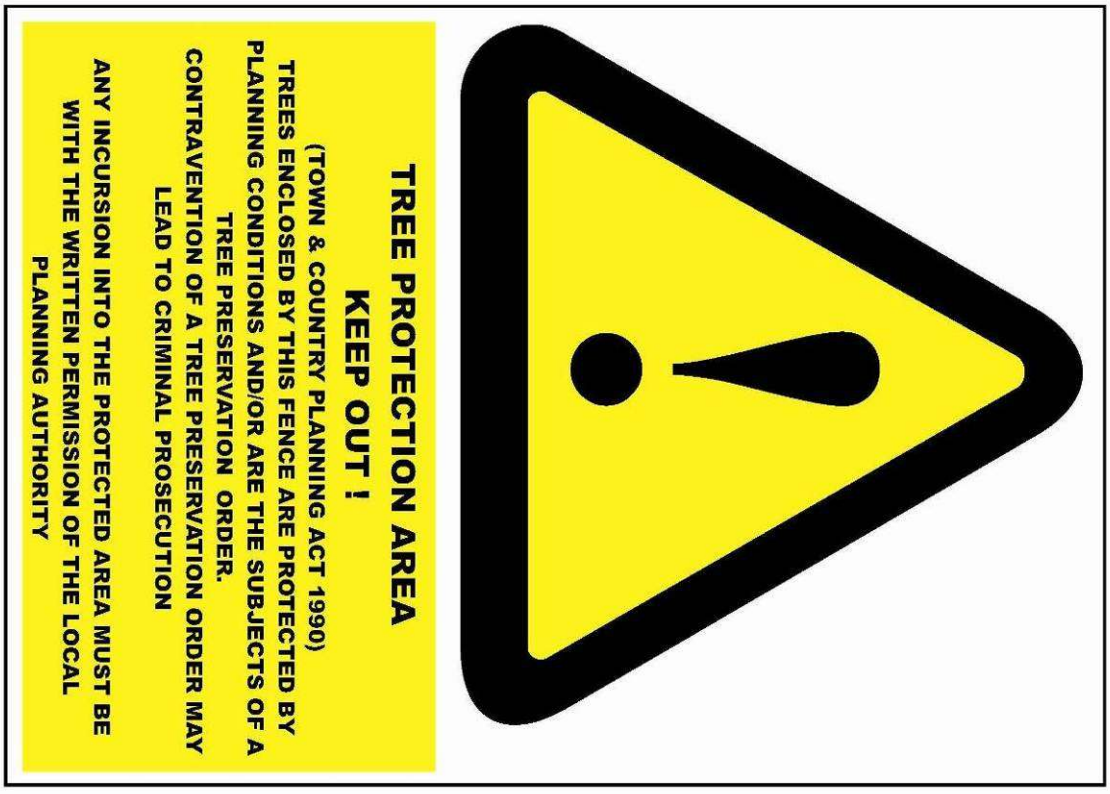
The storage of materials can result in an effective raised soil level. This buries tree roots at depths where air and water are less available and can lead to the decline or death of the tree.

For these reasons the storage of materials and any washing, mixing or refuelling must take place in agreed allocated areas at least 5 m 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





2.5.D. Net Benefit for Biodiversity and Green Infrastructure Statement

nationalgrid

Contents

1. Introduction 4

1.1 Introduction 4
1.2 The Proposed Works 4
1.3 Rationale and Objectives 4
1.4 National Grids Position 5

2. Policy Context 6

2.1 National Planning Policy 6
2.2 Area Statements 8
2.3 Local Planning Policy 8

3. Limitations and Assumptions 10

4. Baseline Site Assessment 11

4.2 Designated Sites 11
4.3 Irreplaceable Habitat 11
4.4 Priority Habitats 12
4.5 Habitats 12
4.6 Species 12
4.7 Public Rights of Way 12
4.8 Water 12

5. Methodology 14

5.1 Step-wise Approach 14
5.2 DECCA Framework 15
5.3 Building with Nature Standards 16

6. Review of Habitat Change 19

7. Demonstration of Policy Compliance 20

7.1 Application and Compliance of Stepwise 20
7.2 Application and Compliance of DECCA 21
7.3 Application and Compliance of Building with Nature Standards Framework 21

8. Conclusion 24

Bibliography 25

Appendix A – Baseline Constraints Plan 26

Appendix B – Summary of Legislation and Policy 28

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 replacement of existing underground cables and installation of new underground cables at the existing Pentir substation in North West Wales ('The proposed works''). This planning application is required for development at the existing Pentir 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 **Pentir Works Planning Statement** and the Environmental 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 are approximately 1.5 hectares (ha). The proposed works will be contained in the existing substation compound and will include part of the existing Pentir Substation, the access road, office and welfare facilities, laydown storage and car parking ('The Pentir works site'). The proposed works will include the following components:

- Removal of existing redundant oil-filled cables and associated electrical equipment.
- Reconfigure cable terminations.
- Install replacement and new 400 kilovolt (kV) cables.
- Reinstatement of the working areas within the exiting Pentir Substation compound.

1.2.2 For further information related to the proposed works at Pentir Substation or the wider context of works for the Project, refer to ES **Volume 2, Chapter 2: Pentir 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 1.3). 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 implementing for any net benefit achieved.

1.3.3 The objectives of this GI 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) (Ref 1.5).

1.4 National Grids Position

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

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

1.4.3 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 1.1). It delivers against the Welsh Government's Programme for Government (Ref 2.7) 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 1.1).

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 1.2). The Act emphasises the importance of maintaining and enhancing biodiversity to ensure ecosystem resilience and sustainability for future generations.

Planning Policy Wales. Edition 12 (2024)

- Planning Policy Wales (PPW) 12 (Ref 1.3) sets out the land use planning policies of Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs) (Ref 2.8), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW 12 sets out the importance of delivery of NBB and GI, aligning with Section 6 under the Environment Act (Wales) 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)

2.1.3 Future Wales: The National Plan 2040 ('Future Wales's) (Ref 1.4) is the National Development Framework for Wales. Future Wales sets out the spatial strategy for growth and development in Wales. Green Infrastructure is set out as a 'Strategic Placemaking Principle' in which '*Through Green Infrastructure Assessments, specific opportunities should be identified to ensure that green infrastructure is fully integrated*."

2.1.4 'Policy 9 - Resilient Ecological Networks and Green Infrastructure' states:

"To ensure the enhancement of biodiversity, the resilience of ecosystems and the provision of green infrastructure, the Welsh Government will work with key partners to:

- *identify areas which should be safeguarded and created as ecological networks for their importance for adaptation to climate change, for habitat protection, restoration or creation, to protect species, or which provide key ecosystems services, to ensure they are not unduly compromised by future development; and*
- *identify opportunities where existing and potential green infrastructure could be maximised as part of placemaking, requiring the use of nature-based solutions as a key mechanism for securing sustainable growth, ecological connectivity, social equality and well-being.*

Planning authorities should include these areas and/or opportunities in their development plan strategies and policies in order to promote and safeguard the functions and opportunities they provide. In all cases, action towards securing the maintenance and enhancement of biodiversity (to provide a net benefit), the resilience of ecosystems and green infrastructure assets must be demonstrated as part of development proposals through innovative, nature-based approaches to site planning and the design of the built environment."

2.1.5 A summary of these relevant local and national planning policies as well as legislation is provided in **Appendix B.**

2.1.6 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 1.1). Area Statements are published for the seven regions of Wales to facilitate the implementation of the national natural resources policy (2017) (Ref 2.5). Each Area Statement outlines the key challenges facing particular localities and provides guidance on what can be done to meet those challenges and how 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 1.3).

2.2.2 Pentir Substation is in the area addressed in the North West Wales Area Statement (Ref 2.6). The five key themes highlighted within the North West Wales Area Statement are as follows:

- Climate and Environment Emergency.
- Encouraging a Sustainable Economy.
- Reconnecting People with Nature.
- Opportunities for a Resilient Ecosystem.
- Supporting Sustainable Land Management.

2.2.3 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

Cyngor Gwynedd [Gwynedd Council]

2.3.1 Relevant local planning policies and supplementary guidance for Gwynedd are currently covered by the Anglesey and Gwynedd Joint Local Development Plan until the new Local Development Plan for the Gwynedd Planning Authority is adopted. The adopted Anglesey and Gwynedd Joint Local Development Plan (2012) (Ref 2.1) does not mention green infrastructure assessment however the Review Report (2022) (Ref 2.2) refers to green infrastructure implementation essential to comply with the National Plan.

2.3.2 Nature Gwynedd (Ref 2.3) produced a series of Local Biodiversity Action Plans (LBAP) and Topic Action Plans (TAP) alongside Supplementary Planning Guidance (Ref 2.4). The action plans do not explicitly detail green infrastructure but explain how habitats contribute to green infrastructure networks.

2.3.3 Gwynedd Council has not produced a Green Infrastructure Assessment. In the absence of a document outlining the Gwynedd green infrastructure aims, relevant policy within the Anglesey and Gwynedd Joint Local Development Plan (Strategic Policy PS19) has

been used (Ref 2.2). Strategic Policy PS19 of the Anglesey and Gwynedd Joint Local Development Plan states:

"*The Councils will manage development so as to conserve and where appropriate enhance the Plan area's distinctive natural environment, countryside and coastline, and proposals that have a significant adverse effect on them will be refused unless the need for and benefits of the development in that location clearly outweighs the value of the site or area and national policy protection for that site and area in question''*.

3. Limitations and Assumptions

3.1.1 For general ecology assumptions and limitations in reference to survey findings see ES **Volume 2, Chapter 5: Ecology and Nature Conservation.**

3.1.2 All on-site habitat was identified through on-site field observation surveys and a review of desk study data, see ES **Volume 2, Chapter 2: Pentir Substation Works**. 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). No HoPI or Section 7 habitats were identified on-site.

3.1.3 Species specific enhancement proposed to achieve NBB is detailed in **Section 7**. It is assumed that National Grid will maintain and monitor proposed species enhancement 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 for the Pentir works site are detailed in the following datasets and reports, and have been considered in this assessment:

4.1.2 Datasets:

- LANDMAP Landscape Habitats (Ref 4.1);
- Urban Tree Canopy Cover (Ref 4.2);
- Habitat Networks (Ref 4.3).

4.1.3 Supporting Planning Documents:

- ES **Volume 2: Pentir Works.**
- ES **Volume 8, Appendix 2.5.B: Pentir Statutory Designated Sites Citations.**
- ES **Volume 8, Appendix 2.5.C: Pentir Arboriculture Impact Assessment.**
- ES **Volume 2, Chapter 5: Ecology and Nature Conservation.**
- Planning Drawings.

4.2 Designated Sites

4.2.1 No designated sites lie within the proposed works site.

4.2.2 For full details of designated sites within 5 kilometres (km) of the Pentir works site, and within 10 km of designated sites for bats, please refer to **Table 5-1** in **Volume 2, Chapter 5: Ecology and Nature Conservation** and **Volume 8, Appendix 2.5.B, Pentir Statutory Designated Sites Citation.** 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 within the Pentir works site and there will be no impacts to irreplaceable habitat from the proposed works.

4.4 Priority Habitats

4.4.1 Section 7 lists Priority Habitats (as defined by Environment Act (Wales) 2016) (Ref 1.1) that are of principal importance for the purpose of maintaining and enhancing biodiversity in Wales. Developers are required to take all reasonable steps to maintain and enhance habitats included in the Section 7 list (Ref 4.4).

4.4.2 No Priority Habitats have been identified within the Pentir works site and therefore there will be no impacts to Priority Habitats from the proposed works.

4.5 Habitats

4.5.1 Baseline data was collected using Phase 1 survey methodology (for further details refer to **Volume 2, Chapter 5: Ecology and Nature Conservation).** The following habitats and their corresponding Phase 1 habitat code are present in the Pentir works site (**Appendix A, Figure 2.5.D.1)**:

- C3.1 Other tall herb and fern – ruderal
- A3.2 Coniferous parkland/scattered trees
- A3.1 Broadleaved parkland/scattered trees
- J2.6 Dry Ditch
- J3.6 Buildings
- J4 Bare ground

4.5.2 Detailed descriptions of baseline habitat are in the ES **Volume 2, Chapter 5: Ecology and Nature Conservation**.

4.6 Species

4.6.1 No species are likely to be present within the Pentir works site pre- or post-construction due to the majority of habitat being hardstanding.

4.6.2 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 Pentir 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 Pentir works site are likely to support breeding and non-breeding birds.

4.6.3 For details of the species present, or potentially present, within the Pentir works site, please refer to **Table 5-4** in **Volume 2, Chapter 5: Ecology and Nature Conservation.**

4.7 Public Rights of Way

4.7.1 The closest Public Rights of Way is Footpath Pentir No 14, 730 metres (m) north-west of the site.

4.8 Water

4.8.1 There is one balancing pond 27 m east of the Pentir works site.

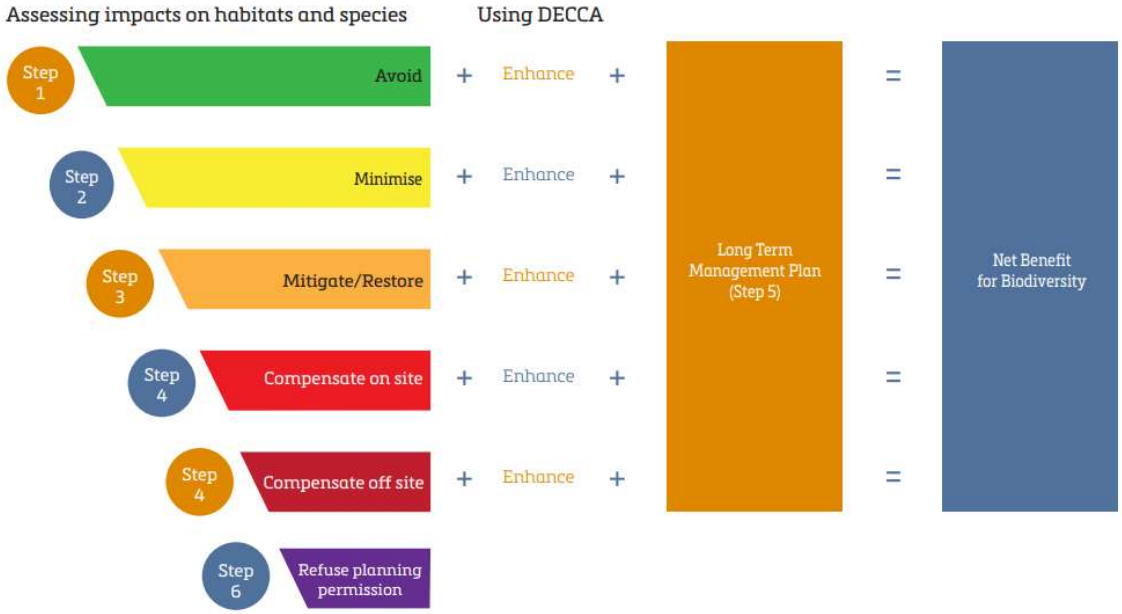
4.8.2 Two watercourses pass beneath the existing access track into the existing Pentir Substation and do not fall within 10 m of the other proposed works activities.

5. Methodology

5.1 Step-wise Approach

5.1.1 The proposed works have been designed in accordance with the stepwise approach **(see Section 7)**. Biodiversity restoration, enhancements or creation that achieve NBB must be delivered following the implementation of the stepwise approach.

5.1.2 The stepwise approach sets out the steps in order of priority **(see Plate 5-1)** to ensure that adverse effects on biodiversity are reduced. The measures undertaken at each step must be incorporated with enhancement measures and the principles of the DECCA Framework to ensure a net benefit for biodiversity is achieved.



(Source: Planning Policy Wales)

Plate 5-1 Stepwise Approach

5.1.3 The proposed works must adhere to the following steps highlighted within the stepwise approach:

- The first priority is the avoidance of impacts on biodiversity.
- If avoidance is not possible, adverse impacts to biodiversity must be minimised, by reducing the size of proposed works and maintaining the connectivity of habitats. Impacts must also be minimised for Section 7 habitats and features used by Section 7 species to ensure their populations are maintained.
- If impacts cannot be avoided or sufficiently minimised then adverse effects to biodiversity must be mitigated against, and/ or habitats and features for species restored. The mitigation and restoration must target the specific adverse effects of the proposed works, seek to restore in excess of like-to-like, and account for factors like time lags in recovery of habitats and species populations.

- When these first three steps have been exhausted, compensation on-Site (4a), or off-Site (4b) if not otherwise feasible, is required. Compensation must always be a last resort and must be of significant magnitude to fully compensate for any loss, be place based, and take account of the Section 6 Duty, the DECCA framework and appropriate ecological advice from the local authority Ecologist, NRW or a suitably qualified ecologist.
- A Long-Term Management Plan should be produced setting out the management of the site and future monitoring arrangements for all secured measures. The management plan must identify the funding mechanisms in place to meet the management plan objectives and the achievement of net benefits for biodiversity.
- Failure to action any of these steps will result in a planning application being refused.

5.2 DECCA Framework

5.2.1 PPW 12 defines Ecosystem resilience as *"the capacity of ecosystems to deal with disturbances, either by resisting them, recovering from them, or adapting to them, whilst retaining their ability to deliver services and benefits now and in the future"* (Disturbances are interpreted to mean pressures and demands on the ecosystem) (Ref 1.3).

5.2.2 NRW has developed a framework for evaluating ecosystem resilience based on five attributes and properties specified in the Environment (Wales) Act 2016 (Ref 1.1), referred to as the DECCA Framework (see **Plate 5-2**). The DECCA framework comprises the following objectives:

- **Diversity** at all scales including genetic, species, habitat and ecosystems or landscape scale;
- **Extent** of ecosystems and habitats;
- **Condition** of ecosystems and biodiversity, including their structure and functioning;
- **Connectivity** between and within ecosystems and habitats; and
- **Adaptability to change** of strengthening ecosystems to withstand and recover from environmental or anthropogenic pressures.

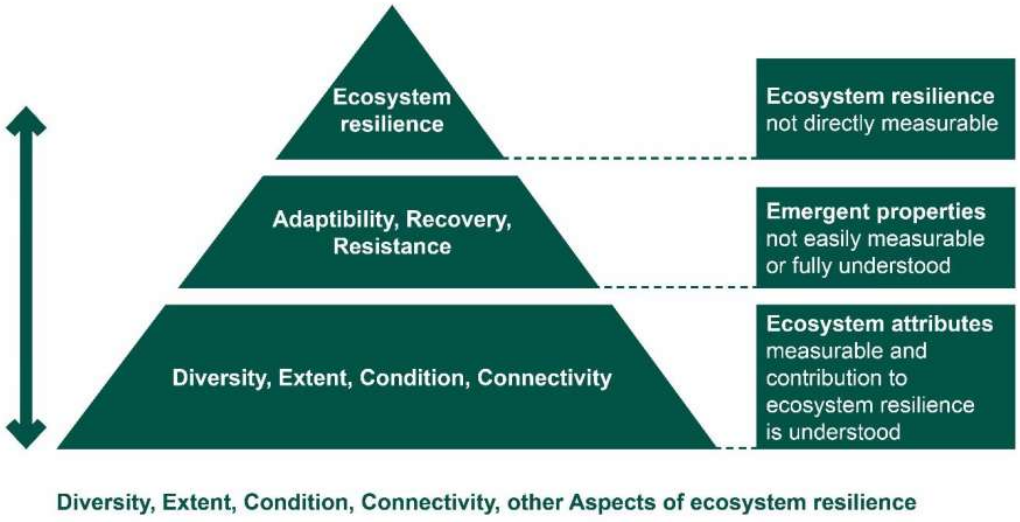


Plate 5-2 DECCA Framework (Ref 5.1)

5.3 Building with Nature Standards

5.3.1 PPW 12 (Ref 1.3) requires the submission of a proportionate GI Statement, signposting the BwNSF 2.0 (Ref 1.5). The twelve (12) Standards provide a pathway for and recognition of early and sustained engagement in the design, implementation and long-term stewardship of high-quality GI. The standards focus on the opportunities to put existing and planned-for habitat and wildlife at the heart of development for the benefit of people and nature. Each Standard is defined by its purpose and key characteristics, which are presented in the form of questions. These questions have been used to inform how the Proposed works meets each Standard. Error! Reference source not found.**Table 5-1** 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	*The green infrastructure optimises multifunctionality and connectivity within the boundary of the project and links with existing and planned for green infrastructure in the surrounding area'.*
Standard 2: Positively Responds to the Climate Emergency	*The green infrastructure is designed to be climate resilient by incorporating mitigation and adaptations that respond to the impacts of climate change. The green infrastructure is designed to promote low carbon behaviours and contributes to achieving zero carbon development by optimising carbon sequestration and demonstrating low carbon approaches to design, construction and long-term maintenance.*

Standard 3: Maximises Environmental Net Gains	*The green infrastructure is designed to actively mitigate any unavoidable harmful environmental impacts of development on soil and air quality and to minimise light and noise pollution. In addition, it delivers environmental net gains, including improving air and water quality and wherever possible includes quiet spaces for people and wildlife.*
Standard 4: Champions a Context Driven Approach	*The green infrastructure positively responds to the local context, including the physical environment, such as landscape and urban character and social, economic and environmental priorities, including the evidenced needs and strengths of existing and future local communities.*
Standard 5: Creates Distinctive Place	*The green infrastructure is integral to the project and is designed to reinforce local distinctiveness and/or create a distinctive sense of place.*
Standard 6: Secures Effective Place-Keeping	*The green infrastructure is subject to management arrangements that demonstrate a commitment to effectively implement, establish and maintain features at all stages of the development process. This should include details of funding, governance, maintenance, monitoring, remediation and, where appropriate, community involvement and stewardship.*
Standard 7: Brings Nature Closer to People	*The green infrastructure is close to where people live, work, learn, play and/or visit and is designed to optimise use and enjoyment for everyone across the year, to maximise health and wellbeing outcomes and to promote active living for existing and future communities.*
Standard 8: Supports Equitable and Inclusive Places	*The green infrastructure is designed to encourage and enable everyone, including those from vulnerable or excluded groups, to use and enjoy it, to help reduce health inequalities and to build a shared sense of community and belonging.*
Standard 9: Delivers Climate Resilient Water Management	*The green infrastructure is integral to sustainable drainage using above ground features to manage flood risk, maintain the natural water cycle and improve water quality within the boundary of the project and at a catchment scale. The green infrastructure is designed to be drought resistant and wherever possible, includes measures for the retention and reuse of rainwater.*
Standard 10: Brings Water Close to People	*The green infrastructure is designed to integrate water, including areas of standing water, flowing water, seasonal and ephemeral features, to bring additional amenity and wildlife benefits.*
Standard 11 Delivers Wildlife Enhancement	*The green infrastructure optimises long term and climate resilient net benefits for nature, by retaining and enhancing existing ecological assets and creating locally relevant new habitats within the boundary of the project. Wildlife measures are secured at all stages of*

	implementation and where applicable, across multiple phases of development.
Standard 12 Underpins Nature's Recovery	*The green infrastructure creates effective links with existing and planned for ecological features and networks beyond the boundary of the project to support the creation and restoration of resilient ecological networks in the wider landscape.*

6. Review of Habitat Change

6.1.1 The post construction proposals for the proposed works are due to take place in hardstanding areas only and no habitats would be impacted. Construction works are to occur in the proposed works area only and there would be no direct or indirect impact to surrounding woodland and watercourse habitats.

6.1.2 No habitats are impacted by the proposed works and NBB will be achieved through species enhancement. Species enhancement will be placed on-site, within National Grid owned land.

6.1.3 A Net Benefit will be achieved by the placement of the following in National Grid owned land to the south of the proposed works:

- 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

Avoid

7.1.1 The proposed works have avoided all impact to habitats and species on-site. This accords with the 'Avoidance' principle of the stepwise approach.

Minimise

7.1.2 The proposed works have been carefully designed to minimise their ecological footprint. This accords with the 'Minimise' principle of the stepwise approach.

Mitigate

7.1.3 The CEMP (**Volume 8, Appendix 2.2.A: Outline Construction Environmental Management Plan**) will detail the measures required to mitigate construction related effects on biodiversity, including those associated with construction dust deposition, air pollution, pollution incidents, water quality, light, noise and vibration.

7.1.4 Paragraph 5.8.9 of **Volume 2, Chapter 5: Ecology and Nature Conservation** details habitat avoidance measures to be implemented during construction.

7.1.5 The Pentir works site requires no vegetation clearance, therefore no habitats will be directly affected.

7.1.6 Although the ecological assessment **Volume 2, Chapter 5: Ecology and Nature Conservation** has identified the site as having low suitability for reptiles, precautionary mitigation measures will be implemented to ensure that no adverse impacts occur to the Pentir works site reptile population. These measures are designed to avoid harm and maintain existing species diversity, rather than to address any specific anticipated impacts. As such, the proposals are not expected to alter the Pentir works site species diversity. This approach is considered precautionary and proportionate to the level of risk identified. Therefore, under the DECCA framework, it is not deemed necessary to provide additional enhancement measures specifically for reptiles, given the absence of predicted impacts and the low habitat suitability.

7.1.7 **Table 5-7** (Assessment of construction impacts and significance of effects on IEFs during construction) in ES **Volume 2, Chapter 5: Ecology and Nature Conservation** provides a summary of the magnitude of impacts and likely significance of environmental effects on IEFs during the construction of the proposed works considering the embedded mitigation described.

Compensate

7.1.8 No compensation is required as part of the proposed works.

Enhancement

7.1.9 The proposed works have avoided all impact to habitats and species on-site and has proposed species specific enhancement to provide a net benefit on-site. Species enhancement specified to achieve a net benefit will include three Schwegler bat and bird boxes. National Grid will take sole ownership for the management and monitoring of bird and bat boxes to achieve NBB.

7.1.10 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 annually to inform adaptive management.

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 GI 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 7-3** 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 are to take place within existing hardstanding of an operational substation. There are no proposed works within vegetated areas of the Pentir works site. It is not anticipated that the works will involve any loss of habitat connectivity within the Pentir works site.
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 2.2.A: Outline Construction Environmental Management Plan**) will detail the measures required to manage the environmental effects of the

Standard	Justification for meeting the standard
	proposed works and demonstrate compliance with environmental legislation will be implemented.
3 Maximises Environmental Net Gains	A net benefit for biodiversity will be delivered species specific enhancement. All environmental and species impacts associated with the proposed works will be actively mitigated against. A robust CEMP (**Volume 8, Appendix 2.2.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	On-site Net Benefit is acquired with no impact to GI. Local stakeholder engagement was not a requirement of this project.
5 Creates Distinctive Places	The proposed works are to take place within existing hardstanding. It is not anticipated that the works will involve any loss of connectivity within the Pentir works site.
6 Secures Effective Place-keeping	The works are proposed within the existing Pentir Substation property boundary, within hardstanding. The location chosen eliminates any need for vegetation clearance or loss of habitat. Regular maintenance is carried out at the Pentir works site. 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 Pentir substation is an operational substation with no public access or PRoW. The nature of the operation of the Pentir works site restricts opportunities to bring people closer to nature.
8 Supports Equitable and Inclusive Places	The Pentir works site is an operational substation, this restricts opportunities to make the proposed works more equitable and inclusive.
9 Delivers Climate Resilient Water Management	All water retaining features will remain as part of the proposed works.
10 Brings Water Closer to People	Pentir is an operational substation on private land with no PRoW, which restricts opportunities to bring people closer to water.
11 Delivers Wildlife Enhancement	Proposals for ecological enhancement have identified bat and bird focused ecological enhancements within the Pentir works site. This includes bat and bird boxes.
12 Underpins Nature's Recovery	The proposed works are to take place within existing hardstanding. All habitat within the Pentir works site footprint is due to be retained and avoided.

Standard	Justification for meeting the standard
	The proposed works would be contained within existing hardstanding. It is not anticipated that the works will involve any loss of connectivity within the site.

8. Conclusion

8.1.1 The NBB assessment and GI Statement incorporates guidance from the stepwise approach, the DECCA Framework, and the BwNSF (Ref 7.1) 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 2.7) notably reversing the decline of, and enhancing, biodiversity.

8.1.3 As demonstrated in **Section 5.8 and 5.9** within the ES **Volume 2, Chapter 5: Ecology and Nature Conservation** the proposed works will be contained within existing hard standing and will not have any direct or indirect impacts on semi-natural habitats. Avoidance of all impacts to semi-natural habitats has been achieved and there is no requirement to evidence the additional steps in the stepwise approach. There is a requirement to evidence that the DECCA framework has been considered, and its application has been evidenced in **Section 7.**

8.1.4 A Net Benefit for Biodiversity is achieved through habitat avoidance and species-specific enhancement. The diversity, extent, condition and connectivity of all habitats has been maintained. Due to the nature of hardstanding within the Pentir works site and nature of the proposed works, no habitat can be enhanced or created on-site. Species-Specific enhancements, through the provision of bat and bird boxes (**see Section 7**), will a Net Benefit. GI is maintained, with no on-site or surrounding impact.

8.1.5 Mitigation measures are also to be included in the CEMP to identify and stop the spread of INNS which would otherwise lower the condition of other habitats surrounding the Proposed works. The DECCA framework has been applied and demonstrated in this NBB Assessment and GI Statement, and the provision of species-specific enhancements will result in a net benefit for the Proposed works.

8.1.6 Species-specific enhancements will be managed and monitored post-construction by National Grid, with long-term management requirements detailed in **Section 7**.

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Ref 1.2 Welsh Government (2015). Well-Being of Future Generations (Wales) 2015.

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Ref 1.4 Welsh Government (2021) Future Wales: The National Plan 2040.

Ref 1.5 Building with Nature (2023). *Building with Nature Green Infrastructure Standards Framework.* BwNSF

Ref 2.1 Isle of Anglesey County Council and Gwynedd Council (2017) Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026

Ref 2.2 Isle of Anglesey County Council and Gwynedd Council (2022) Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026 Review Report

Ref 2.3 Gyynedd Council (2004) Nature Gwynedd Biodiversity Action Plan

Ref 2.4 Gwynedd Council (2010) Supplementary Planning Guidance

Ref 2.5 Welsh Government (2017) Natural Resources Policy.

Ref 2.6 Natural Resource Wales (2023) North West Wales Area Statement

Ref 2.7 Welsh Government (2025) Environment (Principles, Governance and Biodiversity Targets (Wales) Bill. https://laiddocuments.senedd.wales/pri-ld17199-em-en.pdf

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Ref 3.2 Welsh Government (2025) DataMap Wales. New map | DataMapWales

Ref 3.3 Garrett H.M., Ayling S.C. (2021) Terrestrial and freshwater Resilient Ecological Networks: a guide for practitioners in Wales.

Ref 4.1 Natural Resources Wales (2025) LANDMAP - the Welsh landscape baseline

Ref 4.2 Welsh Government (2018) Urban Tree Cover 2018. DataMapWales

Ref 4.3 Welsh Government (2022) Habitat Networks. DataMapWales

Ref 4.4 Welsh Biodiversity Partnership (2016). Section 7 Priority Species and Habitat Lists.

Ref 5.1 Natural Resource Wales (2021). Terrestrial and freshwater Resilient Ecologicall Networks: a guide for practitioners in Wales.

Ref 7.1 Building with Nature Partnership (2022) Building with Nature Standards Framework

Ref 8.1 Garrett H.M., Ayling S.C. (2021) Terrestrial and freshwater Resilient Ecological Networks: a guide for practitioners in Wales.

Appendix A – Baseline Constraints Plan

N

Spring

Well

Coed Tyddyn-Forgan

106.4m

Issues

Drain

Drain

Drain

Drain

Coed Ty'n-llwyn

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0 50 100 150 200 250

Metres

PENTIR SUBSTATION WORKS ROUTE LEGEND



Legend

- Pentir Works Site Boundary

Phase 1 Habitat Feature

- A3.1 - Broadleaved parkland/scattered tree
- A3.2 - Coniferous parkland/scattered trees
- G2 - Running water
- J2.4 - Fence
- J2.6 - Dry ditch
- A1.1.1 - Broadleaved woodland - semi-natural
- B2.2 - Neutral grassland - semi-improved
- 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
- J4 - Bare ground
- Hardstanding

Rev	Date	Description	GIS	Chk	App
A	11/09/2025	Environmental Statement	CA	JC	SK

nationalgrid

Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
PENTIR SUBSTATION WORKS

Document Title: FIGURE 2.5.D.1
PHASE 1 BASELINE HABITATS

Creator:	Date:	Checker:	Date:	Approver:	Date:
CA	11/09/2025	JC	11/09/2025	SK	11/09/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
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Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp5_Fig5.6_ECO_Phase1Habitats.aprx

Appendix B – Summary of Legislation and Policy

Legislation

The UK is no longer a member of the European Union (EU). EU legislation as it applied to the UK on 31 December 2020 is now a part of the UK domestic legislation. EU legislation which applied directly or indirectly to the UK before 11.00pm on 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'.

The Secretary of State for the Environment, Food and Rural Affairs and Welsh Ministers have made changes to parts of the *Conservation of Habitats and Species Regulations 2017* (referred to as the 2017 Regulations) so that they operate effectively. Most of these changes involve transferring functions from the European Commission to the appropriate authorities in England and Wales. All other processes or terms in the 2017 Regulations remain unchanged and existing guidance is still relevant.

Designated Sites

Locally Designated Sites

Local Wildlife Sites (LWSs) are sites with 'substantive nature conservation value' and include Site of Importance for Nature Conservation (SINC). They are defined areas, identified and selected for their nature conservation value, based on important, distinctive and threatened habitats and species within a region.

They are usually selected by the relevant Wildlife Trust, along with representatives of the local authority and other local wildlife conservation groups.

The LWS selection panel select all sites that meet the assigned criteria, unlike Site of Special Scientific Interest (SSSI) which for some habitats are a representative sample of sites that meet the national standard. Consequently, many sites of SSSI quality are not designated and instead are selected as LWSs. LWSs can therefore be amongst the best sites for biodiversity.

Protected Species

Bats/Otter

These species, known as European Protected Species, are protected under Regulation 43 of the 2017 Regulations (as amended). This makes it an offence to:

- deliberately capture, injure or kill an animal.
- deliberately disturb an animal; or,
- damage or destroy a breeding site or resting place used by an animal.

Deliberate capture or killing is taken to include 'accepting the possibility' of such capture or killing. Deliberate disturbance of animals includes in particular any disturbance which is likely to:

- impair their ability to survive, breed, reproduce or rear or nurture young;

- in the case of animals of hibernating or migratory species, to hibernate or migrate; or,
- significantly affect the local distribution or abundance of the species to which they belong.

Where development works are at risk of causing one or more of the offences listed above, a mitigation licence from Natural Resources Wales can be obtained to facilitate the works that would otherwise be illegal.

These species are also protected under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). This makes it an offence to intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb an animal in such a place.

Lower levels of disturbance not covered by the *Conservation of Habitats and Species Regulations 2017* (as amended) remain an offence under the *Wildlife and Countryside Act 1981* although a defence is available where such actions are the incidental result of lawful activity that could not reasonably be avoided.

Nesting Birds

All wild birds are protected under the *Wildlife and Countryside Act 1981* (as amended), with some species afforded great protection under Schedule 1 of the *Wildlife and Countryside Act 1981* (as amended). In addition to the protection from killing or taking that all birds receive; Schedule 1 birds and their young must not be disturbed at, or in the vicinity of the nest.

There are no licensing purposes that explicitly cover development activities affecting wild birds.

Common Species of Reptile (common lizard, slow worm, grass snake and adder)

Common species of reptile are protected against intentional killing and injury under Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended). There is no requirement for a licence where development works affect common species of reptiles. Instead, Natural Resources Wales advise[1] that where reptiles are present, they should be protected from any harm that might arise during the development works through appropriate mitigation.

Badger

Badgers and their setts are protected under the *Protection of Badgers Act 1992* (as amended). This makes it an offence to:

- wilfully kill, injure or take a badger;
- intentionally or recklessly damage, destroy or obstruct access to a badger sett; or,
- disturb a badger in its sett.

It is not illegal to carry out disturbance activities near setts that are not occupied, *i.e.* those that do not show signs of current use.

Where required, licences for development activities involving disturbance or sett interference or closure are issued by Natural Resources Wales. Licences for activities involving watercourse maintenance, drainage works, or flood defences are issued under a separate process.

[1] Reptiles: guidelines for developers, English Nature 2004

When assessing the requirement for a licence in respect of development, Natural Resources Wales state that badgers are relatively tolerant of moderate levels of noise and activity around their setts, and that a low or moderate level of apparent disturbing activity at or near to badger setts does not necessarily disturb the badgers occupying these setts[2].

Licences are normally not granted from December to June inclusive (the badger breeding season) because dependent cubs may be present within setts.

Species and Habitats of Principal Importance for the Conservation of Biodiversity

Section 7 of the *Environment (Wales) Act 2016* sets out the duty for public authorities to conserve biodiversity in Wales. Habitats and species of principal importance for the conservation of biodiversity are referred to in Section 7 of the *Environment (Wales) Act 2016*. The list can be found on the Natural Resources Wales website[3].

The list is used as a guide for decision makers such as public bodies, including local and regional authorities, in implementing their duty under Section 7 of the *Environment (Wales) Act 2016* to have regard to the conservation of biodiversity in Wales when carrying out their normal functions.

Hedgerows

Under the Hedgerow Regulations 1997, it is against the law to remove or destroy certain hedgerows without permission from the local planning authority. In general, permission will be required before removing “important hedgerows” that are at least 20 m in length, over 30 years old and meet specific archaeological and historical or wildlife and landscape criteria. The local planning authority will assess the importance of the hedgerow using the criteria set out in the regulations.

Invasive Non-Native Plant Species

Under the *Wildlife and Countryside Act 1981* (as amended), it is an offence to plant or otherwise cause species listed under Schedule 9 Part II to grow in the wild.

Species listed on Invasive Alien Species of Union concern under the *Invasive Alien Species (Enforcement and Permitting) Order 2019* are subject to restrictions and measures set out in the Regulations. These include restrictions on keeping, importing, selling, breeding, growing and releasing into the environment.

Any contaminated soil or plant material is classified as controlled waste and should be disposed of in a suitably licensed landfill site, accompanied by appropriate Waste Transfer documentation, and must comply with section 34 of the *Environmental Protection Act 1990.*

Environment Act (Wales 2016).

The Environment (Wales) Act 2016 replaced the existing biodiversity duty (in the Natural Environment and Rural Communities Act 2006) which required public authorities to have a regard to conserving biodiversity. The new Section 6 duty takes this further, requiring all public authorities, when carrying out their functions in Wales, to seek to “maintain and enhance

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

[3] https://www.biodiversitywales.org.uk/Section-7

biodiversity" where it is within the proper exercise of their functions. In doing so, public authorities must also seek to "promote the resilience of ecosystems". This was introduced to plan and manage Wales' natural resources in a sustainable and joined-up way and is intended to work alongside the Wellbeing of Future Generations Act 2015.

The Well-being of Future Generations Act 2015

The Wellbeing of Future Generations Act 2015 requires national government, local government, local health boards and other specified public bodies to carry out sustainable development and work towards objectives that contribute to seven wellbeing goals. Sustainable development in the Act means "the process of improving the economic, social, environmental and cultural wellbeing of Wales by taking action, in accordance with the sustainable development principle (i.e. not compromising the ability of future generations to meet their needs), aimed at achieving the well-being goals".

Nature Recovery Action Plan (Wales) (NRAP)

The NRAP complements The Well-being of Future Generations (Wales) Act 2015 and the Environment Act (Wales) 2016. The NRAP[4] sets out how the United Nations Environment Programme's Convention on Biological Diversity's (CBD) Strategic Plan for Biodiversity (and the associated Aichi Biodiversity Targets for 2011-20 in Wales) is addressed in Wales[5]. The ambition of the plan is 'To reverse the decline in biodiversity, for its intrinsic value, and to ensure lasting benefits to society'. The NRAP is split into three parts:

Part 1: Our Strategy for Nature sets out the commitment to reversing the loss of biodiversity in Wales, and the objectives for action. These objectives are listed below:

- Engage and support participation and understanding to embed biodiversity throughout decision making at all levels.
- Safeguard species and habitats of principal importance and improve their management.
- Increase the resilience of our natural environment by restoring degraded habitats and habitat creation.
- Tackle key pressures on species and habitats.
- Improve our evidence, understanding and monitoring.
- Put in place a framework of governance and support for delivery.

Planning Policy

Planning Policy Wales, 2024

PPW sets out the land use planning policies of Welsh Government. It is supplemented by a series of TANs, Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales.

Chapter 6. Distinctive and Natural Places outlines Welsh Government's objectives for the environmental and cultural components of placemaking. These components are complementary

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

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

to those of the Active and Social and Productive and Enterprising themes and collectively the three themes come together to contribute towards the national sustainable placemaking outcomes.

The Environment (Wales) Act 2016 Part 1 – Section 6 'Biodiversity and resilience of ecosystems duty' states that public authorities "*must seek to maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems, so far as consistent with the proper exercise of those functions".* Planning Policy Wales (Ref 1.3) (PPW) expands on this by stating that "*This means development should not cause any significant loss of habitats or populations of species, locally or nationally and must provide a net benefit for biodiversity".*

To facilitate the fulfilment of Section 6, a NBB approach has been adopted by the Welsh Government. This approach has been included in the 12th edition of PPW[6] and sets out the requirement for a Green Infrastructure Statement. Relevant sections of PPW are:

Paragraph 6.2.11: *The quality of the built environment should be enhanced by integrating green infrastructure into development through appropriate site selection and use of creative design. With careful planning and design, informed by an appropriate level of assessment, green infrastructure can embed the benefits of biodiversity and ecosystem services into new development and places, help to overcome the potential for conflicting objectives, and contribute to health and well-being outcomes.*

Paragraph 6.2.12: *A green infrastructure statement should be submitted with all planning applications. This will be proportionate to the scale and nature of the development proposed and will describe how green infrastructure has been incorporated into the proposal… The green infrastructure statement will be an effective way of demonstrating positive multi-functional outcomes which are appropriate to the site in question and must be used for demonstrating how the step-wise approach (see 'Method of Approach' below) has been applied.*

Paragraph 6.2.13: *There are multiple ways of incorporating green infrastructure, depending on the needs and opportunities a site presents, and the green infrastructure assessment should be referred to, as appropriate, in order to ascertain local priorities… In most cases the green infrastructure statement should highlight any baseline data considered and surveys and assessments undertaken, including but not limited to, habitats and species surveys, arboricultural surveys and assessments, sustainable drainage statements, landscape and ecological management plans, open space assessments and green space provision and active travel links.*

Section 6.4 addresses Biodiversity and Ecological Networks. The policy includes the duties and requirements set out in Section 6 the Environment Wales Act (2016) and pays due regard to the State of Natural Resources Report (Natural Resources Wales (NRW), 2016) by taking all reasonable steps to maintain and enhance biodiversity. There is a focus on ecosystem services and the benefits of protecting and enhancing biodiversity.

The relevant measures in place to conserve landscape and biodiversity include:

- Statutory designations;
- Non-statutory designations;
- Maintaining and enhancing biodiversity;
- Ecosystem resilience and connectivity of ecological networks; and,

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

- Protection and consideration of protected and notable species and habitats.

Sections relevant to this Green Infrastructure Statement are detailed below.

Paragraph 6.4.5: *Planning authorities must seek to maintain and enhance biodiversity in the exercise of their functions. This means development should not cause any significant loss of habitats or populations of species (not including non-native invasive species), locally or nationally and must work alongside nature and it must provide a net benefit for biodiversity and improve, or enable the improvement, of the resilience of ecosystems. A net benefit for biodiversity is the concept that development should leave biodiversity and the resilience of ecosystems in a significantly better state than before, through securing immediate and long-term, measurable and demonstrable benefit, primarily on or immediately adjacent to the site. The step-wise approach outlined below is the means of demonstrating the steps which have been taken towards securing a net benefit for biodiversity. In doing so, planning authorities must also take account of and promote the resilience of ecosystems, in particular the following attributes, known as the DECCA Framework:*

- diversity between and within ecosystems;
- the extent or scale of ecosystems;
- the condition of ecosystems including their structure and functioning;
- the connections between and within ecosystems; and
- adaptability of ecosystems including their ability to adapt to, resist and recover from a range of pressures likely to be placed on them through climate change for example.

Paragraph 6.4.21: Planning authorities must follow a step- wise approach to maintain and enhance biodiversity, build resilient ecological networks and deliver net benefits for biodiversity by ensuring that any adverse environmental effects are firstly avoided, then minimised, mitigated, and as a last resort compensated for. Enhancement must be secured by delivering a biodiversity benefit primarily on site or immediately adjacent to the site, over and above that required to mitigate or compensate for any negative impact.

Paragraph 6.4.12: Having worked iteratively through the stages of the step-wise approach (see 'Method of Approach' below), and providing evidence in the Green Infrastructure Statement that the step-wise approach has been followed, a scheme of enhancements must be provided to ensure a NBB. Where biodiversity enhancement proportionate to the scale and nature of the development is not proposed as part of an application, significant weight will be given to its absence, and unless other significant material considerations indicate otherwise, it will be necessary to refuse permission.

Paragraph 6.4.13: Improving ecosystem resilience, particularly improving connectivity to the immediate surroundings, would be a key contribution to on-site avoidance, minimisation, and mitigation strategies and enhancement. How a development would improve the attributes of resilience should be demonstrated as far as this is reasonably practical.

Paragraph 6.4.20: Statutorily designated sites must be protected from damage and deterioration, with their important features conserved and enhanced by appropriate management. The contribution of the designated site to wider resilient ecological networks should be recognised and captured as part of a strategic approach to planning policy and decision making. The links between planning and wider management activity for the restoration and recovery of nature should be made. Complementary, and joint, action between all sectors and beyond the boundaries of the designated sites themselves is necessary to improve extent, connectivity and adaptability and address the nature emergency.

Paragraph 6.4.29: SACs and SPAs are of European importance. Under the Conservation of Habitats and Species Regulations (2017) (the Habitats Regulations), all public bodies (including planning authorities) must have regard to the requirements of the EC Habitats and Birds Directives when carrying out their functions. SACs and SPAs on land are underpinned by notification as SSSIs and hence subject to protection afforded by the SSSI provisions. Before authorising development or adopting a land use plan which is likely to have a significant effect on a SACor SPA (including where outside the boundary of the SAC or SPA), planning authorities must carry out an appropriate assessment of the implications for the designated features, consult NRW and have regard to NRW's representations. The development can normally only be authorised, or the plan adopted, if the planning authority ascertains that it will not adversely affect the integrity of the site, if necessary taking into account any additional measures, planning conditions or obligations.

Paragraph 6.4.31: Although non-statutory designations do not have a statutory process for their protection, Sites of Importance for Nature Conservation, Local Wildlife Sites, Local Nature Reserves, and Regionally Importance Geodiversity Sites make a vital contribution to delivering an ecological network for biodiversity and resilient ecosystems, and they should be given protection in development plans and the development management process.

Paragraph 6.4.35: The presence of a species protected under European or UK legislation, or under Section 7 of the Environment (Wales) Act 2016 is a material consideration when a planning authority is considering a development proposal which, if carried out, would be likely to result in disturbance or harm to the species or its habitat and to ensure that the range and population of the species is sustained.

Paragraph 6.4.39: Planning authorities should protect trees, hedges, groups of trees and areas of woodland where they have ecological value, contribute to the character or amenity of a particular locality, or perform a beneficial green infrastructure function.

Paragraph 6.4.26: Ancient woodland, semi-natural woodlands, individual ancient, veteran and heritage trees and ancient hedgerows are irreplaceable natural resources, and have significant landscape, biodiversity and cultural value. Such trees, woodlands and hedgerows are to be afforded protection from development which would result in their loss or deterioration unless very exceptionally there are significant and clearly defined public benefits; this protection must prevent potentially damaging operations and their unnecessary loss.

Paragraph 6.4.44: the protection and planting of trees and hedges should be delivered, where appropriate, through locally specific strategies and policies, through imposing conditions when granting planning permission, and/or by making Tree Preservation Orders (TPOs).

Technical Advice Note 5 (TAN5) Nature Conservation and Planning

The PPW is supplemented by a series of TANs. TAN 5 provides guidance on how the land use planning system should contribute to protecting and enhancing biodiversity and geological conservation. It provides advice on areas including the key principles of positive planning for nature conservation, nature conservation in Local Development Plans and development management procedures. It also provides advice on development affecting designated sites and habitats, in addition to protected or habitats and species of principal importance.

Key Principles include that the town and country planning system in Wales should integrate nature conservation into all planning decisions; that the town and country planning system should look for development to provide a net benefit for biodiversity conservation with no significant loss of habitats or populations of species, locally or nationally and that they should ensure that the UK's international and national obligations for site, species and habitat protection are fully met in all planning decisions.

The National Plan

The National Plan 2024[7] sets out Wales' national development framework that details the Welsh Government's twenty-year plan for shaping the growth and development of the country. Relevant to this Green Infrastructure Statement is Policy 9 – Resilient Ecological Networks and Green Infrastructure which is outlined below:

To ensure the enhancement of biodiversity, the resilience of ecosystems and the provision of green infrastructure, the Welsh Government will work with key partners to:

- *identify areas which should be safeguarded and created as ecological networks for their importance for adaptation to climate change, for habitat protection, restoration or creation, to protect species, or which provide key ecosystems services, to ensure they are not unduly compromised by future development; and*
- *identify opportunities where existing and potential green infrastructure could be maximised as part of placemaking, requiring the use of nature-based solutions as a key mechanism for securing sustainable growth, ecological connectivity, social equality and well-being.*

Planning authorities should include these areas and/or opportunities in their development plan strategies and policies in order to promote and safeguard the functions and opportunities they provide. In all cases, action towards securing the maintenance and enhancement of biodiversity (to provide a net benefit), the resilience of ecosystems and green infrastructure assets must be demonstrated as part of development proposals through innovative, nature-based approaches to site planning and the design of the built environment.

Local Planning Policy

A summary of relevant local planning policies is provided below.

Document	Planning policy	Summary of policy text
Anglesey and Gwynedd Joint Local Development Plan	Policy AMG 2: Special Landscape Areas	When considering a proposal within Special Landscape Areas (SLA), as identified by the Proposals Map and listed below, there will be a need to appropriate consideration to the scale and nature of the development ensuring that there is no significant adverse detrimental impact on the landscape. The development should aim to maintain, enhance or restore the recognised character and qualities of the SLA. The proposal should have regard to the relevant 'Statement of Value and Significance'. Where appropriate, the Councils will require a Landscape and Visual Impact Assessment in order to consider the impact of the development on the designated area. In exceptional circumstances, where development is necessary and could result in significant impact on the landscape, appropriate mitigation and compensation measures should be provided.
	Policy AMG 3: Protecting	Proposals that would have significant adverse impact upon landscape character as defined by the Landscape Character Areas included within the current Landscape Strategy for the

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

Document	Planning policy	Summary of policy text
	and enhancing features and qualities that are distinctive to the local landscape character	relevant authority, must demonstrate through a landscape assessment how landscape character has influenced the design, scale, nature and site selection of the development.
	Policy AMG 5: Local Biodiversity and Conservation	Proposals must protect and, where appropriate, enhance biodiversity that has been identified as being important to the local area by: • Avoiding significant harmful impacts through the sensitive location of development. • Considering opportunities to create, improve and manage wildlife habitats and natural landscape including wildlife corridors, stepping stones, trees, hedges, woodlands and watercourses. A proposal affecting sites of local biodiversity importance will be refused unless they can conform with all of the following criteria: • That there are no other satisfactory alternative sites available for the development. • The need for the development outweighs the importance of the site for local nature conservation. • That appropriate mitigation or compensation measures are included as part of the proposal. Where necessary, an Ecological Assessment which highlights the relevant local biodiversity issues should be included with the planning application.
	Policy AMG 6: Protecting Sites of Regional or Local Significance	Proposals that are likely to cause direct or indirect significant harm to Local Nature Reserves (LNR), Wildlife Sites (WS) or regionally important geological / geomorphologic sites (RIGS) will be refused, unless it can be proven that there is an overriding social, environmental and/or economic need for the development, and that there is no other suitable site that would avoid having a detrimental impact on sites of local nature conservation value or local geological importance. When a development is granted, it will be necessary to ensure that there are appropriate mitigation measures in place. It will be possible to use planning conditions and/or obligations in order to safeguard the site's biodiversity and geological importance.

Document	Planning policy	Summary of policy text
Natur Gwynedd – Local Biodiversity Action Plan		Natur Gwynedd is the local biodiversity action plan for Gwynedd outside the Snowdonia National Park. The aims are to: • to help conserve the biodiversity of Gwynedd and, thereby, contribute to biodiversity conservation in Wales, the UK and the world. • to develop effective local partnerships to make sure that what we do will be maintained long term. • to increase our knowledge of Gwynedd's biodiversity. • to raise public awareness of biodiversity in Gwynedd. Natur Gywnedd details the Habitat Action Plans and Species Action Plans for Gwynedd outside the Snowdonia National Park.

Supplementary Planning Guidance

The Supplementary Planning Guidance for 'Maintain and Creating Distinctive and Sustainable Communities' (Ref 2.4) supports the implementation of the Joint Local Development Plan. It provides planning advice on a number of areas relating to sustainable design, construction and climate change. The green infrastructure approach combines all these elements to achieve a more joined-up approach to the environment.

With regards to Green Infrastructure Statements, the guidance states:

''An important element of planning for sustainable development is to contribute towards tackling climate change by reducing carbon emissions. In order for a development to be genuinely sustainable, it must be designed and built with the aim of tackling the threat deriving from climate change. Development proposals in the area can help achieve this aim by avoiding areas presently at risk from flooding now, or areas that are anticipated to be at risk in future, and by building sustainable drainage systems (SUDS), and by connecting and improving the green infrastructure network in the area to help wildlife and help it adapt to a changing climate''.

2.6.A Historic Environment Desk Based Assessment for the Pentir Works

nationalgrid

Contents

1. Introduction 4

1.2 Site Location and Proposed Works 4

1.3 Aims 4

1.4 Structure of the Document 5

2. Legislation, Policy and Guidance 6

2.2 Legislation 6

2.3 National Planning Policy 6

2.4 Local Planning Policy 6

2.5 World Heritage Convention 6

2.6 Guidance 6

3. Assessment Methodology 8

3.1 Study Area 8

3.2 Data and Information Sources 8

3.3 Site Walkover Survey 9

3.4 Previous Ground Disturbance 9

3.5 Archaeological Potential 10

3.6 Significance of Historic Assets 10

3.7 Limitations and Assumptions 12

4. Heritage Baseline 13

4.1 Site Conditions 13

4.2 Findings from Site Walkover Surveys 13

4.3 Previous Archaeological Investigations 14

4.4 Historic Assets 15

4.5 Archaeological and Historical Background 18

5. Assessment of Baseline 33

5.1 Previous Ground Disturbance 33

5.2 Archaeological Potential 33

5.3 Historic Landscape Sensitivity to Change 34

5.4 Significance of Designated Historic assets 35

5.5 Significance of Non-Designated Historic Assets 50

5.6 Assets Scoped Out of ES Assessment 51

6. Conclusion 57

Bibliography 58

1. Introduction

1.1.1 This report comprises a desk-based assessment (DBA), which sets out the terrestrial heritage baseline conditions for the proposed works. This DBA is included as an Appendix (**Volume 8: Appendix 2.6.A**) to **Volume 2, Chapter 6: Historic Environment** of the Environmental Statement (ES).

1.1.2 The purpose of the DBA is to identify all known designated and non-designated terrestrial historic assets in the Pentir 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 Pentir works site and provides an assessment of the significance of the known historic assets and potential archaeological remains that have the potential to be affected by the proposed works. The DBA concludes with an assessment of potentially affected historic assets in the Pentir works site and study areas.

1.2 Site Location and Proposed Works

1.2.1 National Grid Electricity Transmission plc (NGET) is proposing to reinforce the existing double circuit electric line which runs between Pentir Substation near Bangor and Trawsfynydd Substation in Eryri National Park (ENP) ('the Project').

1.2.2 Works at Pentir Substation would be limited to within the existing compound, east of the B4547 (SH 559677) as well as the proposed access route which utilises the current access road to the substation (in an area measuring 300 metres (m) north-west to south-east by 600 m north-east to south-west).

1.2.3 Further information on the proposed works is provided in ES **Volume 2, Chapter 2: Pentir Substation Works**.

1.2.4 For the purposes of this assessment, 'the Pentir 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 Pentir works site in its historical and archaeological context through the collection of baseline information.
- To identify the presence of known terrestrial historic assets (both designated and non-designated) in the Pentir 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 Pentir works site.
- To identify the extent of previous ground disturbance which may have affected the survival of archaeological remains in the Pentir works site.

- To assess the significance of terrestrial historic assets in the Pentir works site and study areas, and the likely significance of previously unrecorded archaeological remains that may be in the Pentir works site.
- To identify terrestrial 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 Pentir works site and description of historic assets in the Pentir works site and study areas, as well as a summary of previous archaeological investigations undertaken in the study areas, is set out in **Section 4** (Heritage Baseline).
- **Section** Error! Reference source not found. assesses the potential for unrecorded archaeological remains to exist in the Pentir 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 6** (Conclusions).

1.4.2 This DBA is supported by **Volume 8, Appendix 2.6.B: Gazetteer of Historic Assets**.

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

- **Figure 2.6.A.1**: Designated Historic Assets within 3 km of Pentir Substation.
- **Figure 2.6.A.2**: Non-designated Historic Assets within 500 m of Pentir Substation.
- **Figure 2.6.A.3**: Historic Landscape Character Areas within 500 m of Pentir Substation.
- **Figure 2.6.A.4**: Extract from Tithe Surveys of Bangor Parish and Llanddeniolen Parish in the County of Carnarvon 1841.
- **Figure 2.6.A.5**: Historical OS Map 1888.
- **Figure 2.6.A.6**: Historical OS Map 1901.
- **Figure 2.6.A.7**: Historical OS Map 1920.
- **Figure 2.6.A.8**: 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).
- The Historic Environment (Wales) Act 2023 (Ref 2.4) and relevant regulations.
- 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

- Anglesey and Gwynedd Joint Local Development Plan 2011 – 2026 (Ref 2.11).

2.5 World Heritage Convention

- The Slate Landscape of Northwest Wales. Nomination as a World Heritage Site. Property Management Plan 2020 – 2030 (Ref 2.12).

2.6 Guidance

2.6.1 This DBA has been carried out using guidance from the following sources the relevant to the terrestrial heritage assessment:

- Conservation Principles for the sustainable management of the historic environment in Wales (Ref 2.13).
- Heritage Impact Assessment in Wales (Ref 2.14).
- Managing Change to Listed Buildings in Wales (Ref 2.15).

- Managing Change to Registered Historic Parks and Gardens in Wales (Ref 2.16).
- Managing Conservation Areas in Wales (Ref 2.17).
- Managing Historic Character in Wales (Ref 2.18).
- Managing Lists of Historic Assets of Special Local Interest (Ref 2.19).
- Setting of Historic Assets in Wales (Ref 2.20).
- Chartered Institute for Archaeologists Standard and guidance for historic environment desk-based assessment (Ref 2.21).

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 and are presented on **Figures 2.6.A.2** and **2.6.A.3**.

Designated Historic Assets

3 km Study Area

3.1.2 A study area of 3 km from the Pentir 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.

3.1.3 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 3 km 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 distance from the Pentir works site.

Non-designated Historic Assets

500 m Study Area

3.1.4 A study area of 500 m from the Pentir works site has been defined to provide historical and archaeological context and to identify non-designated historic assets with the potential to be affected by the proposed works.

3.1.5 Undesignated historic receptors are identified with their Historic Environment Record (HER) reference number which uses the prefix 'PRN'. Each receptor 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 Pentir works site)
- Documentary, cartographic and other resources as deposited in the local archives.
- Local authority conservation area appraisals and management documents and their mapping.
- 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 3.10).
- Defence of Britain Database (Ref 3.11).
- Relevant records available from the Portable Antiquities Scheme (PAS) (Ref 3.12).

3.3 Site Walkover Survey

3.3.1 A site visit and visual appraisal of historic assets in the Pentir works site and study areas was undertaken between 12th and 14th November 2024 to:

- Identify known historic assets in the Pentir 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 Pentir works site and study areas.
- Identify the location, extent and severity of modern ground disturbance and previous construction impacts.
- Assess ground conditions and the suitability of the Pentir 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 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/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 Pre-history 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 Pentir works site in addition to the known archaeological resource identified in the baseline. The potential for unrecorded archaeological remains to exist in the Pentir works site has been determined by professional judgement guided by an assessment of the existing heritage resource and the impact of previous modern development or ground disturbance in the Pentir 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 Pentir works site and the study areas.

3.6 Significance of Historic Assets

3.6.1 The assessment criteria to be 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 professional judgement guided by statutory and non-statutory designations, national, regional, and local policies, and archaeological research frameworks.

3.6.2 The value of a historic 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 historic 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 is made on the level of impact (positive or negative) that a historic asset will experience because of the proposed works, supported by an appropriate narrative linking this to how the asset will have its significance changed.

3.6.3 **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. Averagely preserved historic landscape character areas, exhibiting reasonable coherence, time-depth, or other critical factor(s). Historic townscapes with historic integrity in that the assets that constitute their make-up are clearly legible.
Low	Locally Listed Buildings. Non-designated historic assets (archaeological sites, historic buildings, monuments, park, gardens, or landscapes) that can be shown to have demonstrable local importance.

	Assets whose values are compromised by poor preservation or survival of contextual associations to justify inclusion into a higher grade. Historic landscape character areas whose value is limited by poor preservation and/or poor survival of contextual associations.
Very Low	Assets identified on national or regional databases, but which have no evidential, historical, aesthetic, or communal value. Assets whose values are compromised by poor preservation or survival of contextual associations to justify inclusion into a higher grade. Landscape with no or little significant historical merit.

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 The assessment has been undertaken using the available design for the proposed works and the maximum likely extents of land required for its construction, operation, and maintenance.

3.7.3 Historic aerial photographic coverage of the Pentir works site and study area of suitable coverage or resolution was not 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 Pentir works site is the Minffordd Formation – comprising interbed sandstone and conglomerate. This is a sedimentary bedrock formed between 526 and 508 million years ago, during the Cambrian period.

4.1.2 In the late Devensian glaciation during the Pleistocene, sands and gravel was deposited, which comprises much of Caernarfonshire and Gwynedd. The superficial deposit in the Pentir works site consists of 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 Pentir Works Site

4.1.3 No geotechnical data is available.

Topography

4.1.4 Pentir Substation is in the rolling landscape of the Arfon plateau, covered mostly by improved pasture. The pattern of substantial 19th-century farmhouses and outbuildings is typical of the area. Relict prehistoric settlements (hut groups and small forts) are dotted across the landscape, usually in the corners of fields, and some fields display a curvilinear patter of characteristic of the period (Area 23 Arfon plateau).

4.1.5 Just to the east of the Pentir Substation is an area of fertile agricultural land in the southern part of the former parish of Pentir, which in the medieval period may have formed the outer reaches of Maenol Bangor but by the late 18th century was occupied by the Vaynol estate and partly by the Penrhyn estate.

4.1.6 The area is characterised by large, regularly laid-out fields, and by estate farmhouses, outbuildings, and the smaller houses of estate workers. These are typically substantial two-storey dwellings covered with slate on the first floor, and with a few ornamental features such as decorated porches.

4.1.7 In several locations, ribbon developments of labourers' or quarrymen's cottages have developed alongside the road, along with several substantial chapels. The nearest nucleated community is represented by a group of houses and a public house at Pentir, approximately 1.5 km south-east of the Pentir Substation (Area 54 Improved fields above Pentir).

4.2 Findings from Site Walkover Surveys

4.2.1 A site walkover was carried out of the Pentir works site between 12th and 14th November 2024 to examine the area of proposed works. No new assets were recorded as part of the walkover survey.

4.3 Previous Archaeological Investigations

4.3.1 There have been no previous archaeological investigations undertaken in the Pentir works site.

4.3.2 Fourteen previous archaeological investigations have been undertaken in the 500 m study area. The locations are illustrated on **Figure 2.6.A.3** and presented in the gazetteer (**Volume 8: Appendix 2.6.B Gazetteer of Historic Environment Assets**).

4.3.3 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 4.1).

4.3.4 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 4.2). Further work (**PRN 40542** & **40544**) on the same project was carried out again in 2004, and 2007 (Ref 4.3; Ref 4.4).

4.3.5 The Roman road between Segontium and Aber was investigated in a separate exercise in 2008 (**PRN 40543**) (Ref 4.5).

4.3.6 A metal detector was used by a member of the public at Pentir in 2008 (**PRN 44226**). A possible mount was recovered (Ref 4.6).

4.3.7 Gwynedd Archaeological Trust carried out a scoping study of the surviving remains of medieval and post-medieval sites relating to agriculture and subsistence in north-west Wales as part of a 2013 Cadw grant-aided pan-Wales project (**PRN 44846**). The work aimed to assess the potential for new scheduling and focussed on often over-looked sites such as sheepfolds, rabbit warrens and peat cutting (Ref 4.7).

4.3.8 A cultural heritage assessment (**PRN 45026**) commissioned by Iberdrola Engineering and Construction and undertaken in 2012 by the Field Services Section of the Clwyd-Powys Archaeological Trust (CPAT) assessed the potential direct impacts on cultural historic assets along the route of an existing 132 kilovolt (kV) overhead powerline for which a scheme of refurbishment was proposed. The scheme was to be conducted in three phases, commencing with the repainting of pylons along the route and followed by a programme of line refurbishment. The final element involved the installation of a new underground cable from the westernmost pylon at SH 5640 6817 to the substation Pentir (Ref 4.8).

4.3.9 Another cultural heritage assessment (**PRN 45025**) was commissioned by Iberdrola Engineering and Construction and undertaken by the Field Services Section of the CPAT of the potential direct impacts on cultural historic assets along the route of an existing 132 kV overhead powerline for which a scheme of refurbishment was proposed. The overhead line known as the ‘AD line’, ran from Dolgarrog in Conwy, to Pentir, near Bangor, in Gwynedd, passing through the Snowdonia National Park between towers AD5 and AD65. The original assessment was completed in April 2012 (Ref 4.8) and revised in October of the same year to include a proposed underground cable connection to the substation at Pentir. The initial phase of the scheme involved the repainting of towers, and this was completed in 2012. Information from the original baseline study was used to develop the programme of works for the remaining phases of the scheme to mitigate against any potential impacts to known cultural historic assets (Ref 4.9).

4.3.10 In 2013, a small-scale excavation (**PRN 44985**) was undertaken by the Field Services Section of the CPAT on behalf of Iberdrola Engineering and Construction as part of a

wider programme of mitigation works associated with the refurbishment of the 132 kV AD overhead powerline between Dolgarrog and Pentir. The excavation was conducted along the route of a trench for a new underground cable required to divert an existing lower voltage powerline prior to the commencement of refurbishment works. The cable trench crossed a prominent bank thought to be part of a medieval or earlier field system and a full section across the earthwork revealed a sequence of deposits forming the bank, together with the remains of a roughly built stone revetment. Currently the feature remains undated. A watching brief during the machine excavation of the remainder of the cable trench identified no features or deposits of archaeological significance (Ref 4.10).

4.3.11 Network Archaeology undertook an archaeological trenched evaluation (**PRN 45055**) to inform the National Grid North Wales Connection Project between the then proposed new power station at Wylfa, Anglesey, and the substation at Pentir, Gwynedd, in 2017. The evaluation followed a geophysical survey undertaken by West Yorkshire Archaeological Services. Thirty-six trenches were investigated at fourteen sites. Many archaeological features were discovered dating from the Prehistoric to Modern period (Ref 4.11).

4.3.12 Further metal detecting and casual finds (**PRN 45493** & **PRN 45705**) were made by members of the public (Ref 4.12; Ref 4.13).

4.3.13 Archaeological Services WYAS were commissioned by AMEC Foster Wheeler on behalf of National Grid to undertake a geophysical (magnetometer) survey (**PRN 45947**) extending from Wylfa on the Isle of Anglesey to the substation at Pentir, Gwynedd, in 2017. A variety of magnetic responses were detected across the survey area including those of an agricultural nature, magnetic disturbance likely associated with dumped material, and possible archaeological features. Archaeological features included possible burnt mounds and enclosures (Ref 4.14).

4.4 Historic Assets

4.4.1 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 Heneb HER 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 **Appendix 2.6.B** and shown on **Figures 2.6.B.2** and **2.6.B.3**.

Designated Historic Assets

Within the Pentir Works Site

4.4.2 There are no designated historic assets in the Pentir works site.

Within the 3 km Study Area

4.4.3 There is one World Heritage Site – the Slate Landscape of Northwest Wales (**UNESCO 1633**) approximately 2.9 km east of the Pentir works site.

The Slate Landscape of Northwest Wales (UNESCO 1633)

4.4.4 The Slate Landscape of Northwest Wales comprises six areas or component parts which together represent an exceptional example of an industrial landscape which was profoundly shaped by quarrying and mining slate and transporting it for national and international markets.

4.4.5 Each Component Part has its own unique character. They have been chosen for their scale (all of the largest relict quarries and quarrying areas are represented), for their significant landscape impact, for their integrity, and for the way in which they exemplify technology transfer and the transformation of a minority rural culture into a modern industrial society.

4.4.6 The components represent geographically discrete areas of the World Heritage Site and one is in the 3 km study area: Component Part 1: Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn.

4.4.7 Within each Component Part, significant Elements – physical features which embody the attributes of Outstanding Universal Value – have been identified.

4.4.8 One of the elements which comprise Component Part 1 is The Penrhyn Slate Quarry Railroad and Penrhyn Slate Quarry Railway (element 1.3) which exported slate from 1801 to 1962. A short segment (1.85 km) of the abandoned Penrhyn Slate Quarry Railway is in the 3 km study area, approximately 2.9 km east of the Pentir works site.

4.4.9 From 1780 to 1940 this industry dominated world production of roofing slates, transforming both the environment and the communities who lived and worked here. The quarries and mines are monumental in scale, comprising stepped hillside workings, deep pits and cavernous underground chambers, massive cascading tips, ingenious water systems, and a range of industrial buildings. Outstanding technical equipment and major engineering features survive. Innovative transport systems linked quarries and processing sites with purpose-built coastal export harbours and with main-line railways. Grand country houses and estates built by leading industrialists' contrast with workers' vernacular settlements, with their characteristic chapels and churches, band-rooms, schools, libraries, and meeting-places. By the late 19th century, the region produced about a third of the world output of roofing slates and architectural slabs. Its use in terraced houses, factories, warehouses, and elite architecture contributed to rapid global urbanization. It influenced building styles, encouraging the shallow-pitched roofs of the Georgian order. Technologies that were innovated, adopted, and adapted in the property include the ingenious application of waterpower, the development of bulk handling systems and the first known application of the circular saw for cutting stone. These were diffused by specialists and by emigration of skilled Welsh quarrymen to the developing slate industries of the United States, continental Europe, and Ireland. The Snowdon massif's narrow-gauge railway systems gained global influence and were adopted from Asia and America to Africa and Australasia.

Scheduled Monuments

4.4.10 There are 15 scheduled monuments in the 3 km study area. These are listed below with their distance from the Pentir works site:

- Cefn Mawr Hut Group (**CN200**), approximately 2.96 km south-west.
- Cae Metta Hut Group (**CN168**), approximately 3 km south-west.
- Enclosed Hut Group (**CN227)** South-West of Bronydd, approximately 3 km south-east.
- Dinas Dinorwic Camp (**CN017**), approximately 1.93 km south.

- Glascoed Ancient Village (**CN060**), approximately 2.69 km south.
- Glascoed Round Cairn (**CN150**), approximately 2.52 km south-west.
- Castell Llandddeiniolen (**CN197**), approximately 2.2 km south-east.
- Rectangular Earthwork 110 m North-West of Coed Ty Mawr (**CN156**), approximately 790 m south.
- Gors y Brithdir Enclosed Hut Group & Ancient Fields (**CN203**), approximately 830 m north-west.
- Pen-y-Gaer Camp (**CN149**), approximately 2.96 km south.
- Goetre Uchaf barrow (**CN376**), approximately 2.08 km north.
- Coed Nant-y-garth, standing stone to North of (**CN375**), approximately 1.66 km west .
- Gerlan Hut Group (**CN192**), approximately 2.86 km east.
- Fodol Ganol Enclosed Hut Group (**CN175**), approximately 1 km north-west.
- Penrhyn Quarry Railway (**CN417**), approximately 2.88 km east of the site.

4.4.11 There are 104 listed buildings within 3 km of the Pentir works site. These include three Grade I, six Grade II* and 95 Grade II listed buildings.

4.4.12 The Grade I listed buildings comprise the following:

- Vaynol Old Hall (**Cadw 4166**), approximately 2.61 km north-west.
- Chapel of St Mary to North of Vaynol Old Hall (**Cadw 4172**), approximately 2.63 km north-west.
- Vaynol Hall (**Cadw 4173**), approximately 2.65 km north-west.

4.4.13 The Grade II* listed buildings comprise the following:

- Best Stables on South Side of Vaynol Old Hall and courtyard walls (**Cadw 4167**), approximately 2.6 km north-west.
- Terraced Garden to North of Vaynol Old Hall (**Cadw 4169**), approximately 2.62 km north-west.
- Gateway with inscription set in North boundary wall of Terrace Garden opposite Vaynol Old Hall (**Cadw 4170**), approximately 2.63 km north-west.
- Long Barn at Vaynol Farm (**Cadw 4184**), approximately 2.7 km north-west.
- Bryntirion (**Cadw 14924**), approximately 2.76 km north-west.
- Arched wall to forecourt of Vaynol Old Hall (**Cadw 18927**), approximately 2.63 km north-west.

4.4.14 The Grade II listed buildings are dispersed across the study area and comprise farmstead 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 Pentir works site are as follows:

- Ty'n Llwyn Farm - Bothy and Bakehouse Range to NE of Yard (**Cadw 83169**), approximately 580 m east;

- Ty'n Llwyn Farm - Cartshed and Granary (**Cadw 83170**), approximately 594 m east;
- Ty'n Llwyn Farm - Cattle Sheds at South-East of Yard (**Cadw 83279**), approximately 593 m south-east;
- Ty'n Llwyn Farm - Cattle Sheds at South of Yard (**Cadw 83280**), approximately 558 m south-east;
- Ty'n Llwyn - Barn and Cowhouse at West of Yard (**Cadw 83281**), approximately 539 m south-east;
- Ty'n Llwyn Farm - Barn outside yard to South-West (**Cadw 83282**), approximately 532 m south-east;
- Ty'n Llwyn Farm - Hay Barn outside Yard to North-West (**Cadw 83283**), approximately 533 m east;
- Ty'n Llwyn Farm – North-West range of Yard (**Cadw 83284**), approximately 550 m east; and
- Ty'n Llwyn Farm - Detached barn outside Yard to East (**Cadw 83285**), approximately 606 m south-east.

4.4.15 There is one registered historic park and garden within 3 km of the Pentir works site – Vaynol (**PGW(Gd)52(GWY)),** (Grade I) approximately 1.8 km north-west.

4.4.16 There are three conservation areas within 3 km of the Pentir works site. These are:

- Aberpwll – Y Felinheli Conservation Area (**WAL/GWYN/5**), approximately 2.3 km north-west.
- Glasinfryn Conservation Area (**WAL/GWYN/4**), approximately 2.8 km north-east.
- Y Faenol Conservation Area (**WAL/GWYN/30**), approximately 2.2 km north-west.

Non-designated Historic Assets

Within the Pentir Works Site

4.4.17 There are no known non-designated historic assets in the Pentir works site.

4.4.18 A site visit and visual appraisal did not identify any areas with the potential to contain any previously unidentified archaeological or historical remains.

Within the 500 m Study Area

4.4.19 A further 13 non-designated archaeological assets have been identified in the 500 m study area. These non-designated assets comprise archaeological sites and findspots dating to the prehistoric and Roman, as well as of unknown date.

4.5 Archaeological and Historical Background

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

4.5.1 Remains from the Palaeolithic period are rare, and to date, no material from this period has been yet identified in the Pentir works site or in the 500 m or 3 km study areas.

4.5.2 No Mesolithic findspots, archaeological remains or sites have been identified in the Pentir 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 27 km south of the Pentir 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)

4.5.3 As elsewhere, Neolithic settlement sites are particularly rare 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.

4.5.4 Neolithic and early Bronze Age activity is mostly represented in the archaeological record by flint tools and funerary monuments.

4.5.5 More widely, 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.

4.5.6 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. Undefended 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 4.15).

4.5.7 Within the 3 km study area, the Glascoed Round Cairn (**CN150**) is approximately 2.52 km south-west of the Pentir works site. The monument is the remains of a burial cairn, probably dating to the Bronze Age (c.2300 - 800BC). It measures approximately 15 m in diameter by approximately 1.2 m in height and sits on the summit of a low, rounded hill. The centre of the cairn has been disturbed and a sheep shelter built into the top of it, although this is now ruined, and more stone has been dumped elsewhere on the cairn. An arc of large stones on the north side are probably the remains of a kerb. The stones of the cairn extend beyond this kerb, so that its original diameter may have been more than 15 m.

4.5.8 The Goetre Uchaf Barrow (**CN376**) lies approximately 2.08 km north of the Pentir works site. The monument comprises the remains of a round barrow, a burial mound probably dating to the Bronze Age formerly in enclosed pasture on the edge of a slight terrace, now surrounded by a large housing development. The grass-covered barrow is circular on plan and measures about 11 m in diameter and up to 1 m in height.

4.5.9 A Standing Stone to the North of Coed Nant-y-garth (**CN375**) is approximately 1.66 km west of the Pentir works site. The standing stone probably dates to the Bronze Age and is on improved pasture on the summit of the hill. It is a squat, rounded stone, standing 1.4 m in height and measuring 0.6 m in thickness and 0.5 m in width.

4.5.10 The Cefn Mawr Hut Group (**CN200**) is approximately 2.96 km south-west of the Pentir works site. The monument comprises several hut circles, the foundations of round houses probably dating to the Bronze Age or Iron Age. The historic site is very wet in places and contains various remains of walling and huts. There are four readily identifiable huts with diameters of 10 m, 6 m, 6 m and 8 m, respectively. A patchwork of small fields, some of which could conceivably have their origins in prehistory exists immediately to the south-east of the site.

4.5.11 The Gors y Brithdir Enclosed Hut Group & Ancient Fields (**CN203**) is approximately 830 m north-west of the Pentir works site. A single round hut standing in a sub-rectangular enclosure on the level summit of a rocky outcrop overlooks the wooded valley of Gors y Brithdir. A field system adjoins the enclosure on the south-west and is particularly well preserved in a belt of woodland occupying a steep slope. The site probably dates from the Bronze Age to Iron Age. The hut measures approximately10 m across but has no obvious entrance. The sub-rectangular enclosure measures approximately c.25 m across with a prominent entrance of about 2.5 m wide on the west side. The enclosure wall varies in width and height and is apparently absent along the south side where the natural rock outcrops. The boundaries of the field system consist mostly of stone walls, generally up to 2 m thick and up to 1 m high but include banks. There are also mounds of stones scattered amidst the fields, these are assumed to be field clearance cairns.

4.5.12 The Fodal Ganol Enclosed Hut Group (**CN175**) is approximately 1 km north-west of the Pentir works site. The historic site probably dates from the Bronze Age to Iron Age. There are two hut circles in the enclosure, although the walls are just low grassy banks; other irregularities may be other features or possibly a third hut. A length of field wall 55m long is included in the scheduled area. It runs from the enclosure wall in a north-east direction and is probably of the same date as the enclosed settlement, although a more recent field wall has been constructed on top of the earlier wall.

Iron Age (800 BC to AD 43)

4.5.13 The Iron Age roughly spans the centuries between approximately 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 very rare 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 4.16). 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

4.5.14 As mentioned above in paragraph 4.4.16, the Cefn Mawr Hut Group (**CN200**) is approximately 2.96 km south-west of the Pentir works site. The monument comprises several hut circles, the foundations of round houses probably dating to the Bronze Age or Iron Age.

4.5.15 The Cae Metta Hut Group (**CN168**) is approximately 3 km south-west of the Pentir works site. An enclosed hut group containing both round and rectilinear huts, probably dating to the Iron Age or Romano-British period, lying on the south-east side of a small

valley. A modern wall overlies the enclosure wall on the south-west and the site is crossed by a modern stone wall running from north-west to south-east. The larger part of the site lies to the south-west of the modern wall, where there are two round huts, one rectilinear hut and several other structures. Walls are up to 1 m high, of earth and stones with orthostatic faces. To the north-east of the modern wall is a further round hut and the enclosure wall is clearly visible, c.1 m wide and 0.5 m high.

4.5.16 The Enclosed Hut Group South-West of Bronydd (**CN227**) is approximately 3 km south-east of the Pentir works site. A multi-period settlement which lies on west-facing ground below the steeper slopes of Moel Rhiwen. The southern part of the historic site includes the clear foundations of five circular huts and associated features dating from the Iron Age and Romano-British period. To the north there are indications of further hut circles but also the foundation of a well-preserved long hut representing more recent settlement in, perhaps, the later medieval period.

4.5.17 Dinas Dinorwic Camp (**CN017**) is approximately 1.93 km south of the Pentir works site. The monument comprises the remains of a hillfort, which probably dates to the Iron Age period. Dinas Dinorwig hillfort is on one summit of a ridge. The hillfort comprises an inner wall surrounded by two massive ramparts of earth and rubble. Of two entrances through the wall, the larger is obstructed by the inner rampart, indicating that the ramparts are of a later phase than the wall. The outer rampart has an exterior ditch approximately 4 m wide around most of the circuit. On the north side there is a wedge-shaped annexe between the outer rampart and the steep slope of the hill. Within the defences, on the west side, a single hut is visible as a depression.

4.5.18 Glascoed Ancient Village (**CN060**) is approximately 2.69 km south of the Pentir works site. An enclosed hut group probably dating to the Iron Age or Romano-British period, containing at least four round huts and one rectangular hut. The enclosure is roughly circular, with a diameter of 34 m. The enclosing bank probably consisted of two faces of upright stones (orthostats) with a rubble core, but the orthostats have nearly all been removed leaving a rubble bank approximately 9 m wide and 1.5 m high on the north side, decreasing to 3 m wide and 0.8 m high on the south. The entrance may have been through the rectangular building on the south, which is on a lower level than the round huts. All the internal walls are grass-grown banks and much of the detail of the site is hidden by gorse and brambles. Another rectangular building may lie to the east of the enclosure, just outside the scheduled area, but its relationship with the enclosed site is not clear.

4.5.19 As mentioned above in paragraph 4.5.11, the Gors y Brithdir Enclosed Hut Group & Ancient Fields (**CN203**) approximately 830 m north-west of the Pentir works site probably dates from the Bronze Age to Iron Age. Also mentioned in paragraph 4.5.12, is the Fodal Ganol Enclosed Hut Group (**CN175**) approximately 1 km north-west of the Pentir works site which also probably dates from the Bronze Age to Iron Age.

Roman (AD 43 to AD 410)

4.5.20 North-west Wales contains some of the defining type-sites of the Roman period in Wales – the enclosed and unenclosed hut-groups together with some of the best known and extensively excavated military installations; Segontium being 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 being notable geographical markers in the context of first century military operations (Ref 4.17).

4.5.21 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 4.17).

4.5.22 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 road's crossing through it.

4.5.23 Part of a Roman Road, which linked Segontium with Canovium near Conwy (**PRN 17566**), has been projected to run through the eastern end of the Pentir works site in a north-east to south-west orientation. Alternatively, the same road (**PRN 17834**) is also projected to run in a similar orientation approximately 190 m to the south-east of the Pentir works site. The road to the west of the B4547 is clearly visible as a parch mark on aerial photography (RCAHMW AP 2006/28071). The road to the east of the B4547 runs through fairly rough ground that retains the remains of field boundaries that appear to predate the 1832 estate map.

4.5.24 An earthwork on the line of this road was subject to archaeological evaluation. The recorded feature (201102) would appear to have been a road (**PRN 90578**), though without dating evidence it was uncertain whether the extant earthwork is the original Roman road or a later reiteration (Ref 4.11).

4.5.25 The archaeological evaluation also revealed quarry pits (**PRN 90579**) in the vicinity of the same road. Pit 201105 was one of several visible earthworks in the field, which appeared to be the remains of quarry pits. Significant quantities of stone were visible in the field, both loose in topsoil and as solid outcrops, suggesting that road stone could be quarried locally, and pit 201105 was likely to be one such quarry pit (Ref 4.11).

4.5.26 Another Roman Road, which ran from Segontium to Bangor (**PRN 17829**) is also projected to run in a north-east to south-west orientation, approximately 420 m north-west of the Pentir works site.

4.5.27 As mentioned above in paragraph, 4.5.15, the Cae Metta Hut Group (**CN168**) is an enclosed hut group containing both round and rectilinear huts, probably dating to the Iron Age or Romano-British period. There are two round huts, one rectilinear hut and several other structures.

4.5.28 As mentioned above in paragraph 4.5.16, the Enclosed Hut Group South-West of Bronydd (**CN227**) is a multi-period settlement, the southern part of the which includes the clear foundations of five circular huts and associated features dating from the Iron Age and Romano-British period.

4.5.29 The Gerlan Hut Group (**CN192**) is approximately 2.86 km east of the Pentir works site. The monument consists of a well-preserved group of stone huts: six roughly circular structures, with boulder-faced stone walls, of probable Romano-British date. A sub-

rectangular structure in the north-east corner of the group represents potential continuity into the post-Roman period. The remains of a later stone building lie in the south-west corner. The whole group lies in unimproved ground now defined by a later stone wall, which overlies one hut on the north side and separates the archaeological features from surrounding improved pasture.

Early Medieval (AD 410 to 1066)

4.5.30 No findspots, archaeological remains or sites of early medieval date have been identified in the Pentir works site or the 500 m and 3 km study areas, though historic sites are known in the wider region.

4.5.31 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 4.18).

4.5.32 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 become known 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 4.18).

4.5.33 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 to support the lifestyles evidenced on the few high-status sites that have been recognised (Ref 4.18).

4.5.34 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 4.18).

Medieval (1066-1640)

4.5.35 No findspots, archaeological remains or sites of medieval date have been identified in the Pentir works site or the 500 m study area, though sites are known in the wider 3 km study area.

4.5.36 The 11th century saw the first Norman incursions into Wales, their initial defeat by Gruffydd ap Cynan (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 4.19). 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.

4.5.37 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 Pentir 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 4.19) and protect royal interests in the region.

4.5.38 Castell Llanddeiniolen (**CN197**) is approximately 2.2 km south-east of the Pentir works site. The monument comprises the remains of a defensive site, which resembles a medieval ringwork, although it may be prehistoric in origin. It is on a hill of glacial drift approximately 7.5 m to 9 m above the road which skirts its north side, the top is oval approximately 27.5 m by 33.5 m. The north and north-west slopes are steep, the east and south are more gentle and have been scarped to form a ditch and outer bank. There is some stone at the south edge of the relatively level top of the hill, and a distinct, if slight, terrace a little further down the south side, again with some stone in the edge. The track which runs past the east side of the historic site is sunken, and a retaining wall over 1 m high forms the west side. This may be the line of a ditch protecting the site on the accessible east side.

4.5.39 A Rectangular Earthwork 110 m North-West of Coed Ty Mawr (**CN156**) lies approximately 790 m south of the Pentir works site. The monument comprises the remains of a well-preserved medieval moated homestead. There are two ditches and a central bank with traces of an external bank on the north-east and south-west sides. The interior is 42 m by 34 m and contains traces of a building in the east corner. The entrance appears to have been on the north-west side, where there is a stone causeway cutting through the two ditches, about 4.5 m wide.

Post-Medieval (1640 to 1900)

4.5.40 No findspots or archaeological remains of post-medieval date have been identified in the Pentir works site.

4.5.41 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. Pentir is known for rich agricultural land, which is split into regular fields, managed by estate farmhouses (Arfon – Area 54 Improved fields above Pentir). Whilst there is little large-scale farming, there is evidence of clear small-scale industries in the 3 km study area, such as the Ty'n Llwyn Farm.

4.5.42 Alongside farming, there were other primary industries that impacted the landscape, notably the slate industry which has shaped Gwynedd's landscape. The Slate Landscape of Northwest Wales (**UNESCO 1633**) is approximately 2.9 km from the Pentir works site. The quarry first opened during the 18th century and was one of the most prolific slate producers in the world. A section of the quarry remains active, alongside post-medieval water-balance shaft heads and mills. In addition to this, the post-medieval quarry shaped the economic, social, and political background of Gwynedd. This is reinforced by the historic strikes at the quarry between 1896-1900 supported by the British Labour Movement for better working conditions (Ref 4.20).

4.5.43 One of the elements which comprises Component Part 1 of the the Slate Landscape of Northwest Wales (**UNESCO 1633**) is the Penrhyn Quarry Railway which is approximately 2.9 km east of the Pentir works site. The railway was designed by Charles Easton Spooner of the Ffestiniog Railway for the sole use of Penrhyn Slate Quarry, although a passenger service was also operated for the quarrymen from 1880 to 1947. It remained in operation until 1962 and was dismantled three years later. The stretch of railway in the 3 km study area is Area D – Pont Felin Hen to Coed Hywel Uchaf.

4.5.44 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 4.21).

4.5.45 There is the Grade II listed Ty'n llwn farm (**Cadw 83169** to **83170**, **83279** to **83285**) approximately 530 m south-east of the Pentir works site. The farm comprises a large rectangular enclosed yard, with the house backing on to its north-east corner to face east. Ty'n llwyn was a farm on the Vaynol estate of Thomas Assheton Smith. Cartographic evidence suggests that a small early farm (in existence by approximately1780) was replaced by a larger scale farmstead between approximately 1820 and1830, though perhaps reconstructed as a model farmstead by its most notable tenant, John Owen. The architectural evidence suggests that the farm was essentially laid out as a new model holding. In 1853, the tenancy was taken on by John Owen who farmed here until 1868: in that year, he was evicted for his Liberal political convictions, which placed him at odds with the Toryism of his landlord. John Owen was a methodist preacher and a pioneering farmer and writer on agriculture. He invested considerably in the improvement of the land at Ty'n llwyn. His interest in Welsh Black Cattle is possibly reflected in the design of this farm, which is laid out as a specialist stock-raising establishment.

Modern (1900 to Present)

4.5.46 No findspots or archaeological remains of modern date have been identified in the Pentir works site or the 500 m study area, though sites are known in the wider region.

4.5.47 During the early 20th century, industry continued to boom, creating a stabilised economy and increased population. During the First World War (WWI), Wales prepared communities and the landscape for heavy impact, as seen with other areas around Britian. Due to the relatively sparse nature of Gwynedd, a substantial range of buildings were constructed or re-used for the purpose of defence (Ref 4.22). Both newly constructed hospitals in Bangor and Caernarfon were used for injured soldiers serving in the war (Ref 5.59). Alongside this, other schemes such as large-scale food production (allotments) and forestry were also formed to help support the war effort. Tree felling took place during the WWI approximately 2.7 km east of the Pentir works site. In June 1916, Lord Penrhyn assigned a group of Finnish sailors to support tree

felling around Parc Bryniau and Parc Ocar. As part of the workers' contract, a temporary camp (**PRN 58738**) was set up in Parc Y Bwlch wood (Ref 4.22). A tramway ran from the temporary camp to a sawmill (**PRN 62346**), this allowed workers to be transported each day.

4.5.48 During the Second World War (WWII), Wales continued to support the war effort, whilst also defending the coastline of Gwynedd against invasion. One notable defensive structure still extant comprises WWII-era anti-tank cubes along Fairbourne beach (Ref 4.23). Despite evidence of WWII remains in Gwynedd, there are no known remains dating to WWII in the 3 km study area.

Undated

4.5.49 A number of sites of historic interest of unknown date have been recorded in the 500 m study area.

4.5.50 A small enclosure whose condition and date are unknown (**PRN 28869**) has been recorded on the first edition of the Ordnance Survey (OS) six-inch series (1888), approximately 26 m west of the Pentir works site.

4.5.51 A magnetic disturbance indicating a double-ditched trackway was revealed by geophysical survey 380 m north-west of the Pentir works site. The linear was of a different alignment to the existing boundaries, however it is likely that this may have been a geological trend which followed the underlying bedrock of the field, and consequently a natural feature (**PRN 90524**).

4.5.52 The same archaeological evaluation as mentioned in paragraph 4.5.24 revealed pits (**PRN 90580**), approximately 200 m south-east of the Pentir works site. One small pit (201103) was uncovered albeit with no evidence as to its date or function. However, given its proximity to the road and charcoal content, some roadside activity such as a camp hearth was plausible. Another pit (201107) was of greater potential, as it pre-dated the earthwork, and hence suggests the potential for future work to give a solid terminus post quem for construction of the earthwork. No clear function for this pit was visible from the sondage, though it may have been related to road construction. The charcoal in the pit fill formed thick 'threads' suggestive of roots or fibres, though assessment of those was uninformative, and it was not considered suitable for scientific dating (Ref 4.10).

4.5.53 A possible quarry (**PRN 28871**) of unknown date and north-west of Groeslon Ty Mawr was recorded on the first edition of OS six-inch series (1888). It was approximately 270 m south-east of the Pentir works site.

4.5.54 A stone boundary marker (**PRN 43**) of unknow date was recorded approximately 330 m north-west of the Pentir works site near Cae Gwydryn on the OS six-inch map series but was not recorded by the RCAHM.

4.5.55 Another stone boundary marker (**PRN 38**) is marked approximately 467 m south-east of the Pentir works site on the OS six-inch map series near Groeslon.

4.5.56 Geophysical survey detected an anomaly possibly indicating a trackway (**PRN 90523**), approximately 398 m north-west of the Pentir works site.

4.5.57 Metal detecting at Llanddeiniolen revealed a findspot of various finds (**PRN 76093**) approximately 386 m north-west of the Pentir works site. These comprised a copper alloy weight, two copper alloy bag tags and a lead shield weight.

4.5.58 A well of unknown date (**PRN 28863**) was recorded approximately 410 m south-east of the Pentir works site on the first edition of the OS six-inch map series, north-west of Groeslon Ty Mawr.

Cartographic Assessment

4.5.59 Historic cartographic sources of the area dating from before tithe maps of the mid- 19th century are largely limited to county level surveys of limited detail. A map published by Rev. William Bingley to accompany his book *Excursions in North Wales, including Aberystwith and the Devil's Bridge…* (1839) (Ref 4.24) depicts a settlement pattern similar to that which survives into the modern period with many of the large contemporary hamlets and villages in the study area and the surrounding landscape still evident today.


Llanllechid
Penrhyn
Llandderfel-gen
Llanllechid
St Anne's Chapel
Carnedd Llewellyn
Carn David
Trefriw
Llanrwst
Llanrwst
Llanrwst

4.5.61 The first edition of the OS six-inch series mapping, published in 1888, depicts the Pentir works site in a mixture of rough pasture and woodland. The woodland occupied the southern area of the Pentir works site and was named 'Ty n-llwyn-gors Covert', likely associated with the 'Ty'n-llwyn' farmstead to the south-east. The covert consisted of a portion of dense vegetation in an open pasture. There are pockets of covert throughout the 3 km study area, owned by different landowners. The map depicts a small farmstead listed as 'Tyddyn-Forgan' 346 m south-west of the Pentir works site. The landscape does not change throughout the 20th century and remains largely the same in the second edition (1901), third edition (1920) & fourth edition (1953) of the OS six-inch map series (see **Figures 2.6.A.5 to 2.6.A.8**).

LiDAR Assessment

4.5.62 The following LiDAR imagery (Plate 2) has been sourced by DataMapWales (Ref 3.10). The LiDAR shows the Pentir Substation and associated overhead line. The most prominent features are the vegetation surrounding the substation.

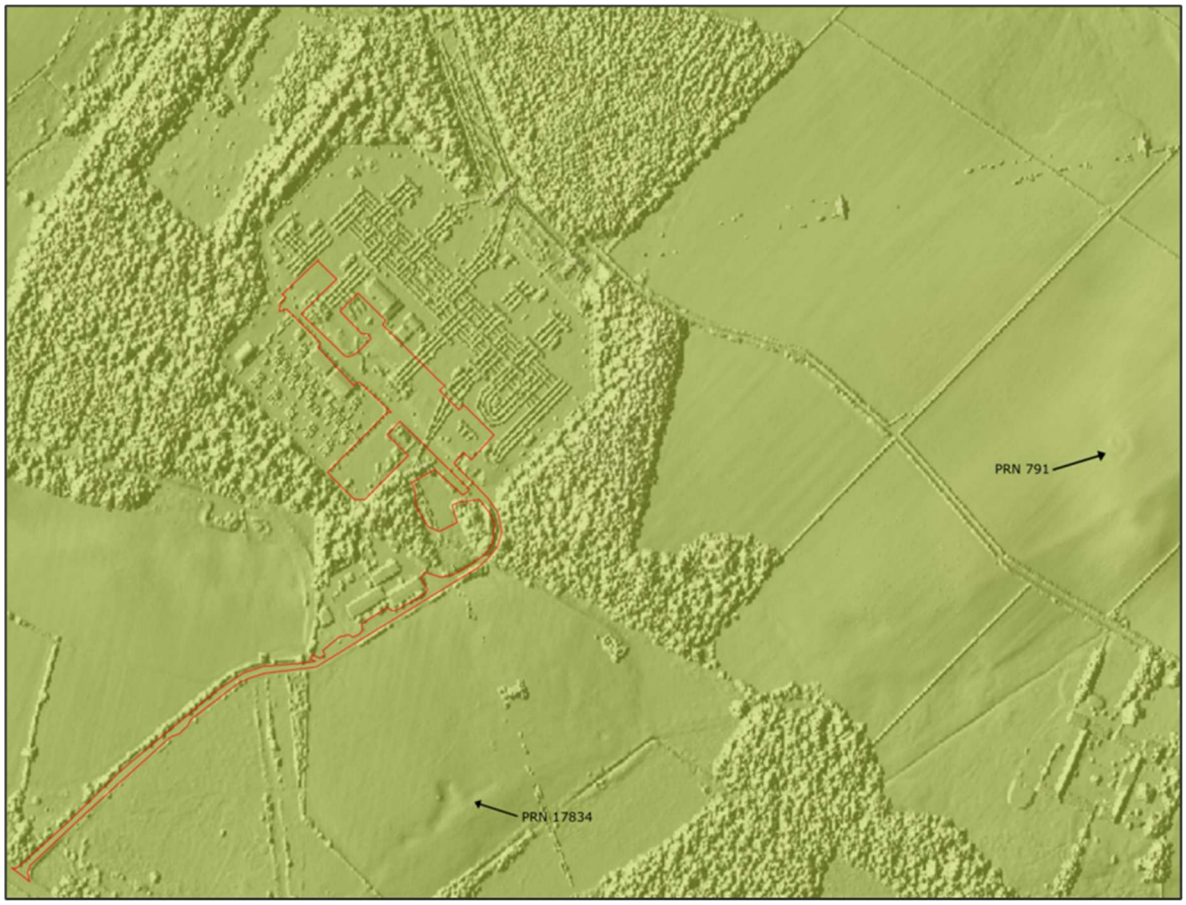


Plate 2: Image taken from a LiDAR 1 m resolution 2020-22 DSM (multidirectional hillshade) (DataMapWales)

4.5.63 There are two notable earthwork features identified by the LiDAR survey in fields to the north-east and south respectively of the Pentir works site. Plate 3 below provides an enlarged image which shows a small circular earthwork feature possibly representing a mound with a ditch and bank. The HER data states that this is likely to be a mound (**PRN 791**) of unknown date, approximately 549 m east of the Pentir works site. This feature is recorded on the first edition of the OS six-inch map series (1888) (see **Figure**

2.6.A.5) as a water pond. A similar water pond is nearby adjacent to the farmstead of 'Ty'n-llwyn'.

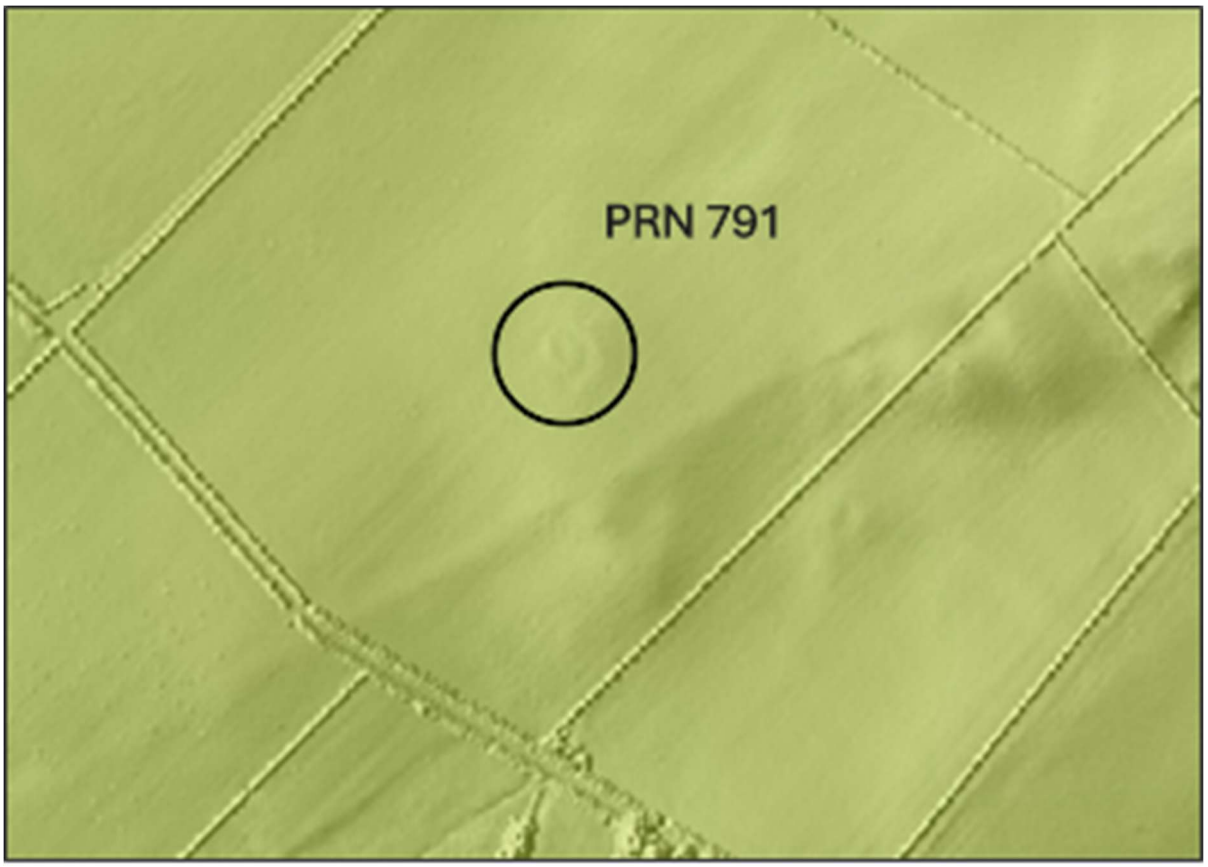


Plate 3: Image taken from a LiDAR 1 m resolution 2020-22 DSM (multidirectional hillshade) (DataMapWales)

4.5.64 A separate large ditch and bank (see **Plate 4)** has been identified approximately 190 m south-east of the Pentir works site. This may be associated with a Roman Road (**PRN 17834**) which linked Segontium with Canovium near Conwy. The road is projected to run in a north-east to south-west orientation approximately 190 m to the south-east of the Pentir works site, sharing the same orientation as the ditch. This earthwork feature was subject to archaeological evaluation. The recorded feature (201102) would appear to have been a road (**PRN 90578**), though without dating evidence it was uncertain whether the extant earthwork is the original Roman road or a later reiteration (Ref 4.10).

4.5.65 Quarry pits (**PRN 90579 and 90580)** associated with the Roman Road are also recorded by the Heneb HER in the same area.

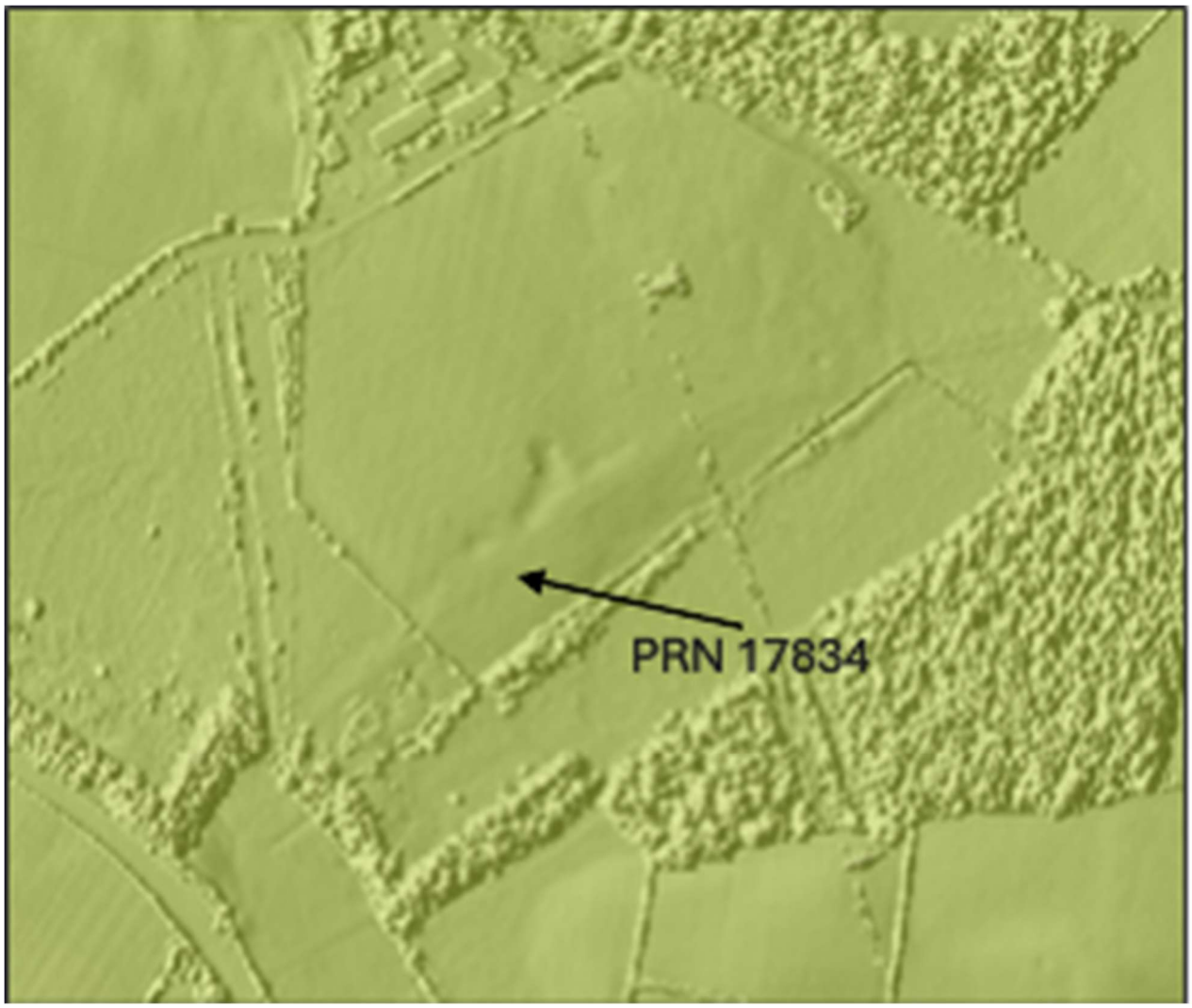


Plate 4: Image taken from a LiDAR 1 m resolution 2020-22 DSM (multidirectional hillshade) (DataMapWales)

Historic Landscape Characterisation

4.5.66 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. Two GHLC types were identified within 500 m of the Pentir works site. These are displayed below in **Table 4-1.**

4.5.67 The GIS data for the Extended Study of Historic Characterisation Landscape types in the wider 3km study area was obtained from Heneb as part of the HER data request and is presented in **Figure 2.6.A.5**. Historic Land Classification (HLC) types presented in **Figure 2.6.A.5** have been used in this study to establish the existing time depth of the historic landscape of the Pentir works site and to examine how the surviving historic landscape of the context of the Pentir 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 23	Arfon plateau	Lowland plain, some relict archaeology
Area 54	Improved fields above Pentir	Improved agricultural land

4.5.68 The Pentir works site is in the rolling landscape of the Arfon plateau, made of mostly of improved pasture. The pattern of substantial 19th-century farmhouses and outbuildings is typical of the estate. Relict prehistoric settlements (hut groups and small forts) are dotted across the landscape, usually in the corners of fields, and some fields display a curvilinear patter of characteristic of the period (Area 23 Arfon plateau).

4.5.69 Just to the east of the Pentir works site is an area of fertile agricultural land in the southern part of the former parish of Pentir, which in the medieval period may have formed the outer reaches of Maenol Bangor, but by the late 18th century was occupied by the Vaynol estate and partly by the Penrhyn estate (Area 54 Improved fields above Pentir).

4.5.70 The area is characterised by large, regularly laid-out fields, and by estate farmhouses and gamekeepers' dwellings. These are typically substantial two-storey dwellings hung with slate on the first floor, and with a number of ornamental features such as decorated porches.

4.5.71 In a number of locations, ribbon developments of labourers' or quarrymen's cottages have come into being alongside the road, with substantial chapels in a number of places. The nearest to a nucleated community is the group of houses and the public house at Pentir (Area 54 Improved fields above Pentir).

Registered Historic Landscapes

4.5.72 The Pentir works site is just inside the northern boundary of the Dinorwig Registered Historic Landscape HLW (Gw) 6 on the gently undulating Arfonian plateau. The Dinorwig valley, or Nant Peris, is on the north-west side of the Snowdonian massif. The valley has been heavily glaciated with its craggy edges rising steeply on both sides. The summit of Yr Wyddfa the highest peak in Wales at 1085 m above ordnance datum (AOD), towers above the valley and defines the southern extent of this area. The valley, with its twin lakes Padarn and Peris, opens north westwards onto the Arfonian plateau at about 100 m AOD.

Prehistoric Landscape

4.5.73 The evidence for late prehistoric landscape organisation in the Dinorwig Registered Historic Landscape is not as well-preserved because of later agricultural improvements. Only the more massive, robust settlement sites have tended to survive. However, it is often possible to trace the former extents of destroyed settlements and field systems where surviving fragments have been incorporated into later features. The multivallate Iron Age hillfort of Dinas Dinorwig is perhaps the best example, sitting on an isolated hill with dominant views of the Arfonian plateau in all directions, but surrounded by a fragmentary complex of contemporary hut settlements and enclosures with traces of associated field systems and field banks, many of which are recorded as having been obliterated by land clearance and improvements in the 19th century. More complete remains occasionally survive on the poorer, unimproved margins.

Post Medieval Landscape

4.5.74 Not unexpectedly, the scenic grandeur of the area was celebrated by most of the antiquarian tourists and artists who visited the area in the late 18th and the 19th centuries. The area has retained considerable evidence for late prehistoric land use and settlement, and for medieval land holdings, but superimposed over these earlier patterns, and dominating the present landscape, are the extensive remains of 19th and 20th-century slate quarries, their associated settlements and transport infrastructure. These developments were made possible by, and were linked to, the Vaynol Estate, one of the most significant and powerful post-medieval landholdings in north-west Wales.

4.5.75 The area is linked with the growth, development and eventual domination of the Vaynol Estate, a process which has been charted in some detail. The estate no longer exists, but Vaynol Hall and its great walled park survive in the north-west of the area on the banks of the Menai Strait. By the late 16th century, the estate was the principal landowner and ruthlessly consolidated its interest by the acquisition and extinction of any remaining medieval bond hamlets in the area. From the mid-18th century, following a period when they were in poor condition, tenancies were remodelled as they fell vacant, and the estate was improved and expanded by the enclosure of common land. From the 1850s onwards, capital was spent on improvements and plantations, and the great wall around Vaynol Park dates from this time. As the economic potential of slate quarrying became evident, the industrial resources of the estate were also developed. In 1809, the Vaynol Estate developed the Dinorwig quarries of Nant Peris. Here, the main outlet for the slate was Port Dinorwig on the Menai Strait, which had an artificial harbour since 1793. A road was built to the coast in 1790 for the easier export of slate, followed by an unsuccessful horse tramway which had to be later replaced by a new line, and finally, in 1848, by a new railway on a different route along the shores of Lake Padarn to Port Dinorwig. This ceased operating in 1962, just before the final closure of the Dinorwig quarries in 1969.

4.5.76 In summary, the Pentir works site is on agricultural land on the Arfon Plateau.

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 Pentir works site is in an area that was mostly of rough pasture and that a belt of woodland occupied the southern area of the present substation. This woodland was named 'Ty n-llwyn-gors Covert'. Until the present-day substation was constructed, the area was a mixture of rough pasture and woodland with no evidence for any previous settlement. No borehole data is available but the construction of Pentir Substation would have disturbed 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 Pentir works site. There is no indication that this activity extends to within the site or elsewhere within the 500 m and 3 km study areas, and the potential for encountering remains of this period is negligible.

5.2.2 **Neolithic to Bronze Age**: There are no known assets of Neolithic and Bronze Age date recorded in the Pentir works site. The wider region sees the development of the funerary monuments and settlement including Glascoed Round Cairn (**CN150**) approximately 2.52 km south-west of the Pentir works site and the Goetre Unchaf Barrow (**CN376**) approximately 2.08 km north of the Pentir works site. A Standing Stone to the North of Coed Nant-y-garth (**CN375**) is approximately 1.66 km west of the Pentir works site. The Cefn Mawr Hut Group (**CN200**) is approximately 2.96 km south-west of the Pentir works site. The Gors y Brithdir Enclosed Hut Group & Ancient Fields (**CN203**) is approximately 830 m north-west of the Pentir works site. There is no indication that this activity extends to within the Pentir works site, and the potential for encountering remains of this period is negligible.

5.2.3 **Iron Age:** There are no known assets of Iron Age date recorded in the Pentir works site. The wider area sees settlement of this period. The Cefn Mawr Hut Group (**CN200**) is approximately 2.96 km south-west of the Pentir works site. The Cae Metta Hut Group (**CN168**) is approximately 3 km south-west of the Pentir works site. The Enclosed Hut Group South-West of Bronydd (**CN227**) is approximately 3 km south-east of the Pentir works site. Dinas Dinorwic Camp (**CN017**) is approximately 1.93 km south of the Pentir works site. Glascoed Ancient Village (**CN060**) is approximately 2.69 km south of the Pentir works site. The Gors y Brithdir Enclosed Hut Group & Ancient Fields (**CN203**) is approximately 830 m north-west of the Pentir works site. There is no indication that this activity extends to within the Pentir works site, and the potential for encountering remains of this period is negligible.

5.2.4 **Roman:** Part of a Roman Road, which linked Segontium with Canovium near Conwy (**PRN 17566**), has been projected to run through the eastern end of the Pentir works site in a north-east to south-west orientation. Another line of the same road (**PRN 17834**) is also projected in a similar orientation approximately 190 m to the south-east of the Pentir works site (Plates 9 and 10). Archaeological evaluation on the line of the

latter road also revealed quarry pits (**PRN 90579**) that were possibly used for road stone. Another Roman Road, which ran from Segontium to Bangor (**PRN 17829**) is projected to run in a north-east to south-west orientation, approximately 420 m north-west of the Pentir works site. While there are no known assets of Roman date recorded in the Pentir works site, given the presence of Roman Roads in the 500 m study area, the potential for unknown remains from this period in the Pentir works site would be medium in any areas of ground that has not been previously disturbed.

5.2.5 **Early Medieval:** There are no known assets of early medieval date recorded in the Pentir works site. There is no indication that this activity extends to within the Pentir works site or elsewhere within the 500 m or 3 km study areas, and the potential for encountering remains of this period is negligible.

5.2.6 **Medieval:** There are no known assets of medieval date recorded in the Pentir works site. However, there is settlement in the 3 km study area. Castell Llanddeiniolen (**CN197**) is approximately 2.2 km south-east of the Pentir works site. A Rectangular Earthwork North-West of Coed Ty Mawr (**CN156**) lies approximately 790 m south. There is no indication that this activity extends to within the Pentir works site, and the potential for encountering remains of this period is negligible.

5.2.7 **Post-Medieval:** There are no known assets of post-medieval date recorded in the Pentir works site. In the wider area, there has been industrial activity related to slate quarrying. The Slate Landscape of Northwest Wales (**UNESCO 1633**) is approximately 2.9 km east of the Pentir works site. There is no indication that this activity extends to within the Pentir works site, and the potential for encountering remains of this period is negligible.

5.2.8 **Modern:** There are no known assets of modern date recorded in the Pentir works site. There is no indication that this activity extends to within the Pentir works site or elsewhere within the study areas, and the potential for encountering remains of this period is negligible.

Summary of Archaeological Potential and Significance of Archaeological Remains

5.2.9 The significance of potential unrecorded archaeological remains 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 are of low value, whilst well preserved and in situ evidence for occupation/settlement remains could be of medium or even high value.

5.2.10 In the preceding section, it was assessed that given there are three possible Roman Roads in the 500 m and 3 km study areas, the potential for unknown remains of Roman date within the Pentir works site could be medium. However, given that the disturbance resulting from the construction of the current substation, the potential for unknown remains is reduced to low.

5.2.11 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 in 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 Pentir works site is in a post-medieval landscape comprising extant agricultural fields and woodland. Due to the industrial nature of the Pentir Substation, there is no connection between the Pentir 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 historic landscape character of the Pentir works site is assessed as being of low value and the sensitivity to change is assessed as low.

5.3.5 The proposed works would not alter the ability to appreciate the historic landscape of the Pentir works site, as following the installation of the underground cables within the existing Pentir Substation, the new infrastructure would be entirely below ground.

5.4 Significance of Designated Historic assets

World Heritage Site

Within 3 km of the Pentir Works Site

The Slate Landscape of Northwest Wales (UNESCO 1633)

5.4.1 The Slate Landscape of Northwest Wales comprise six areas together which represent an exceptional example of an industrial landscape which was profoundly shaped by quarrying and mining slate and transporting it for national and international markets.

5.4.2 The components represent geographically discrete areas of the World Heritage Site of which one is in the 3 km study area: Component Part 1: Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn.

5.4.3 One of the elements which comprise Component Part 1 is The Penrhyn Slate Quarry Railroad and Penrhyn Slate Quarry Railway (element 1.3) which exported slate from 1801 to 1962. A short segment (1.85 km) of the abandoned Penrhyn Slate Quarry Railway is in the wider study area, 2.9 km east of the site.

5.4.4 The values of a World Heritage site are expressed by its attributes. These are the essential qualities which make it culturally significant. Attributes can be tangible (physical) or intangible. Retention of attributes is important to maintain the values that make the proposed World Heritage Site of international importance.

Summary of key attributes of the Outstanding Universal Value of the World Heritage Site

5.4.5 Monumental scale of quarries and mines – stepped hillside workings, deep pits, cavernous underground chambers, massive cascading tips, ingenious water systems, bulk handling systems, range of industrial buildings.

- Innovative narrow gauge railway systems leading to purpose-built coastal export harbours and main-line railways – some fully operational.

- Innovative processing systems – including first known use of circular saw for cutting stone.
- Slate craft skills and use of slate throughout the landscape.
- Grand country houses and estates.
- Workers' vernacular settlements, showing variations in social context, pattern, and scale.
- Chapels and churches, band-rooms, schools, libraries and meeting places, indicating cultural identity and linguistic identity, and aspirations for social justice.
- The Welsh language – placenames.
- Literary tradition associated with The Slate Landscape of Northwest Wales.

5.4.6 The essential setting of this Component Part is made up of the Ogwen and Cegin valleys, incorporating the entire landscape of slate production and distribution from the quarry northwards to the port for onward shipment. It extends from the quarrymen's town of Bethesda to the parkland and neo-Norman castle of the owning family; from the steep sided slopes of the Carneddau mountains which define the southern limit, to the Arfon coastal plain and to the Menai Straits adjacent to the castle (Ref 5.1).

5.4.7 The setting of the Penrhyn Slate Quarry Railway is the Cegin valley through which slate was transported northwards for shipment. The Pentir works site does not form part of the setting. There is no intervisibility between the Pentir works site and the railway due to topography and screening from intervening trees to the west.

5.4.8 The Pentir works site does not contribute to the understanding of the attributes of the Outstanding Universal Value of the World Heritage Site.

Scheduled Monuments

Within the 3 km Study Area

Cefn Mar Hut Group (CN200)

5.4.9 The Cefn Mawr Hut Group (**CN200**) is approximately 2.96 km south-west of the Pentir works site. The monument comprises several hut circles, the foundations of round houses probably dating to the Bronze Age or Iron Age (see paragraph 4.5.10 for description of monument).

5.4.10 The monument is of national importance for its potential to enhance our knowledge of prehistoric domestic life and social organisation. It retains significant archaeological potential, with a strong probability of the presence of structural evidence and associated archaeological features and deposits. There is also the potential for preserved environmental evidence. A patchwork of small fields, some of which could conceivably have their origins in prehistory exists immediately to the south-east of the historic site and is the most important component of the monument's setting. The setting of the asset is considered to be the local Bronze Age and Iron Age landscape in which it is situated. The asset holds a group association with the Cae Metta Hut Group (**CN168**), the Gors y Brithdir Enclosed Hut Group & Ancient Fields (**CN203**), the Enclosed Hut Group South-West of Bronydd (**CN227**), Dinas Dinorwic Camp (**CN017**) and Glascoed Ancient Village (**CN060**). Based on archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Bronze Age

and Iron Age settlement landscape. This group value also contributes to its significance and combined these assets provide a rare example of a well-preserved and large Bronze Age and Iron Age settlement in Wales.

5.4.11 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the south-west and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.12 The asset holds archaeological interest, with its value derived from its ability to inform on Bronze Age and Iron Age settlement patterns. The asset is of high value.

Cae Metta Hut Group (CN168)

5.4.13 The Cae Metta Hut Group (CN168) is approximately 3 km south-west of the Pentir works site. An enclosed hut group containing both round and rectilinear huts, probably dating to the Iron Age or Romano-British period (see paragraph 4.5.15 for description of monument).

5.4.14 The hut group was the subject of archaeological excavations undertaken between 1971 and 1974, directed by Mr R G Livens of University College of North Wales (UCNW) Bangor. These recovered information about the construction of the hut group, sherds of Roman pottery and a much-worn bronze coin presumed to be Roman. Post-excavation analysis has shown that it is likely that the site was occupied in the 2nd and 4th centuries.

5.4.15 The monument is of national importance for its potential to enhance our knowledge of prehistoric settlement and defence. It retains significant archaeological potential, with a strong probability of the presence of associated archaeological features and deposits. The structures themselves may be expected to contain archaeological information concerning chronology and building techniques.

5.4.16 The asset holds a group association with the Cefn Mawr Hut Group (**CN200**), Gors y Brithdir Enclosed Hut Group & Ancient Fields (**CN203**), Enclosed Hut Group South-West of Bronydd (**CN227**), Dinas Dinorwic Camp (**CN017**) and Glascoed Ancient Village (**CN060**). Based on archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Bronze Age and Iron Age settlement landscape. This group value also contributes to its significance, and combined, these assets provide a rare example of a well-preserved and large Bronze Age and Iron Age settlement in Wales.

5.4.17 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the south-east and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.18 The asset holds archaeological interest, with its value derived from its ability to inform on Bronze Age and Iron Age settlement patterns. The asset is of high value.

Enclosed Hut Group South-West of Bronydd (CN227)

5.4.19 This multi-period settlement is approximately 3 km south-east of the Pentir works site on west-facing ground below the steeper slopes of Moel Rhiwen (see paragraph 4.5.16 for description of monument).

5.4.20 The monument is an unusually complete example of a multi-period site and includes a variety of hut types. This diversity gives the site particular importance, and the suggested long period of occupation increases its archaeological potential. All is enhanced by the presence of an extensive adjoining field system within which are at

least two other types of settlement. The site therefore has particular group value. The structures themselves may be expected to contain archaeological information concerning chronology and building techniques.

5.4.21 The asset holds a group association with the Cefn Mawr Hut Group (**CN200**), the Cae Metta Hut Group (**CN168)**, the Gors y Brithdir Enclosed Hut Group & Ancient Fields (**CN203**), Dinas Dinorwic Camp (**CN017**) and Glascoed Ancient Village (**CN060**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Bronze Age and Iron Age settlement landscape. This group value also contributes to its significance, and combined, these assets provide a rare example of a well-preserved and large Bronze Age and Iron Age settlement in Wales.

5.4.22 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the south-east and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.23 The asset holds archaeological interest, with its value derived from its ability to inform on Bronze Age and Iron Age settlement patterns. The asset is of high value.

Dinas Dinorwic Camp (CN017)

5.4.24 Dinas Dinorwig hillfort is approximately 1.93 km south of the Pentir works site on one summit of a ridge (see paragraph 4.5.17 for description of monument).

5.4.25 The monument is of national importance for its potential to enhance our knowledge of later prehistoric defensive organisation and settlement. The monument forms an important element in the wider later prehistoric context and in the surrounding landscape. The site is well preserved and retains considerable archaeological potential. There is a strong probability of the presence of evidence relating to chronology, building techniques and functional detail.

5.4.26 The asset holds a group association with the Cefn Mawr Hut Group (**CN200**), the Cae Metta Hut Group (**CN168)**, Gors y Brithdir Enclosed Hut Group & Ancient Fields (**CN203**), Enclosed Hut Group South-West of Bronydd (**CN227**) and Glascoed Ancient Village (**CN060**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Bronze Age and Iron Age settlement landscape. This group value also contributes to its significance and combined these assets provide a rare example of a well-preserved and large Bronze Age and Iron Age settlement in Wales.

5.4.27 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the south of the Pentir works site and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.28 The asset holds archaeological interest, with its value derived from its ability to inform on Bronze Age and Iron Age settlement patterns. The asset is of high value.

Glascoed Ancient Village (CN060)

5.4.29 This settlement is approximately 2.69 km south of the Pentir works site. An enclosed hut group probably dating to the Iron Age or Romano-British period, containing at least four round huts and one rectangular hut (see paragraph 4.5.18 for description of monument).

5.4.30 The monument lies on a glacial hillock, on ground that slopes gently to the south.

5.4.31 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 structures themselves may be expected to contain archaeological information concerning chronology and building techniques.

5.4.32 The asset holds a group association with the Cefn Mawr Hut Group (**CN200**), the Cae Metta Hut Group (**CN168)**, Gors y Brithdir Enclosed Hut Group & Ancient Fields (**CN203**), Enclosed Hut Group South-West of Bronydd (**CN227**) and Dinas Dinorwic Camp (**CN017**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Bronze Age and Iron Age settlement landscape. This group value also contributes to its significance and combined these assets provide a rare example of a well-preserved and large Bronze Age and Iron Age settlement in Wales.

5.4.33 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the south and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.34 The asset holds archaeological interest, with its value derived from its ability to inform on Bronze Age and Iron Age settlement patterns. The asset is of high value.

Glascoed Round Cairn (CN150)

5.4.35 Glascoed Round Cairn is approximately 2.52 km south-west of the Pentir works site. The remains of the burial cairn probably dates to the Bronze Age (see paragraph 4.5.7 for description of monument).

5.4.36 The monument is of national importance for its potential to enhance our knowledge of prehistoric burial and ritual practises. The monument is an important relic of a prehistoric funerary and ritual landscape and retains significant archaeological potential, with a strong probability of the presence of associated archaeological features and deposits.

5.4.37 The asset holds a group association with the Goetre Uchaf Barrow (**CN376**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Bronze Age and Iron Age funeral landscape. This group value also contributes to its significance and combined these assets provide rare examples of well-preserved and large Bronze Age and Iron Age funerary practices in Wales.

5.4.38 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the south-west and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.39 The asset holds archaeological interest, with its value derived from its ability to inform on Bronze Age and Iron Age settlement patterns. The asset is of high value.

Castell Llanddeiniolen (CN197)

5.4.40 The monument 2.2 km south-east of the Pentir works site comprises the remains of a defensive site, which resembles a medieval ringwork, although it may be prehistoric in origin (see paragraph 4.5.38 for description of monument).

5.4.41 The monument is of national importance for its potential to enhance our knowledge of prehistoric or medieval settlement and defence. It retains significant archaeological

potential, with a strong probability of the presence of associated archaeological features and deposits.

5.4.42 The asset holds a group association with a Rectangular Earthwork 110 m North-West of Coed Ty Mawr (**CN156**). 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 and large medieval defensive earthwork sites in Wales.

5.4.43 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the south-east and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.44 The asset holds archaeological interest, with its value derived from its ability to inform on medieval settlement patterns. The asset is of high value.

Rectangular Earthwork 110 m North-west of Coed Ty Mawr (CN156)

5.4.45 The monument approximately 790 m south of the Pentir works site comprises the remains of a well-preserved medieval moated homestead (see paragraph 4.5.39 for description of monument).

5.4.46 The monument is of national importance for its potential to enhance our knowledge of medieval settlement and defence. 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.

5.4.47 The asset holds a group association with Castell Llanddeiniolen (**CN197**). 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 and large medieval defensive earthwork sites in Wales.

5.4.48 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.49 The asset holds archaeological interest, with its value derived from its ability to inform on medieval settlement patterns. The asset is of high value.

Gors y Brithdir Enclosed Hut Group & Ancient Fields (CN203)

5.4.50 This hut group and associated fields is approximately 830 m north-west of the Pentir works site (see paragraph 4.5.11 for description of monument).

5.4.51 A broad turf-covered, stony bank, representing the remains of a single hut, stands isolated in the middle of the enclosure. The hut measures approximately 10 m across but has no obvious entrance. The sub-rectangular enclosure measures approximately 25 m across with a prominent entrance about 2.5 m wide on the west side.

5.4.52 The boundaries of the field system consist mostly of stone walls, generally up to 2 m thick and up to 1 m high but include banks. The boundaries run up and down slope to form small paddocks or fields which utilised the Brithdir streams as a natural boundary on their west sides.

5.4.53 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 structures themselves may be expected to contain archaeological information concerning chronology and building techniques.

5.4.54 The asset holds a group association with the Cefn Mawr Hut Group (**CN200**), the Cae Metta Hut Group (**CN168)**, Glascoed Ancient Village (**CN060**), Enclosed Hut Group South-West of Bronydd (**CN227**) and Dinas Dinorwic Camp (**CN017**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Bronze Age and Iron Age settlement landscape. This group value also contributes to its significance and combined these assets provide a rare example of a well-preserved and large Bronze Age and Iron Age settlement in Wales.

5.4.55 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the north-west and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.56 The asset holds archaeological interest, with its value derived from its ability to inform on Bronze Age and Iron Age settlement patterns. The asset is of high value.

Pen-y-Gaer Camp (CN149)

5.4.57 This is a rectangular enclosure on a small rocky hill, approximately 2.96 km south of the Pentir works site, probably dating to the later prehistoric period. The enclosure measures 38 m by 35 m and is demarcated by a rubble wall 3 m thick, which was faced with large orthostats. The remains of the entrance can still be seen on the north-east side, where one large gatepost survives. The enclosure wall has been used as a stone dump and is surmounted, in places, by a modern stone wall. The south-west wall has been largely robbed out. There are vague traces of a rectangular building in the south-east corner.

5.4.58 The monument is of national importance for its potential to enhance our knowledge of prehistoric settlement and defence. It retains significant archaeological potential, with a strong probability of the presence of associated archaeological features and deposits. The structures themselves may be expected to contain archaeological information concerning chronology and building techniques.

5.4.59 The asset holds a group association with the Cefn Mawr Hut Group (**CN200**), the Cae Metta Hut Group (**CN168)**, Glascoed Ancient Village (**CN060**), Enclosed Hut Group South-West of Bronydd (**CN227**) and Dinas Dinorwic Camp (**CN017**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Bronze Age and Iron Age settlement landscape. This group value also contributes to its significance and combined these assets provide a rare example of a well-preserved and large Bronze Age and Iron Age settlement in Wales.

5.4.60 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the south and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.61 The asset holds archaeological interest, with its value derived from its ability to inform on Bronze Age and Iron Age settlement patterns. The asset is of high value.

Goetre Uchaf Barrow (CN376)

5.4.62 This barrow lies approximately 2.08 km north of the Pentir works site (see paragraph 4.5.8 for description of monument).

5.4.63 The monument is of national importance for its potential to enhance our knowledge of prehistoric burial and ritual. The monument is an important relic of a prehistoric funerary and ritual landscape and retains significant archaeological potential, with a strong probability of the presence of both intact burial or ritual deposits and environmental and structural evidence, including a buried prehistoric land surface.

5.4.64 The asset holds a group association with the Glascoed Round Cairn (**CN150**) and a Standing Stone to the North of Coed Nant-y-garth (**CN375**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Bronze Age and Iron Age funeral and ritual landscape. This group value also contributes to its significance and combined these assets provide rare examples of well-preserved and large Bronze Age and Iron Age funerary and ritual practices in Wales.

5.4.65 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as modern housing development and further woodland areas to the north. The Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.66 The asset holds archaeological interest, with its value derived from its ability to inform on Bronze Age and Iron Age settlement patterns. The asset is of high value.

Coed Nant-y-garth, Standing Stone to North of Coed Nant-y-garth (CN375)

5.4.67 The monument comprises a standing stone approximately 1.66 km west of the Pentir works site (see paragraph 4.5.9 for description of monument).

5.4.68 The monument is of national importance for its potential to enhance our knowledge of prehistoric ritual practices. The monument retains significant archaeological potential with a strong probability of associated archaeological features and deposits and forms an important element in the wider prehistoric funerary and ritual landscape.

5.4.69 The asset holds a group association with the Glascoed Round Cairn (**CN150**) and Goetre Unchaf Barrow (**CN376**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Bronze Age and Iron Age ritual and funerary landscape. This group value also contributes to its significance and combined these assets provide rare examples of well-preserved and large Bronze Age and Iron Age ritual and funerary practices in Wales.

5.4.70 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the west and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.71 The asset holds archaeological interest, with its value derived from its ability to inform on Bronze Age and Iron Age settlement patterns. The asset is of high value.

Gerlan Hut Group (CN192)

5.4.72 The monument approximately 2.86 km east of the Pentir works site consists of a well-preserved group of stone huts (see paragraph 4.5.29 for description of monument).

5.4.73 The whole group lies in unimproved ground now defined by a later stone wall, which overlies one hut on the north side and separates the archaeological features from surrounding improved pasture. The hut group was not a defensive site, the significant views would have been medium and short over fields farmed from the settlement.

5.4.74 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 structures themselves may be expected to contain archaeological information concerning chronology and building techniques.

5.4.75 The asset holds a group association with the Cae Metta Hut Group (**CN168)** and the Enclosed Hut Group South-West of Bronydd (**CN227**). 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 rare examples of well-preserved and large Romano-British settlement practices in Wales.

5.4.76 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the east and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.77 The asset holds archaeological interest, with its value derived from its ability to inform on Romano-British settlement patterns. The asset is of high value.

Fodol Ganol Enclosed Hut Group (CN175)

5.4.78 This monument is approximately 1 km north-west of the Pentir works site (see paragraph 4.5.12 for description of monument).

5.4.79 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 structures themselves may be expected to contain archaeological information concerning chronology and building techniques.

5.4.80 The asset holds a group association with the Cefn Mawr Hut Group (**CN200**), the Cae Metta Hut Group (**CN168)**, Glascoed Ancient Village (**CN060**), Enclosed Hut Group South-West of Bronydd (**CN227**) and Dinas Dinorwic Camp (**CN017**). Based upon archaeological investigations in the wider area surrounding these assets, these are likely part of a wider and much larger Bronze Age and Iron Age settlement landscape. This group value also contributes to its significance and combined these assets provide a rare example of a well-preserved and large Bronze Age and Iron Age settlement in Wales.

5.4.81 The asset is shielded from the Pentir works site by woodland on the Pentir Substation perimeter, as well as further woodland areas to the north-west and the Pentir works site does not contribute to the understanding of the heritage interests of the asset.

5.4.82 The asset holds archaeological interest, with its value derived from its ability to inform on Bronze Age and Iron Age settlement patterns. The asset is of high value.

Conservation Areas

Within 3 km of the Pentir Works Site

5.4.83 There are three conservation areas within 3 km of the Pentir works site.

Aberpwll – Y Felinheli Conservation Area (WAL/GWYN/5)

5.4.84 Aberpwll – Y Felinheli Conservation Area (**WAL/GWYN/5**) is approximately 2.3 km west-north-west of the Pentir works site. The conservation area encompasses the area around eight Grade II listed structures. These comprise Port Church and Port Church House (**Cadw 18345**), a telephone callbox at the north end of bridge over a disused railway (**Cadw 4147**), Y Fron (**Cadw 18339**), and Nos 1 to 5 Cae Glas (**Cadw 18347** to **Cadw 18351**). Port Church was built as a church and attached house by the Vaynol Estate approximately 1863 as a replacement for the Seamen's Mission. It was built to a similar design and in a similar period as the church in Bethel. The church and grounds were transferred to Llanfair-is-gaer Parochial Church Council in 1950 and subsequently sold. The church was later converted to a separate dwelling. Y Fon is a mid-19th-century detached house of late Georgian type. The presence of a rear wing rather than sloping rear roof suggests a date around 1840-50. Cae Glas comprises a row of five Vaynol estate cottages.

5.4.85 Aberpwll – Y Felinheli Conservation Area and the listed buildings possess architectural and historic interest as surviving 19th century buildings associated with Vaynol estate, displaying a range of building types and materials. Its setting also contributes to its significance. The buildings and conservation area are of medium value.

Glasinfryn Conservation Area (WAL/GWYN/4)

5.4.86 Glasinfryn Conservation Area (**WAL/GWYN/4**) is approximately 2.8 km north-east of the Pentir works site. The conservation area encompasses the area around seven Grade II listed structures associated with the village of Glasinfryn. These comprise Pont Ty-gwyn bridge (**Cadw 18921**), 8 High Street (**Cadw 18929**), the Old Post Office (**Cadw 18930**), and 1 to 4 Elizabeth Terrace (**Cadw 1893**1 to **Cadw 18934**).

5.4.87 Glasinfryn Conservation Area and the listed buildings possess architectural and historic interest as surviving 19th century buildings, displaying a range of building types and materials. Its setting also contributes to its significance. The buildings and conservation area are of medium value.

Y Faenol Conservation Area (WAL/GWYN/30)

5.4.88 Y Faenol Conservation Area (**WAL/GWYN/30**) is approximately 2.2 km north-west of the Pentir works site. The conservation area comprises three Grade I, five Grade II* and 23 Grade II listed buildings associated with the Vaynol country residence and parkland.

5.4.89 The listed buildings in the conservation area include the following Grade I listed buildings: Vaynol Old Hall (**Cadw 4166**), Chapel of St Mary to north of Vaynol Old Hall (**Cadw 4172**) and Vaynol Hall (**Cadw 4173**).

5.4.90 Also in the conservation area are the following Grade II* listed buildings: the best stables on south side of Vaynol Old Hall and courtyard walls (**Cadw 4167**), the terraced garden to north of Vaynol Old Hall (**Cadw 4169**), the gateway with inscription set in north boundary wall of terraced garden (**Cadw 4170**), Long Barn at Vaynol Farm (**Cadw 4184**), and arched wall to forecourt of Vaynol Old Hall (**Cadw 18927**).

5.4.91 The following Grade II listed buildings are to be found in the conservation area: L-shaped courtyard range to rear of Vaynol Old Hall with enclosing yard wall at south end (**Cadw 4168**), the stone bench seat on west side of terraced garden at Vaynol Old Hall (**Cadw 4171**), terrace walls and fountain to formal garden to north-east of Vaynol Hall (**Cadw 4174**), urn and pedestal in formal garden north-east of Vaynol Hall (**Cadw 4175**), putti and pedestal in formal garden north-east of Vaynol Hall (**Cadw 4176**), putti and pedestal in formal garden north-east of Vaynol Hall (**Cadw 4177**), gateway with bellcage at head of formal garden north-east of Vaynol Hall (**Cadw 4178**), classical statue to south-west of Vaynol Hall (**Cadw 4179**), Well Head to south-west of Vaynol Hall (**Cadw 4180**), coach house to north of Vaynol Hall (**Cadw 4181**), chapel to south-west of Vaynol Farm (**Cadw 4182**), Y Bwthyn (**Cadw 4183**), stable range to north-west farmyard (**Cadw 4185**), cart shed to north-west farmyard including hammel to rear (Cadw 4186), hammel and haystore to north-east farmyard (**Cadw 4187**), farmyard range to south-east of Long Barn (**Cadw 4188**), central farmyard range to south of Long Barn (**Cadw 4189**), farmyard range to south of Long Barn (**Cadw 4190**), range attached to west end of Long Barn (**Cadw 4191**),detached small range to south-west of Long Barn (**Cadw 4192**), detached small range to north-west of Dairy Cottage (**Cadw 4193**), Dairy Cottage with garden walls to rear (**Cadw 4194**), walled garden opposite Dairy Cottage, with two sets of gates (**Cadw 4195**), Butler's House within walled garden, opposite Dairy Cottage (**Cadw 4196**), stables and Brood Mare's yard (**Cadw 4197**), garden seat in south-west garden of Vaynol Hall (**Cadw 18911**), kennels (**Cadw 18912**), classical bust in niche of garden wall at Vaynol Old Hall (**Cadw 18917**), and walls to inner and outer gardens on east side of Vaynol Old Hall (**Cadw 18924**).

5.4.92 The conservation area occupies a small area focused on the listed buildings, its character is, therefore, defined by the special interest of the structures. and listed buildings. The built form possesses architectural and historic interest as an example of a surviving post-medieval country residences (Old Vaynol Hall and Vaynol Hall), gardens and farmyard buildings, with surrounding grounds and woodlands, which survive unchanged, and its setting contributes to its significance. The building and conservation area are both of high value.

Listed Buildings

Within 3 km of the Pentir Works Site

5.4.93 There are a 104 listed buildings in the 3 km study area, comprising three Grade I, six Grade II* and 95 Grade II listed assets. All high value listed buildings (Grade I and Grade II* listed buildings) in the wider 3 km study area are considered below, as well as all listed buildings within 500 m of the Pentir works site. No Grade II buildings lie within 500 m of the Pentir works site.

Vaynol Old Hall (Cadw 4166) (Grade I)

5.4.94 Vaynol Old Hall is approximately 2.61 km north-west of the Pentir works site. It is an important sub-medieval house which appears to be constructed in at least three or four phases, beginning in the early to mid-16th century as a two-unit house consisting of the ground floor of hall, passage, and small outer room. It reached the present E-shaped plan in the early to mid-17th century, with the addition of a storeyed porch over the entrance, and a similar oriel bay at the east end. The E-plan was completed towards the end of the 17th century with the addition of a larger north wing on the west side in the late 17th century. Outbuildings attached to the west end are later, mostly 19th century. Built of local stone rubble, with large quoins and freestone dressings and slate roofs.

Main east-west range is of two storeys, comprising a main hall with lateral fireplace, a cross passage, and beyond an inner room, a parlour or service room. Perhaps also contemporary, a three-storey rear wing on the east, with service rooms below. The windows are generally of 2-, 3- or 4-lights, stone mullioned with rounded heads to the lights, set back in chamfered ashlar surrounds. The setting of house is the surrounding buildings and parkland of the Vaynol Estate. The Pentir works site does not form part of its setting. There is no intervisibility between the Pentir works site and the house, as a result of the topography and screening from intervening trees to the south-east. The building possesses architectural and historic interest as a surviving example of a country house of the medieval and post-medieval periods. The house is of high value.

Chapel of St Mary to North of Vaynol Old Hall (Cadw 4172) (Grade I)

5.4.95 This chapel is approximately 2.63 km north-west of the Pentir works site. The building is immediately north of the Old Hall, on a raised terrace in the south-west corner of the Terraced Gardens. A rectangular building with no aisles aligned north-west to south-east. Rubble masonry with quoins and a slate roof, a crucifix on the east gable. Gabled porch to the south-west not bonded in, has a depressed arched entrance, and dated keystone (WWE 1596) and stone benches either side. Turned timber balusters form the upper part of the porch walls. The inner doorway has broached stops. Three-light windows with arched lights and hollow-moulded jambs under a square head and label. A similar 4-light window is set in the east end. Exceptional marbled enrichments carried out in the conversion to a family chapel in 1910. The walls are fully lined with marble, and the floor is of black and white chequered marble, all in a richly Italianate manner. 16th-century arch-braced roof trusses and chamfered purlins. Some 16th-century glass survives in the stained-glass windows. Altar with kneeling angels at either end. Wall monuments to the Assheton-Smiths at the west end, set in ogee-headed recesses, and plaque reading "completed and restored by him [Sir Charles Assheton-Smith] and his loving wife Sybil Mary"; the former died 24/9/1914 and the latter 27/10/1943. Balustraded steps lead down to a single-chambered and similarly marbled mausoleum with coffins to either side of a central passage. The setting of chapel is the surrounding buildings and parkland of the Vaynol Estate. The Pentir works site does not form part of its setting. There is no intervisibility between the Pentir works site and the chapel, as a result of the topography and screening from intervening buildings and trees to the south-east. The building possesses architectural and historic interest as a surviving example of a private family chapel and mausoleum of the post-medieval period. The building is of high value.

Vaynol Hall (Cadw 4173) (Grade I)

5.4.96 Vaynol Hall replaced the Old Hall as the principal house in Vaynol Park. It is of early-mid 18th-century in origin and was extensively remodelled in the 19th-century to create the present vast building. Successive early 20th-century works include alterations in 1901-5 and in 1912, the demolition of a wing in 1959, and conversion into flats. Of white painted stucco with slate roofs behind high parapets. Three storeys; 'L'-plan. The south-east front is of 10 bays; with a canted three-storey bay, and the right-hand wing also set forward and canted. The ground floor windows are set in shallow arched recesses; all 16-paned sash windows, mostly horned. The parapet has a band and slight cornice. Set back at the south-west end is a two-storey stair projection with an especially tall window. The north-east front has the main entrance from the driveway in the re-entrant angle, facing north-east; a classical portico added in 1910 with a winged symbol on the fascia. Behind is a lobby with a domed roof. The south-west front is of seven window bays. The garden to this side is bordered on the south-east side by a rebuilt brick wall

with acorn finials and closed to the south-west by a balustraded wall with a concrete handrail, terracotta balusters and oval fluted urns. The setting of house is the surrounding buildings and parkland of the Vaynol Estate. The Pentir works site does not form part of its setting. There is no intervisibility between the Pentir works site and the house, as a result of the topography and screening from intervening trees to the south-east. The house possesses architectural and historic interest as a fine example of a country house of the Georgian era. The house is of high value.

Best Stables on South Side of Vaynol Old Hall and Courtyard Walls (Cadw 4167) (Grade II*)

5.4.97 This building is approximately 2.6 km north-west of the Pentir works site. The stables are set in the heart of Vaynol Park, attached to buildings at the west end of Vaynol Old Hall. They close the east side of the enclosed cobbled courtyard which opens from the main driveway to Vaynol Hall. This grand stable range probably dates from the early 20th century (approximately 1905) when the family's equestrian interests demanded improved stabling. Alterations were made in the summer of 1913, when new furnishings were installed by Young & Co. The Vaynol Papers have exceptionally detailed accounts of expenditure on the horses (by name) and the stables, including evidence of continual improvements. Winners of all the major races are said to have been trained here, including four Grand National winners, e.g. Cloister (1912-4) whose head is now preserved in the Newmarket Museum. Of stone, with a slate roof. A single-storey five bay stable range with segmental headed horned sash windows with voussoirs and keystones. A central boarded door has a tall paned fanlight. The setting of the stables is the surrounding buildings and parkland of the Vaynol Estate. The Pentir works site does not form part of its setting. There is no intervisibility between the Pentir works site and the stables, as a result of the topography and screening from intervening trees to the south-east. The building possesses architectural and historic interest as exceptional example of estate stabling, representing the height of fashion and knowledge about the care of horses at this date. The building is of high value.

Terraced Garden to North of Vaynol Old Hall (Cadw 4169) (Grade II*)

5.4.98 This walled and terraced garden is approximately 2.62 km north-west of the Pentir works site. The garden appears to have been laid out contemporaneously with work on the Old Hall in the early to mid-17th century. The garden is laid out in a late medieval-early Renaissance style, rising from south to north away from the front of the Old Hall, and bounded on three sides by tall rubble stone walls. Axial rounded steps, lead to a narrow cross walk which has the private chapel at the west end, and from which squared steps lead to the next level. In the upper section of the garden there is a circular pond, set at the node point of a wide bow in the upper wall, and at the centre of which is the 'gateway with inscriptions', giving access to the next walled garden at the rear of the later Dairy Cottage. The setting of the garden is the surrounding buildings and parkland of the Vaynol Estate. The Pentir works site does not form part of its setting. There is no intervisibility between the Pentir works site and the garden, as a result of the topography and screening from intervening walls and trees to the south-east. This garden possesses an architectural and historic interest as a well preserved and important example of a 16th-century or early 17th-century terraced garden of a type which very rarely survives in anything like a recognisable form. Also listed for its setting in front of the fine Grade I listed Vaynol Old Hall. The garden is of high value.

Gateway with Inscription set in North Boundary Wall of Terrace Garden Opposite Vaynol Old Hall (Cadw 4170) (Grade II*)

5.4.99 This gateway is approximately 2.63 km north-west of the Pentir works site. Set in the heart of Vaynol Park, at the north end of the Terraced Garden opposite the north front of Vaynol Old Hall. Erected in 1634 to embellish the Terrace Garden, and to provide a link to the rear garden. Of dressed stone. A four-centred arched gateway with a distinctive stepped hood, with a projecting keystone dated 1634 and initialled TW/K. It has stilted hoodmould and moulded jambs, the spandrels now eroded. The inner arch is touchingly inscribed on the soffit "Ye mystic Garden Fold Me Close I love Thee Well", and below, "Beloved Vaynol". In the opening, is a scrolled 17th-century ironwork gate with a flat pointed arch. The setting of the gateway is the Terraced Garden facing Old Vaynol Hall. The Pentir works site does not form part of its setting. There is no intervisibility between the Pentir works site and the gateway, due to the topography and screening from intervening buildings and trees to the south-east. This gateway possesses an architectural and historic interest as a well-preserved example of a mid-17th-century gateway and a dated element of the Terrace Garden. The gateway is of high value.

Long Barn at Vaynol Farm (Cadw 4184) (Grade II*)

5.4.100 The Long Barn is approximately 2.7 km north-west of the Pentir works site. This building stands at the centre of the Vaynol Farm buildings, the gable end facing the east approach drive. The farm lies to the north of Vaynol Old Hall. The Long Barn is of two 17th-century phases. The first of 1605, is substantiated by a datestone reading '1605/ W*W/D' over the barn doors on the south side, indicating that it was initiated by William Williams, and his second wife Dorothy Dymock. The second phase relates to its extension to the west in the 1660's (another, weathered, datestone reading 'Sr GW/P [?]' placed over the second south door). This refers to Sir Griffith Williams and his wife Penelope, daughter of Lord Bulkeley. The fine cupola was probably added in 1899, the date the clock was installed. The barn is built of local stone rubble, with a slate roof. It is 4 m long and 9 m wide, making it possibly the largest intact barn of this date in Wales, comparable in size to major estate barns of the same period in England. It is for a combination of uses, including hay barn, granary, and stores. The thick, slightly battered walls have off-centre cambered headed doorways both sides, and two tiers of slit ventilators. The north-east gable has a two-light stone mullioned window, opening to an internal dovecote. The clock cupola stands on a raised hipped apron roof, and is boarded, with a corniced lower stage, arched lower openings to the upper stage, and a swept lead roof terminating in an iron weathervane.

5.4.101 The setting of the Long Barn is the surrounding buildings and parkland of the Vaynol Estate. The Pentir works site does not form part of its setting. There is no intervisibility between the site and the Long Barn, as a result of the topography and screening from intervening buildings and trees to the south-east. This building possesses an architectural and historic interest as a well preserved and exceptionally impressive example of a large-scale sub-medieval barn, and for its group value among the listed buildings of Vaynol Park. The building is of high value.

Bryntirion (Cadw 14924) (Grade II*)

5.4.102 Bryntirion is approximately 2.76 km west of the Pentir works site. The building lies near the south end of Vaynol Park and is reached by a drive entered from the main road at Aber Pwll which climbs up through Bryntirion Lodge Wood to the sloping site of Bryntirion and its outbuildings. Bryntirion appears to be of late 17th-century or early 18th-century origins and was given a late Georgian remodelling early in the 19th

century. It is documented in the 19th century as being the agent's house, and its size and character indicate that it was always one of the most important houses in Vaynol Park. Victorian alterations and enlargements followed, with modern changes (approximately 1956) to the outbuildings to form Bryntirion Bach at the north end. Built of coursed rubble, with slate roofs. Mostly of two storeys and attic, the main front is of four window bays, continuing to the north as a lower structure formerly for service accommodation, without attic. The main front, facing east, is of two builds, the more northerly relating to the early 19th-century remodelling in a slightly different stone. Twelve-paned sash windows, and a portico, off-centre, with panelled surround and porch with Ionic columns (replaced), and half-glazed doors. The attic floor has four gabled dormer windows with 12-pane sashes in the very tall, hipped roof. The south front is rendered and lined and has two-pane 19th-century sash windows either side of a projecting, canted four-storey central bay, also with four-pane sash windows, and unusually, gabled dormers with similar windows on all three faces. Similar gabled dormers light the attic of each side bay. The setting of house is the surrounding buildings and parkland of the Vaynol Estate. The Pentir works site does not form part of its setting. There is no intervisibility between the Pentir works site and the house, because of the topography and screening from intervening trees to the east. The house possesses architectural and historic interest as a fine early house with interesting development, for its well-preserved interior and importance to Vaynol Park. The house is of high value.

Arched Wall to Forecourt of Vaynol Old Hall (Cadw 18927) (Grade II*)

5.4.103 The arched wall is approximately 2.63 km north-west of the Pentir works site. It is at the west side of the forecourt between Vaynol Old Hall and the Terraced Garden and adjoining the Chapel of St Mary. Probably late 16th century in date. The wing of Vaynol Old Hall was built in approximately 1590, and the porch added to the Chapel in 1596. It is probable that this wall is either contemporary or built shortly afterwards to enclose the forecourt. Rubble stonework, with freestone voussoirs to the arch. The wall is approximately 11 m long, and 3.3 m high, with a wide three-centred arch over the pathway in front of the Hall. It adjoins the west wing of the Old Hall, and the corner of the south porch of the Chapel of St Mary. The copings appear to be missing. The wall possesses architectural and historic interest as a vital element in the setting of the Grade I Old Hall, and the Grade I chapel, and of group value with other surrounding buildings and listed features in the Vaynol Estate. The Pentir works site does not form part of its setting. There is no intervisibility between the Pentir works site and the arched wall, as a result of the topography and screening from intervening buildings trees to the south-east. The house is of high value.

Registered Historic Parks and Gardens

Within 3 km of the Pentir Works Site

Vaynol (PGW(Gd)52(GWY)) (Grade II*)

5.4.104 Vaynol is on the Menai Strait to the south-west of Bangor. It is registered for its well-preserved walled and terraced Elizabethan garden which survives at the centre of a superb, walled, coastal landscape park, with recently restored lake, in an outstanding setting with the Strait on one side and Snowdonia on the other. There are also later formal gardens and kitchen gardens, a large model farm, various park buildings including a mausoleum, viewing tower and boat house, and good surviving plantings

along the main drive. There is important group value with Grade I Listed, eighteenth-century, Vaynol Hall (**Cadw 4173**) and its sixteenth-century predecessor Vaynol Old Hall (**Cadw 4166**), together with numerous Grades II and II* Listed ancillary, estate, farm and religious buildings around both, as well as a range of Grades I, II and II* Listed structures linked to the park and gardens. The designed landscape also has historic significance as the former private estate of the wealthy and locally prominent Assheton (later Duff) family who owned the Dinorwic quarries.

5.4.105 The park is roughly oval on plan and is surrounded by a high stone wall dating from the 1860s (Grade II Listed, **Cadw 18344** & **18910**). It is bounded on the west by the Menai Strait, on the south by the mouth of the Afon Heulyn, on the east by the A487 and B4547, and on the north by woodland and recent developments carved out of it in the north-east corner. The park layout today is much as it was in the nineteenth century, with wooded areas dispersed in lush parkland dotted with oak trees, sloping gently to the Strait on the west and spreading out below the view of Snowdonia on the east. The configuration of woodland is largely unchanged. Some of it is managed for timber and replanted, mostly within or around the original wooded areas.

5.4.106 Vaynol Hall is on the Menai Strait and set in extensive parkland and is surrounded by gardens; together these provide the setting for the house. From the south-east end of the Water Garden an unobstructed view over the park is obtained, while superb views across the Strait to Anglesey were to be had from the dock area (**Cadw 4206**). The folly tower at Coed Twr (**Cadw 4204**), gave sweeping views over the landscape, with the Strait to one side and the heights of Snowdonia to the other, although these views do not include the Pentir works site. The setting of the Vaynol Hall (**Cadw 4173**) and Vaynol Old Hall (**Cadw 4166**) is the surrounding park and gardens, while the park's setting is on its relationship with both country residences.

5.5 Significance of Non-Designated Historic Assets

Within the Pentir Works Site

5.5.1 There are no known non-designated historic assets in the Pentir works site.

5.5.2 Part of a Roman Road, which linked Segontium with Canovium near Conwy (**PRN 17566**), however, has been projected to run through the eastern end of the Pentir works site in a north-east to south-west orientation. The land through which the road is projected to run is occupied by the existing Pentir Substation and modern forestry plantation.

5.5.3 Alternatively, the same road (**PRN 17834**) is also projected in a similar approximate orientation outside the Pentir works site, 190 m to the south-east. Archaeological evaluation on the line of the latter revealed a road feature (**PRN 90578**) and associated quarry pits (**PRN 90579**) albeit with no dating evidence.

5.5.4 The Roman Road (**PRN 17566**) projected as running through the Pentir works site holds archaeological interest in its ability to inform upon Roman roads and settlement patterns in Gwynedd and would likely be of regional interest. The asset is of medium to high value.

Within the 500 m Study Area

5.5.5 Non-designated buildings have the potential to be affected by the Pentir works as a result of changes to their setting.

5.5.6 There are no non-designated extant buildings in the 500 m study area.

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
UNESCO 1633	World Heritage Site	The Slate Landscape of Northwest Wales - Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn	There is no intervisibility between the Pentir works site and the asset, and the proposed works would not result in changes to the setting of the asset or impacts on the attributes of outstanding universal value of the asset.
CN200	Scheduled Monument	Cefn Mawr Hut Group	There is no intervisibility between the Pentir works site and the asset, and the proposed Pentir works would not result in changes to the setting of the asset.
CN168	Scheduled Monument	Cae Metta Hut Group	There is no intervisibility between the Pentir works site and the asset, and the proposed works would not result in changes to the setting of the asset.
CN277	Scheduled Monument	Enclosed Hut Group South-West of Bronydd	There is no intervisibility between the Pentir works site and the asset, and the proposed works would not result in changes to the setting of the asset.
CN017	Scheduled Monument	Dinas Dinorwic Camp	There is no intervisibility between the Pentir works site and the asset, and the proposed works would not

Reference	Designation and Grade	Name	Rationale for Scoping Out of Assessment
			result in changes to the setting of the asset.
CN060	Scheduled Monument	Glascoed Ancient Village	There is no intervisibility between the Pentir works site and the asset, and the proposed works would not result in changes to the setting of the asset.
CN150	Scheduled Monument	Glascoed Round Cairn	There is no intervisibility between the Pentir works site and the asset, and the proposed works would not result in changes to the setting of the asset.
CN197	Scheduled Monument	Castell Llandddeiniolen	There is no intervisibility between the Pentir works site and the asset, and the proposed works would not result in changes to the setting of the asset.
CN156	Scheduled Monument	Rectangular Earthwork 110 m North-West of Coed Ty Mawr	There is no intervisibility between the Pentir works site and the asset, and the proposed works would not result in changes to the setting of the asset.
CN203	Scheduled Monument	Gors y Brithdir Enclosed Hut Group & Ancient Fields	There is no intervisibility between the Pentir works site and the asset, and the proposed works would not result in changes to the setting of the asset.
CN149	Scheduled Monument	Pen-y-Gaer Camp	There is no intervisibility between the Pentir works site and the asset, and the Pentir works would not result in changes to the setting of the asset.
CN376	Scheduled Monument	Goetre Uchaf barrow	There is no intervisibility between the Pentir works site and the asset, and the proposed works would not result in changes to the setting of the asset.

Reference	Designation and Grade	Name	Rationale for Scoping Out of Assessment
CN375	Scheduled Monument	Coed Nant-y-garth, standing stone to North of	There is no intervisibility between the Pentir works site and the asset, and the Pentir works would not result in changes to the setting of the asset.
CN192	Scheduled Monument	Gerlan Hut Group	There is no intervisibility between the Pentir works site and the asset, and the Pentir works would not result in changes to the setting of the asset.
CN175	Scheduled Monument	Fodol Ganol Enclosed Hut Group	There is no intervisibility between the Pentir works site and the asset, and the Pentir works would not result in changes to the setting of the asset.
WAL/GWYN/5; Cadw 18345; 4147; 18339; 18347 to 18351	Conservation Area, Grade II listed building	Aberpwll – Y Felinheli Conservation Area and listed buildings	The conservation area is approximately 2.3 km from the Pentir works site, separated by intervening buildings and woodlands to the east. The Pentir works would not result in changes to the setting of the conservation area and the listed buildings within.
WAL/GWYN/4; Cadw 18921; 18929; 18930; 18931 to 18934	Conservation Area, Grade II listed building	Glasinfryn Conservation Area and listing buildings	The conservation area is approximately 2.8 km from the Pentir works site, separated by intervening buildings and woodlands to the south-west. The Pentir works would not result in changes to the setting of the conservation area and the listed buildings within.
WAL/GWY/30; Cadw 4166; 4172; 4173; 4167; 4169; 4170; 4184; 18927; 4168; 4171; 4174 to 4183; 4185 to	Conservation Area, Grade I listed building, Grade II* listed building, Garde II listed building	Y Faenol Conservation Area	The conservation area is approximately 2.2 km from the Pentir works site, separated by intervening buildings and woodlands to the south-east. The Pentir works would not

Reference	Designation and Grade	Name	Rationale for Scoping Out of Assessment
4197; 18911; 18912; 18917; 18924			result in changes to the setting of the conservation area and the listed buildings within.
Cadw 4166	Grade I listed building	Vaynol Old Hall	There would be no intervisibility between the Pentir works site and the building, and the Pentir works would not result in changes to the setting of the asset.
Cadw 4172	Grade I listed building	Chapel of St Mary to North of Vaynol Old Hall	There would be no intervisibility between the Pentir works site and the building, and the Pentir works would not result in changes to the setting of the asset.
Cadw 4173	Grade I listed building	Vaynol Hall	There would be no intervisibility between the Pentir works site and the building, and the Pentir works would not result in changes to the setting of the asset.
Cadw 4167	Grade II* listed building	Best Stables on South Side of Vaynol Old Hall and courtyard walls	There would be no intervisibility between the Pentir works site and the building, and the Pentir works would not result in changes to the setting of the asset.
Cadw 4169	Grade II* listed building	Terraced Garden to North of Vaynol Old Hall	There would be no intervisibility between the Pentir works site and the building, and the Pentir works would not result in changes to the setting of the asset.
Cadw 4170	Grade II* listed building	Gateway with inscription set in North boundary wall of Terrace Garden opposite Vaynol Old Hall	There would be no intervisibility between the Pentir works site and the building, and the Pentir works would not result in

Reference	Designation and Grade	Name	Rationale for Scoping Out of Assessment
			changes to the setting of the asset.
Cadw 4184	Grade II* listed building	Long Barn at Vaynol Farm	There would be no intervisibility between the Pentir works site and the building, and the Pentir works would not result in changes to the setting of the asset.
Cadw 14924	Grade II* listed building	Bryntirion	There would be no intervisibility between the Pentir works site and the building, and the Pentir works would not result in changes to the setting of the asset.
Cadw 18927	Grade II* listed building	Arched wall to forecourt of Vaynol Old Hall	There would be no intervisibility between the Pentir works site and the building, and the Pentir works would not result in changes to the setting of the asset.
PGW(Gd)52(GWY)	Grade II* registered historic park and garden	Vaynol	The proposed works would not result in changes to the setting of the park or the listed buildings within. The views to the south-east do not include the Pentir works site and the surrounding woodland of the park would screen the Pentir works site from view.
Historic Landscape Character	N/A	N/A	The Historic Landscape Character of the Pentir 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 as, following installation of the underground cables in the

Reference	Designation and Grade	Name	Rationale for Scoping Out of Assessment
			existing Pentir Substation, the infrastructure will be entirely below ground.

5.6.2 The remaining assets discussed in the assessment of the baseline that are not listed above are those where the assessment has identified the potential for the proposed works to result in impacts to the assets, either through physical impacts or through change to their setting.

5.6.3 There are no historic assets to be taken forward for assessment in **Chapter 6: Historic Environment** (**Volume 2** of this ES) given lack of physical impacts or changes to setting.

6. Conclusion

6.1.1 The assessment outlined in this report considers the potential for the proposed Pentir works to result in effects to historic assets either through change to their settings and/or physical impacts. It also allows for the identification for assets where there is no potential for the proposed works to result in such effects. Such assets, as detailed above, can be scoped out of further assessment. The remaining assets are those where the assessment has identified the potential for the proposed works to result in effects to the historic assets. There are no historic assets to be scoped into further assessment in **Volume 2, Chapter 6: Historic Environment**.

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The Slate Landscape of Northwest Wales - Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn WHS

Y Faenol CA

Vaynol RPG

Aberpwll - Y Felinheli CA

Glasinfryn CA

0 50 100 150 200 250
Metres

0 0.5 1 1.5 2 2.5
Kilometres

PENTIR SUBSTATION WORKS ROUTE LEGEND

Legend

- Pentir Works Site Boundary
- 3km Buffer of Pentir Works Site Boundary

Designated Historic Assets

- World Heritage Site (WHS)
- Scheduled Monument
- Registered Park and Garden (RPG)
- Conservation Area (CA)

Registered Historic Landscape

- Dinorwig
- Ogwen Valley

Listed Building

- Grade I
- Grade II*
- Grade II

Rev	Date	Description	GIS	Chk	App
A	27/08/2025	Environmental Statement	LP	JL	AM

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Scheme: PENTIR TO TRAWSFYNYDD REINFORCEMENT

Volume: VOLUME 8: APPENDICES
PENTIR SUBSTATION WORKS

Document Title: FIGURE 2.6.A.1
DESIGNATED HISTORIC ASSETS WITHIN 3KM OF PENTIR WORKS SITE

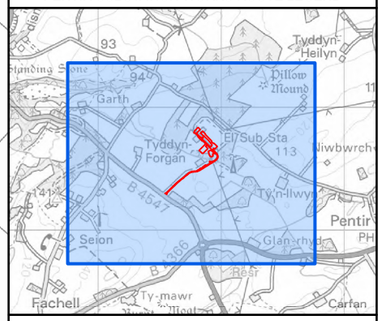
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LP	27/08/2025	JL	27/08/2025	AM	27/08/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:26,000	A3	1 OF 1	A

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Document Path: \\na.aecomnet.com\lfs\EMEA\Manchester-UKMCR5\DCS\Projects\EGE\60686216_NWWC_GIS2\900_CAD_GIS\920_GIS\02_Maps\PTR - Environmental Statement\PTR_ES_Chp6App_Fig_HER_DesignatedHistoricAssets.aprx

PENTIR SUBSTATION WORKS ROUTE LEGEND



Legend

- Pentir Works Site Boundary
- 500m Buffer of Pentir Works Site Boundary
- Non-Designated Historic Asset
- Roman Road (Indicative Alignment)

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PENTIR SUBSTATION WORKS

Document Title: FIGURE 2.6.A.2
NON-DESIGNATED HISTORIC ASSETS
WITHIN 500M OF PENTIR WORKS SITE

Creator:	Date:	Checker:	Date:	Approver:	Date:
ID	01/08/2025	EC	01/08/2025	AM	01/08/2025

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FIGURE	1:6,000	A3	1 OF 1	A

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PENTIR SUBSTATION WORKS ROUTE LEGEND



Legend

- Pentir Works Site Boundary
- 500m Buffer of Pentir Works Site Boundary

Heneb Historic Landscape Character (HLC)

- Area 23: Arfon Plateau
- Area 54: Improved fields above Pentir

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

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PENTIR SUBSTATION WORKS

Document Title: FIGURE 2.6.A.3
HISTORIC LANDSCAPE CHARACTER AREAS
WITHIN 500M OF PENTIR WORKS SITE

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LP	28/08/2025	JL	28/08/2025	AM	28/08/2025

Document Type:	Scale:	Format:	Sheets:	Rev:
FIGURE	1:6,000	A3	1 OF 1	A

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Metres

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PENTIR SUBSTATION WORKS ROUTE LEGEND



Legend

Pentir Works Site Boundary

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PENTIR SUBSTATION WORKS

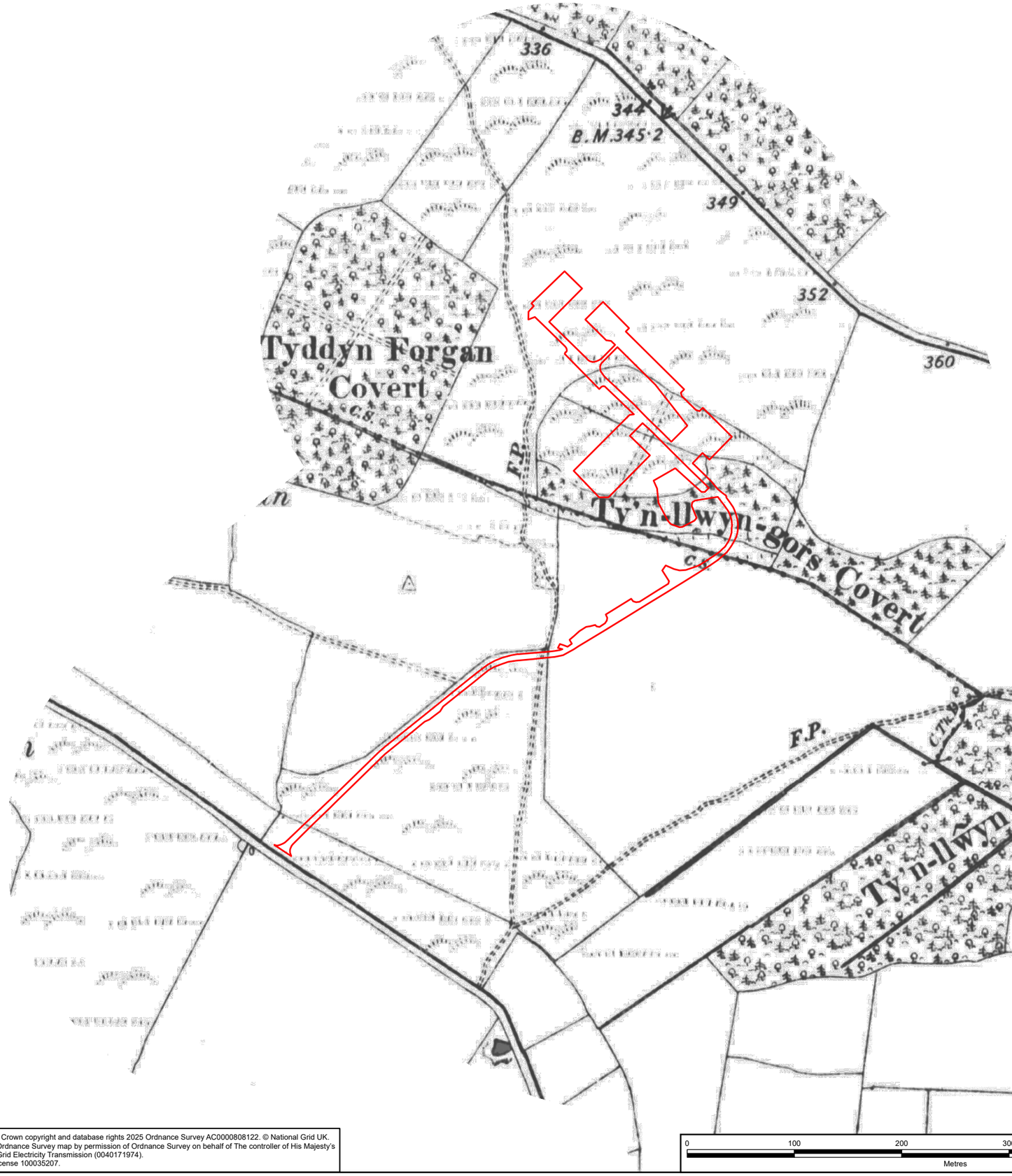
Document Title: FIGURE 2.6.A.4
EXTRACT FROM TITHE SURVEYS OF
BANGOR PARISH AND LLANDDENIOLEN PARISH
IN THE COUNTY OF CARNARVON 1841

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FIGURE	1:4,000	A3	1 OF 1	A

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Metres

PENTIR SUBSTATION WORKS ROUTE LEGEND



Legend

Pentir Works Site Boundary

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PENTIR SUBSTATION WORKS

Document Title: FIGURE 2.6.A.5
HISTORICAL OS MAP 1888

Creator:	Date:	Checker:	Date:	Approver:	Date:
ID	31/07/2025	JL	31/07/2025	AM	31/07/2025

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FIGURE	1:4,000	A3	1 OF 1	A

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PENTIR SUBSTATION WORKS ROUTE LEGEND



Legend

Pentir Works Site Boundary

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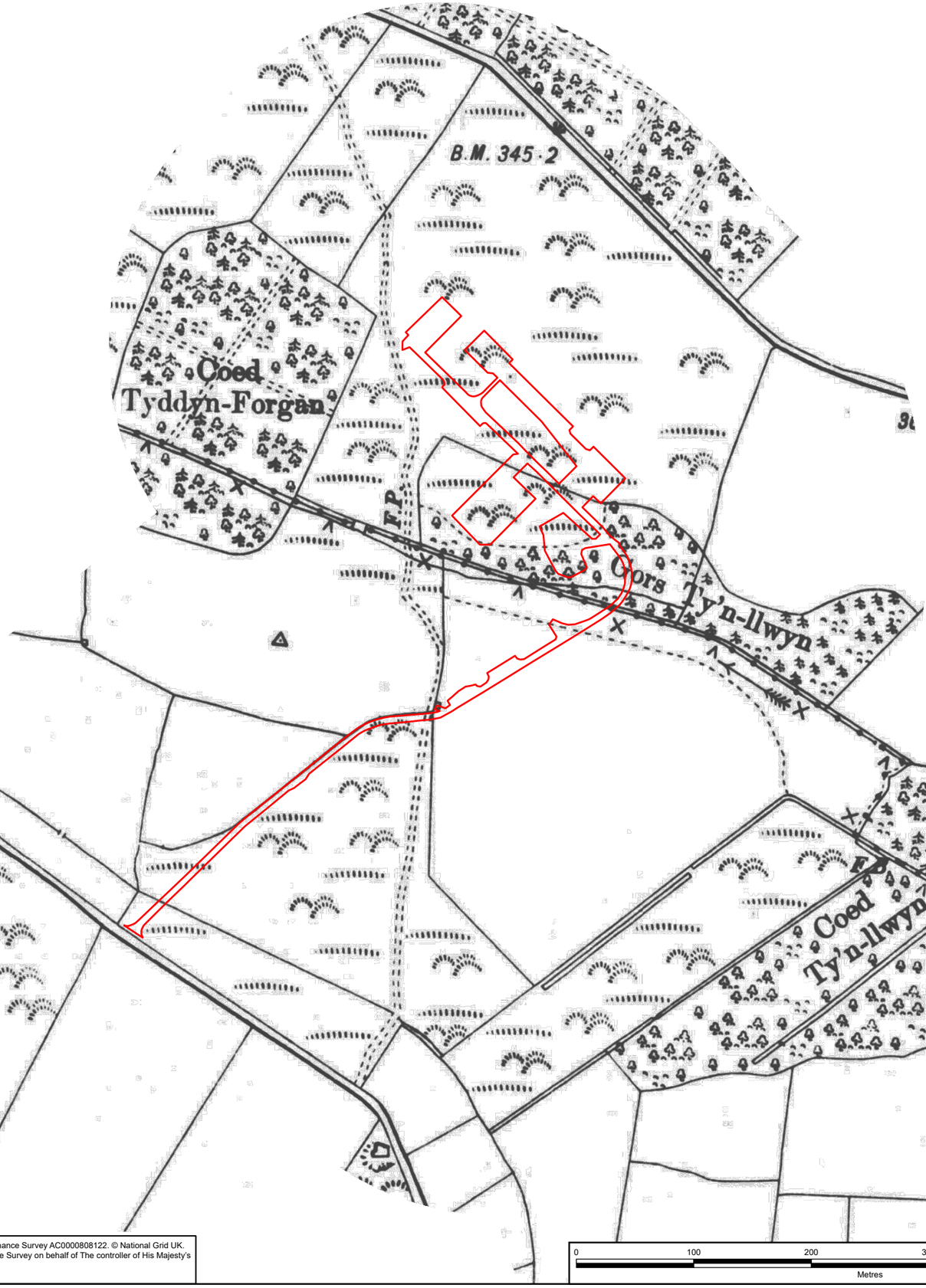
Document Title: FIGURE 2.6.A.6
HISTORICAL OS MAP 1901

Creator:	Date:	Checker:	Date:	Approver:	Date:
ID	31/07/2025	JL	31/07/2025	AM	31/07/2025

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FIGURE	1:4,000	A3	1 OF 1	A

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PENTIR SUBSTATION WORKS ROUTE LEGEND



Legend

Pentir Works Site Boundary

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PENTIR SUBSTATION WORKS

Document Title: FIGURE 2.6.A.7
HISTORICAL OS MAP 1920

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ID	31/07/2025	JL	31/07/2025	AM	31/07/2025

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FIGURE	1:4,000	A3	1 OF 1	A

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PENTIR SUBSTATION WORKS ROUTE LEGEND



Legend

Pentir Works Site Boundary

Rev	Date	Description	GIS	Chk	App
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PENTIR SUBSTATION WORKS

Document Title: FIGURE 2.6.A.8
HISTORICAL OS MAP 1953

Creator:	Date:	Checker:	Date:	Approver:	Date:
ID	31/07/2025	JL	31/07/2025	AM	31/07/2025

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FIGURE	1:4,000	A3	1 OF 1	A

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Appendix 2.6.B: Gazetteer of Historic Assets and Archaeological Investigations (Pentir)

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World Heritage Sites

UNESCO Ref.	Grade	Name	Description	Period	NGR
1633	WHS	The Slate Landscape of Northwest Wales - Penrhyn Slate Quarry and Bethesda, and the Ogwen Valley to Port Penrhyn	The Slate Landscape of Northwest Wales is located in the United Kingdom, in the mountains of Snowdon massif. Six areas together represent an exceptional example of an industrial landscape which was profoundly shaped by quarrying and mining slate, and transporting it for national and international markets. From 1780 to 1940 this industry dominated world production of roofing slates, transforming both the environment and the communities who lived and worked here. The quarries and mines are monumental in scale, comprising stepped hillside workings, deep pits and cavernous underground chambers, massive cascading tips, ingenious water systems, and a range of industrial buildings. Outstanding technical equipment and major engineering features survive. Innovative transport systems linked quarries and processing sites with purpose-built coastal export harbours and with main-line railways. Grand country houses and estates built by leading industrialists' contrast with workers' vernacular settlements, with their characteristic chapels and churches, band-rooms, schools, libraries and meeting-places. By the late 19th century the region produced about a third of the world output of roofing slates and architectural slabs. Its use in terraced houses, factories, warehouses and elite architecture contributed to rapid global urbanization. It influenced building styles, encouraging the shallow-pitched roofs of the Georgian order. Technologies that were innovated, adopted and adapted in the property include the ingenious application of waterpower, the development of bulk handling systems and the first known application of the circular saw for cutting stone. These were diffused by specialists and by emigration of skilled Welsh quarrymen to the developing slate industries of the United States, continental Europe and Ireland. The Snowdon massif's narrow-gauge railway systems gained global influence and were adopted from Asia and America to Africa and Australasia.	Post-medieval	SH6107067759

Scheduled Monuments

SAM No.	Grade	Name	Description	Period	NGR
CN200	SM	Cefn Mawr Hut Group	The monument comprises several hut circles, the foundations of round houses probably dating to the Bronze Age or Iron Age (c.2300 BC - AD 74). The site is very wet in places and contains various remains of walling and huts. There are four readily identifiable huts with diameters of 10 m, 6 m, 6m and 8m. The monument is of national importance for its potential to enhance our knowledge of prehistoric domestic life and social organisation. It retains significant archaeological potential, with a strong probability of the presence of structural evidence and associated archaeological features and deposits. There is also the potential for preserved environmental evidence. A patchwork of small fields, some of which could conceivably have their origins in prehistory exists immediately to the southeast of the site and is the most important component of the monument's setting.	Bronze Age	SH5333065242
CN203	SM	Gors y Brithdir Enclosed Hut Group & Ancient Fields	A single round hut standing within a sub-rectangular enclosure on the level summit of a rocky outcrop overlooking the wooded valley of Gors y Brithdir. A field system adjoins the enclosure on the SW and is particularly well preserved in a belt of woodland occupying a steep slope. The site probably dates from the first millennium BC. A broad turf-covered, stony bank, representing the remains of a single hut, stands isolated in the middle of the enclosure. The hut measures c.10m across but has no obvious entrance. The sub-rectangular enclosure measures c.25m across with a prominent entrance of about 2.5m wide on the W side. The enclosure wall varies in width and height and is apparently absent along the S side where the natural rock outcrops. The boundaries of the field system consist mostly of stone walls, generally up to 2m thick and up to 1m high, but include banks. The boundaries run up and down slope to form small paddocks or fields which utilised the Brithdir streams as a natural boundary on their west sides. There are also mounds of stones scattered amidst the fields, these are assumed to be field clearance cairns.	Bronze Age	SH5550368873
CN376	SM	Goetre Uchaf barrow	The monument comprises the remains of a round barrow, a burial mound probably dating to the Bronze Age (c.2300 BC - 800 BC) formerly situated within enclosed pasture on the leading edge of a slight terrace, now surrounded by a large housing development. The grass-covered barrow is circular on plan and measures about 11m in diameter and up to 1m in height.	Bronze Age	SH5556069902
CN375	SM	Coed Nant-y-garth, standing stone to N of	The monument comprises a standing stone, probably dating to the Bronze Age (c.2300 BC - 800 BC) and situated in improved pasture on the rounded summit of the hill to the N of Coed Nant-y-garth. It is a squat, rounded stone, standing 1.4m in height and measuring 0.6m in thickness and 0.5m in width.	Bronze Age	SH5419068272
CN150	SM	Glascoed Round Cairn	The monument comprises the remains of a burial cairn, probably dating to the Bronze Age (c.2300 - 800BC). It measures c. 15m in diameter by up to 1.2m in height and sits on the summit of a low, rounded hill. The centre of the cairn has been disturbed in the past and a sheep shelter built into the top of it, although this is now ruined and more stone has been dumped elsewhere on the cairn. An arc of large stones on the N side are probably the remains of a kerb. The stones of the cairn extend beyond this kerb, so that its original diameter may have been more than 15m.	Bronze Age	SH5469064906
CN168	SM	Cae Metta Hut Group	An enclosed hut group containing both round and rectilinear huts, probably dating to the Iron Age or Romano-British period , lying on the SE side of a small valley. A modern wall overlies the enclosure wall on the SW and the site is crossed by a modern stone wall running from NW to SE. The larger part of the site lies to the SW of the modern wall, where there are two round huts, one rectilinear hut and several other structures. Walls are up to 1m high, of earth and stones with orthostatic faces. To the NE of the modern wall is a further round hut and the enclosure wall is clearly visible, c. 1 m wide and 0.5 m high. The hut group was the subject of archaeological excavations undertaken between 1971 and 1974, directed by Mr R G Livens of University College of North Wales (UCNW) Bangor. These recovered information about the construction of the hut group, sherds of Roman pottery and a much-worn bronze coin presumed to be Roman. Post-excavation analysis has shown that it is likely that the site was occupied in the 2nd and 4th centuries	Iron Age	SH5334865258
CN227	SM	Enclosed Hut Group SW of Bronydd	A multi-period settlement which lies on west-facing ground below the steeper slopes of Moel Rhiwen. The southern part of the site includes the clear foundations of 5 circular huts and associated features dating from the Iron Age and Romano-British period. To the north there are indications of further hut circles but also the foundation of a well-	Iron Age	SH5765564999

SAM No.	Grade	Name	Description	Period	NGR
			preserved long hut representing more recent settlement in, perhaps, the later medieval period. The monument is an unusually complete example of a multi-period site and includes a variety of hut types. This diversity gives the site particular importance, and the suggested long period of occupation increases its archaeological potential. All is enhanced by the presence of an extensive adjoining field system within which are at least two other types of settlement. The site therefore has particular group value. The structures themselves may be expected to contain archaeological information concerning chronology and building techniques.		
CN017	SM	Dinas Dinorwic Camp	The monument comprises the remains of a hillfort, which probably dates to the Iron Age period (c.800 BC - AD 74, the Roman conquest of Wales). Hillforts are usually located on hilltops and surrounded by a single or multiple earthworks of massive proportions. Hillforts must have formed symbols of power within the landscape, while their function may have had as much to do with ostentation and display as defence. Dinas Dinorwig hillfort is located on one summit of a ridge. To the north-west the ground falls away steeply to a small tributary of the River Seiont and to the south-east less steeply to the marshy valley in which the River Cegin rises. The hillfort comprises an inner wall surrounded by two massive ramparts of earth and rubble. Of two entrances through the wall the larger is obstructed by the inner rampart, indicating that the ramparts are of a later phase than the wall. The outer rampart has an exterior ditch c.4m wide around most of the circuit. On the north side there is a wedge-shaped annexe between the outer rampart and the steep slope of the hill. Within the defences, on the west side, a single hut is visible as a depression.	Iron Age	SH5498065320
CN060	SM	Glascoed Ancient Village	An enclosed hut group probably dating to the Iron Age or Romano-British period (c.800BC to AD400), containing at least 4 round huts and 1 rectangular hut. The enclosure is roughly circular, with a diameter of 34 m. The enclosing bank probably consisted of two faces of upright stones (orthostats) with a rubble core, but the orthostats have nearly all been removed (a few remain on the SW corner) leaving a rubble bank c.9 m wide and 1.5 m high on the N side, decreasing to 3 m wide and 0.8 m high on the S. The entrance may have been through the rectangular building on the S, which is on a lower level than the round huts. All the internal walls are grass-grown banks and much of the detail of the site is hidden by gorse and brambles. Another rectangular building may lie to the E of the enclosure, just outside the scheduled area, but its relationship with the enclosed site is not clear and the E end of the building is obscured by stone dumping and vegetation.	Iron Age	SH5471464701
CN149	SM	Pen-y-Gaer Camp	A rectangular enclosure on a small rocky hill, probably dating to the later prehistoric period. The enclosure measures 38m by 35m and is demarcated by a rubble wall 3m thick, which was faced with large orthostats. The remains of the entrance can still be seen on the NE side, where one large gatepost survives. The enclosure wall has been used as a stone dump and is surmounted, in places, by a modern stone wall. The SW wall has been largely robbed out. There are vague traces of a rectangular building in the SE corner.	Prehistoric	SH5475664387
CN175	SM	Fodol Ganol Enclosed Hut Group	There are two hut circles within the enclosure, although the walls are just low grassy banks; other irregularities may be other features or possibly a third hut. A length of field wall 55 m long is included in the scheduled area. It runs from the enclosure wall in a NE direction, and is probably of the same date as the enclosed settlement, although a more recent field wall has been constructed on top of the earlier wall.	Prehistoric	SH5505668554
CN197	SM	Castell Llanddeiniolen	The monument comprises the remains of a defensive site, which resembles a medieval ringwork, although it may be prehistoric in origin. It is situated on a hill of glacial drift c.7.5m to 9m above the road which skirts its N side, the top is oval c.27.5m by 33.5m. The N and NW slopes are steep, the E and S are gentler, and have been scarped to form a ditch and outer bank. There is some stone at the S edge of the relatively level top of the hill, and a distinct, if slight, terrace a little further down the S side, again with some stone in the edge. The track which runs past the E side of the site is sunken, and a retaining wall over 1 m high forms the W side. This may be the line of a ditch protecting the site on the accessible E side. The base of a more recent field wall runs round the S and W sides of the site. On the NE, a gravel pit has encroached nearly to the summit of the mound.	Medieval	SH5694965534
CN156	SM	Rectangular Earthwork 110m NW of Coed Ty Mawr	The monument comprises the remains of a well-preserved medieval moated homestead. There are two ditches and a central bank with traces of an external bank on the NE and SW sides. The two ditches may be connected on the NE and SW sides. The interior is 42m by 34m and contains traces of a building in the E corner. The entrance appears to have been on the NW side, where there is a stone causeway cutting through the two ditches, about 4.5m wide. The E corner of the site, which lies in a separate field, has been filled in and the ditches are not visible from the ground. A modern field wall crosses the site from NW to SE and in addition to this there is a denuded bank running across the site from SW to NE, the line of which is marked by two oak trees. The ditches appear to have been fairly shallow, although in the N corner the exterior ground surface rises one metre above the level of the outer ditch.	Medieval	SH5553666430

SAM No.	Grade	Name	Description	Period	NGR
CN192	SM	Gerlan Hut Group	The monument consists of a well-preserved group of stone huts: 6 roughly circular structures, with boulder-faced stone walls, of probable Romano-British date. A sub-rectangular structure in the NE corner of the group represents potential continuity into the post-Roman period. The remains of a later stone building lie in the SW corner. The whole group lies in unimproved ground now defined by a later stone wall, which overlies one hut on the N side and separates the archaeological features from surrounding improved pasture. The hut group was not a defensive site, the significant views would have been medium and short over fields farmed from the settlement, and which would probably have been on the lower lands to the north.	Roman	SH5880066943
CN417	SM	Penrhyn Quarry Railway	Powered by steam locomotive from the outset the railway used a 2' gauge rail. It was built to a similar design as the Ffestiniog Railway although it was unusually steep - a maximum gradient of 1/33 was used in order to avoid the need for inclined planes as used by its predecessor. It followed a more circuitous route than the railroad, being almost 10km in length, with passing-loops at Felin Hen and Tregarth. The Penrhyn Quarry Railway was designed by Charles Easton Spooner of the Ffestiniog Railway for the sole use of Penrhyn Slate Quarry (CN416), although a passenger service was also operated for the quarrymen from 1880 to 1947. It remained in operation until 1962, and was dismantled three years later. The railway today survives as four relict sections: Area A – Felin Fawr to Hendurnpike, Area B – Hendurnpike to Tregarth, Area C – Moel Y Ci to Rhydau Duon, and Area D – Pont Felin Hen to Coed Hywel Uchaf. Area A: Felin Fawr to Hendurnpike.	Post-medieval	SH6100068367

Listed Buildings

NPRN No	Grade	Name	Description	Period	NGR
4166	I	Vaynol Old Hall	In the medieval period Vaynol was in the hands of the Bishops of Bangor. It was made over to the Cochwillan family of Bangor by Bishop Skevington in 1533, and eventually came into the hands of the Williams family; William Williams of Vaynol, and Cochwillan (through his wife Elen) was high sheriff for Caernarfonshire in 1598, and was created baronet in 1608. An inventory taken in the period 1660-90 records a total of 44 rooms. It was held by this family until the last member died without issue in 1696. By 1723 the property was in the hands of John Smith, MP, and in 1764 it was left to Thomas Assheton of Cheshire, who assumed the name Smith. Much work of expansion and improvement throughout the estate was carried out until the time the property was sold in 1967, finally passing out of the family's hands in 1984. Vaynol Old Hall is an important sub-medieval house which appears to be constructed in at least three or four phases, beginning in the early-mid C16 as a 2-unit house with lateral chimney, consisting of the ground floor of hall, passage and small outer room. It reached the present E-shaped plan in the early-mid C17, with addition of a storeyed porch over the entrance, and a similar oriel bay at the E end: rear stair wing dated on close-studding, 1638. The E-plan was completed towards the end of the C17 with the addition of a larger N wing on the W side in the late C17. Outbuildings attached to the W end are later, mostly C19. Built of local stone rubble, with large quoins and freestone dressings and slate roofs. Main E-W range is of 2 storeys, comprising a main hall with lateral fireplace, a cross passage, and beyond an inner room, a parlour or service room. Perhaps also contemporary, a 3-storey rear wing on the E, with service rooms below. Added on the N side is the storeyed porch over the entrance, with an open outer moulded Tudor arch, within a square frame, with shields in the spandrels. The windows are generally of 2-, 3- or 4-lights, stone mullioned with rounded heads to the lights, set back in chamfered ashlar surrounds. One 3-light window in the porch gable, and the gabled oriel wing, probably added, at the E end of the N elevation, has 3- over 4-light similar arched Tudor windows. At the W end, a balancing wing with crow stepped copings; a 4-light window to the ground floor and a stone mullioned cross window above. A stone stack is between the porch and the oriel. The E elevation, overlooking the sunken garden, is of 3 storeys, with a door to the under croft in the large gable of the main block, with 5- over 4-light windows, and similar windows to the rear wing. The oriel windows, beyond the imperceptible join, are not recessed. Overlooking the stable yard, the building is of 4 storeys under 2 gables. Some cross windows and other windows altered. This elevation adjoins the Best Stables.	Post-medieval	SH5382969536
4172	I	Chapel of St Mary to N of Vaynol Old Hall	Vaynol, originally the property of the Bishop of Bangor in the medieval period, was given to the crown after the last of the Williams family died without issue in 1696. Before 1723 the estate was granted to John Smith MP Chancellor of the Exchequer and Speaker of the House of Commons, and in 1764 it was left to Thomas Assheton of Cheshire who then took the name of Smith. Marriages of various descendants introduced the Duff and Vivian into the names. The Vaynol estate was enlarged enormously with the wealth created by the Dinorwic Quarry; one of the two most important slate quarries in Wales. However, much of the property was sold by Sir Michael Duff in 1967, and after his death in 1980 the remaining Vaynol Park was sold in 1984, passing out of the family. The chapel was probably built in the mid-late C16, with the porch being added in 1596, the datestone bearing the inscription WW/E, referring to William Williams and his wife Ellen. In 1910 Charles Assheton-Smith converted the building into a private family chapel, although Sir George Assheton Smith is said to have instigated this plan before his death in 1904. Building accounts show that the marble was supplied by Bayliss Jones Cripps Ltd at a cost of £60. With the iron railings by Bayliss Jones and Bayliss Ltd and the wrought iron gates by Spital and Clark, the total expenditure on this work was far greater than anything else on the estate. A rectangular aisless building aligned NW-SE. Rubble masonry with quoins and a slate roof, a crucifix on the E gable. Gabled porch to the SW not bonded in, has a depressed arched entrance and dated keystone (WWE 1596) and stone benches either side. Turned timber balusters form the upper part of the porch walls. The inner doorway has broached stops. Three-light windows with arched lights and hollow-moulded jambs under a square head and label. A similar 4-light window is set in the E end.	Post-medieval	SH5382169561
4173	I	Vaynol Hall	Vaynol was given to the crown after the last of the Williams family died without issue in 1696. Before 1723 the estate was granted to John Smith, MP, chancellor of the Exchequer and Speaker of the House of Commons. In 1764 it was left to Thomas Assheton of Cheshire, who took the name Smith; marriages of various descendants introduced Duff	Post-medieval	SH5369669434

NPRN No	Grade	Name	Description	Period	NGR
			and Vivian into the name. The Vaynol Estate was enlarged enormously from the wealth created by the Dinorwic Slate Quarries, one of the two most important in Wales. However, much of this property was sold by Sir Michael Duff in 1967, and after his death in 1980 the remaining part of the estate was sold, passing out of the family. Vaynol Hall replaced the Old Hall as the principal house in Vaynol Park. It is of early-mid C18 in origin, and was extensively remodelled in the C19 to create the present vast building. Successive early C20 works include alterations in 1901-5 and in 1912, the demolition of a wing in 1959, and conversion into flats. Of white painted stucco with slate roofs behind high parapets. Three storeys; 'L'-plan. The SE front is of 10 bays; with a canted 3-storey bay, and the right hand wing also set forward and canted. The ground floor windows are set in shallow arched recesses; all 16-paned sash windows, mostly horned. A panelled door with over light is set in the canted bay. The parapet has a band and slight cornice. Set back at the SW end is a 2-storey stair projection with an especially tall window. The NE front has the main entrance from the driveway in the re-entrant angle, facing NE; a classical portico added in 1910 with a winged symbol on the fascia. Behind is a lobby with a domed roof. The SW front is of 7 window bays, including a splayed ground floor on the right. The garden to this side is bordered on the SE side by a rebuilt brick wall with acorn finials and closed to the SW by a balustraded wall with a concrete handrail, terracotta balusters and oval fluted urns.		
18927	II*	Arched wall to forecourt of Vaynol Old Hall	Probably late C16. The wing of Vaynol Old Hall was built in c1590, and the porch added to the Chapel in 1596. It is probable that this wall is either contemporary or built shortly afterwards to enclose the forecourt. Rubble stonework, with freestone voussoirs to the arch. The wall is approximately 11m long, and 3.3m high, with a wide 3-centred arch over the pathway in front of the Hall. It adjoins the W wing of the Old Hall, and the corner of the S porch of the Chapel of St Mary. The copings appear to be missing.	Post-medieval	SH5382569556
4167	II*	The Best Stables on S side of Vaynol Old Hall and courtyard walls.	This grand stable range probably dates from the early C20 (?1905) when the family's equestrian interests demanded bigger and better stabling. Alterations were made in the summer of 1913, when new furnishings were installed by Young & Co. The Vaynol Papers have exceptionally detailed accounts of expenditure on the horses (by name) and the stables, including evidence of continual improvements. Winners of all the major races are said to have been trained here, including four Grand National winners, e.g. Cloister (1912-4) whose head is now preserved in the Newmarket Museum. Of stone, with a slate roof. A single-storey 5 bay stable range with segmental headed horned sash windows with voussoirs and keystones. A central boarded door has a tall paned fanlight.	Modern	SH5382069521
4169	II*	Terraced Garden to N of Vaynol Old Hall	In the medieval period, Vaynol was part of the episcopal estate of the Bishops of Bangor. After the dissolution, it came into the Williams family of Cochwillan and elsewhere, passing out of their hands after the last of the Williams family died without issue in 1696. The garden appears to have been laid out contemporaneously with work on the Old Hall in the early to mid C17. Walled and terraced garden in a late medieval-early Renaissance style, rising from S to N away from the front of the Old Hall, and bounded on 3 sides by tall rubble stone walls. Axial rounded steps, lead to a narrow cross walk which has the private chapel at the W end, and from which squared steps lead to the next level. In the upper section of the garden there is a circular pond, set at the node point of a wide bow in the upper wall, and at the centre of which is the 'gateway with inscriptions', giving access to the next walled garden at the rear of the later Dairy Cottage.	Post-medieval	SH5384569562
4170	II*	Gateway with inscription set in N boundary wall of Terrace Garden opposite Vaynol Old Hall	Erected in 1634 to embellish the Terrace Garden, and to provide a link to the rear garden. The arch carries the initials TW/K for Sir Thomas and Katherine Williams. Thomas was the 3rd son of William Williams of Cochwillan. Of dressed stone. A 4-centred arched gateway with a distinctive stepped hood, with a projecting keystone dated 1634 and initialled TW/K. It has stilted hoodmould and moulded jambs, the spandrels now eroded. The inner arch is touchingly inscribed on the soffit "Ye mystic Garden Fold Me Close I love Thee Well", and below, "Beloved Vaynol". In the opening, a scrolled C17 ironwork gate with a flat pointed arch.	Post-medieval	SH5383069566
4184	II*	Long Barn at Vaynol Farm	In the medieval period Vaynol was in the hands of the Bishops of Bangor. It eventually came into in the hands of the Williams family of Cochwillan and elsewhere, and was held until the last member died without issue in 1696. The Long Barn is of two C17 phases. The first, of 1605, is substantiated by a datestone reading '1605/ W*W/D' over the barn doors on the S side, indicating that it was initiated by William Williams, and his second wife Dorothy Dymock. The second phase relates to its extension to the W in the 1660's (another, weathered, datestone reading 'Sr GW/P [?]' placed over the second S door). This refers to Sir Griffith Williams and his wife Penelope, daughter of Lord Bulkeley. The fine cupola was probably added in 1899, the date the clock was installed. The barn is built of local stone rubble, with a slate roof. It is 42m long and 9m wide, making it possibly the largest intact barn of this date in	Post-medieval	SH5378069640

NPRN No	Grade	Name	Description	Period	NGR
			Wales, comparable in size to major estate barns of the same period in England. It is for a combination of uses, including hay barn, granary and stores. The thick, slightly battered walls have off-centre cambered headed doorways both sides, and 2 tiers of slit ventilators. The NE gable has a 2-light stone mullioned window, opening to an internal dovecote. The early date stone is placed over the doors. The mid C17 extension is of 2 storeys, including 3-light sliding sash granary windows; with the datestone below the right hand one. Adjoining on the N side is a small rubble enclosure with a rounded wall into which the stables, at right angles, were mucked out. The clock cupola stands on a raised hipped apron roof, and is boarded, with a corniced lower stage, arched lower openings to the upper stage, and a swept lead roof terminating in an iron weathervane.		
14924	II*	Bryntirion	Vaynol was given to the crown after the last of the Williams family died without issue in 1696. Before 1723 the estate was granted to John Smith, MP, Chancellor of Exchequer and Speaker in the House of Commons, and in 1764 it was left to Thomas Assheton of Cheshire, who then took the name of Smith. Marriages of various descendants introduced the Duff and Vivian names. The Vaynol Estate was enlarged enormously from the wealth created by the Dinorwic Slate Quarries, one of the two most important in Wales. However, much of this property was sold by Sir Michael Duff in 1967, and after his death in 1980, the remaining Vaynol Park was sold in 1984, passing out of the family. Bryntirion appears to be of late C17 or early C18 origins and was given a late Georgian remodelling early in the C19. It is documented in the C19 as being the agent's house, and its size and character indicate that it was always one of the most important houses in Vaynol Park. Victorian alterations and enlargements followed, with modern changes (?1956) to the outbuildings to form Bryntirion Bach at the N end. Built of coursed rubble, with slate roofs. Mostly of 2 storeys and attic, the main front is of 4 window bays, continuing to the N as a lower structure formerly for service accommodation, without attic. A rubble screen wall divides off Bryntirion Bach. The main front, facing E, is of 2 builds, the more northerly relating to the early C19 remodelling in a slightly different stone. Twelve-paned sash windows, and a portico, off-centre, with panelled surround and porch with Ionic columns (replaced), and half-glazed doors. The attic floor has four gabled dormer windows with 12-pane sashes in the very tall, hipped roof. The S front is rendered and lined, and has 2-pane C19 sash windows either side of a projecting, canted 4-storey central bay, also with 4-pane sash windows, and unusually, gabled dormers with similar windows on all 3 faces. Similar gabled dormers light the attic of each side bay. At the downhill end (S) is a rustic archway of largely drystone construction. Two tall chimney stacks with multiple flues.	Post-medieval	SH5313668651
3673	II	Pont-y-felin	An C18 road bridge connecting Pentir to Caerhun and Y Felinheli. A road bridge comprising a single semi-circular arch of stone, set slightly behind a regulating course. The rubble spandrels are carried up as parapets, without differentiation, and capped with a flush slate coping. Large boulders used for the abutments. Buttressing walls added, probably in the C19, on the SE and SW sides.	Post-medieval	SH5719767268
4142	II	Bodarborth	Circa 1850-60 one half of a pair of Vaynol estate cottages, No 1 with addition of c1900. Addition to No 1 is set back, rendered to front, slate-hung to side, one-window range with brick right end stack. 4-pane sash above, half-glazed door and overlight below. Iron porch-veranda in angle of a single broad bay with curved angle brackets and low cast-iron rail above.	Post-medieval	SH5277467793
4144	II	Tros-y-canol	Documentary references date the building back to 1726 but, in its present form, the house is early C19 in character, in a style associated with the Penrhyn Estate which owned the property for a few years from 1813. Stuccoed stone and brick, with a hipped slate roof. Two storeys, 'L'-plan. Main front is of 3 bays, with 2 further bays set back on the right. Central lattice porch to the main block over a half-glazed door, stepping down to house. Small pane sash windows with cusped and pointed glazing bars to the upper light, and stone label moulding. Slate sills and splayed recesses to the ground floor. The upper windows of the main block have raised hipped dormers with deep eaves. Central half-glazed door to the first floor formerly leading on to a railed verandah, the railings now removed. The right-hand part has one similar window to ground floor, the others altered, one blocked. Contemporary rain-water head. Slate hung left end with similar half-hipped gable end windows, tripartite to ground floor and 12-pane above. The rear is largely pebble dashed and has a modern lean-to structure over almost the full width concealing a tripartite sash window. Rendered outer side and pebbled sashed gable to rear; the former includes 3 leaded casement windows, one with Gothic heads.	Post-medieval	SH5607470610
4147	II	Telephone Callbox at N end of bridge over disused railway (01248 670285)	Telephone callbox to standard K6 design by Sir Giles Gilbert Scott, introduced by the GPO in 1936. Red-painted cast-iron kiosk with two glazed sides, blank rear and wooden door with inserted glazed iron panel. Square plan with raised plinth, glazing each side in horizontal panels with marginal bars. Top has four opalescent panels under	Modern	SH5316268095

NPRN No	Grade	Name	Description	Period	NGR
			shallow Soaneian domed roof with lunettes, each with embossed George VI crown. Rubble wall to rear continuing from the parapet of the bridge.		
4168	II	L-shaped courtyard range to rear of Vaynol Old Hall with enclosing yard wall at S end.	These ranges mainly date from the mid and later C19 estate improvements, although the part immediately adjoining the Old Hall probably has C17 origins. Built of stone rubble, with slate roofs. One and a half storeys, comprising coach housing and some domestic accommodation. A 5-window range runs E-W at the top of the courtyard, and has 16-pane sash windows to gabled attic dormers. Later inserted garages. The N-S range is of 4 + 2 window bays; with small-pane casement windows, boarded garage and carriage gates below the central entrance, flanked by windows. Two windows are set back at the right-hand end, with steps up to a boarded door beside a 12-pane sash window. The rear of the E-W range has a Tudor doorway with freestone surround and rounded steps; the return range runs N at the W end, and has small-pane sash windows and freestone chimneys. The S part of the slate roof has been renewed. The cobbled courtyard is closed at its southern end by a rubble wall with slate copings, and curves inwards to square gate piers with pyramidal caps and an iron overthrow.	Post-medieval	SH5380769539
4171	II	Stone bench seat on W side of Terraced Garden at Vaynol Old Hall	Possibly contemporary with the mid or later C17 work in the Terraced Garden opposite the Old Hall. A limestone garden bench, the seat carried on compressed scrolls together with a similar inserted support at the centre. Fluted and curved bench ends and carved nosing to the seat itself. The back is ornamented with cherubs, a lion and pipes etc.	Post-medieval	SH5382069552
4174	II	Terrace Walls and fountain to formal garden to NE of Vaynol Hall.	The Italian Garden at Vaynol Hall was probably created c1913 when there is a reference to 'Garden Alterations' in the Estate papers. The garden is not shown on the 1st edition of the OS map of 1881. The garden is laid out on sloping land immediately E of the Hall. It consists of a main axis path with a secondary cross axis, intersecting at an urn (q.v.) and terminating at wrought iron gates. The main axis has 2 flights of steps, the second upper flight leading on to a terrace with a fishpond and central cast iron fountain of 3 stages, the water springing from a circular stand held aloft by a putto. Swans are set around the base. The bounds of the garden are marked by stone balustrades, forming a wide apsidal lower end, and defining the edge of the upper terrace. It has small urns at intervals, and terminates in larger urns. The paths are box edged, and lawns fill the bays, shaped for effect. At the top of the garden is a stone wall with the bell cage gate (q.v.).	Modern	SH5373569513
4175	II	Urn and pedestal in formal garden NE of Vaynol Hall.	The urn and pedestal are early to mid C18, in a continental baroque style, and were reset in the formal garden at its inception in c1913. Of Weldon type limestone. A tall, swagged urn with a gadrooned base and broad foliated rim below the fruit encrusted cap, set on a panelled and painted pedestal.	Post-medieval	SH5374969490
4176	II	Putti and pedestal in formal Garden NE of Vaynol Hall.	Probably mid C18 and placed in the Italian Garden at its inception c1913. Made of lead and mounted on a stone pedestal. One of a pair of garden figures depicting two standing putti disporting themselves with bunches of grapes, with vines wrapping around their waists, a cornucopia at their feet. The pedestal is octagonal and is set on a stone platform in the grassed upper bay of the garden.	Post-medieval	SH5373569523
4177	II	Putti and pedestal in formal garden NE of Vaynol Hall.	Probably mid C18 and placed in the Italian Garden at its inception c1913. Made of lead and mounted on a stone pedestal. One of a pair of garden figures, depicting two putti disporting themselves with bunches of grapes, one sits on a fish, and leans out drunkenly, and is supported by the other holding on to a branch with an acorn finial. The leaning putto has one arm missing. The pedestal is octagonal and is set on a stone platform in the grassed upper bay of the garden.	Post-medieval	SH5372169516
4178	II	Gateway with bellcage at head of formal garden NE of Vaynol Hall	The Formal Italian garden is probably the work of the late C19 or early C20 (1913 work campaign). The gateway, which is probably contemporary, provides access through the continuous wall separating Vaynol Hall from the farm and service areas of the estate. A cast iron gate set into a rubble stone boundary wall. Scrolled finials and locking rail, with a simple iron overthrow. This gateway is particularly of interest because of its bell-cage to the top right, the clapper now missing, and was placed here to call the staff in from the gardens and service areas.	Post-medieval	SH5372569526
4179	II	Classical statue to SW of Vaynol Hall	This statue, which is probably an C18 or early C19 copy of a classical prototype, was probably placed here when the garden was laid out, either contemporary with the late remodelling of Vaynol Hall or in 1913 when there are references in the estate papers to 'Garden Alterations'. Of white marble. A standing draped figure of a goddess on a circular plinth, set on a low square pedestal. She looks down, and her arms are gently outstretched. The figure is unsigned. One hand has become detached.	Post-medieval	SH5364469393
4180	II	Well Head to SW of Vaynol Hall	Of late medieval date and Italian, and placed in a relationship with the SW garden when this was laid out, either contemporary with the later remodelling of Vaynol Hall, or during 1913 when there is reference to 'Garden Alterations'	Post-medieval	SH5363369389

NPRN No	Grade	Name	Description	Period	NGR
			in the Estate Papers. The fine Italian well head is used as an ornamental feature in the garden. It is made of one piece of pink marble, and circular in form with labels beneath an octagonal top, and retains sockets for the well hoist. The plinth is also octagonal. The sides are decorated with raised and waisted blank shields.		
4181	II	Coach House to N of Vaynol Hall	Probably mid C19, with modern conversion. Formerly known as The Barracks and provided staff accommodation. It is said to have never in fact been a coach house. Stone rubble with red brick voussoirs and a slate roof and rendered chimney stacks. Three storeys. Three doorways to right, 2 being 6-panelled, and a modern entrance to the left. Six and 9-pane sash windows, only one with horns. Similar sash windows to the left end. A taller water tower adjoins to the rear; of brick, with a pyramidal roof. A rubble boundary wall is to the left.	Post-medieval	SH5368069491
4182	II	Chapel to SW of Vaynol Farm	This chapel is probably contemporary with the later C19 estate improvements, or possibly not built until c1911, when Sir Charles Garden Assheton-Smith made alterations to Vaynol Park. Built as the chapel apparently without dedication, for the estate staff, reserving the chapel of St Mary by the Old Hall for his own family's use. Built of rubble stonework with freestone dressings and a slate roof. A rectangular single cell building with a porch, unusually placed at the blank W end beneath a bellcote. Deep quarter-round moulded stone eaves cornices, ending in gabled kneelers. The windows are of mixed styles, including Perpendicular window tracery with V-jointed quoined surrounds. Returned and stilted labels to the 2-window side elevations, each 4-light and square headed with cusping. A 3-light reticulated E window. Four-centred arch to the entrance to the gabled porch.	Post-medieval	SH5374069590
4183	II	Y Bwthyn	Built in the mid-late C19, probably during the extensive improvements then being carried out on the estate, much of the work being carried out c1869. The design is similar to Ty Glo, which appears in the estate papers of 1871. Built of rubble stonework with a slate roof. Single storey, with a symmetrical S front; an open central porch with a 2-centred opening, the porch gabled with a ball finial. Modern windows to the original openings on either side, and a small square bay window to the left (W) gable. The roof is hipped, with wide eaves, and stacks on the rear wall.	Post-medieval	SH5371369682
4185	II	Stable range to NW farmyard	The extensive model farm was begun by the Assheton-Smith family in the later C19 using the wealth created by the Dinorwic Slate Quarries, which enabled them to undertake continual improvements to Vaynol Park. The Vaynol Papers have exceptionally detailed accounts of expenditure on the horses (by name) and the stables include evidence of continual improvements. Alterations to this range took place at the time of the Investiture of Charles, Prince of Wales. Built of polygonal rubble with a slate roof having 3 raised louvred ventilators. The building is 'L'-shaped at the S end against the Long Barn. The original boarded doors have been replaced during to conversion to small workshops, but tall windows, the glazing also altered, retain the horizontal ventilation slit over the openings, typical of the later C19 estate farm buildings. All openings have voussoirs forming flat arches with keystones. A blacksmith's shop is placed towards the N end, retaining a brick forge. The former slaughterhouse was at the N end. Off-centre doorway to the N gable end. To the rear, a band of ventilators appears below the eaves for the southern section.	Post-medieval	SH5375669641
4186	II	Cart shed to NW farmyard, including hammel to rear.	This extensive model farm was begun by the Assheton-Smith family in the later C19, using the wealth created from the Dinorwic Slate Quarries. This enabled them to carry out a programme of continual improvement to Vaynol Park. Built of polygonal masonry, with a slate roof and ventilators. A low building with 5 bays of open fronted cartshed with segmental-headed openings, 3-bay stores to the left with square headed boarded doors and tall 12-pane windows, replacing the original part louvre - part small pane estate windows. Slit ventilators over openings. All openings have voussoirs forming flat arches with keystones. To the rear, an 8-arch hammel in a dog-legged lean-to, with cambered voussoir arches opening on to two gated yards formed with rubble walls on the E side. Now converted to small workshop units.	Post-medieval	SH5377169663
4187	II	Hammel and hay store to NE farmyard	This extensive model farm was begun by the Assheton-Smith family in the later C19, using the wealth created by the Dinorwic Slate Quarries, which enabled them to undertake a continual programme of improvements to farming practise at Vaynol. This farmyard group dates from this period. Built of rubble stonework, with slate roofs. Single storey ranges of hammels either side of a taller central hay store set transversely. The hammels have segmental voussoir arches opening on to two gated yards, divided from each other by a low stone wall. A broad opening made at a later date is on the N gable end. Feed passage door to the S gable end; feeders retained internally. Slit ventilators in 2 stages to the hay store, which is open internally to the king post roof. Loading door on the E side.	Post-medieval	SH5378969672
4188	II	Farmyard range to SE of Long Barn	An extensive model farm was begun by the Assheton-Smith family in the later C19 using the wealth created by the Dinorwic Slate Quarries. This enabled them to carry out continual improvements to farming practice on the Vaynol Estate. The three ranges S of the Long Barn appear later than those to the N. Built of rock-faced stone with a slate	Post-medieval	SH5381869637

NPRN No	Grade	Name	Description	Period	NGR
			roof. Single storey animal accommodation with stores. Voussoirs and keystones to windows and door openings; the former boarded above and louvred, and with ventilation slots above the doorway at the right end. Broad central waggon entrance. The N gable end has rectangular louvred loft opening over a boarded door with a raised sill. Gabled louvred ventilators on the roof, skylights and a chimney at the S end.		
4189	II	Central farmyard range to S of Long Barn	This extensive model farm was begun by the Assheton-Smith family in the later C19 with the wealth created by the Dinorwic Slate Quarries, which enabled them to carry out continual improvements to farming practice on the Vaynol Estate. The 3 ranges S of the Long Barn appear later than those to the N. Built of rock-faced stone with a slate roof. Single storey animal accommodation, with food processing units and stores. Voussoirs and keystones to window and door openings; the former boarded above louvres and with ventilation slots above. Broad entry doors, one blocked. The N gable end has rectangular louvred loft opening over a boarded door. On the roof, louvred ventilators, a square central ventilator, skylights and a chimney stack at the S end.	Post-medieval	SH5381069610
4190	II	Farmyard range to S of Long Barn	An extensive model farm was begun by the Assheton-Smith family using the wealth created by Dinorwic Slate Quarries. This enabled them to carry out continual improvements to farming practice on the Vaynol Estate. The 3 ranges S of the Long Barn appear later than those to the N. Built of rock-faced stone with a slate roof. Single storey animal accommodation and stores. The E side is largely blank; the W side has voussoirs and keystones to windows and door openings, with horizontal slit ventilators above. The windows are of the small pane pivot type. Central broad waggon entry. The N gable end has a similar louvred rectangular loft opening and offset boarded door. An Avery weighbridge is located at the N end. Two louvred roof ventilators.	Unknown	SH5379269610
4191	II	Range attached to W end of Long Barn	An extensive model farm was begun by the Assheton-Smith family in the later C19 using the wealth created by the Dinorwic Slate Quarries, which enabled them to undertake a programme of continual improvements on their farm estate. This range is contemporary with the 3 parallel farmyard ranges immediately S of the Long Barn. Built of rubble with freestone dressings, and a slate roof. Single storey, with a symmetrical W gable elevation comprising two doors and two windows, a pair facing a rubble walled yard. The openings have voussoir lintels with keystones. Part glazed and part louvred windows, and stable doors. In the gable, two keyed oculi. The building and yards were probably intended for cows with calves.	Post-medieval	SH5375569628
4192	II	Detached small range to SW of Long Barn	Part of the extensive model farm begun by the Assheton-Smith family in the later C19 using the wealth created by the Dinorwic Slate Quarries. This range is probably contemporary with the 3 parallel farm buildings immediately to the E, but could be the 'new slaughterhouse' referred to in the 1911 Building Accounts. Built of rubble with a slate roof. Single-storey, 3 bays. Boarded door and small pane window of similar detail to other contemporary farm buildings nearby, - the range attached to the W end of the Long Barn. A single storey range is attached to the rear. Large, boarded door at the S end.	Post-medieval	SH5376769616
4193	II	Detached small range to NW of Dairy Cottage	Part of the extensive model farm begun by the Assheton-Smith family in the later C19, using wealth created by the Dinorwic Slate Quarries. This building is probably contemporary with the 3 parallel farm buildings immediately to the E. Built of rubble with a slate roof. Single storey, 2-bays. Gable chimney stack and framed and boarded door and one 8-pane window to left, ventilation louvres below - similar detail to the contemporary farm buildings on this farm, including the detached small range at right angles SW of the Long Barn.	Post-medieval	SH5378069592
4194	II	Dairy Cottage with garden walls to rear.	Dated 1911 and initialled CAS for Charles Garden Assheton-Smith, who was created a baronet in 1911. This was the former dairy to Vaynol Farm and was a late addition to the model farm created in the later C19. Modern conversion into a dwelling. Built of snecked rubble with freestone dressings, and a slate roof. Symmetrical Tudor-Gothic style. Single storey and attic, 3 bays emphasised by gables on the SW front, the centre one smaller and stepped, and embellished with the coat of arms and date. Similar end gables, all with copings with apex and corner finials. The outer gable windows are 2-light, arch headed, with labels over. Three light windows to the ground floor and narrow windows flank the central 4-centred arched doorway. Along the front and returning across each end is a distinctive lean-to verandah on chamfered timber posts, the returns being arch-braced forming pointed arches. To the rear is a small wing, also gabled, with one terminal octagonal chimney stack. To the rear, steps descend to the upper walled garden, the stone garden wall on the right is the top wall of the Terraced Garden (q.v.), bowed inwards. On the far side (NE) a gateway with a wrought iron gate leads out to the trackway on the E side of the farm.	Modern	SH5381069586
4195	II	Walled garden opposite Dairy Cottage, with two sets of gates.	Walled garden probably late C19; main gateway probably erected in 1911 at the same time as Dairy Cottage, and initialled CAS for Charles Assheton-Smith, who was created baronet in 1911. The garden is surrounded by a coped rubble stone wall, which is swept down to meet the coped square ashlar gate piers. The iron gates have a heavily	Modern	SH5378769581

NPRN No	Grade	Name	Description	Period	NGR
			scrolled wrought iron overthrow in the C18 manner incorporating initials at the centre. The pair of gates are arch headed, with top, foot and locking rails also ornamented, and decorative iron panels each side. On the far SW side there is another, smaller, gateway with a single iron gate with the same detailing.		
4196	II	Butler's House within walled garden, opposite Dairy Cottage.	Built in the late C19 as a dwelling for the estate butler. Rubble stone with some ashlar dressings, and a slate roof. Two storeys, 'L'-plan, the front of 3 windows with distinctively hipped hoods to the upper windows which rise above the eaves. Central 4-panelled door with overlight, and 4-paned horned sash windows, including to a canted bay window to the left. The S boundary wall of the garden is attached to the right gable end. Cross range at rear, similarly detailed. A further service range steps down beyond, returning at a near right angle to meet the W wing of Vaynol Old Hall.	Post-medieval	SH5379569566
4197	II	Stables and Brood Mare's Yard	The stables probably date from the later C19 or early C20 when the family's equestrian interests were continually increasing. The Vaynol Papers have exceptionally detailed accounts of expenditure on the horses and the stables, including evidence of continual improvements. Of rubble construction with slate roofs. A long low building of 5 stables to a reflected, almost symmetrical, design around a central tack room. These stables are distinctive for the fact that each has its own individual yard on the E front, formed by brick walls with piers. (Some of these centre ones have been demolished). These extend 30m long to gates at the bottom where there is another trackway. Boarded stable doors and small-pane pivot windows, also to the rear. Access to the stables is from both sides.	Post-medieval	SH5389969517
4199	II	Main Entrance to Vaynol Park, including flanking approach walls,	The Agents Account Books for the 1860's and 1870's have numerous references to 'expenditure on Vaynol [or "Park"] wall'. The 1st edition OS map, surveyed in 1888, shows what appears to be this entrance, although the more Edwardian style suggests later enrichment. Of rock-faced snecked rubble with freestone dressings. The tripartite main entrance is in a free Indian style, with tapered pilasters and flat pyramidal finials, and bracketed cornice, repeated on piers on the flanking walls. Segmental arch to the main carriageway, and flanking semi-circular headed pedestrian arches, all with voussoirs. Iron gates with scrollwork below the lock rail. Further 'bays' to either side, each with a semi-circular headed and iron barred aperture. The boundary walls that adjoin at right angles, gently stepped downwards, are in a similar manner to the main entrance and form a pair of deep quadrants, each of 8 bays and more finely detailed than the main wall. Battered walls and plinth and channelled freestone pilasters, coping and finials; distinctive voussoired straight-sided oval apertures, similarly iron-barred, to each bay. On the SW side, close to the main entrance, one bay is opened between piers leading to the drive to Wern-y-Gogas.	Post-medieval	SH5412368765
4200	II	Grand Lodge at Main Entrance to Vaynol Park	Probably contemporary with the later C19 improvements to the estate. However the quantity of materials listed in the Building Accounts for 1905 suggests that it was substantially altered then. It appears on the first edition of the OS map, surveyed in 1888. Built of rock-faced rubble with a slate roof. Tudor style. Single storey, 'L'-plan, with the entrance in the re-entrant angle brought flush with the projecting gabled wing facing the driveway with a stone roofed canted stone mullioned and transomed bay window, ornamented with a pilaster pinnacle over, and crude Tudor panelling in the apron below. The bay is flanked by giant arrow-slit like windows with extended hoodmoulds, one opened to a lozenge at its centre. The entrance has an open Tudor arch and asymmetrically stepped 'Dutch' parapet between diminuative crenellated towers. The gable has a string course implying a parapet. A pointed bay on the SE side gable and a 2-storey tower to the rear with stone chimney stacks.	Post-medieval	SH5411068767
4201	II	Capel-y-graig Lodge and adjoining gatepiers	Built 1863-64 at the start of the construction of the Estate Boundary Wall (q.v.), being part of the almost continual improvements carried out on the Vaynol Estate. Built of rubble with a slate roof, the gate piers of freestone. Single storey, 'L'-plan. The design is distinctive for the lean-to verandah on the S side, returning around the E corner in front of the main entrance, a detail favoured in this particular building campaign (q.v. Wern Gogas). Here the columns are of turned limestone. Boarded door and a canted bay window with transomed glazing on the eastern forward gable. Small pane sash windows on the S side, and modern windows to the rear. A central rendered chimney stack, perhaps replacing one with octagonal shafts. The gatepiers stand immediately SE; square and tall, with necking band and weathered copings.	Post-medieval	SH5459669508
4202	II	Wern Gogas	Built 1863-4 and contemporary with Capel-y-graig Lodge, as part of the almost continual improvements carried out on the estate by the Assheton-Smith family in the C19. Built of coursed rubble stonework, with a slate roof. Single storey estate cottage in the picturesque style. 'T'-plan, with the main entrance, a part-glazed door facing the garden, under a timber posted verandah that returns along the SW gable end. A similar lean-to occurs at the NE side. Four-paned timber sash windows, with, in the gabled cross wing, a canted bay flanked by implied slit ventilators overlooking the garden. A cluster of 4 octagonal brick chimney flues are set on a panelled square base at the junction	Post-medieval	SH5396368660

NPRN No	Grade	Name	Description	Period	NGR
			of the wing, and a further, but rendered, stack at the SW gable. One 12-pane sash window to the W side. Half-glazed Gothic door on the E side. The N side is partly slate hung.		
14927	II	Church of St Deiniol	Entirely rebuilt in 1843 by J G Weightman and E M Hadfield of Sheffield close to the site of the old church, which stood immediately to the north-east. Weightman and Hadfield were prolific church builders of the mid-C19, most of their major ecclesiastical commissions being for Roman Catholic clients. Decorated style. Simple cruciform plan comprising nave, short chancel, transepts, north porch and vestry. Roughly coursed rubblestone with buttered pointing and granite ashlar dressings; large slate roofs have coped verges with trefoil-gabled kneelers and stone crosses to gables. Nave, buttressed in 3 bays, has pointed 2-light trefoil-headed windows with small mouchettes and hoodmoulds to eastern bays; gabled porch in west bay on south has iron cross to gable and pointed hollow-chamfered inner and outer doorways, former with nail-studded strap-hinged door, latter with iron gates; small narrow trefoil-headed windows without glazing to sides and 2 old stoups stand outside. West wall of nave has tall, slightly projecting gabled bellcote with single bell in arched opening to top and Latin inscription with date 1843 above single broad lancet to ground stage. Chancel has east window in 4 shallow trefoil-headed lights with further trefoils above forming Y-tracery and additional mouchettes and quatrefoils to top; vestry with small single-light Caernarfon arch on east. Transept gables have 3-light trefoil-headed windows with mouchettes and quatrefoil to tops.	Post-medieval	SH5457065920
17380	II	Dock System at Y Felinheli	Complete dock system with entrance lock, long dock crossed by bascule bridge and graving-dock at upper end, converted from a tidal inlet of Afon Heulyn, previously partially used as a quay. It was designed and supervised by Frank Oswell BA (Associate Member, Institution of Civil Engineers), at a cost of £18,527. Lock-gates and cast-iron bollards by Cleghorn & Wilkinson, Northwich; the bridge was constructed by Pearson & Knowles, based in Warrington. Work began in April 1897 and was completed in December 1900. Port Dinorwic was successively developed and enlarged from the 1790s by the Assheton-Smith family of Vaynol, owners of the Dinorwic slate quarry, Llanberis. Their quarries produced by late 1890s almost one quarter of the entire output of Welsh slate. The outer end of the system probably incorporates stonework from the quays of the 1820s. Dock system approx. 500m long, following line of former natural inlet. At outer (W) end of system is entrance lock in dressed grey stone; 2 lock gates in wood with walkways over having railings consisting of iron posts and chains. Inner dock walls in red brick with massive stone capstones and dressings (some capstones replaced in concrete); ladders set into dock sides. Dock broadens inside lock before narrowing at single-leaf bascule bridge. Steel bridge pivots at S end (modified with an electric drive motor in 1912); sloping parapets become (at S end) semi-circular with teeth which engage with raising mechanism. E of bridge, the dock curves and varies in width, following line of the natural inlet. At inner end of system is dry dock, or graving-dock, sealed by steel caisson. Dry-dock has stepped sidewalls and polygonal E end.	Post-medieval	SH5278667930
17381	II	Former Dock Offices at Y Felinheli	Built circa 1902 as offices for newly redeveloped Port Dinorwic; later extended and converted to restaurant/public house. Slate-hung walls in fish-scale slates of three alternating colour bands: grey, purple, and green. Steeply pitched hipped roofs with contrasting bands of coloured slate and two rendered chimneys, one on front roof hip, one on rear ridge. L-plan, single-storey with later polygonal-ended conservatory filling angle. Hipped end to harbour has two 4-light metal casement windows of c1930-50, and to leave a similar 5-light window and doorway in flat-roofed extension, slate-hung to match. Infilling the angle is later canted-ended conservatory with canted hipped roof and hipped raised clerestorey, the glazing all altered. Within is earlier 5-light bay window. Modern additions to right of conservatory. Slate-hanging to exterior may be of similar date to extensions and windows, mid C20.	Modern	SH5273867833
18333	II	Ffinfa	Vaynol estate house of c1870, a pair with Cae Gwyn to West. E end addition of c1890-1900. Pink squared rubble stone with slate roofs and brick end stacks. L-plan, two-storey, with picturesque estate cottage detail, similar to, but subtly varied from that on Cae Gwyn next door. Front has large gable to right with arch-bracing and kingpost to bargeboards. Pair of first floor plate-glass long sashes, with stone voussoirs. Ground floor big hipped-roofed canted bay with pilasters between narrow side lights and broad 4-pane front light. Fretted brackets to cornice. To left ground floor has casement pair to left of panelled door with over light, window and door close-spaced. Above, breaking eaves is timber overhanging oriel on two shaped brackets, with triple casement and hipped roof. W side wall is slate hung with chimney gable to left and short rear wing to right. E side has big bay-fronted 2-storey projecting addition with canted hipped slate roof. Bay is canted with pilasters between sash windows, cornices over each floor, upper cornice under eaves.	Post-medieval	SH5274467792
18334	II	Cae Gwyn	Vaynol estate house of c1870, built as a pair with Ffinfa, to E, but varied in detail. Pink square rubble stone with slate roofs and brick stacks. L-plan, two-storey, picturesque estate house. A cross wing projects to right with ornate	Post-medieval	SH5272967779

NPRN No	Grade	Name	Description	Period	NGR
			bargeboards in three curves, two close-set first floor plate glass long sashes with stone voussoirs and ground floor large, canted bay. This has hipped canted roof, 2-pane side lights and wide 4-pane front light, pilasters between. Fretted brackets to eaves. Crosswing has brick ridge stack. Set-back to left is entrance wing with half-hipped left end and rear-wall stack. Two-window range, upper floor with two 4-pane sashes breaking eaves, right one under hipped roof, left one slightly taller under half-hipped roof. Ground floor has panelled door with stained-glass in over light to right and half-round bay to left. Bay has similar but smaller sashes to cross wing bay, similar pilasters and eaves brackets, but flat roof with crenelated parapet. Right side of cross wing has slate-hung walls, large half-hipped gable and smaller hipped half-dormer. 4-pane sashes.		
18335	II	War Memorial	1925-6 First World War Memorial by Segar Owen of Warrington and London (architect to Lord Lever at Port Sunlight, Cheshire). Built by J. M. Jones of Amlwch. Unveiled in 1926, after considerable discussion about the form a memorial should take. A Memorial Hall was opened the same year. The site for the memorial was donated by the Trustees of the Vaynol Estate and the directors of the London Midland and Scottish Railway Company. A plaque was added subsequently to commemorate the dead of the 1939-45 war. Clock tower in Anglesey granite, rock-faced to main part, but ashlar to top clock-stage and cap. Square plan with chamfered angles. Plinth, shaft and clock-stage. Plinth and shaft are rock-faced, cut-back at leading angles. Main front inset bronze plaque, recessed with rebated upper angles. Inscription to the dead of the 1914-18 war with the dedication in both Welsh and English. Above is recessed gilded cross. Below is added bronze plaque to 19 men killed in the 1939-45 war. The N and S sides have smaller inset bronze rectangular plaques with names of 46 men killed in the First World War. Rear has painted ledged door presumably for access to clock mechanism. Ashlar clock stage is set back with coved plinth, four round clock-faces and laurel pendants on each chamfered angle. Moulded pediments above and ogee square dome with fish scale carved bands, topped with bronze cross. Under the S face at ground level is a slate plaque to a soldier of the Welch Guards killed in Scotland on 24 February 1981.	Modern	SH5264667732
18339	II	Y Fron	Mid C19 detached house of late Georgian type. The presence of a rear wing rather than sloping rear roof suggests a date around 1840-50. Not marked on 1840 Bangor Tithe Map. Whitewashed stucco with slate roof and rendered corniced end stacks. Two-storey, three-window range of 16-pane hornless sashes with slate sills. Centre half-glazed door with overlight in attractive trellissed porch with corniced flat top. NW rear wing. Slate-hung W end wall.	Post-medieval	SH5317468147
18340	II	Singrig	Former Vaynol estate cottages built c1864 to replace those of the same name which stood on the other side of Afon Heulyn. These were demolished when the Vaynol estate wall was erected and a new road constructed alongside.	Post-medieval	SH5355368251
18341	II	Former Railway Station	Built 1874 as Port Dinorwic Station, S of the original which was near Halfway House Inn. The new station was larger and accommodated the stationmaster in a flat above the station building, the first to use it being Isaac Jones. The station had a General Waiting Room, Ladies' Waiting Room, Stationmaster's Office, Booking Office, Toilets and Oil-lamp Room. The Bangor to Caernarvon railway line opened to traffic on 10 March 1852 and the station closed in 1969 when the line was closed to passenger trains. The line closed finally in 1972. Yellow brick with red brick decorative detail, slate roofs with terracotta ridges and tall corniced yellow-brick stacks. Unusually large and ornate near-symmetrical front, two-storey, with big half-hipped slightly projecting cross-wings framing a three-bay centre with two eaves gables and centre small, hipped gable. Two tall stacks on ridge frame centre bay. Cross-wings had tall side-wall stacks, surviving only on left end. Gables have punched patterns to bargeboards and terracotta finials. Windows are singles, pairs and triplets with moulded bricks to jambs, mullions and cambered heads. Eight-pane sashes throughout, the top and bottom panes smaller than those between. Flush slate sills. Raised plinths, red brick band at mid-height of ground floor windows and double bands at ground floor window-head height, first floor sill height and also head-height on cross-wings only. Cambered window heads are also framed in red brick and gables have red brick lozenge patterning with crosses in lozenge centres. Hipped small centre gable has yellow brick corbelled eaves. Centre has 2-1-2 window arrangement and ground floor broad double doors under cambered head. Left cross-wing has paired window above, triplet below. Right cross-wing has broad triplet above and three windows below, the outer ones narrower. Attached each end are single storey wings with half-hipped gables. Left wing has paired window right and full-height double doors left. End-wall blank door. Right wing is similar, but end-wall paired window. Rear has similar detail, two half-hipped gables projecting, framing gabled centre, but cross wing have ground floor canted bays.	Post-medieval	SH5268367679
18344	II	Vaynol Park Wall (the part in Y Felinheli Community)	Part of the extensive wall built around the Vaynol Estate between 1863 and c1870. Five entrances were incorporated into the wall which cost in excess of £25,000. Running first NE and then SE below Park Wood in straight lines, the	Post-medieval	SH5308268056

NPRN No	Grade	Name	Description	Period	NGR
			wall continues as a curve around Dock Wood and then turns NE again to Bryntitrion Lodge gates. Rubble stone wall of considerable height with coping of rough slate slabs laid on edge. The wall terminates at tall gate piers at the two lodge entrances each end, both of grey ashlar with battered sides and stepped slate caps. Incorporated into the wall by the graving dock is a slate roofed boat store with double ledged doors, single door to left and boarded window.		
18345	II	Port Church and Port Church House	Port Church was built as a church and attached house by the Vaynol Estate c1863 as a replacement for the Seamans' Mission. It was built to a similar design and in a similar period as the church in Bethel. The church and grounds were transferred to Llanfair-is-gaer Parochial Church Council in 1950 and subsequently sold. The church was later converted to a separate dwelling. Pink squared rubble stone with slate roof. One and a half storeys, T-plan. Picturesque cottage style with rustic verandas, and Gothic leaded casement-windows. Windows are cambered-headed with stone voussoirs and stone sills, timber mullioned with transom, the top-lights only with Gothic tracery. Centre projecting gable with 4-light window each floor. Wings have 3-light window each floor, the upper window breaking eaves under stone dormer gable with fretted bargeboards. Ground floors have very attractive slate-roofed rustic verandas on painted tree-trunk posts, each 4-bay with the inner bay enclosed as porch and roof hipped at outer end. Enclosed porches have ledged Gothic doors. Right end wall has ashlar bellcote of former church, and 2-light window each floor similar to those elsewhere but with C20 tracery. Right end has first floor 3-light and ground floor blank window.	Post-medieval	SH5332668222
18346	II	Road Bridge over former Padarn Railway	Road bridge over deep cutting of the Padarn railway from the Dinorwic quarry to Port Dinorwic, the line built between June 1841 and December 1843. From 1843 until the introduction of steam locomotives in 1848, the slates from the quarry were drawn on wagons pulled by horses. From just W of Penscoins, the slate wagons were taken to the quayside via an inclined plane. The railway and the port system closed on 27 October 1961. Slightly humped rubble stone tall bridge with parapet, the latter is some 22m long and 1m high. The arch is approximately 5m high and 4m wide at track level. Slate arch ring and stone voussoirs both sides. Bridge has buttressed on NW side to full height.	Post-medieval	SH5354567737
18347	II	Cae Glas	One of a row of five Vaynol estate cottages, probably of c1863. Plain bargeboards to right pair of porches (Nos 1 & 2).	Post-medieval	SH5320468138
18348	II	Cae Glas	One of a row of five Vaynol estate cottages, probably of c1863. Plain bargeboards to right pair of porches (Nos 1 & 2).	Post-medieval	SH5320768141
18349	II	Cae Glas	One of a row of five Vaynol estate cottages, probably of c1863. Fretted bargeboards to left pair of porches (Nos 3 & 4).	Post-medieval	SH5321068144
18350	II	Cae Glas	One of a row of five Vaynol estate cottages, probably of c1863. Fretted bargeboards to left pair of porches (Nos 3 & 4).	Post-medieval	SH5321468147
18351	II	Cae Glas	One of a row of five Vaynol estate cottages, probably of c1863. No 5 at right angles to rear has porch with plain bargeboards and two similar dormer gables. Brick stack.	Post-medieval	SH5322068133
18352	II	No. 2 Bodarborth	Circa 1850-60 one half of a pair of Vaynol estate cottages, No 1 with addition of c1900.	Post-medieval	SH5278067797
18353	II	Singrig	Former Vaynol estate cottages built c1864 to replace those of the same name which stood on the other side of Afon Heulyn. These were demolished when the Vaynol estate wall was erected and a new road constructed alongside.	Post-medieval	SH5354768251
18354	II	Singrig	Former Vaynol estate cottages built c1864 to replace those of the same name which stood on the other side of Afon Heulyn. These were demolished when the Vaynol estate wall was erected and a new road constructed alongside.	Post-medieval	SH5353868250
18355	II	Engine Shed on former Padarn Railway	1895 engine shed of the Padarn railway from the Dinorwic quarry to Port Dinorwic, the line built between June 1841 and December 1843. From 1843, until the introduction of steam locomotives in 1848, the slates from the quarry were drawn on wagons pulled by horses. From a point just W of the engine shed, the slate wagons were taken to the quayside via an inclined plane. The railway and the port system closed on 27 October 1961. Rectangular engine shed approximately 40m long and 6m wide of slate slabs with slate roof. Three regularly spaced windows each side all with rail lintels. NW end has large pair of sliding board doors and slate plaque above with 1895 date. Water tank to right supported by tower of similar slate slabs. SE end has door to right.	Post-medieval	SH5344867806
18904	II	Eglwys Sant Cedol	Church in the Decorated style designed by Henry Kennedy (1814-1896), prolific architect for the Diocese of Bangor, and an early example of his work. Built in 1848 under the patronage of the Williams family of Plas Pentir, principally Jeremiah Green Jones Pym ap Ednyfed. The church replaced a single cell chapel which lay further to the N within	Post-medieval	SH5726667085

NPRN No	Grade	Name	Description	Period	NGR
			the present churchyard, demolished in 1847. Built of roughly squared igneous stone with margin dressed and scabbled gritstone dressings, the chancel joints galleted, and a large unit modern slate roof. Nave of 5 bays, divided by gabled buttresses. 2-light windows with trefoiled heads, and drip hoods with mask terminals. The short chancel has a lean-to vestry on the S with the heating chamber below. Triple lancet E window, and gable floriated cross. At the W end, a very tall gabled bellcote with 2 C17 or C18 bells and 2 lancets in the W wall. The windows are margin glazed. Gabled S porch with a chamfered outer arch, and a boarded door with heavy ironwork.		
18905	II	Milestone opposite Bryn goleu	Milestones were erected in the early C19 along the turnpiked road leading to Caernarfon. This milestone however was omitted from the 1st edition OS map Caernarvon XI.8 of 1889, and has been relocated here some metres from its original site c1914 when the road was straightened. A monolithic slate slab with chamfered top corners, deeply incised with the inscription CARNARVON 7 MILES / LLANDDEINIOLEN 2 1/4 / FELINHEN 1 1/4 / BETHESDA 4.	Post-medieval	SH5772067044
18906	II	Caerhun MC Chapel	Built 1895 to serve the Calvinistic Methodist community in this small hamlet. The large chapel is aligned to the Glasinfryn road, with the facade facing E away from the village. Rendered, with a slate roof. The E front is symmetrical, with central tripartite 20-pane sash window with rendered architrave, and triangular pediment on scrolled consoles, flanked by one narrow tall light each side. Round-headed doors to the outer sides, set forward within a classical type of corniced arch, the door panelled with an overlight. Above each door a glazed oculus and a similar but blind roundel in the tympanum of the gable. The side elevations are of 4 bays; similar 12-pane sash windows within a shouldered architrave frame. At the NW end a narrower and lower section, forming the lobby and schoolroom, with a window facing the main street having a segmental pediment on brackets enriched with acanthus leaves. Two metal roof ventilators.	Post-medieval	SH5736369066
18909	II	Bronwydd	Built 1905 for Mr H Vincent, solicitor, in a Domestic Revival style. It was later occupied by Sir William Vincent, c1917-1930 who played an important part in achieving independence for India. Built of battered rock-faced red stone, the upper floor rendered and whitewashed, and slate roofs with axial and lateral stacks. The single room wide house of 9-bedrooms has its main reception rooms at the SW end, and a narrower service wing in line at the NE. Lower gables form slight wings at each end of the main range, but asymmetrical between. Panelled entrance door with suspended canopy, with part-external stack to the dining room to the right. Paned timber windows, irregularly placed, those on the upper floor placed close below the eaves. Double transomed window to stair to left of entrance. Canted bay to the dining room on the rear (SE) side, the roof extended to form a sheltered porch over French doors. Small-paned casement windows, some with transoms. A two-storey square bay window with leaded glazing projects from the end elevation, lighting the drawing room.	Modern	SH5477670426
18910	II	Boundary Wall to Vaynol Park, including railings along the Menai Strait shore.	Wealth created by the Dinorwic Slate Quarries enabled Thomassmith Assheton and his descendants to carry out continual improvements to Vaynol Park including the gardens and landscape, and in this case also the estate boundary wall which was begun in 1863, the piers being finally capped in 1870. The total cost is recorded as being £25,098, a remarkable amount. The Agent's Account Books for 1860's and 1870's have numerous references to "expenditure on Vaynol [or Park] wall". The wall is of local snecked and rock-faced stone rubble with fine Dinorwic slate copings closely and jaggedly set to project both sides. It begins at the N end near the road junction of the A487 and A5, SE of the Britannia Bridge, and runs downhill (S) past the entrance to the Vaynol Farm drive and that of Capel-y-Graig Lodge as far as the roundabout junction of the A487 with the A4087. It then turns SW past the fine main drive entrance in front of the Grand Lodge, and continues in a highly distinctive crinkle-crankle fashion as far as the junction with the B4547 where the walls steps back behind Nant Cottage - the story is that the owner refused to sell so that the wall had to divert behind it. Beyond, the wall borders a narrow winding stretch of road as far as the entrance gate piers to the lane to Caerefail (Aberpwll), set at right angles and facing into Felinheli. It then turns inwards, crossing and following the course of the Nant-y-garth, past the tall gate piers at Bryntirion lodge. The wall meets the Menai Strait shore at the harbour at Port Dinorwic. From there a lower boundary wall follows N along the shoreline including a stretch near Vaynol Dock and Boathouse, which has iron railings on a stone plinth. At 25253 36838 this wall spans the mouth of a short canal that once served an earlier lime kiln, it passes then under the W drive. A railed clair-vue breaks the wall opposite Bath Cottage.	Post-medieval	SH5411968751
18911	II	Garden seat in SW garden of Vaynol Hall	The seat is in an C18 Kentian style, and possibly of that date, and was placed in the SW garden when it was laid out, either contemporary with the later remodelling of Vaynol Hall, or in 1913 when there are references in the Estate Papers to 'Garden Alterations'. Of limestone. Segmental in shape supported on 3 winged dragons, and with a balustraded back rest with console stops.	Post-medieval	SH5366069436

NPRN No	Grade	Name	Description	Period	NGR
18912	II	Kennels	The kennels are of the early C20, probably relating to the expenditure incurred by the estate in 1913. Pebble dashed brickwork, with a slate roof. The building has separate pens, with an enclosed feeding walkway on the N side, and a door in a re-entrant angle. On the S, three railed exercise enclosures with tall round-topped iron railings on a orthostatic slate wall approximately 1m high. On the W, 2 larger dog runs, perhaps added later, railed with standard railings set on a low brick wall with a slate coping.	Modern	SH5371869717
18915	II	Glasinfryn Viaduct (partly in Llandygai community)	Built c1880 to carry the former Bangor to Bethesda Branch of the London and North-Western Railway across the deep valley of the Afon Cegin. It is now a footpath. The viaduct is of rock-faced coursed stone, and is laid out on a very distinct curve extending for some 120m. It consists of eight arches with a broad central semi-elliptical skewed arch having 5-ring dry-toothed blue brick voussoirs. The central arch is flanked by narrower semi-circular straight arches, four on one side and three on the other. A margin-dressed rock faced string course forms the base of a similar parapet of 5 courses, coped with hog-backed stone.	Post-medieval	SH5871269089
18916	II	The 'Stepped' Bridge to Britannia Park.	The bridge was constructed at the instigation of Richard Davies, MP, shortly after the opening of the Chester to Holyhead Railway in 1850, to link his residence, Treborth Hall, with Britannia Park and the Suspension Bridge. The design suggests that Davies engaged the services of a railwayman, perhaps their architect, Francis Thompson. Built of rock-faced coursed stone, with freestone dressings. The bridge carries a driveway across the railway cutting, where the 2 sides are of very different height, necessitating a stepping down to the N of 5 segmental arches set on battered piers. The freestone voussoirs are chamfered, and the ashlar parapet is arcaded between terminal piers which are carried down as pilasters. The arcade, mounted on a moulded string, has rectangular openings and the coping is moulded and chamfered. The parapet is splayed on to abutments at each end.	Post-medieval	SH5874569046
18917	II	Classical bust on stele in niche of garden wall at Vaynol Old Hall.	One of a number of classical garden ornaments placed around the garden by the Assheton-Smith family during the many campaigns to improve the gardens in the C19 and early C20. This figure is probably an C18 copy of a Roman original. Of limestone, the stele painted. A classical bust of a young woman, her wavy hair tied with a ribbon, wearing a draped himation, set on a plinth, and mounted on an inverted-tapered stele, its front recessed as a moulded panel, and enriched top and bottom with husks. Moulded die and a 2-stage square base. Small concrete repair to chin. The niche, of which the lower part is properly chamfered, has been altered later in a rustic manner to form a 2-centred arched recess.	Post-medieval	SH5385669556
18918	II	Ysgol Treborth	The mansion house was built for Richard Davies, ship-owner and controversial MP (liberal + methodist) for Anglesey after 1852, who bought the Treborth isaf estate in 1867. The house was built c1860-70, as Davies is recorded as being in residence in 1878. It appears on the OS map of 1889. It became a school for remedial education in 1950 when certain adaptations were made, and a separate block built to the rear. The building is rendered with terracotta dressings, and some rendered quoining. Hipped slate roofs behind parapets. Two storeys with an attic storey, asymmetrical main NW front, comprising a tall cross wing on the left, and 3 blocks stepping back to the right, each arris quoined. The first of 2 window bays, contains the main entrance, followed by a 2-bay section with a raised and pedimented dormer, and a 3-bay end block. The main entrance has double doors oversteps in a single storey extension brought forward to the face of the left wing, and is arched and flanked by Corinthian pilasters, with flanking narrow architraved windows to the main hall. To the left, a two-storey canted bay, enriched with pilasters, the first-floor window pedimented, and above a moulded terracotta cornice string, a pierced balustrade providing a balcony to the attic room. The windows are all 4-pane sashes with moulded and keyed architraves. Round-headed semi-dormers with stepped keystones and ball finials to the 3-bay end block. Rendered and panelled chimneys. The front and rear elevations extend to the SW to embrace a walled service yard with walls swept down to the central entrance.	Post-medieval	SH5501470763
18919	II	Railway bridge at Coed Howel	The railway bridge was built c1884 for the new standard gauge Bangor and Bethesda branch of the London and North-Western Railway, to replace the former Penrhyn mineral railway on the opposite bank of the Afon Cegin. It is now disused and the track removed. The bridge carries a single-track line on high embankments, over the access to Coed Howel. It has closely jointed and coursed slate abutments, capped with margin-dressed rock-faced stone copings and dressings. The splayed sides fall steeply to coped end piers. The bridge itself consists of two wide compound girders, one under each line, with an arched iron plate spanning between them, the girders supported on corbels. The guard rail each side consists of rivetted angles forming an open lattice, and angle top member, spanning to coped and weathered end abutment piers.	Post-medieval	SH5862869305

NPRN No	Grade	Name	Description	Period	NGR
18921	II	Pont Ty-gwyn	Probably constructed in the C18 or early C19, to carry the Bangor to Tregarth road via the Cegin valley. Built of local stone rubble. A single arched span, founded on rock on each side, where the river runs through rapids below a stone sluice, perhaps for a former mill. The arch has slightly inset voussoirs with a regulating course above. The spandrels and bowed flush parapets are coped with a sharply keeled flush coping both sides.	Post-medieval	SH5871368723
18922	II	Fferm Glasynfryn	Built probably in the early C19 as a farmhouse. Built of stone boulders, with a slate roof. Two storeys and attic, 2 bays, double-pile plan with central hall and flanking reception rooms. Symmetrical front facing E, central 6-panelled door with 3-pane overlight, and 12-pane sash windows to the ground floor, 9-pane to the first floor, all set in slightly camber-headed openings. Rear elevation similar but windows altered. Both gables have round-headed windows lighting the attic rooms.	Post-medieval	SH5838969158
18923	II	Bryn-y-meddyg	Built by the Penrhyn Estate in c1880. Built of rubble stonework, and faced with slate hanging to the upper floor on front and sides. Slate roof. Two storeys, 3-bay building with a single bay rear wing on the left, and later porch in the angle. The main front, facing E across the valley, has a central door; panelled and part-glazed with an overlight, and to either side, canted bay windows with 4-pane sashes, all set back under a timber lean-to verandah which extends across the full facade. Lattice timber sides to the porch under the verandah and curved brackets rise from timber posts to support the hipped verandah roof. The upper floor has three 4-pane sashes, and similar windows in the end elevations. Framed lattice bargeboards in the distinctive Penrhyn Estate style at the N end, and gable brick stacks.	Post-medieval	SH5866269278
18924	II	Walls to inner and outer gardens on E side of Vaynol Old Hall	The inner, rectangular walled garden probably dates from the full development of the Old Hall at the end of the C17. The circular central pool is probably of the first half of the C18, when the garden was being embellished before the move to the new Vaynol Hall, and altered in the C19. The outer garden, probably first intended as a kitchen garden, is probably C18. The inner garden is rectangular and sunk below the ground level to that of the service basement of the Old Hall. The N approach has 5 steps down, with a hedge and revetment wall, the wall being approximately 4m high to the S and 2-5m to the E with a central voussoired archway. At the centre, opposite the service door, is an oval pool set flush with the surrounding garden, and with a fountain at the centre; a lobed bowl on cross supports. Further E, the outer garden has roughly coursed rubble walls, approximately 4m high and battered externally, the outer corners rounded, and with a cart entrance flanked by plain capped gate piers at the S end of the E side. Later boarded gates. A lean-to shelter extends across the garden on the S side.	Post-medieval	SH5384569533
18925	II	Gate piers in boundary wall by Wern Gogas	Vaynol Estate boundary wall was commenced 1863 and construction continued until c1870. There are indications that the gates were built slightly before the wall. Built of local freestone, and set in the coursed rubble estate boundary wall. Square in plan, slightly tapered up to a flat necking band, and weathered slate cappings. The wall is swept down each side; on the right to a similar but lower pier without the necking band.	Post-medieval	SH5338968301
18926	II	Gate piers on Bryntirion Drive	Vaynol Estate boundary wall was commenced 1863 and construction continued until c1870. There are indications that the gates were built slightly before the adjoining wall. Built of local freestone, and set in the estate boundary wall. Square in plan and slightly tapered upwards to a flat necking band, and weathered slate cappings. Bryntirion Lodge, attached to the right, has been altered.	Post-medieval	SH5322068292
18928	II	Capel y Gladdfa	Erected in the mid C19, and after the completion of the adjacent church in 1848, to provide both for funerary use and to serve as a separate chapel for non-conformist worship. Green igneous rubble stonework, with rock-faced pale gritstone dressings, and a graded slate roof. A single cell building, with a gabled S porch near the W end. Lancet windows, paired at the W and centre of each side, and paired with a trefoiled roundel at the head at the E end with a pair of slit vents to the roof space. Two single lancets. Bracketed eaves and chamfered plinth. Coped gables; that at the E crowned with a metal cross. Diamond leaded glazing with red-flashed margins. The access from the road is by a 'kissing gate' in a high half-round boulder wall and square gate piers.	Post-medieval	SH5724267137
18929	II	8 High Street,Glasinfryn,Bangor,,LL57 4UP	Probably built in the mid to later C19. Built of uncoursed rubble stone, with slate roof. Two storeys, No.8 is a single unit plan; a boarded door on the right, and a 4-pane sash to the ground floor, and 2 smaller 4-pane sashes to the upper floor. Timber lintels, and stack on the N gable end. Of continuous build with No. 9.	Post-medieval	SH5864268818
18930	II	The Old Post Office	Built in the mid to later C19 at the time of expansion in this small, nucleated village, and formerly used as the village post office. Built of uncoursed large stone rubble, continuous with No. 8 which it adjoins to the N. Slate roof. Two bays, symmetrical, central hallway plan with flanking reception rooms and gable stacks. Central framed and boarded door, below a gabled slated canopy. Six-paned horned sash windows to the ground floor, and similar but smaller windows to the upper floor, all openings with timber lintels. The gable stacks are of brick. Outbuilding to rear.	Post-medieval	SH5864568811

NPRN No	Grade	Name	Description	Period	NGR
18931	II	1 Elizabeth Terrace, Glasinfryn, Bangor,	Built probably in the first decades of the C19 at the time of expansion in this village, or possibly a remodelling of an earlier range of village cottages. Belongs to a group of 4. 1-4 Elizabeth Terrace, Glasinfryn. Rubble stonework, originally rendered, with a slate roof. The range is built on a curve following the High Street, and with a pebbled path between the front wall and the road. Each cottage is of 2 storeys, 2 bays, with central 6-panel part glazed door, and 2-light paned timber windows. The upper floor has raised dormers under small gables. Gable stone stacks with various pots. To the rear, a single storey service extension. At the S end of the terrace. Part-glazed C20 door, and windows renewed. The external rendering was removed recently. Now amalgamated with No. 2.	Post-medieval	SH5862668809
18932	II	2 Elizabeth Terrace, Glasinfryn, Bangor,	Built probably in the first decades of the C19 at the time of expansion in this village, or possibly a remodelling of an earlier range of village cottages. Belongs to a group of 4. 1-4 Elizabeth Terrace, Glasinfryn. Rubble stonework, originally rendered, with a slate roof. The range is built on a curve following the High Street, and with a pebbled path between the front wall and the road. Each cottage is of 2 storeys, 2 bays, with central 6-panel part glazed door, and 2-light paned timber windows. The upper floor has raised dormers under small gables. Gable stone stacks with various pots. To the rear, a single storey service extension. The only one of the group which was originally a single bay cottage with a room on each floor. Original rendering removed recently. It is now amalgamated with No. 1.	Post-medieval	SH5862268814
18933	II	3 Elizabeth Terrace,Glasinfryn,Bangor,	Built probably in the first decades of the C19 at the time of expansion in this village, or possibly a remodelling of an earlier range of village cottages. Belongs to a group of 4 1-4 Elizabeth Terrace, Glasinfryn. Rubble stonework, originally rendered, with a slate roof. The range is built on a curve following the High Street, and with a pebbled path between the front wall and the road. Each cottage is of 2 storeys, 2 bays, with central 6-panel part glazed door, and 2-light paned timber windows. The upper floor has raised dormers under small gables. Gable stone stacks with various pots. To the rear, a single storey service extension. This cottage still retains its rendered facade.	Post-medieval	SH5861968821
18934	II	4 Elizabeth Terrace,Glasinfryn,Bangor,	Built probably in the first decades of the C19 at the time of expansion in this village, or possibly a remodelling of an earlier range of village cottages. Belongs to a group of 4. 1-4 Elizabeth Terrace, Glasinfryn. Rubble stonework, originally rendered, with a slate roof. The range is built on a curve following the High Street, and with a pebbled path between the front wall and the road. Each cottage is of 2 storeys, 2 bays, with central 6-panel part glazed door, and 2-light paned timber windows. The upper floor has raised dormers under small gables. Gable stone stacks with various pots. To the rear, a single storey service extension. This cottage still retains its rendered facade.	Post-medieval	SH5861768826
18935	II	Bodlondeb	A slate in the gable of this row carries the date of 1836. That this is likely to be the original building date is confirmed by the presence of the row on the Bangor Tithe Map of 1840. On this map, the terrace appears to be shown as a row of back-to back cottages, though by the time of the first edition Ordnance Survey Map of 1889, only the top house was so shown. The terrace was one of several such rows in the village, suggesting an unusual concentration of workers' housing for a small rural settlement: the presence of at least one textile factory in 1840 may account for this. Belongs to a group of 7. Bodlondeb and 1-6 Howe Street, Glasinfryn. Terrace of 7 houses at right-angles to the road. The form of the row is distinctive, with the top house facing the road as a wide 2-unit gable-entry house, the others stepped down behind it, each single unit, double depth plan. This unusual arrangement may owe to the possible origins of the row as a back-to back terrace. Rubble construction, rendered to front and upper gable elevations, exposed to rear. Slate roofs and brick stacks. Top house has doorway to right of gable, and paired 6-pane sash windows on each floor. Slate dated slab towards gable apex, and stack parallel to ridge line. The houses behind each have doorway to left and a single window on each floor, mainly 4-pane sashes (with some 12-pane sashes surviving in rear elevation, and some replacement windows). Brick stacks at right angles to ridge line on the gable ends.	Post-medieval	SH5860168907
18936	II	1 Howe Street, Glasinfryn, Bangor,	A slate in the gable of this row carries the date of 1836. That this is likely to be the original building date is confirmed by the presence of the row on the Bangor Tithe Map of 1840. On this map, the terrace appears to be shown as a row of back-to back cottages, though by the time of the first edition Ordnance Survey Map of 1889, only the top house was so shown. The terrace was one of several such rows in the village, suggesting an unusual concentration of workers' housing for a small rural settlement: the presence of at least one textile factory in 1840 may account for this. Belong to a group of 7. Bodlondeb and 1-6 Howe Street, Glasinfryn. Terrace of 7 houses at right-angles to the road. The form of the row is distinctive, with the top house facing the road as a wide 2-unit gable-entry house, the others stepped down behind it, each single unit, double depth plan. This unusual arrangement may owe to the possible origins of the row as a back-to back terrace. Rubble construction, rendered to front and upper gable elevations, exposed to rear. Slate roofs and brick stacks. Top house has doorway to right of gable, and paired 6-pane sash windows on each floor. Slate dated slab towards gable apex, and stack parallel to ridge line. The houses behind each	Post-medieval	SH5860568907

NPRN No	Grade	Name	Description	Period	NGR
			have doorway to left and a single window on each floor, mainly 4-pane sashes (with some 12-pane sashes surviving in rear elevation, and some replacement windows). Brick stacks at right angles to ridge line on the gable ends.		
18937	II	2 Howe Street, Glasinfryn, Bangor,	A slate in the gable of this row carries the date of 1836. That this is likely to be the original building date is confirmed by the presence of the row on the Bangor Tithe Map of 1840. On this map, the terrace appears to be shown as a row of back-to back cottages, though by the time of the first edition Ordnance Survey Map of 1889, only the top house was so shown. The terrace was one of several such rows in the village, suggesting an unusual concentration of workers' housing for a small rural settlement: the presence of at least one textile factory in 1840 may account for this. Belong to a group of 7. Bodlondeb and 1-6 Howe Street, Glasinfryn. Terrace of 7 houses at right-angles to the road. The form of the row is distinctive, with the top house facing the road as a wide 2-unit gable-entry house, the others stepped down behind it, each single unit, double depth plan. This unusual arrangement may owe to the possible origins of the row as a back-to back terrace. Rubble construction, rendered to front and upper gable elevations, exposed to rear. Slate roofs and brick stacks. Top house has doorway to right of gable, and paired 6-pane sash windows on each floor. Slate dated slab towards gable apex, and stack parallel to ridge line. The houses behind each have doorway to left and a single window on each floor, mainly 4-pane sashes (with some 12-pane sashes surviving in rear elevation, and some replacement windows). Brick stacks at right angles to ridge line on the gable ends.	Post-medieval	SH5860968908
18938	II	3 Howe Street, Glasinfryn, Bangor,	A slate in the gable of this row carries the date of 1836. That this is likely to be the original building date is confirmed by the presence of the row on the Bangor Tithe Map of 1840. On this map, the terrace appears to be shown as a row of back-to back cottages, though by the time of the first edition Ordnance Survey Map of 1889, only the top house was so shown. The terrace was one of several such rows in the village, suggesting an unusual concentration of workers' housing for a small rural settlement: the presence of at least one textile factory in 1840 may account for this. Belong to a group of 7. Bodlondeb and 1-6 Howe Street, Glasinfryn. Terrace of 7 houses at right-angles to the road. The form of the row is distinctive, with the top house facing the road as a wide 2-unit gable-entry house, the others stepped down behind it, each single unit, double depth plan. This unusual arrangement may owe to the possible origins of the row as a back-to back terrace. Rubble construction, rendered to front and upper gable elevations, exposed to rear. Slate roofs and brick stacks. Top house has doorway to right of gable, and paired 6-pane sash windows on each floor. Slate dated slab towards gable apex, and stack parallel to ridge line. The houses behind each have doorway to left and a single window on each floor, mainly 4-pane sashes (with some 12-pane sashes surviving in rear elevation, and some replacement windows). Brick stacks at right angles to ridge line on the gable ends.	Post-medieval	SH5861368908
18939	II	4 Howe Street, Glasinfryn, Bangor,	A slate in the gable of this row carries the date of 1836. That this is likely to be the original building date is confirmed by the presence of the row on the Bangor Tithe Map of 1840. On this map, the terrace appears to be shown as a row of back-to back cottages, though by the time of the first edition Ordnance Survey Map of 1889, only the top house was so shown. The terrace was one of several such rows in the village, suggesting an unusual concentration of workers' housing for a small rural settlement: the presence of at least one textile factory in 1840 may account for this. Belong to a group of 7. Bodlondeb and 1-6 Howe Street, Glasinfryn. Terrace of 7 houses at right-angles to the road. The form of the row is distinctive, with the top house facing the road as a wide 2-unit gable-entry house, the others stepped down behind it, each single unit, double depth plan. This unusual arrangement may owe to the possible origins of the row as a back-to back terrace. Rubble construction, rendered to front and upper gable elevations, exposed to rear. Slate roofs and brick stacks. Top house has doorway to right of gable, and paired 6-pane sash windows on each floor. Slate dated slab towards gable apex, and stack parallel to ridge line. The houses behind each have doorway to left and a single window on each floor, mainly 4-pane sashes (with some 12-pane sashes surviving in rear elevation, and some replacement windows). Brick stacks at right angles to ridge line on the gable ends.	Post-medieval	SH5861768908
18940	II	5 Howe Street, Glasinfryn, Bangor,	A slate in the gable of this row carries the date of 1836. That this is likely to be the original building date is confirmed by the presence of the row on the Bangor Tithe Map of 1840. On this map, the terrace appears to be shown as a row of back-to back cottages, though by the time of the first edition Ordnance Survey Map of 1889, only the top house was so shown. The terrace was one of several such rows in the village, suggesting an unusual concentration of workers' housing for a small rural settlement: the presence of at least one textile factory in 1840 may account for this. Belong to a group of 7. Bodlondeb and 1-6 Howe Street, Glasinfryn. Terrace of 7 houses at right-angles to the road. The form of the row is distinctive, with the top house facing the road as a wide 2-unit gable-entry house, the others stepped down behind it, each single unit, double depth plan. This unusual arrangement may owe to the possible origins of the row as a back-to back terrace. Rubble construction, rendered to front and upper gable elevations, exposed to rear. Slate roofs and brick stacks. Top house has doorway to right of gable, and paired 6-pane sash	Post-medieval	SH5862068908

NPRN No	Grade	Name	Description	Period	NGR
			windows on each floor. Slate dated slab towards gable apex, and stack parallel to ridge line. The houses behind each have doorway to left and a single window on each floor, mainly 4-pane sashes (with some 12-pane sashes surviving in rear elevation, and some replacement windows). Brick stacks at right angles to ridge line on the gable ends.		
18941	II	6 Howe Street, Glasinfryn, Bangor, LL57 4UN	Bodlondeb and 1-6 Howe Street, Glasinfryn. A slate in the gable of this row carries the date of 1836. That this is likely to be the original building date is confirmed by the presence of the row on the Bangor Tithe Map of 1840. On this map, the terrace appears to be shown as a row of back-to back cottages, though by the time of the first edition Ordnance Survey Map of 1889, only the top house was so shown. The terrace was one of several such rows in the village, suggesting an unusual concentration of workers' housing for a small rural settlement: the presence of at least one textile factory in 1840 may account for this. Terrace of 7 houses at right-angles to the road. The form of the row is distinctive, with the top house facing the road as a wide 2-unit gable-entry house, the others stepped down behind it, each single unit, double depth plan. This unusual arrangement may owe to the possible origins of the row as a back-to back terrace. Rubble construction, rendered to front and upper gable elevations, exposed to rear. Slate roofs and brick stacks. Top house has doorway to right of gable, and paired 6-pane sash windows on each floor. Slate dated slab towards gable apex, and stack parallel to ridge line. The houses behind each have doorway to left and a single window on each floor, mainly 4-pane sashes (with some 12-pane sashes surviving in rear elevation, and some replacement windows). Brick stacks at right angles to ridge line on the gable ends.	Post-medieval	SH5862468908
22631	II	Milestone	Early to mid-C19 milestone relating to the turnpike road first established in the 1820s. Slatestone with simple chamfered top edge set in field boundary. Inscribed "MILES" to top right corner with below "Carnarvon 4/ Llandeiniolen 3/4/ Felinhen 4 1/4/ Bethesda 7".	Post-medieval	SH5337365534
22640	II	Cefn Braich	Not shown on the 1838 Tithe Map, Cefn Braich was probably built c1850. In 1889 it was a public house, The Coach and Horses. 2-storey, 3-bay front. Rendered rubblestone, roughcast to front with cement-rendered window surrounds; grouted graded slate roof. Front has 4-paned sashes with slate cills on each floor flanking central C20 boarded door with glazed top; integral end stacks with slate drips. Full-length asbestos-sheet roofed lean-to on rear.	Post-medieval	SH5800265714
22647	II	Tros-y-gonfa	Shown on the 1838 Tithe Map, the cottage originated in the early C19 as a smallholder's cottage with its own small field system; as such, it is one of the very few buildings in Rhiwlas pre-dating its development as a small slate quarry village from c1850 onwards, even if the cottage's original occupants also supplemented their income by working in the Dinorwic Quarry. Single-storey 2-room plan, aligned roughly north-east to south-west. Painted irregularly coursed rubblestone with window and doors picked out in dark colour; grouted graded slate roof with raised verges. Front has 16-paned sash window to left and 12-paned sash on right (4- over 8-panes) of slightly offset boarded door; integral end stacks. Window in right gable end indicates presence of loft over right room.	Post-medieval	SH5794065722
23383	II	Pant-y-Cyff	Remodelled in 1842 as one of the first in a major programme of improvements being carried out by the Penrhyn Estate to its farms after the succession of Edward Douglas-Pennant to the estate in 1840. 2-storey rectangular-plan, aligned roughly north-west to south-east with lower 2-storey range on same axis set back to left (south-east). Regularly coursed and dressed rubblestone blocks to main house with more roughly coursed rubblestone to set-back range; slate roofs. 3-bay symmetrical front to main house; three 16-paned top-hung windows (probably converted from original sashes) to first floor and 6-paned sashes to ground floor on either side of central hip-roofed porch with segmental outer arch and inner 4-panel door with upper panels glazed; integral end stacks with drips and stepped capping. Recessed range has lean-to porch on right in angle with main house with to its left a 20-paned sash window and 16-paned horizontal sliding sash to eaves directly above; 2 further eaves windows to left above wide opening on ground floor and ridge stack to right of centre, like those on main house but with added brick shaft.	Post-medieval	SH5857867550
23458	II	Glasinfryn Viaduct (partly in Pentir community)	Built c1880 to carry the former Bangor to Bethesda Branch of the London and North-Western Railway across the deep valley of the Afon Cegin. It is now a footpath.	Post-medieval	SH5879468999
83169	II	Ty'n Llwyn Farm - Bothy and Bakehouse Range to NE of Yard	The farm comprises a large rectangular enclosed yard, with the house backing on to its NE corner to face E. This range lies to the E of the main entrance to the yard, and adjoins the house to the E. East of the main entrance to the yard, is a range including the Bothy and Bakehouse. Single storeyed, quarry dressed rubble in large blocks with smaller infill, and characteristic coarse mortared joints. Roof of large slates with single ridge stack towards right hand end. Sawn slate lintels to openings. The bakehouse is at the right-hand end of the range, and was once accessed from the house, which it directly adjoins. Its two doors are modern, beneath dormer gables: ridge stack defines limit of the bakehouse, left of which is the former bothy, with doorway to the right, and window (modern glazing in earlier	Post-medieval	SH5652767409

NPRN No	Grade	Name	Description	Period	NGR
			opening) to the left. Left of this, a narrower unit also has doorway to right, with window alongside. Beyond again, double plank doors, then a further unit with doorway to right and window to left, at the left-hand end of the range. These windows retain the original detail, comprising a single upper pane over a slatted glazed lower section. Dark red paint may be an estate feature.		
83170	II	Ty'n Llwyn Farm - Cartshed and Granary	The Cartshed and Granary is now a free-standing building at the north end of the east range, but originally adjoined a shed to the S, the rear wall of which survives intact (its remains are included with the Cattle Sheds at the SE corner of the yard). 2 storeyed, roughly quarry dressed rubble in large blocks with smaller infill, and characteristic coarse mortared joints. Large slates to roof, which has gable coping and bellcote (retaining bell) on left-hand gable. 4 bays, the cart entries each with rough slate lintels. Upper storey has small-pane and louvred windows in 1st, 3rd and 4th bays, and boarded doorway in 2nd bay: the dark red paint may be an estate colour. Modern circular window inserted in east wall.	Post-medieval	SH5653467388
83279	II	Ty'n Llwyn Farm - Cattle Sheds at SE of Yard	L-shaped range of cattle-sheds defining the SE corner of the yard. Single storeyed, rough quarry dressed rubble combined with field stone, with characteristic coarse mortared joints and large slates to roofs. The cattle sheds comprise 6 bays on the E side of the yard, originally divided into two groups of 4 and 2, separated by a surviving yard wall, with a further 3 bays to the S. Each has a thin slate lintel over wide open entry (though some have subsequently been blocked). Two doorways in rear wall (one blocked). The sheds gave onto enclosed yards originally: the rough boulder walls of these survive to the left of the range, and after the first 4 bays. Attached at the left (N) end of this range, are the remains of another lower building: the roof, with rear and side walls. Chimney on its right-hand gable, serving wide fireplace within. (perhaps this was pig sty and cegin foch?) Trusses survive, though lacking front support: they are of collar strut type, with wrought-iron braces and post. Attached to the right of the S range is a short length of wall, with wide entry to field beyond quarried and field stone construction.	Post-medieval	SH5651767350
83280	II	Ty'n Llwyn Farm - Cattle Sheds at S of Yard	Range of cattle sheds enclosing the yard to the south, west of the entrance to the fields. A single storeyed range of 6 regular open-fronted sheds, continued by a further 2 bays to join the barn at the SW corner of the yard. Quarried rubble with some field-stone, and characteristic coarse mortared joints; large slates to roof with gable coping. Each of the 6 regular bays has wide opening with slate lintel. To the right, the end bay has wide doorway with small window alongside (the dark red paint may be an estate colour). The sheds originally gave onto enclosed yards, the end and dividing walls of which partially survive.	Post-medieval	SH5648267357
83281	II	Ty'n Llwyn - Barn and Cowhouse at W of Yard	Barn and cow-house range. The higher barn is at the SW corner of the yard, and the cowsheds adjoin it to the N, in two distinct ranges. Rough quarry dressed rubble with coarse mortared joints and large slates to roofs. Slate lintels to all openings. Dark red paint may be an estate colour. Barn has doorway to right with split boarded door, and blocked vents. Wider doorway aligned at rear, where there are also blocked vents. Adjoining the barn is a single bay shed, with boarded door to right, and window with glazed upper panel over boarded lower section. Beyond again is a longer shed, with window with glazed upper panel over slatted lower section to right, wide doorway with sliding doorway to centre, with partially blocked window alongside it. Adjoining to the right is a lower range, slightly stepped back: this comprises a series of split boarded doors and small windows with glazed upper panels and slatted lower sections. Rear has series of vents and doorways (2 from N shed, 1 from central shed).	Post-medieval	SH5647867396
83282	II	Ty'n Llwyn Farm - Barn outside yard to SW	Tall 3-bay open-fronted hay-barn, facing north. Rough quarried rubble with coarse mortared joints. Large slate roof, continuing over passage to rear of SW barn. The open front is articulated by full-height stone piers, and the right-hand gable wall and rear have two tiers of vents.	Post-medieval	SH5645867367
83283	II	Ty'n Llwyn Farm - Hay Barn outside Yard to NW	Large hay-barn, rough quarried rubble with coarse mortared joints, and large slate roof. 3 bays facing south, originally articulated by full-height stone piers, but the outer bays at some time filled in , and now with tiers of vents. Similar vents in W gable end and to rear.	Post-medieval	SH5648367428
83284	II	Ty'n Llwyn Farm - NW range of Yard	Single storeyed. Rough quarried rubble, with coarse mortared joints and large slates to roof. Brick dressings to openings. Alternating arrangement of windows and doors, with one original boarded door, the other a modern replacement; the windows with glazed upper panels and slatted lower sections. Dark red paint may be an estate feature.	Post-medieval	SH5649967422
83285	II	Ty'n Llwyn Farm - Detached barn outside Yard to E	Small barn. Rubble construction, mainly of field boulders, with large slates to roof. Doorways in each gable end, and to right of N wall; single window in S wall.	Post-medieval	SH5652867342

NPRN No	Grade	Name	Description	Period	NGR
87611	II	Hafod Elfyn (former Natural Environment Research Council Offices)	Office in vernacular revival style. Single storey 'L'-shaped plan with additional accommodation in the roof, main range parallel to and offset back from Penrhos Road. Roughcast walls, tall slate roof laid in diminishing courses with small hips, ridge finial and axial chimney to main range. Dormer windows to the rear roof slope. Metal casement windows to the ground floor and small pane sash windows to the attic floor in each gable. Main entrance is in the long elevation facing the road and is offset to the right, plain timber plank doors set within a deep pink sandstone moulded surround.	Modern	SH5636870769

Registered Parks and Gardens

Record No.	Grade	Name	Description	Period	NGR
PGW(Gd)52(GWY)	RPG	Vaynol	Vaynol is located on the Menai Strait to the south-west of Bangor. It is registered for its well-preserved walled and terraced Elizabethan garden which survives at the centre of a superb, walled, coastal landscape park, with recently restored lake, in an outstanding setting with the Strait on one side and Snowdonia on the other. There are also later formal gardens and kitchen gardens, a large model farm, various park buildings including a mausoleum, viewing tower and boat house, and good surviving plantings along the main drive. There is important group value with Grade I Listed, eighteenth-century, Vaynol Hall (LB4173) and its sixteenth-century predecessor Vaynol Old Hall (LB 4166), together with numerous Grades II and II* Listed ancillary, estate, farm and religious buildings around both, as well as a range of Grades I, II and II* Listed structures linked to the park and gardens. The designed landscape also has historic significance as the former private estate of the wealthy and locally prominent Assherton (later Duff) family who owned the Dinorwic quarries. The present park was laid out in the 1820s when it came into the hands of Thomas Assherton who established the park, initially as a fox-hunting estate, and was continually improved throughout the century. But it occupies a site with a longer history of construction and landscape design and was originally a possession of the Bishops of Bangor. The park is roughly oval on plan and is surrounded by a high stone wall dating from the 1860s (Grade II Listed, LBs 18344 & 18910). It is bounded on the west by the Menai Strait, on the south by the mouth of the Afon Heulyn, on the east by the A487 and B4547, and on the north by woodland and recent developments carved out of it in the north-east corner. There were once deer in the park and a menagerie of exotic animals in various enclosures.	Post-medieval	SH5344069273

Conservation Areas

Inspire ID	Grade	Name	NGR
WAL/GWYN/5	CA	Aberpwll - Y Felinheli	SH 52507 67777
WAL/GWYN/4	CA	Glasinfryn	SH 58610 69069
WAL/GWYN/30	CA	Y Faenol	SH 53733 69452

Non-Designated Assets

PRNUID	Name	Description	Period	NGR
32824	Flanged Axehead, Findspot, Pentir	The findspot of a Bronze Age flanged axehead.	Bronze Age	SH 5648 6803
17566	Part of Roman Road, Segontium - Canovium	Just above Ty Coch was found a milestone in 1806 , Fenton in 1810 records signs of a road close to the house but the milestone was destroyed. There are no obstacles to a direct line between Llanddeiniolen and Ty Coch (line projected only).	Roman	SH 5625 6789
17834	Part of Roman Road, Segontium - Canovium	The road to the west of the B4547 is clearly visible as a parch mark on RCAHMW AP 2006/28071. On the ground, part C-D is visible as a spread and somewhat fragmentary agger running though a boggy area in improved pasture. It is in places defined by an area free of Juncus spp rushes indicating better drainage. The agger runs across a natural hollow and is approximately 8m wide at its base at this point. Part B-C and D-E are visible on the RCAHM aerial photographs as parch marks but not as earthworks on the ground. The line is less clear at the western end (A-B), the parch mark alignment indicates that it runs to the northwest of a small hill to the north of Ty-mawr and there are faint indications of a feature that could be the road running along this line on the Get Mapping APs. The basic field pattern remains the same as that shown on the 1832 Vaynol Estate map although some boundaries have since been removed.	Roman	SH 5628 6752
90579	Quarry Pits, Remains of, Pentir	Pit 201105 was one of several visible earthworks in the field, which appeared to be the remains of quarry pits. Significant quantities of stone were visible in the field, both loose in topsoil and as solid outcrops, suggesting that road stone could be quarried locally, and pit 201105 was likely to be one such quarry pit (Cruse 2018).	Roman	SH 55892 67321
90578	Roman Road, Part of, Possible, Pentir	An earthwork believed to represent the Roman road from Caernavon (Segontium) to Aber, and from there to Chester, was targeted at this site. The recorded feature, 201102, would appear to be a road, though without dating evidence it is uncertain whether the extant earthwork is the original Roman road or a later reiteration.	Roman	SH 55903 67308
17829	Roman Road, Proposed, Segontium to Bangor	Waddelove proposes a slightly more N route along the north Wales coast than RR67c and suggests that the road leads to a fort at Penrhyn. The siting of a fort here has some topographical merit but no evidence has so far been uncovered. The route itself follows modern features and is based on topological arguments. If the recent cropmark evidence along RR67c proves to be significant this route can probably be largely discounted.	Roman	SH 5390 6689
65179	Ty'n Llwyn - Barn and Cowhouse at W of Yard	A post medieval Barn and cowhouse range.	Post-medieval	SH 56478 67396
65155	Ty'n Llwyn Farm - Barn outside yard to SW	A post medieval barn.	Post-medieval	SH 56458 67367
65181	Ty'n Llwyn Farm - Bothy and Bakehouse Range to NE of Yard	A post medieval bothy and bakehouse range at Ty'n Llwyn Farm.	Post-medieval	SH 56527 67409
65180	Ty'n Llwyn Farm - Cartshed and Granary	A post medieval Cartshed and Granary.	Post-medieval	SH 56534 67388
65152	Ty'n Llwyn Farm - Cattle Sheds at S of Yard	A range of cattle sheds.	Post-medieval	SH 56482 67357
65149	Ty'n Llwyn Farm - Cattle Sheds at SE of Yard	A post medieval range of cattle-sheds.	Post-medieval	SH 56517 67350
65159	Ty'n Llwyn Farm - Hay Barn outside Yard to NW	A post medieval large hay-barn.	Post-medieval	SH 56483 67428
65151	Ty'n Llwyn Farm - NW range of Yard	A post medieval farmstead.	Post-medieval	SH 56499 67422

PRNUID	Name	Description	Period	NGR
33	Arrow-sharpening Stone, Rhos Fawr, Pentir	A large boulder with as many as forty-five sharpening marks was discovered during fieldwork along the line of the Pentir Llanfairpwll gas pipeline in June 1976. The incisions were accompanied by an area impressed with small punch marks and patches of deliberate smoothing. The boulder was moved to the side of the pipeline track to avoid further disturbance. A total of 45 V-sectioned incisions were observed. (Kelly, 1977)	Undated	SH 5608 6833
28869	Enclosure, North-East of Llys Gwynt	A small enclosure, condition unknown.	Undated	SH 55518 67301
791	Mound, N of Ty'n Y Llwyn	N of Ty'n y Llwyn. Mound. Pit symbol marked on OS sheet: not so much a pit but an irregular mound which is about 1m high and 12-15m across. Overgrown, has been utilised as a field clearance dump. One boulder deeply incised on one face. Possibly result of plough. Some markings seem too irregular and too stylised to have been caused thus. Boulder is barrel-shaped and stands 1m high.	Undated	SH 5652 6767
24130	Mount, Possible, Findspot, Pentir	Cast copper alloy sub-rectangular probable mount, found using a metal detector. Appears to have been broken off a larger object, but it is unclear how long it would have originally been. One face is polished. There are small transverse cut marks along one edge of the object, and a thin decorative line running parallel with the edge on the polished face. (Steele 2008)	Undated	SH 563 682
90524	Natural Feature, Pentir	(Area 1) Double-ditched trackway. Magnetic disturbance. A linear which is of a different alignment to the existing boundaries has been identified, however it is likely that this may be a geological trend which follows the underlying bedrock of the field (Sykes, Goulding & Trace, 2017).	Undated	SH 55510 68075
20	Pillow Mound, Rhos Fawr	Pillow mound on Rhos Fawr, at 350ft above OD. Rectangular mound, 65ft by 18ft and 2ft high. (RCAHMW, 1960). May be larger than originally observed by RCAHM. At NW end of rectangular mound is another low pile of stones, while on se side further mounds and odd boulders can be seen. Dimensions indeterminable as the whole area is overgrown. Has been used as field clearance dump. Located on former field boundary. Not shown on 25 inch County Series maps. There is what appears to be a long narrow bank in the neighbouring field 78m to NE.	Undated	SH 5635 6818
90580	Pits, Pentir	Pit was small and gave no evidence as to its date or function, though given its proximity to the road and charcoal content, then some roadside activity such as a camp hearth was plausible. Of great potential is the pit, as it pre-dates the earthwork, and hence suggests the potential for future work to give a solid terminus post quem for construction of the earthwork. No clear function for this pit was visible from the sondage, though it may have been related to road construction. suggestive of roots or fibres, though assessment of those was uninformative, and it is not considered suitable for scientific dating.	Undated	SH 5591 067300
28871	Quarry, Possible, North-West of Groeslon Ty Mawr	A possible quarry, condition unknown.	Undated	SH 55757 67106
43	Stone (Boundary Marker), Near Cae Gwydryn	Stone marked on OS map - not on 1:10000. Not recorded by RCAHM.	Undated	SH 5524 6743
38	Stone (Boundary Marker), Near Groeslon	Stone marked on map, near Groeslon. 'The house and buildings of Ty'n Llwn are a typical highly efficient Scottish layout of the late 18th century/early 19th century and probably the many stones in the pasture land of the vicinity were set up at that time with the field boundary systems'.	Undated	SH 5588 6695
90523	Trackway, Pentir	Area 1 (Sykes, Goulding & Trace, 2017).	Undated	SH 55539 68123
28863	Well, North-West of Groeslon Ty Mawr	A well.	Undated	SH 55761 66934
76093	Various Finds, Llanddeiniolen	The findspot of various finds.	Undated	SH 553 676

Roman Roads

PRNUID	Name	Description	Period	NGR
17566	Roman Road 1	Documentary evidence of Roman road of unknown condition or survival.	Roman	SH 5430 6612
17829	Roman Road 2	Documentary evidence of Roman road of unknown condition or survival.	Roman	SH 4857 6248
17834	Roman Road 3	Cropmark evidence of Roman road of poor surviving quality.	Roman	SH 5532 6696

Previous Archaeological Investigations

PRNUID	Name	Description	Organisation	NGR
40406	Deserted Rural Settlement in Eastern	Field survey carried out by Gwynedd Archaeological Trust of deserted rural settlement sites in eastern Caernarfonshire as part of a Cadw funded thematic monument type survey.	Gwynedd Archaeological Trust (GAT)	SH 72962 74172
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)	None Provided	Gwynedd Archaeological Trust (GAT)	N/A
40543	Roman Military Sites 2008: The Roman Road Between Segontium and Aber	None Provided	Gwynedd Archaeological Trust (GAT)	SH 55802 67241
40544	Roman Roads in North-west Wales	None Provided	Gwynedd Archaeological Trust (GAT)	N/A
44226	Metal Detecting at Pentir	Metal detector use by a member of the public at Pentir. A possible mount was recovered.	Stenson, I.	SH 563 682
44846	Medieval and Post-Medieval Agricultural Features in North-West Wales. Report on Scheduling Enhancement Study: Part 1: Report and Gazetteer	Gwynedd Archaeological Trust carried out a scoping study of the surviving remains of medieval and post-medieval sites relating to agriculture and subsistence in north-west Wales as part of a 2013 Cadw grant-aided pan-Wales project. The work aimed to assess the potential for new scheduling's and focussed on often over-looked sites such as sheepfolds, rabbit warrens and peat cutting.	Gwynedd Archaeological Trust (GAT)	N/A
44985	Dolgarrog to Pentir Overhead Powerline, Gwynedd: Excavations adjacent to Tower AD13	A small-scale excavation was undertaken by the Field Services Section of the Clwyd-Powys Archaeological Trust on behalf of Iberdrola Engineering and Construction as part of a wider programme of mitigation works associated with the refurbishment of a 132kV overhead powerline between Dolgarrog and Pentir, in Gwynedd. The excavation was conducted along the route of a trench for a new underground cable required to divert an existing lower voltage powerline prior to the commencement of refurbishment works. The cable trench crossed a prominent bank thought to be part of a medieval or earlier field system and a full section across the earthwork revealed a sequence of deposits forming the bank, together with the remains of a roughly built stone revetment. Currently the feature remains undated. A watching brief during the machine excavation of the remainder of the cable trench identified no features or deposits of archaeological significance.	Clwyd-Powys Archaeological Trust (CPAT)	SH 74819 70132
45025	Scottish Power Energy Networks: Dolgarrog to Pentir 132Kv Overhead Powerline Refurbishment	Cultural Heritage Assessment commissioned by Iberdrola Engineering and Construction and undertaken by the Field Services Section of the Clwyd-Powys Archaeological Trust (CPAT) of the potential direct impacts on cultural heritage assets along the route of an existing 132kv overhead powerline for which a scheme of refurbishment was proposed. The overhead line known as the AD line, runs from Dolgarrog in Conwy, to Pentir, near Bangor, in Gwynedd, passing through the Snowdonia National Park between towers AD5 and AD65. The original assessment was completed in April 2012 (Jones 2012) and revised in October of the same year in order to include a proposed underground cable connection to the substation at Pentir. The initial phase of the scheme involved the repainting of towers, and this was completed in 2012. Information from the original baseline study has been used to develop the programme of works for the remaining phases of the scheme in order to mitigate against any potential impacts to known cultural heritage assets.	Clwyd-Powys Archaeological Trust (CPAT)	SH 5640 6817

PRNUID	Name	Description	Organisation	NGR
45026	Scottish Power Energy Networks: Dolgarrog to Pentir 132Kv Overhead Powerline Refurbishment. Cultural Heritage Assessment.	Cultural Heritage Assessment commissioned by Iberdrola Engineering and Construction and undertaken in 2012 by the Field Services Section of the Clwyd-Powys Archaeological Trust (CPAT) of the potential direct impacts on cultural heritage assets along the route of an existing 132kv overhead powerline for which a scheme of refurbishment was proposed. We are informed that the scheme will be conducted in three phases, commencing with the repainting of pylons along the route and followed by a programme of line refurbishment. The final element involves the installation of a new underground cable from the westernmost pylon at SH 5640 6817 to the substation at SH 6030 6780. It is understood that there are no elements of the scheme which requires planning permission.	Clwyd-Powys Archaeological Trust (CPAT)	SH 5640 6817
45055	North Wales Connection Project: Wylfa to Pentir, Anglesey and Gwynedd. Archaeological Trenched Evaluation	Network Archaeology undertook an archaeological trenched evaluation to inform the National Grid North Wales Connection Project between the proposed new power station at Wylfa, Anglesey, and the substation at Pentir, Gwynedd, in 2017. The evaluation followed on from a geophysical survey undertaken by West Yorkshire Archaeological Services. Thirty-six trenches were investigated at fourteen sites. A large number of archaeological features were discovered dating from the Prehistoric to Modern period.	AMEC Foster Wheeler/Network Archaeology	SH 46342 81875
45493	Metal Detecting Use at Llanddeiniolen, Beaumaris and Llanfair-mathafarn-eithaf	Metal detecting find made by a member of the public in 2018.	Coupe, S.	SH 553 676
45705	Metal Detector Use, Northwest Wales	Metal detecting and casual finds made by a member of the public.	N/A	SH 5648 6803
45947	North Wales Connection Project Anglesey and Gwynedd Wales Geophysical Survey	Archaeological Services WYAS were commissioned by AMEC Foster Wheeler on behalf of National Grid to undertake a geophysical (magnetometer) survey extending from Wylfa on the Isle of Anglesey to the substation at Pentir, Gwynedd, in 2017. A variety of magnetic responses were detected across the survey area including those of an agricultural nature, magnetic disturbance likely associated with dumped material, and possible archaeological features. Archaeological features included possible burnt mounds and enclosures.	Archaeological Services WYAS	SH 46342 81875
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)	N/A

Appendix 2.7.A Pentir: Initial Conceptual Site Model and Risk Assessment

nationalgrid

Contents

1. Initial Conceptual Site Model 3

1.1 Introduction 3

1.2 Assessment Framework 3

2. Risk Assessment Principles 9

2.2 Preliminary Risk Assessment 11

Bibliography 17

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 Pentir works site, receptors on or near the Pentir works 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 proposed Pentir works as defined in Environmental Statement (ES) **Volume 2, Chapter 2: Pentir Substation Works.**

1.2 Assessment Framework

1.2.1 The Pentir works site, in terms of potential land contamination, will be regulated by Gwynedd Council under the Town and Country Planning Act 1990 (as amended) (**Error! Reference source not found.**), taking account of Planning Policy Wales (**Error! Reference source not found.**), with Natural Resources Wales (NRW) acting as statutory consultee.

1.2.2 Environmental liabilities can arise through provisions contained in statutory legislation including Part 2A of the Environmental Protection Act (EPA) 1990 (Ref 1.3), the Environmental Damage (Prevention and Remediation) Regulations 2015 (Ref 1.4), the Water Resources Act 1991 (Ref 1.5), the Groundwater (England and Wales) Regulations 2009 (Ref 1.6) and the Water Act 2003 (Ref 1.7).

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) and Land Contamination Risk Management (LCRM) (2023) (Ref 1.8) and the NRW Advice for Developers – Land Contamination (Ref 1.9).

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 Pentir works 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; and

- **Receptor:** target that may be affected by contamination: examples include human occupants or 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 Pentir works 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 2 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 and the 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 1.10) and professional judgment.

Table 1.1 – Potential Sources of Contamination

Source	Description	CoPC
Made Ground	Made Ground is anticipated in the vicinity of Pentir Substation and roads (on-site). There is the potential for Made Ground off-site relating to the wider Pentir Substation and potential non-coal mine workings (although presence and location not confirmed).	Metals and metalloids, cyanides (total, free), semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCBs), pH and asbestos containing material (ACM) or asbestos. Potential low levels of ground gas – methane (CH_4) and carbon dioxide (CO_2).
Agricultural Land	The Pentir Substation is bounded by agricultural land. With agricultural land, there is a potential for pesticides and herbicides to be used on the land, a potential for spills and	Metals and metalloids, SVOCs, VOCs, PAH, pesticides and herbicides, sulphate, sulphide, ammoniacal nitrogen, pathogens.

Source	Description	CoPC
	leaks from machinery used, and potential burial of animal remains.	
Pentir Substation	The Pentir Works are on the site of the existing Pentir Substation. A historical tank has been mapped adjacent to the west of the Pentir works site boundary. The Groundsure data states that there is a waste exemption 80 m south-east of the Pentir works site for storage of waste in a secure place.	Metals and metalloids, SVOCs, VOCs, PCBs, TPH, PAHs, sulphate, pH and ACM or asbestos.
Alluvium and Peat	Mapped across limited areas of the Pentir works site (Alluvium) and 180 m north-west of the Pentir works site (Peat).	Potential low levels of ground gas – CH_4 and CO_2.

Potential Receptors

1.2.10 Potential receptors associated with the Pentir works site are shown on **Table 1.2**.

Table 1.2 – Potential Receptors

Receptor Group	Receptor	Description
Human Health	Construction Workers	Exposures experienced by construction workers are of short duration due to the limited period of exposure, although construction workers are more likely to encounter potential contaminants during the construction works when compared with personnel visiting the Pentir works site after completion of the development.
	Site Workers (Maintenance Workers)	The Substation is manned with maintenance workers required to come on site to undertake routine maintenance works at and around the substation.
	Adjacent Site Users	Adjacent users include persons on agricultural land and agricultural buildings including farms (beyond 250 m from the Pentir Works site).
Controlled Waters	Secondary Undifferentiated Aquifer	A Secondary undifferentiated superficial aquifer is mapped across the majority of the Pentir works site relating to the Devensian Till.

Receptor Group	Receptor	Description
	Secondary A Aquifer	The Minffordd Formation bedrock underlying the entire Pentir works site is classified as a Secondary A aquifer. Within 250 m, Secondary A aquifer associated with the Padarn Tuff Formation – Tuff, Felsic is present. Small portions of the superficial deposits in the central and southern extent of the Pentir works site are classified as Secondary A aquifers, relating to the alluvium deposits.
	Surface Waterbodies	The Pentir works site is in the Nant-y-Garth River Waterbody Catchment, though the Nant-y-Garth waterbody is 1.5 km to the west of the Pentir works site, which retains a Good overall status under the WFD. The closest recorded WFD river waterbody is the Afon Cegin approximately 1 km to the east of the Pentir works site which retains a Moderate overall status under the WFD. A tributary (an unnamed watercourse) of the Agon Cegin is present approximately 700 m south-east of the Pentir works site. The closest watercourse to the Pentir works site is an unnamed watercourse approximately 70 m south and passes below the Pentir substation access road flowing in an east – west direction. The unnamed watercourse is not recorded under the Western Wales Framework Directive River Waterbodies dataset.
Property	Buildings & Infrastructure: Structures with enclosed spaces	Existing and proposed buildings on-site. Drinking water pipes. Agricultural buildings (beyond 250 m from the Pentir works site).
Ecology	Flora and Fauna	There are three cLWS and areas of ancient woodland within 250 m of the Pentir works site. Flora and fauna on-site or surrounding the Pentir works site could be affected by the presence of contaminants.
Livestock	Animals within nearby farms	Livestock in the area surrounding due to migration of contaminants.

Potential Pathways

1.2.11 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.
	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.
	Baseflow from groundwater to surface water	Surface waterbodies are beneath on-site roads. 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 on-site surface water bodies and drainage on-site and off-site.
Property	Gas intrusion – explosion.	Ground gas migrating from the source off-site property receptors.
	Corrosion of concrete or permeation of water pipes	Direct contact with aggressive ground conditions
Ecology: Flora and Fauna	Direct contact with contaminants in soil or water or indirect contact due to dust	Direct or indirect contact with contaminants on-site or migration of contaminants off-site
Agricultural: Livestock	Direct contact with contaminants in soil	Direct or indirect contact with contaminants due to migration off-site

	or water or indirect contact due to dust.

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 the CIRIA C552 (Ref 2.**Error! Reference source not found.**), the magnitude of the risk associated with potential contamination at the Pentir works 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 pollution). A significant	Concentrations of a contaminant from site exceed the generic, or site-specific assessment criteria.

Consequence	Definition	Examples (as defined by C552)
	change in a particular ecosystem, or organism forming part of such ecosystem. (note: the definitions of ecological systems in Draft Circular on Contaminated Land, DETR, 2000).	Leaching of contaminants from a site to a major or minor aquifer. Death of a species in 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
High	There is a 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 reach a receptor are all present.
Likely	There is a pollutant linkage and all the elements are present and in the right place which means that it is probable that an event	The conditions are such that there are very few foreseeable reasons to suggest that a source-pathway-receptor linkage is not occurring,

	will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.	and that all or most of the required mediums for a contamination source to pass through or in to each a receptor are present.
Low	There is a 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 or presence of the receptor.
Unlikely	There is a 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 Likelihood, 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 Pentir works 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 Pentir works 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 Pentir works site.

Table 2-4. Contaminant Linkage Preliminary Risk Assessment

Source	Pathway	Receptor		Severity	Likelihood	Risk
On-Site Contamination Sources: Made Ground Agricultural Land Pentir Substation	Ingestion of soil and soil-derived dust, Dermal contact - indoor and outdoor	Human Health – on-site	Site Workers and Visitors (including Maintenance Workers)	Medium	Unlikely	Low
	Inhalation of dust - indoor and outdoor			Medium	Unlikely	Low
	Vapour intrusion and inhalation – indoors and outdoors			Medium	Unlikely	Low
	Gas ingress			Medium	Unlikely	Low
	Dermal contact with and ingestion of contaminants in soil, soil-derived dust and water. Inhalation of ground gas and contaminants in soil-derived dust		Construction Workers	Medium	Likely	Moderate
	Inhalation of contaminants in soil, soil-derived dust, fibres and volatile vapours.	Human Health – off-site	Adjacent Site Users	Medium	Unlikely	Low
	Leaching and vertical migration through unsaturated zone	Water Environment - Controlled Waters	Secondary Undifferentiated Aquifer, Secondary A Aquifer	Medium	Low	Moderate/ Low
	Vertical migration in groundwater			Medium	Unlikely	Low
	Lateral migration in groundwater		Secondary Undifferentiated	Medium	Low	Moderate/ Low

Source	Pathway	Receptor		Severity	Likelihood	Risk
			Aquifer, Secondary A Aquifer			
	Baseflow from groundwater to surface water		Surface Waterbodies	Medium	Low	Moderate/ Low
	Direct run-off			Medium	Low	Moderate/ Low
	Gas intrusion – explosion	Built Environment	Property: Buildings & Infrastructure: Structures with enclosed spaces	Mild	Low	Low
	Direct contact of contaminants in soil and/or groundwater		Existing and future structures, Public Water Supply	Mild	Likely	Moderate/ Low
	Direct or indirect contact of contaminants in soil and/or groundwater	Ecology	Flora and Fauna	Mild	Low	Low
	Direct or indirect contact with contaminants	Livestock	Animals in nearby farms	Minor	Low	Very Low
Off-site Contamination Sources	Human Health – On-site	Human Health – on-site	Site Workers and Visitors (including Maintenance Workers)	Medium	Unlikely	Low

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

Table 2-5. Identified Risks to Receptors

Receptor	Discussion
Human Health: Site Workers and Visitors (including Maintenance Workers)	Potential sources of contamination have been identified associated with the existing substation and Made Ground. The risk to future site users is low as site workers undertaking maintenance are not likely to come into contact with soil contaminants. No potentially significant sources of ground gases or vapours have been identified. Site visitors would make infrequent visits of short duration. If maintenance works involving excavations are required, risks will be similar to construction workers.
Human Health: Adjacent Site Users	There are limited adjacent site users due to the rural location of the Pentir works site. The adjacent land uses include farmland where farmers could be working outdoors although much of site is surrounded by trees limiting the potential for close access. There are less frequent residential dwellings in the vicinity of the Pentir works site. It is unlikely that adjacent site users would be impacted by contaminants at the Pentir works site. The construction works will be managed in accordance with Construction Design and Management (CDM) 2015 regulations (Ref 2.3) 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 (Ref 2.4) to reduce this risk.
Human Health: Construction Workers	There is a potential risk to workers in terms of exposure to contaminants in soil or shallow groundwater during ground-based works such as excavations and stockpiling based on the historical and current land uses identified at the Pentir works site. The proposed development works will be undertaken in compliance with CDM 2015 regulations (Ref 2.3). Prior to work commencing, a health and safety risk assessment will need to be carried out by the appointed Principal Contractor or developed in 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 (Ref 2.4) to mitigate dust or run-off. Potential risk from ground gas in confined spaces, including excavations. 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.
Controlled Waters: Secondary Undifferentiated Aquifer Secondary A Aquifer	A Secondary undifferentiated superficial aquifer is mapped across the majority of the Pentir works site relating to the Devensian Till. This comprises predominantly clay which limits the potential for groundwater and contaminant migration, although granular horizons could be present within the Till.

Receptor	Discussion
	The Alluvium is classified as a Secondary A aquifer. Mapping indicates this comprises a relatively narrow strip which crosses the Pentir works site in the area of the existing access road and the southern end of the substation. The Minffordd Formation bedrock underlies the Pentir works site and surrounding area. This comprises sandstone and conglomerate and is classified as Secondary A aquifer. No groundwater abstractions from this stratum have been identified within 1 km of the Pentir works site. The presence of Till is likely to limit the potential for vertical migration of contaminants towards the bedrock. A groundwater abstraction has been identified from the superficial deposits within 50 m of the existing site access road, but almost 500 m from the substation area. This is used for construction dewatering and the potential for contaminants arising from the Pentir works site impacting water quality at this abstraction is considered low. The nearest drinking water abstraction is 775 m from the Pentir works site in mudstone bedrock. The potential for contaminants arising from the Pentir works site impacting water quality at this abstraction is considered low.
Controlled Waters: Surface Water	Two unnamed water courses are culverted beneath the southern and northern ends of the existing access road to the Pentir works site and there are other water courses within 250 m of the Pentir works site. These are tributaries to the Afon Cegin (which is outside the 250 m study area, approximately 700 m south-east of the Pentir works site). The potential for lateral migration of contaminants in groundwater arising from the Pentir works site impacting surface water quality is low, especially as the substation is underlain by Till. However, mitigation should be implemented during construction works to ensure run-off during excavations and stockpiling does not impact water quality.
Property: Buildings & Infrastructure: Buried concrete, drinking water pipes, structures	Potential for aggressive ground conditions to be present associated with Made Ground or superficial deposits at the Pentir works site which could require mitigation for buried concrete. Potential for contamination associated with the Made Ground and existing substation which could impact buried drinking water pipes. No potentially significant sources of ground gas have been identified within 250 m of the Pentir works site.
Ecology: Flora and Fauna, Livestock	The surrounding area comprises predominantly agricultural uses and woods, and the Pentir works site is not in an environmentally designated area. The potential for contamination to impact on flora and fauna on the Pentir works site or surrounding area is considered low. There is also a low potential for contaminants at the Pentir works site impacting on nearby livestock.

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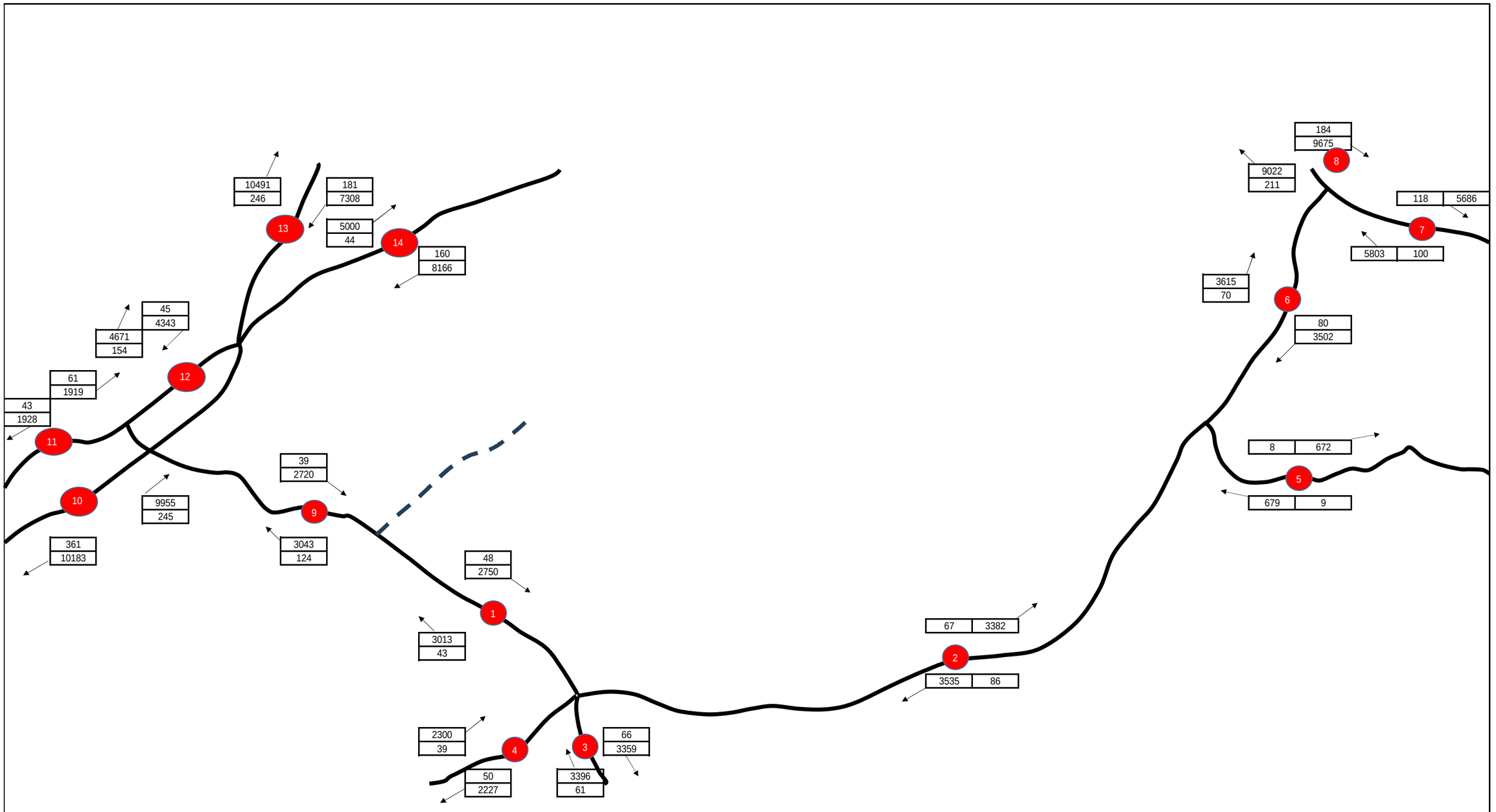
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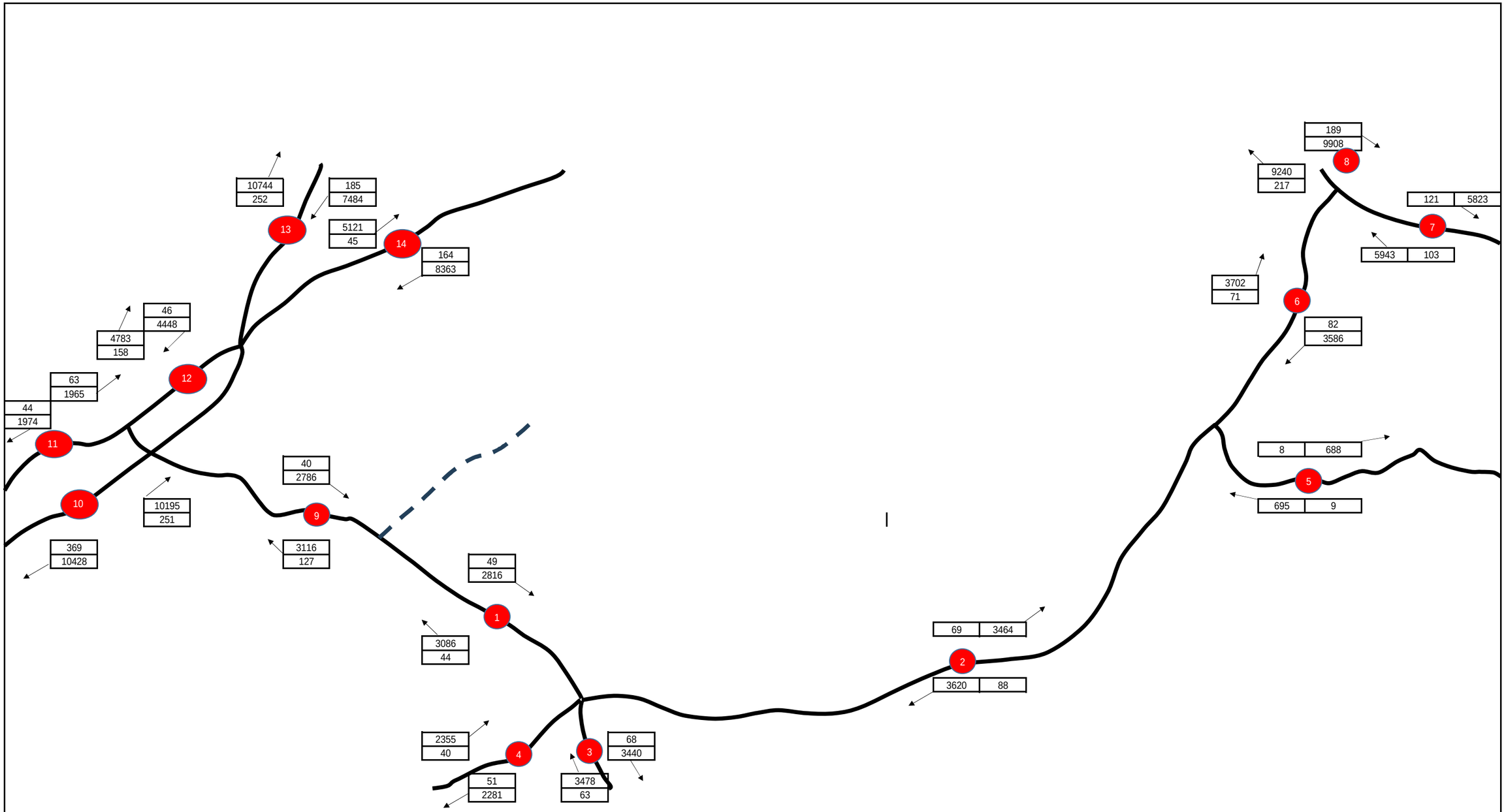
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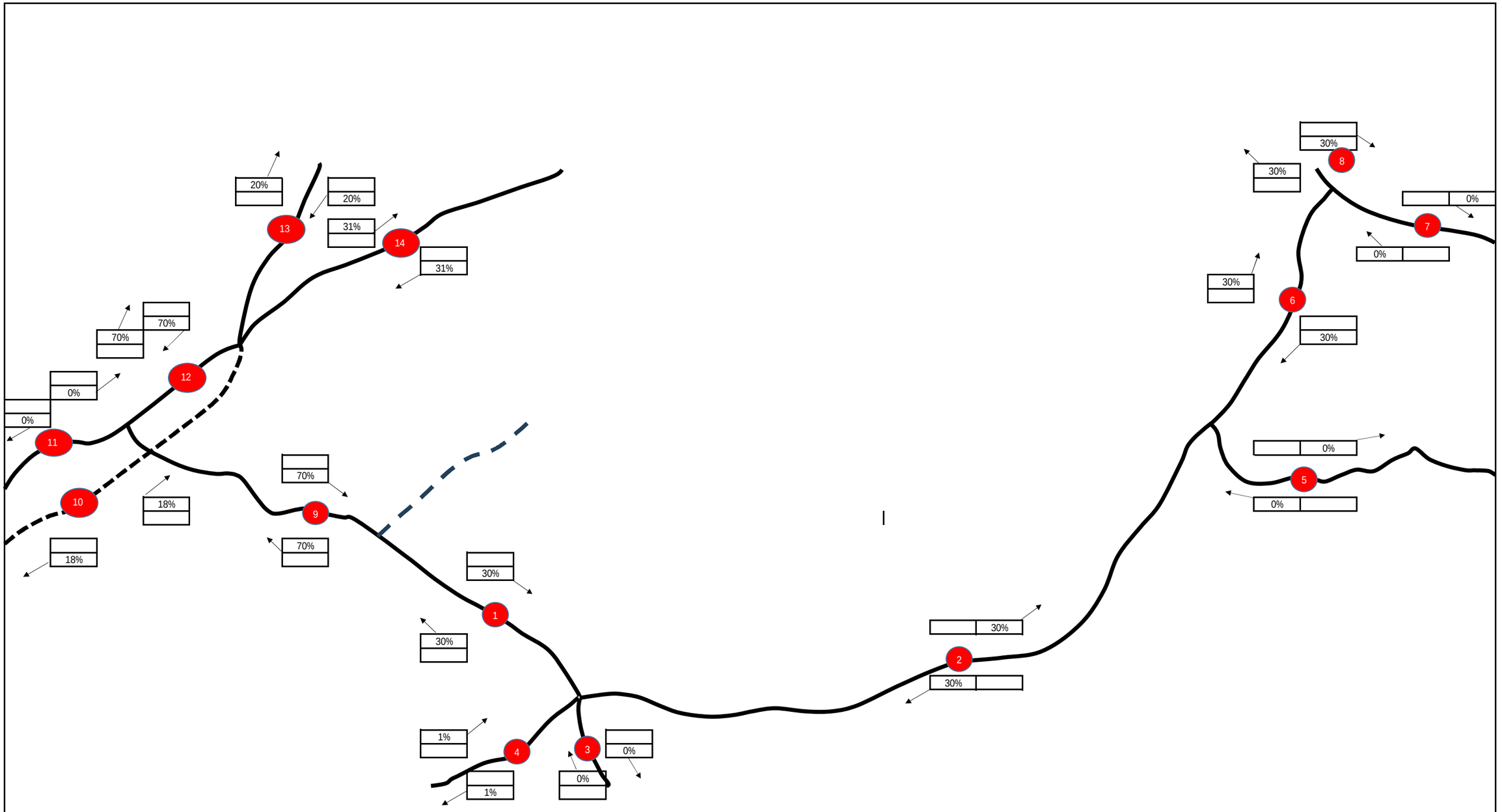
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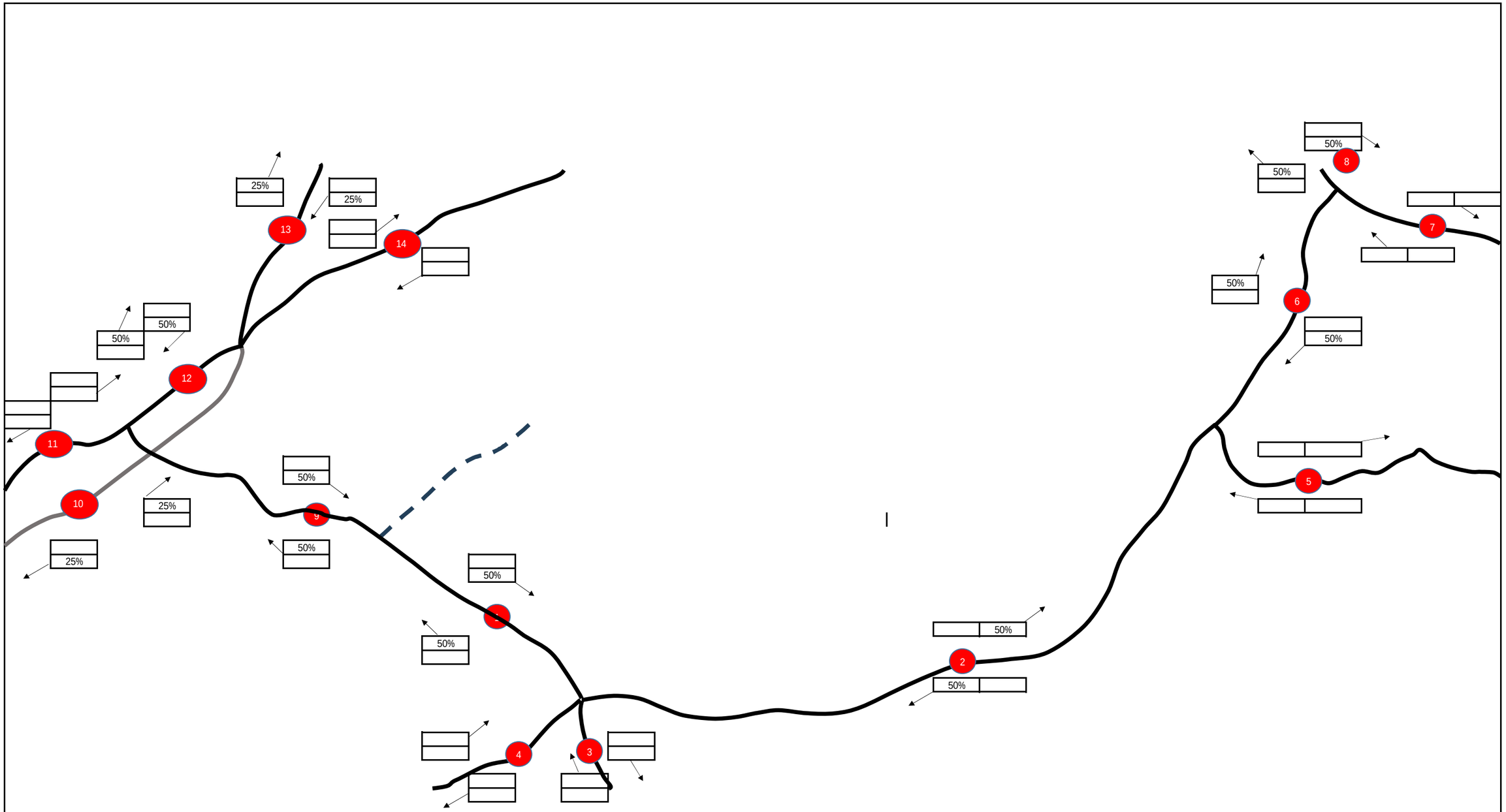
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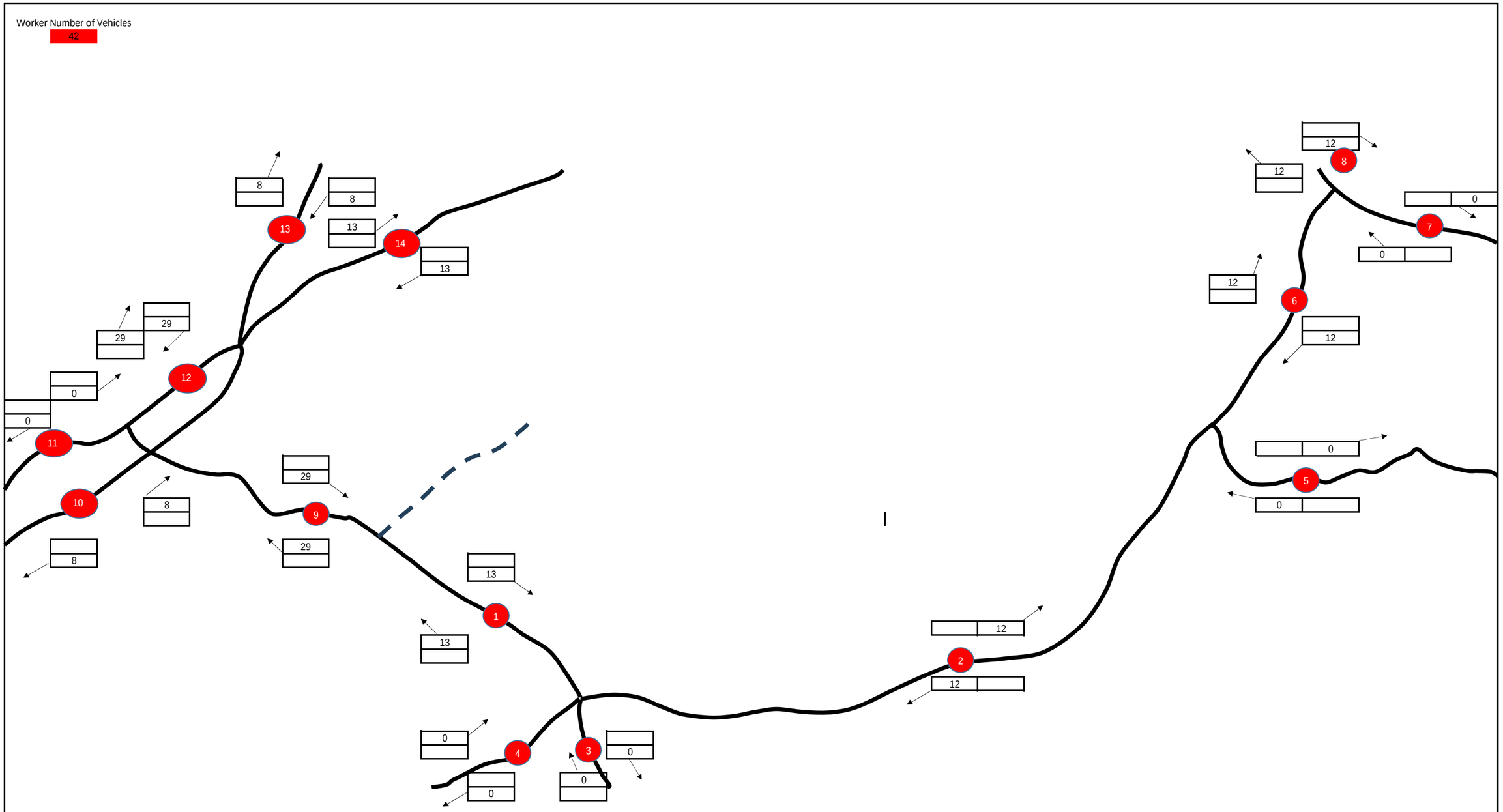
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Client:	Project:	Title:		Project Number:	Rev	Date	19.05.2025
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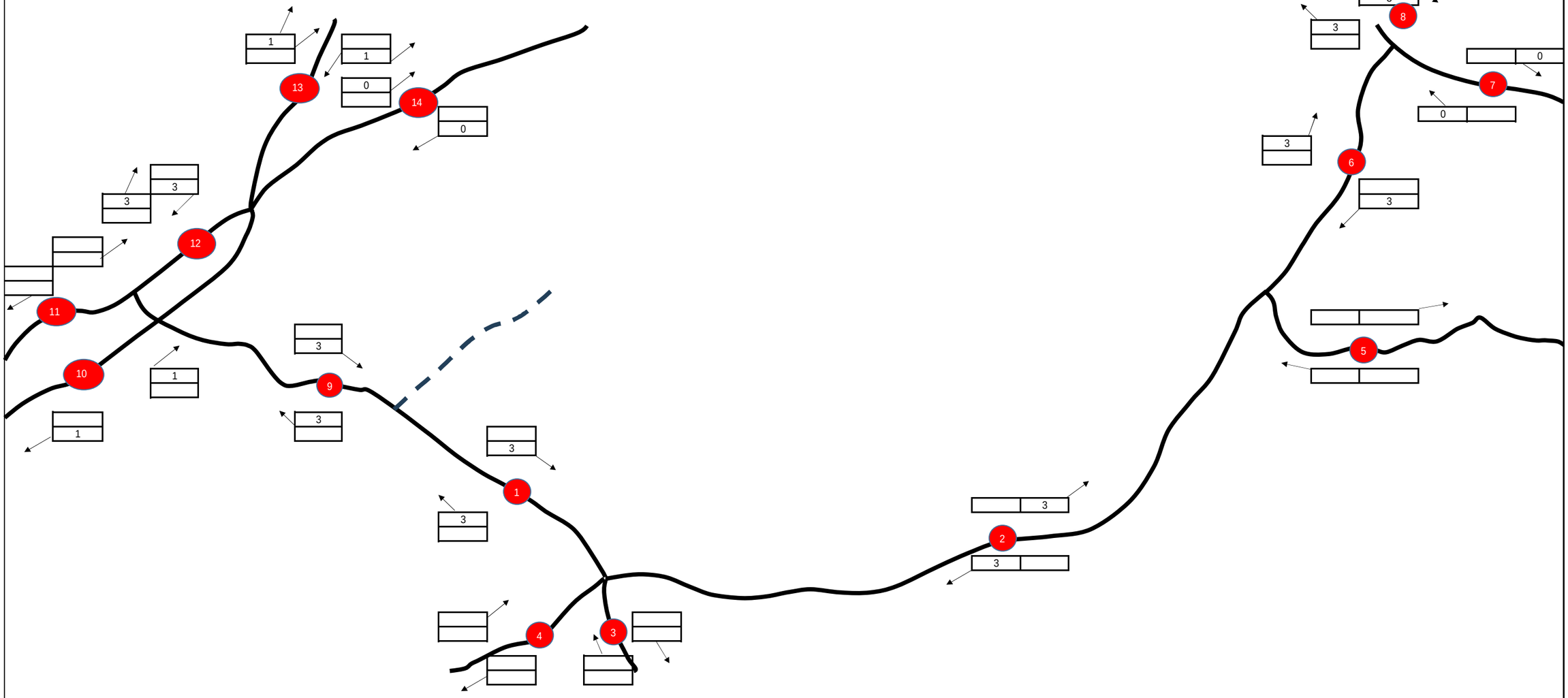


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						Approved	MR

HGV Number of Vehicles
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Client:	Project:	Title:		Project Number:	Rev	Date	19.05.2025
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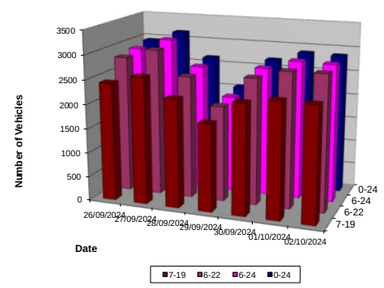
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Channel 1 - /hwestbound — Vehicle Flow — Week 1

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1	7	9	17	22	1	4	6	5	9
2	6	5	7	5	5	3	3	4	5
3	2	1	7	6	3	3	2	2	3
4	5	6	11	15	1	3	1	3	6
5	5	3	8	2	5	6	6	5	5
6	37	24	10	4	24	20	22	25	20
7	38	46	23	10	37	33	50	41	34
8	140	165	83	46	139	139	116	140	118
9	164	175	110	60	159	136	147	156	136
10	138	145	144	90	128	163	169	149	140
11	128	212	186	128	141	135	149	153	154
12	187	184	211	182	150	141	137	160	170
13	187	222	227	191	172	174	171	185	192
14	190	163	209	224	162	180	172	173	186
15	213	240	198	218	194	210	207	213	211
16	249	305	239	249	213	226	247	248	247
17	319	292	223	194	308	340	318	315	285
18	303	275	233	106	320	331	313	308	269
19	212	224	158	103	175	186	202	200	180
20	160	178	114	63	121	148	156	153	134
21	120	113	84	62	136	126	153	130	113
22	70	76	75	40	39	106	77	74	69
23	46	63	39	22	37	49	33	46	41
24	19	35	34	14	20	19	9	20	21
7-19	2430	2602	2221	1791	2261	2361	2348	2400	2288
6-22	2818	3015	2517	1966	2594	2774	2784	2797	2638
6-24	2983	3193	2696	2057	2851	2942	2954	2863	2701
0-24	2945	3161	2650	2056	2690	2881	2866	2909	2758

Vehicle Flow (Channel 1)



Channel 1 - utheastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	46.4	44.7	46.2	45.9	42.0	36.4	44.5
2	43.1	42.6	46.4	43.6	40.0	42.2	36.4
3	41.2	49.2	46.5	41.6	40.1	49.3	44.2
4	44.2	48.8	48.1	44.4	41.4	47.2	42.3
5	47.7	41.0	50.8	36.8	42.5	42.3	41.6
6	46.9	46.0	49.0	43.0	45.7	44.6	45.9
7	45.4	45.1	43.9	45.3	43.8	45.3	42.2
8	42.2	42.8	45.9	47.2	42.2	41.9	42.9
9	42.9	42.4	44.8	44.6	43.2	41.7	43.1
10	42.7	44.2	44.5	45.1	43.1	44.6	42.2
11	40.5	43.8	43.1	43.2	42.6	44.0	42.0
12	39.8	43.0	42.8	42.5	41.4	42.5	41.5
13	41.3	43.3	43.3	42.8	41.2	43.1	40.7
14	40.5	42.9	44.8	45.0	40.5	42.2	40.4
15	41.7	42.5	43.5	42.8	40.6	41.7	40.3
16	42.2	40.8	43.0	42.5	41.3	41.0	41.7
17	39.6	43.5	44.1	44.1	39.8	43.6	39.3
18	40.9	42.9	45.3	44.6	39.5	42.3	39.7
19	40.9	43.3	44.7	43.5	41.5	43.3	42.2
20	40.5	40.7	43.8	43.6	40.6	40.6	40.6
21	41.4	42.2	45.5	43.9	40.9	41.5	40.4
22	40.9	43.2	45.0	45.7	41.9	43.4	41.0
23	44.0	42.4	46.1	44.3	46.9	42.9	48.2
24	44.3	43.3	47.5	48.2	41.5	43.1	42.3
10-12	40.1	43.4	43.0	42.8	41.8	43.2	41.7
14-16	42.8	41.8	43.3	43.7	41.9	41.9	41.9
0-24	41.3	42.8	44.2	43.7	41.2	42.6	41.2

Mean (ALL): 42.4
Weekday Inter-Peak: 41.7

Channel 1 - utheastbound — 85th Percentile

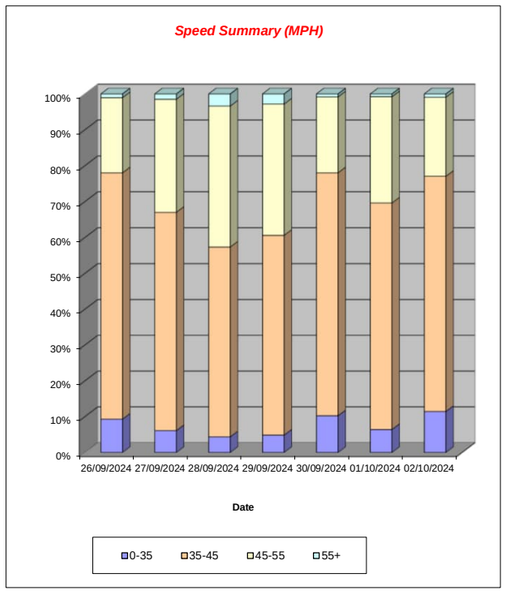
Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	54.1	52.1	55.2	51.4	-	41.1	50.1
2	50.4	44.3	51.7	45.1	44.9	43.2	41.2
3	45.8	-	53.8	47.5	45.2	50.0	49.7
4	49.2	53.9	53.3	49.3	-	48.5	-
5	55.3	44.8	56.1	41.4	48.9	44.7	47.7
6	54.1	51.4	52.4	48.2	51.9	48.8	54.7
7	51.4	51.1	48.5	51.4	49.3	50.2	47.8
8	49.2	48.0	52.6	56.9	49.0	47.1	49.8
9	47.3	48.0	50.2	49.6	47.7	47.0	47.6
10	48.3	49.3	49.7	50.6	48.4	49.7	47.6
11	46.8	49.8	50.1	49.0	49.0	49.6	47.9
12	45.3	48.1	48.4	49.1	47.0	47.1	46.9
13	47.1	48.9	50.1	49.4	48.3	48.9	49.0
14	46.0	49.3	50.4	51.1	45.4	48.3	45.7
15	47.4	48.2	48.8	48.4	46.2	47.3	46.4
16	47.5	48.3	48.9	48.2	47.0	47.9	47.5
17	45.6	49.5	49.8	50.2	45.3	49.3	44.2
18	46.6	49.2	51.5	50.9	44.9	49.2	45.5
19	46.6	48.3	50.3	50.3	46.3	48.1	47.5
20	45.6	46.1	50.9	51.4	45.9	45.5	46.9
21	47.2	47.5	52.3	49.6	47.1	46.3	47.1
22	47.4	49.2	52.6	52.2	49.1	48.4	46.9
23	50.2	49.0	54.9	51.3	52.8	48.4	54.8
24	49.9	48.8	56.2	52.8	47.2	47.6	47.9
10-12	46.0	49.0	49.3	49.1	45.6	48.4	47.4
14-16	47.0	48.4	49.8	49.9	46.2	47.9	47.3
0-24	47.2	48.8	50.5	50.0	47.1	48.4	47.3

85th %ile (ALL): 48.5
Weekday Inter-Peak: 47.7

Channel 1 - utheastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-35	274	193	116	100	276	185	328
35-45	2024	1926	1404	1146	1823	1821	1880
45-55	616	995	1040	752	568	852	631
55+	31	47	90	58	23	23	27
TOTAL	2945	3161	2650	2056	2690	2881	2866

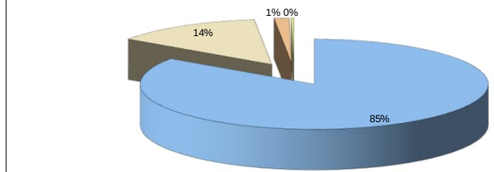
Speed Summary (MPH)



Channel 1 - Southeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	1988	378	58	6	2430
6-22	2338	417	60	6	2818
6-24	2399	423	60	6	2883
0-24	2447	432	60	6	2945
27/09/2024					
7-19	2382	377	37	6	2792
6-22	2683	347	41	5	3076
6-24	2753	363	41	5	3122
0-24	2762	363	41	5	3131
28/09/2024					
7-19	2046	229	21	3	2299
6-22	2267	246	23	3	2538
6-24	2311	250	24	3	2588
0-24	2350	254	22	3	2629
29/09/2024					
7-19	1634	171	12	4	1821
6-22	1761	180	12	4	1961
6-24	1773	183	12	4	1977
0-24	1810	187	12	4	2013
30/09/2024					
7-19	2012	334	27	4	2376
6-22	2371	373	33	4	2780
6-24	2535	384	54	4	2977
0-24	2676	388	33	5	3097
01/10/2024					
7-19	2241	290	32	7	2570
6-22	2809	348	37	7	3201
6-24	2988	374	37	7	3409
0-24	3127	384	54	7	3572
02/10/2024					
7-19	2202	336	39	5	2582
6-22	2780	437	49	5	3276
6-24	2916	468	53	5	3516
0-24	3170	502	53	9	3734
Average					
7-19	1914	331	27	6	2288
6-22	2225	370	33	6	2638
6-24	2285	377	34	6	2701
0-24	2325	380	38	6	2750

Total Vehicle Class Distribution



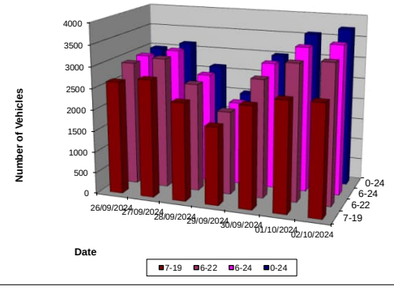
Pentir ATC 1, B4547

Produced by Road Data Services Ltd.

Channel 2 - /hwestbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	5	1	15	12	1	59	81	29	25
2	3	3	2	4	0	18	31	11	9
3	2	1	5	3	0	13	12	6	5
4	0	0	4	7	0	9	26	7	7
5	7	4	4	5	3	22	35	14	11
6	23	18	10	5	26	42	33	28	22
7	71	69	29	17	75	55	65	67	54
8	259	197	79	51	210	241	217	225	179
9	357	350	117	90	348	403	391	370	294
10	246	230	205	136	200	228	228	226	210
11	191	215	205	185	168	187	213	195	193
12	172	193	217	201	203	154	175	179	188
13	190	178	218	259	160	175	163	173	192
14	190	196	229	207	176	183	166	182	192
15	204	294	227	198	186	210	208	220	218
16	199	246	211	181	200	190	220	211	207
17	256	207	221	120	201	234	228	225	210
18	199	212	214	117	187	209	185	198	189
19	175	236	156	76	136	156	188	178	160
20	116	137	105	62	118	262	264	179	152
21	47	62	64	31	118	184	210	124	102
22	47	54	41	30	94	130	155	96	79
23	20	23	26	4	116	139	123	84	64
24	8	23	25	12	81	69	117	60	48
7-19	2638	2754	2299	1821	2375	2570	2582	2584	2434
6-22	2918	3076	2538	1961	2780	3201	3276	3050	2822
6-24	3087	3199	2585	1977	2977	3409	3516	3194	2934
0-24	2987	3151	2629	2013	3007	3572	3734	3290	3013

Vehicle Flow (Channel 2)



Channel 2 - rthwestbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	40.5	45.9	44.2	44.6	37.5	47.5	37.4
2	37.2	51.9	59.4	42.3	-	49.4	37.5
3	43.8	47.7	50.9	44.2	-	47.2	41.1
4	-	-	41.3	43.8	-	26.7	27.6
5	44.7	41.8	48.3	44.1	40.6	39.5	44.3
6	46.5	45.0	49.0	38.8	45.1	43.4	44.7
7	46.1	44.0	43.9	44.7	44.3	44.3	44.4
8	45.0	44.8	46.6	46.7	45.0	43.6	46.2
9	44.6	44.2	45.3	43.8	44.3	44.4	44.2
10	43.0	43.7	44.1	45.6	43.4	44.0	43.7
11	42.0	42.9	44.8	44.0	42.6	43.1	42.4
12	42.3	42.1	43.4	42.1	42.3	41.9	42.9
13	43.3	43.1	44.0	45.3	42.4	43.2	43.1
14	42.5	43.4	43.6	44.7	42.3	43.5	42.2
15	43.3	42.8	42.4	43.8	44.0	42.5	44.2
16	43.2	43.5	44.6	45.2	42.0	43.4	41.9
17	43.5	44.5	45.8	44.7	42.6	44.6	42.4
18	43.8	44.2	44.5	44.5	43.1	43.1	42.0
19	43.0	43.3	44.8	45.5	43.8	43.5	43.9
20	42.6	43.6	44.1	41.9	42.8	43.2	42.4
21	43.1	43.6	45.9	45.7	45.1	43.1	42.8
22	44.2	43.7	44.6	44.6	44.7	43.3	41.1
23	44.3	46.9	48.5	44.8	45.4	48.6	43.3
24	42.3	46.2	47.9	45.1	45.1	47.1	41.7
10-12	42.1	42.5	44.0	43.0	42.5	42.6	42.6
14-16	43.0	43.1	43.5	44.1	42.8	43.8	41.9
0-24	43.5	43.6	44.5	44.4	43.5	43.8	42.9

Average (ALL): 43.7
Weekday Inter-Peak: 42.8

Channel 2 - rthwestbound — 85th Percentile

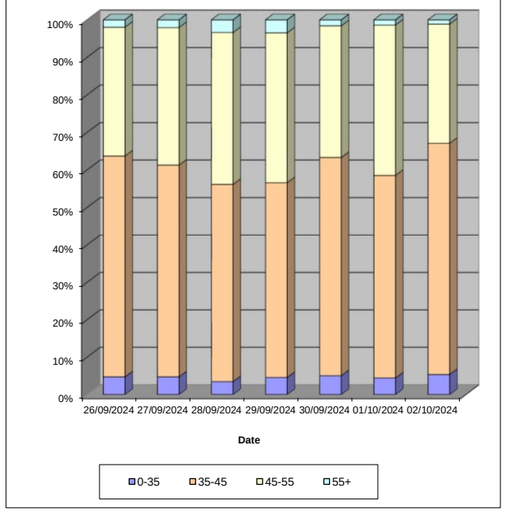
Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	45.4	-	48.5	49.2	-	49.0	39.0
2	38.6	55.6	70.1	44.3	-	54.1	39.0
3	51.4	-	57.7	47.6	-	48.9	48.4
4	-	-	50.6	51.6	-	28.0	29.0
5	48.7	45.6	56.2	45.2	42.5	42.8	47.8
6	51.8	51.5	53.4	41.8	49.5	48.0	49.4
7	52.1	49.5	51.9	50.5	48.7	50.4	49.3
8	50.4	50.8	51.7	53.4	50.4	48.2	52.0
9	49.5	49.6	52.2	51.0	48.8	49.8	48.8
10	48.6	48.5	49.7	52.5	49.5	49.0	49.7
11	47.6	47.9	50.5	49.5	47.6	47.3	47.3
12	47.5	49.1	48.6	50.1	48.6	49.4	48.1
13	49.3	48.9	49.5	52.0	48.3	48.8	48.7
14	48.7	50.0	50.3	50.6	47.7	49.9	47.6
15	48.7	49.8	49.0	50.1	50.2	50.5	50.2
16	49.4	49.2	50.6	51.6	47.2	49.3	47.4
17	49.4	51.3	51.4	50.9	48.8	51.0	49.1
18	49.8	50.9	50.5	49.5	48.7	49.1	47.4
19	48.8	48.2	50.1	52.2	49.1	47.6	48.9
20	47.8	49.1	51.0	47.2	47.5	48.3	47.4
21	49.3	49.0	54.3	50.8	51.1	48.0	47.7
22	52.4	50.6	51.7	50.9	50.9	49.9	46.5
23	51.5	57.2	54.8	47.3	52.6	57.4	49.0
24	49.3	52.5	54.3	50.2	51.5	52.6	47.6
10-12	47.5	48.5	49.5	50.6	48.3	48.6	47.6
14-16	49.1	49.6	49.9	50.8	48.7	50.1	48.9
0-24	49.3	49.7	50.7	50.9	49.3	49.9	48.6

85th %ile (ALL): 49.7
Weekday Inter-Peak: 48.8

Channel 2 - rthwestbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-35	141	149	91	92	152	158	200
35-45	1762	1782	1385	1047	1752	1933	2305
45-55	1025	1155	1064	804	1055	1431	1186
55+	59	65	89	70	48	50	43
TOTAL	2987	3151	2629	2013	3007	3572	3734

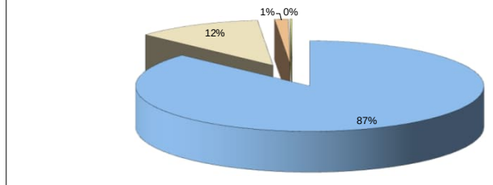
Speed Summary (MPH)



Channel 2 - Northwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	2234	353	48	5	2638
6-22	2484	383	48	5	2919
6-24	2509	384	48	6	2947
0-24	2540	393	49	5	2987
27/09/2024					
7-19	2388	338	38	5	2754
6-22	2681	347	43	5	3076
6-24	2751	363	41	5	3122
0-24	2762	363	41	5	3131
28/09/2024					
7-19	2046	229	21	3	2299
6-22	2267	246	23	3	2538
6-24	2311	250	24	3	2588
0-24	2350	254	22	3	2629
29/09/2024					
7-19	1634	171	12	4	1821
6-22	1761	180	12	4	1961
6-24	1773	183	12	4	1977
0-24	1810	187	12	4	2013
30/09/2024					
7-19	2012	334	27	4	2376
6-22	2371	373	33	4	2780
6-24	2535	384	54	4	2977
0-24	2676	388	33	5	3097
01/10/2024					
7-19	2241	290	32	7	2570
6-22	2809	348	37	7	3201
6-24	2988	374	37	7	3409
0-24	3127	384	54	7	3572
02/10/2024					
7-19	2202	336	39	5	2582
6-22	2780	437	49	5	3276
6-24	2916	468	53	5	3516
0-24	3170	502	53	9	3734
Average					
7-19	2110	288	31	5	2434
6-22	2451	330	34	5	2822
6-24	2605	344	34	5	2934
0-24	2618	353	38	5	3013

Total Vehicle Class Distribution



A4244

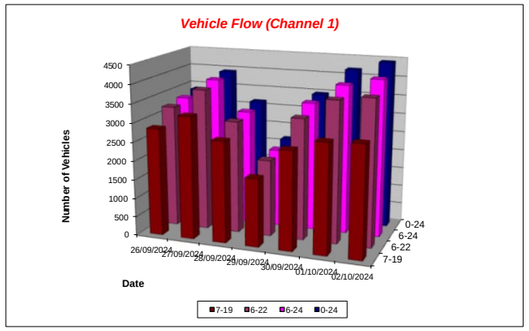
ices Ltd.

Pentir ATC 2, A4244

Produced by Road Data Services Ltd.

Channel 1 - Westbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	17	14	27	25	2	67	91	38	35
2	16	9	21	24	6	22	45	20	20
3	8	7	12	5	8	30	20	15	13
4	7	8	15	6	3	22	32	14	13
5	6	7	8	12	9	33	47	20	17
6	28	27	16	12	33	72	54	43	35
7	77	77	50	36	66	64	65	70	62
8	216	204	124	62	189	197	207	203	171
9	319	354	190	87	287	344	341	329	275
10	215	219	223	147	182	229	198	209	202
11	195	219	256	142	198	195	215	204	203
12	190	206	304	174	173	178	214	192	206
13	204	211	245	169	170	146	200	186	192
14	183	245	251	176	175	210	193	201	205
15	225	293	252	178	203	211	210	228	225
16	240	316	246	200	272	255	254	267	255
17	360	379	232	208	286	332	333	338	304
18	309	336	202	139	300	348	319	322	279
19	190	257	151	111	171	239	241	220	194
20	146	202	121	77	156	350	341	239	199
21	89	129	68	76	215	258	281	194	159
22	76	99	61	44	158	174	233	148	121
23	54	79	43	34	126	142	161	112	91
24	22	40	34	17	89	71	139	72	59
7-19	2846	3239	2676	1793	2606	2884	2925	2900	2710
6-22	3234	3746	2976	2026	3201	3730	3845	3551	3251
6-24	3318	3865	3053	2077	3418	3943	4145	3736	3401
0-24	3392	3937	3152	2161	3477	4189	4434	3886	3535



Channel 1 - Westbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	44.2	43.7	42.1	44.8	40.5	39.1	37.5
2	38.5	44.2	44.3	42.2	49.8	38.5	41.7
3	44.2	43.2	45.0	47.7	41.9	39.2	42.4
4	43.5	49.2	42.2	48.4	41.1	40.1	42.5
5	48.0	46.2	49.3	44.2	40.9	42.0	41.0
6	44.7	44.4	46.7	46.1	42.2	38.3	42.8
7	42.5	43.3	43.7	44.0	42.2	42.0	43.0
8	44.8	43.6	45.2	45.1	43.6	44.1	44.3
9	42.7	42.0	43.6	43.2	43.7	42.9	42.6
10	42.5	43.2	43.5	43.3	41.6	41.6	42.8
11	40.3	42.5	41.8	42.8	40.0	42.5	42.4
12	41.2	41.3	41.4	43.2	41.2	42.5	43.2
13	42.0	43.9	43.4	42.9	42.2	43.4	43.0
14	42.6	42.7	41.9	43.7	41.4	41.8	43.2
15	42.6	41.2	41.9	44.6	38.9	42.1	43.2
16	41.8	40.9	42.1	43.4	41.4	42.8	43.0
17	40.7	41.8	43.1	44.2	40.6	42.0	43.4
18	42.4	41.4	43.2	44.4	41.9	42.3	42.8
19	42.1	42.1	44.0	43.2	42.4	41.8	43.3
20	40.0	40.4	44.6	40.9	40.2	35.4	37.0
21	38.0	39.1	42.5	41.7	37.2	36.9	36.4
22	40.3	39.3	43.7	42.4	38.0	38.5	37.4
23	41.8	41.9	44.3	42.3	37.0	38.7	38.4
24	42.3	42.0	44.6	46.9	36.7	37.7	38.5
10-12	40.7	41.9	41.8	43.0	40.6	42.5	42.8
14-16	42.3	41.1	42.5	43.8	40.3	42.3	43.1
0-24	41.9	41.9	42.9	43.5	40.8	41.0	41.4

Mean (ALL) 41.8
Weekday Inter-Peak 41.8

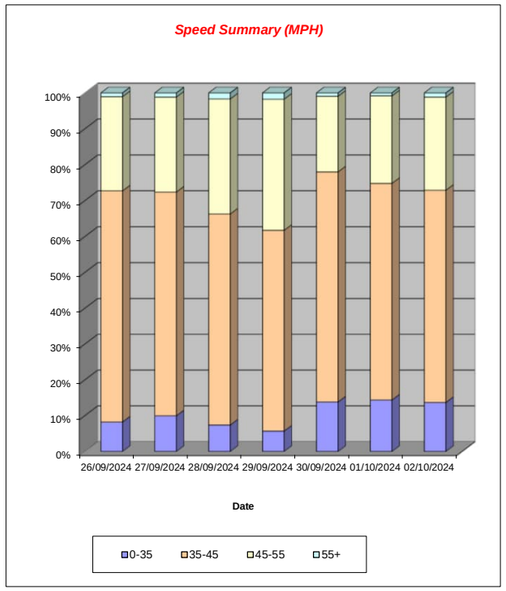
Channel 1 - Westbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	50.2	50.7	50.5	51.3	41.8	44.8	44.7
2	44.4	49.8	52.3	48.1	54.7	46.6	48.9
3	51.4	50.8	48.7	50.8	50.5	46.0	51.2
4	50.8	56.2	50.0	54.4	49.9	46.2	47.3
5	53.0	49.6	61.2	53.5	46.0	48.9	49.3
6	49.9	51.4	56.0	54.8	48.0	46.8	48.5
7	48.1	50.8	50.8	51.6	46.9	47.2	50.7
8	50.4	49.5	50.4	50.4	48.5	50.2	49.6
9	49.7	47.8	49.6	50.6	50.2	47.8	48.6
10	47.8	49.0	49.2	50.6	47.5	48.6	48.6
11	46.4	47.9	50.3	48.7	46.9	47.4	48.5
12	46.9	47.0	47.0	48.8	48.1	48.0	48.7
13	48.4	49.3	49.3	48.3	47.3	48.9	48.5
14	48.7	48.5	48.8	49.6	47.3	49.3	48.5
15	48.4	46.2	47.8	49.8	46.5	48.1	49.1
16	47.2	47.8	47.4	49.0	46.7	48.6	49.0
17	47.3	47.8	47.8	50.1	45.5	48.0	48.6
18	47.7	47.2	49.0	49.4	46.9	48.9	48.5
19	47.2	48.7	50.0	48.6	47.8	48.6	49.6
20	45.1	46.4	50.7	47.1	46.6	45.0	44.6
21	43.8	44.7	49.5	47.5	45.5	44.4	43.7
22	45.6	46.1	51.3	48.4	45.0	44.7	44.3
23	46.9	47.6	50.4	48.3	43.7	46.5	45.5
24	48.6	47.5	51.2	54.7	42.9	44.4	44.8
10-12	48.6	47.5	48.7	48.7	47.6	47.7	48.6
14-16	47.8	47.2	47.8	49.1	46.8	48.4	48.9
0-24	48.0	48.0	49.3	49.5	47.3	48.2	48.2

85th %ile (ALL) 48.4
Weekday Inter-Peak 47.9

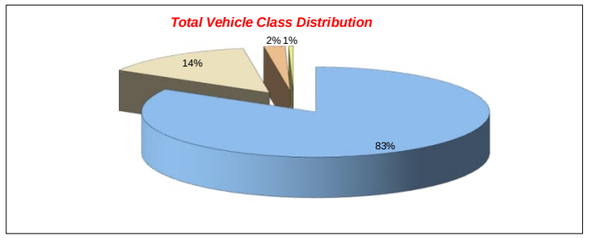
Channel 1 - Westbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-35	279	392	233	123	481	602	607
35-45	2187	2458	1856	1211	2231	2531	2625
45-55	890	1041	1010	789	732	1021	1150
55+	36	46	53	38	33	35	52
TOTAL	3392	3937	3152	2161	3477	4189	4434



Channel 1 - Westbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	2283	494	64	5	2846
6-22	2613	540	69	5	3234
6-24	2673	563	69	5	3310
0-24	2747	571	69	5	3392
27/09/2024					
7-19	2614	497	58	2	3270
6-22	2991	539	63	2	3595
6-24	3051	543	63	3	3660
0-24	3110	559	63	4	3736
28/09/2024					
7-19	2493	374	45	5	2917
6-22	2757	402	49	5	3213
6-24	2814	408	49	5	3277
0-24	2893	419	49	5	3366
29/09/2024					
7-19	2184	321	36	2	2543
6-22	2577	338	41	3	2748
6-24	2636	338	41	3	2775
0-24	2467	341	37	3	2851
30/09/2024					
7-19	2353	462	68	3	2886
6-22	2627	521	63	13	3222
6-24	2686	527	64	13	3262
0-24	2753	530	63	13	3309
01/10/2024					
7-19	2477	452	33	14	2991
6-22	2774	503	46	14	3337
6-24	2811	508	46	14	3379
0-24	2869	520	46	19	3454
02/10/2024					
7-19	2337	476	50	6	2879
6-22	2681	518	62	18	3280
6-24	2734	523	62	18	3324
0-24	2780	536	64	21	3401
Average					
7-19	2448	396	48	8	2710
6-22	2715	459	64	13	3251
6-24	2844	479	64	13	3401
0-24	2947	502	70	16	3535



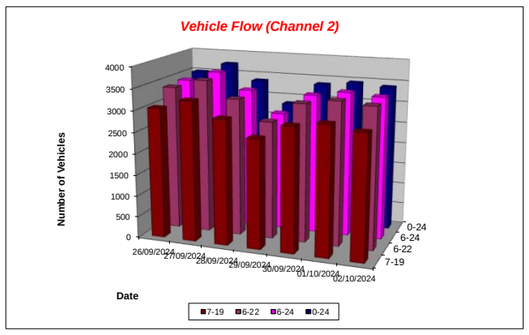
A4244

Pentir ATC 2, A4244

Produced by Road Data Services Ltd.

Channel 2 - Eastbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	6	4	28	23	3	2	3	4	10
2	3	4	16	7	5	4	4	4	8
3	8	3	5	14	7	1	6	5	8
4	9	9	7	6	17	10	14	12	10
5	16	15	11	7	23	18	16	18	15
6	34	41	22	19	52	40	34	40	32
7	76	75	29	26	96	104	104	91	73
8	236	206	81	67	227	262	220	230	186
9	310	297	208	96	340	320	316	317	270
10	204	248	248	227	267	218	197	227	230
11	202	270	270	276	220	200	182	215	231
12	239	198	249	259	214	230	206	217	228
13	176	214	277	285	188	192	186	191	217
14	193	231	279	291	184	199	187	199	223
15	247	333	284	246	206	233	249	254	252
16	311	359	275	262	248	258	296	294	287
17	404	333	301	248	346	364	348	359	335
18	338	348	246	167	292	348	292	324	290
19	186	233	199	119	154	167	200	188	180
20	116	132	126	83	119	120	137	125	119
21	86	68	73	59	79	72	96	80	76
22	62	50	68	38	42	50	64	54	53
23	23	38	41	12	31	33	32	31	30
24	11	27	23	14	9	9	12	14	15
7-19	3046	3270	2917	2543	2886	2991	2879	3014	2933
6-22	3388	3695	3213	2749	3222	3337	3280	3364	3255
6-24	3429	3866	3277	2775	3262	3379	3324	3409	3300
0-24	3498	3736	3366	2851	3369	3454	3401	3492	3382



Channel 2 - Eastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	45.1	43.4	43.1	47.7	36.9	53.6	40.6
2	45.3	48.8	44.5	41.1	38.5	42.6	45.5
3	40.5	45.5	49.2	46.0	42.9	44.2	47.3
4	41.1	41.1	47.3	50.1	39.2	43.4	42.9
5	41.3	46.1	44.9	46.3	44.4	44.5	45.3
6	45.1	46.0	42.0	45.5	42.3	44.7	45.0
7	44.7	44.3	42.2	45.1	42.6	43.2	44.7
8	43.5	44.0	45.1	42.6	43.7	43.7	44.0
9	43.3	42.9	42.6	41.6	42.4	42.7	43.6
10	42.3	42.0	41.6	39.9	41.9	41.3	41.8
11	40.6	41.6	40.3	40.6	40.6	41.8	41.2
12	39.8	41.4	41.7	40.8	41.3	40.6	41.2
13	39.9	41.6	43.0	40.7	41.5	41.8	41.7
14	41.1	42.4	41.5	40.5	39.9	39.4	40.3
15	41.4	41.0	41.5	40.2	40.7	41.0	40.8
16	40.5	41.1	40.8	40.9	42.1	42.2	41.1
17	42.4	42.4	42.5	40.9	40.4	41.7	42.4
18	42.1	41.4	41.9	41.7	41.7	42.8	42.8
19	41.2	43.6	41.5	42.6	41.7	42.6	41.8
20	40.8	41.0	42.8	41.8	41.0	42.4	42.7
21	40.6	41.6	43.3	42.5	42.6	41.6	42.8
22	39.8	41.2	42.2	40.4	43.0	42.9	42.0
23	42.9	40.5	44.0	45.9	43.9	41.4	42.5
24	47.3	42.1	44.3	44.6	43.9	46.9	47.5
10-12	40.2	41.5	41.0	40.7	40.5	41.2	41.2
14-16	40.8	41.0	41.3	40.6	41.3	41.3	41.0
0-24	41.7	42.1	42.0	41.1	41.6	42.0	42.2

Average (ALL) 41.8
Weekday Inter-Peak 41.1

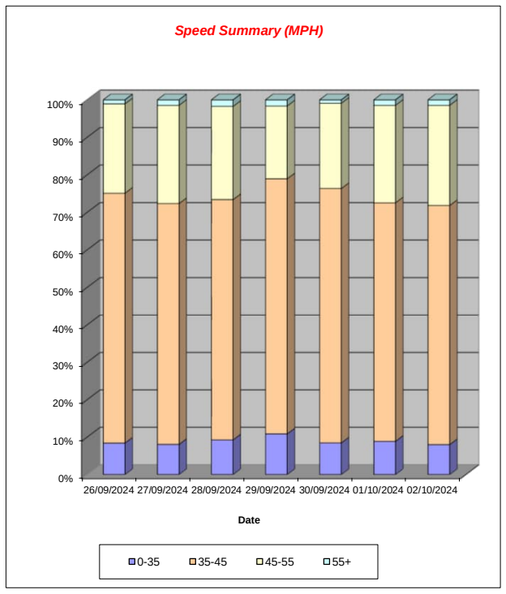
Channel 2 - Eastbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	50.4	45.1	48.5	54.1	40.2	55.5	44.5
2	51.7	58.4	50.0	45.8	43.9	46.4	54.3
3	47.9	49.1	56.1	49.5	49.3	-	51.8
4	48.4	50.3	55.4	57.7	48.2	52.0	50.2
5	54.0	50.7	51.6	55.1	51.4	51.2	51.2
6	50.4	51.8	49.0	50.0	48.3	54.9	52.1
7	50.6	50.4	47.8	50.2	48.9	49.9	50.5
8	48.8	49.5	51.8	49.8	48.9	49.2	49.1
9	48.5	49.0	48.5	47.4	47.5	47.8	49.0
10	47.9	48.4	47.2	45.3	47.7	47.2	47.1
11	46.0	47.3	46.3	47.2	46.1	47.6	46.7
12	45.1	47.3	47.5	47.2	46.8	45.9	47.3
13	48.1	48.4	49.0	46.7	46.5	47.7	47.3
14	46.4	47.8	47.7	46.3	45.4	47.1	46.3
15	46.4	46.5	47.6	45.8	46.2	47.2	46.3
16	46.3	47.0	47.1	46.6	47.6	48.6	47.2
17	47.6	48.8	48.8	46.5	45.5	47.7	48.3
18	48.2	46.8	47.6	47.9	48.8	49.2	48.5
19	46.9	49.8	47.3	48.6	47.4	49.0	47.9
20	46.3	47.8	50.1	48.3	47.4	47.8	47.7
21	46.4	48.1	49.9	49.6	50.0	48.0	50.8
22	45.0	47.9	50.5	45.9	48.5	49.8	48.0
23	49.0	48.7	51.1	50.9	49.7	47.8	53.0
24	53.9	47.7	52.1	54.3	51.1	54.9	54.4
10-12	45.6	47.3	46.8	47.2	46.4	46.8	47.0
14-16	46.4	46.7	47.5	46.1	47.1	47.8	46.8
0-24	47.6	48.2	48.3	47.3	47.4	48.3	48.2

85th %ile (ALL) 47.9
Weekday Inter-Peak 46.8

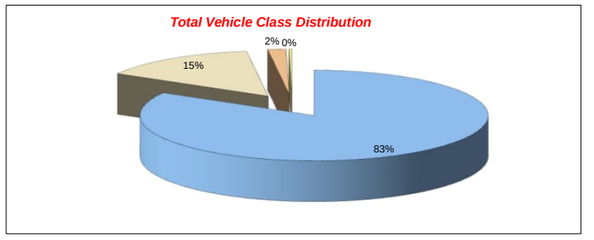
Channel 2 - Eastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-35	294	301	312	310	285	307	272
35-45	2333	2402	2159	1941	2288	2199	2171
45-55	833	978	836	553	765	897	908
55+	38	55	59	47	31	51	50
TOTAL	3498	3736	3366	2851	3369	3454	3401



Channel 2 - Eastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	2463	503	73	3	3046
6-22	2754	549	78	3	3386
6-24	2785	554	79	3	3420
0-24	2852	563	81	3	3498
27/09/2024					
7-19	2714	495	59	2	3270
6-22	2991	539	63	2	3595
6-24	3051	543	63	3	3660
0-24	3110	559	63	4	3736
28/09/2024					
7-19	2493	374	45	5	2917
6-22	2757	402	49	5	3213
6-24	2814	408	49	5	3277
0-24	2893	419	49	5	3366
29/09/2024					
7-19	2184	321	36	2	2543
6-22	2577	338	41	3	2748
6-24	2636	338	41	3	2775
0-24	2467	341	37	3	2851
30/09/2024					
7-19	2353	462	68	3	2886
6-22	2627	521	63	13	3222
6-24	2686	527	64	13	3262
0-24	2753	530	63	13	3309
01/10/2024					
7-19	2477	452	33	14	2991
6-22	2774	503	46	14	3337
6-24	2811	508	46	14	3379
0-24	2869	520	46	19	3454
02/10/2024					
7-19	2337	476	50	6	2879
6-22	2681	518	62	18	3280
6-24	2734	523	62	18	3324
0-24	2780	536	64	21	3401
Average					
7-19	2432	442	54	8	2933
6-22	2709	481	57	8	3255
6-24	2766	492	58	8	3300
0-24	2818	497	58	10	3382



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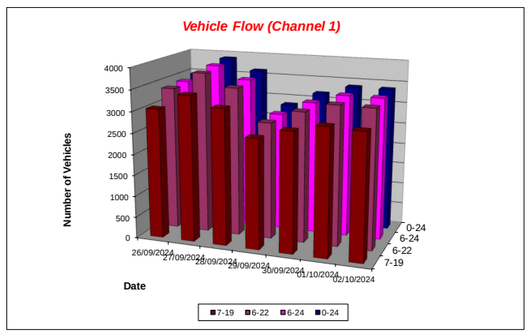
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Pentir ATC 3, A4244

Produced by Road Data Services Ltd.

Channel 1 - Northbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	6	1	29	17	2	2	7	4	9
2	7	6	11	10	3	2	5	5	6
3	3	4	7	6	3	4	2	3	4
4	3	0	6	8	2	1	1	1	3
5	7	13	8	9	8	8	7	9	9
6	36	31	23	15	42	31	30	34	30
7	64	79	31	21	77	76	72	74	60
8	267	210	77	76	246	280	244	249	200
9	340	346	184	129	367	378	390	364	305
10	237	282	267	208	265	217	210	242	241
11	226	274	289	284	230	224	222	235	250
12	219	228	271	270	221	186	220	215	231
13	209	225	298	309	187	197	185	201	230
14	207	227	316	296	192	222	180	206	234
15	256	423	313	277	235	260	281	291	292
16	281	320	293	254	230	240	259	266	268
17	354	281	350	213	253	334	298	304	298
18	262	334	294	159	218	260	226	260	250
19	190	267	227	95	152	161	205	195	185
20	118	167	126	79	95	119	144	129	121
21	78	65	96	42	51	71	67	66	67
22	70	55	58	34	37	40	52	51	49
23	26	35	33	16	43	49	51	41	36
24	9	20	26	19	12	16	16	15	17
7-19	3048	3417	3179	2570	2796	2959	2920	3028	2984
6-22	3378	3783	3490	2746	3056	3265	3255	3347	3282
6-24	3415	3809	3548	2781	3111	3316	3312	3403	3335
0-24	3475	3893	3633	2846	3171	3378	3374	3458	3396



Channel 1 - Northbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	41.9	50.2	47.2	55.2	45.2	51.5	46.4
2	40.0	51.0	46.5	46.8	47.4	43.3	53.9
3	41.5	47.9	50.9	47.3	45.8	49.7	50.3
4	39.2	-	54.6	55.2	39.6	43.0	48.3
5	44.1	48.5	45.9	44.5	41.4	43.7	51.6
6	48.7	49.5	51.3	49.8	43.4	48.1	49.1
7	46.2	47.4	46.7	48.4	46.1	45.6	46.7
8	46.1	45.9	48.0	46.7	45.9	46.1	46.4
9	44.6	44.4	45.8	45.9	43.2	45.0	43.8
10	44.5	44.3	43.8	44.3	44.3	44.4	45.6
11	42.7	43.2	43.3	44.0	44.2	44.1	42.8
12	42.6	43.5	43.8	41.3	44.1	45.0	44.1
13	44.2	44.4	45.2	45.4	44.4	42.5	44.9
14	44.1	43.6	43.0	43.6	42.9	44.6	45.0
15	43.0	42.5	42.2	42.2	41.6	42.8	43.4
16	42.0	42.7	43.2	44.4	43.7	43.2	43.8
17	43.6	43.8	43.6	44.3	43.0	43.8	44.5
18	45.5	43.1	44.0	46.7	44.6	44.5	46.3
19	43.5	44.2	44.1	47.7	45.3	46.0	44.9
20	42.7	44.7	44.0	45.1	45.1	46.3	46.0
21	42.3	44.4	44.6	45.0	46.4	46.2	46.2
22	43.9	45.8	47.4	46.3	48.8	48.9	47.7
23	42.8	44.5	53.2	52.3	46.7	49.1	49.2
24	45.5	49.4	48.5	46.9	48.9	50.8	52.1
10-12	42.6	43.3	43.5	42.6	44.2	44.5	43.5
14-18	42.5	42.6	42.7	43.2	42.7	43.6	43.6
0-24	43.9	44.0	44.2	44.5	44.1	44.7	44.9

Mean (ALL):	44.3
Weekday Inter-Peak:	43.2

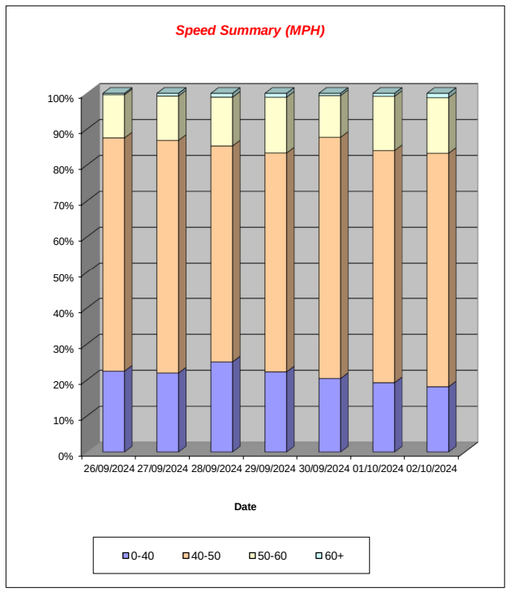
Channel 1 - Northbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	44.8	-	52.8	62.9	48.8	52.1	52.1
2	48.7	60.1	54.1	52.0	56.7	51.6	59.6
3	49.7	52.7	57.1	51.2	55.5	53.9	52.1
4	48.9	-	70.1	62.0	45.2	-	-
5	51.6	54.4	52.7	50.4	45.6	49.6	59.8
6	55.5	58.3	61.7	61.7	50.2	53.8	55.5
7	52.1	53.8	54.9	52.7	52.5	51.0	52.2
8	51.6	51.9	55.6	53.8	52.2	51.8	51.8
9	50.9	49.8	51.7	52.8	48.6	50.9	49.2
10	50.3	50.0	50.2	50.5	49.4	49.5	51.5
11	47.5	48.6	49.0	50.0	49.7	49.4	50.4
12	48.7	50.7	50.1	51.2	49.9	51.0	50.1
13	49.8	50.6	50.8	51.4	49.4	49.2	51.7
14	50.3	50.6	48.3	49.4	48.7	50.1	51.1
15	49.4	50.3	48.8	48.7	48.1	49.2	48.8
16	48.4	48.9	49.6	50.0	49.8	50.6	50.6
17	49.1	50.7	49.4	50.4	48.3	50.3	50.8
18	51.0	49.4	50.3	52.8	51.4	50.2	51.8
19	48.9	50.8	50.5	54.5	52.0	51.2	51.3
20	47.9	51.7	50.1	52.6	51.8	52.5	52.2
21	48.5	49.2	52.5	52.9	52.6	54.5	55.0
22	53.4	52.2	57.4	54.2	55.8	56.4	57.7
23	49.2	54.8	61.7	60.6	53.8	57.9	55.1
24	53.2	57.9	57.3	53.0	53.5	57.6	60.0
10-12	48.1	49.6	49.5	50.8	49.8	50.1	50.4
14-18	48.9	49.8	49.3	49.4	49.1	49.8	49.7
0-24	50.0	50.7	50.8	51.6	50.2	51.0	51.3

85th %ile (ALL):	50.8
Weekday Inter-Peak:	49.6

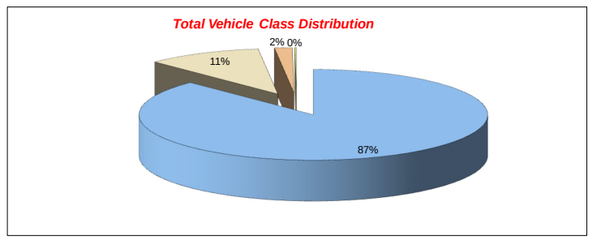
Channel 1 - Northbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	781	855	910	634	648	651	612
40-50	2263	2528	2191	1739	2135	2189	2199
50-60	417	481	493	442	368	510	523
60+	14	29	39	31	20	28	40
TOTAL	3475	3893	3633	2846	3171	3378	3374



Channel 1 - Northbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	2614	364	66	4	3048
6-22	2905	402	67	4	3378
6-24	2934	408	67	4	3413
0-24	2993	410	68	4	3475
27/09/2024					
7-19	2975	381	54	7	3417
6-22	3288	428	59	8	3783
6-24	3338	435	59	8	3838
0-24	3389	437	59	8	3893
28/09/2024					
7-19	2850	286	39	4	3179
6-22	3142	302	42	4	3490
6-24	3190	305	42	4	3549
0-24	3273	314	42	4	3633
29/09/2024					
7-19	2287	243	37	3	2570
6-22	2450	254	38	4	2746
6-24	2484	256	38	4	2781
0-24	2545	258	39	4	2846
30/09/2024					
7-19	2412	319	61	4	2796
6-22	2643	347	62	4	3056
6-24	2688	349	62	4	3111
0-24	2747	355	65	4	3171
01/10/2024					
7-19	2577	321	54	7	2959
6-22	2849	353	56	7	3265
6-24	2891	356	56	7	3310
0-24	2956	359	56	7	3378
02/10/2024					
7-19	2495	359	61	5	2920
6-22	2788	399	62	6	3255
6-24	2830	404	62	6	3322
0-24	2900	406	62	6	3374
Average					
7-19	2601	325	53	5	2984
6-22	2866	355	55	5	3282
6-24	2918	359	55	5	3335
0-24	2972	363	56	5	3396

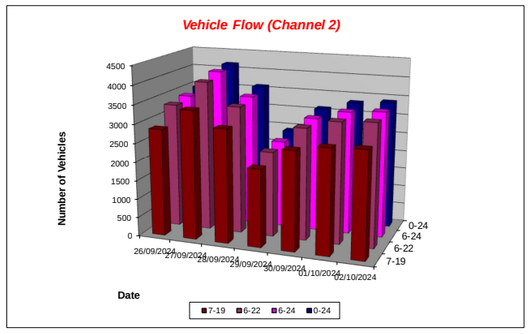


Pentir ATC 3, A4244

Produced by Road Data Services Ltd.

Channel 2 - Southbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	13	10	34	23	3	5	9	8	14
2	14	9	15	20	6	3	4	7	10
3	6	3	13	7	7	6	1	5	6
4	9	8	19	12	1	3	2	5	8
5	6	6	11	9	8	6	5	6	7
6	51	25	19	13	43	36	45	40	33
7	77	69	53	35	60	65	66	67	61
8	199	266	164	80	187	184	201	207	183
9	243	303	215	100	221	218	235	244	219
10	179	203	244	146	180	191	200	191	192
11	169	262	280	158	180	190	209	202	207
12	219	236	299	206	180	186	178	200	215
13	225	262	281	179	195	184	201	213	218
14	229	231	277	233	214	220	235	226	234
15	224	289	263	231	226	219	217	235	238
16	256	348	302	247	224	255	245	266	268
17	334	375	260	215	295	327	344	335	307
18	344	355	261	136	321	361	329	342	301
19	236	286	168	122	201	236	217	235	209
20	175	217	137	79	125	163	196	175	156
21	120	154	104	79	111	116	111	122	114
22	86	115	82	33	61	96	80	88	79
23	58	94	53	41	36	46	60	59	55
24	16	37	43	22	18	13	16	20	24
7-19	2857	3416	3014	2053	2624	2771	2811	2896	2792
6-22	3315	3971	3390	2279	2981	3211	3264	3348	3202
6-24	3389	4102	3486	2342	3035	3275	3340	3427	3281
0-24	3488	4163	3597	2426	3103	3329	3406	3498	3359



Channel 2 - Southbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	44.5	50.6	46.4	49.7	49.5	46.0	48.1
2	41.1	44.1	44.6	45.7	49.4	46.4	48.0
3	47.4	37.5	44.7	44.6	45.8	53.8	63.1
4	43.4	50.7	48.7	46.6	51.1	40.0	44.4
5	48.4	45.7	50.0	45.8	44.7	51.1	43.9
6	46.0	47.6	49.6	45.3	44.1	46.8	48.2
7	46.6	46.2	46.1	46.3	45.1	46.3	47.0
8	44.6	44.7	46.0	46.3	44.8	44.1	46.3
9	44.5	41.7	44.7	44.2	43.3	44.3	44.9
10	43.0	44.5	42.6	43.9	43.5	43.4	42.8
11	41.7	43.3	43.6	44.4	42.8	42.6	42.4
12	41.5	43.8	42.8	42.7	43.3	43.0	43.9
13	43.2	44.7	44.3	44.6	43.6	44.5	44.6
14	42.8	43.8	44.0	45.3	42.3	44.6	42.9
15	42.6	43.2	43.5	43.9	42.5	43.8	43.1
16	43.5	43.4	44.3	44.9	43.2	44.5	45.1
17	42.9	45.1	44.5	44.3	41.8	44.0	44.8
18	42.4	43.8	45.4	44.8	43.6	45.0	46.3
19	42.7	44.6	47.4	44.8	45.3	44.9	45.2
20	40.9	43.3	45.9	43.9	43.1	44.8	44.7
21	41.8	43.4	47.0	44.4	44.3	46.1	45.7
22	42.2	42.6	44.9	43.4	47.9	46.7	45.2
23	43.7	44.7	47.3	44.4	46.0	45.0	49.3
24	42.9	44.2	50.5	49.2	49.5	47.7	47.4
10-12	41.6	43.6	43.2	43.5	43.0	42.8	43.1
14-18	43.1	43.7	43.9	44.4	42.9	44.7	44.2
0-24	42.9	43.9	44.7	44.5	43.5	44.4	44.8

Average (ALL):	44.1
Weekday Inter-Peak:	43.2

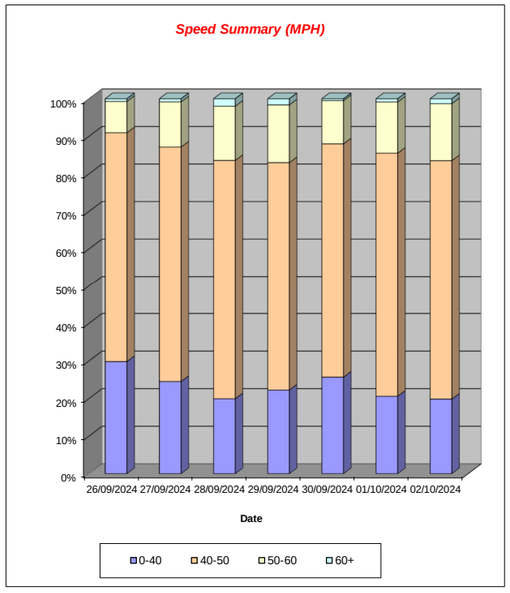
Channel 2 - Southbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	50.7	59.1	54.5	56.0	54.2	52.3	54.4
2	49.2	50.6	49.4	51.4	54.6	50.8	50.7
3	55.8	48.7	52.3	48.3	57.1	57.7	-
4	49.5	55.3	59.0	54.5	-	45.9	45.6
5	56.2	51.1	59.0	54.9	51.6	57.7	45.8
6	52.2	54.3	56.5	51.5	49.7	52.8	55.3
7	52.7	52.2	54.3	54.7	50.8	53.8	54.3
8	52.0	50.6	52.1	55.1	52.7	51.9	52.7
9	50.3	47.7	50.4	49.9	49.9	50.6	50.9
10	49.3	51.2	49.9	51.0	49.5	48.7	49.2
11	47.9	49.4	49.8	50.2	49.2	48.8	48.4
12	47.6	49.3	49.4	50.0	49.3	49.9	50.5
13	48.5	50.9	51.7	50.2	49.5	51.1	50.9
14	48.4	51.0	50.6	52.3	48.0	50.6	49.6
15	48.7	48.9	51.0	49.9	48.2	50.4	49.5
16	48.8	49.5	50.6	51.1	49.3	49.7	52.0
17	48.5	51.6	50.0	50.0	47.3	49.4	50.4
18	48.5	49.7	51.2	52.4	49.0	50.9	52.0
19	48.6	50.3	54.7	53.0	51.7	50.9	51.8
20	46.4	49.1	53.8	51.7	50.1	52.1	52.0
21	47.7	49.6	54.1	52.5	50.6	52.8	52.3
22	48.4	50.6	52.7	52.0	54.6	54.2	52.6
23	48.9	51.7	55.4	54.4	52.2	53.9	57.0
24	51.9	50.9	61.1	58.2	57.4	54.5	53.0
10-12	47.7	49.4	49.6	50.3	49.2	49.3	49.4
14-18	48.8	49.7	50.8	50.8	48.8	50.1	51.0
0-24	49.0	50.2	51.7	51.5	49.8	50.8	51.4

85th %ile (ALL):	50.6
Weekday Inter-Peak:	49.3

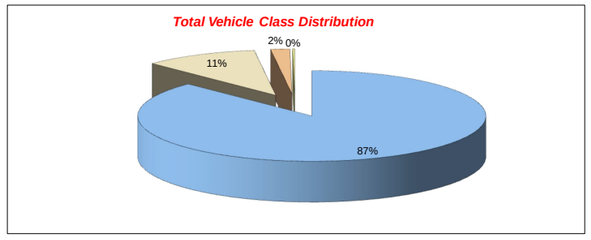
Channel 2 - Southbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	1040	1021	717	540	797	686	676
40-50	2132	2606	2289	1473	1933	2160	2168
50-60	291	501	519	373	357	454	517
60+	25	35	72	40	16	29	45
TOTAL	3488	4163	3597	2426	3103	3329	3406



Channel 2 - Southbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	2457	329	65	6	2857
6-22	2871	371	67	6	3315
6-24	2938	378	67	6	3389
0-24	3023	392	67	6	3488
27/09/2024					
7-19	2975	361	72	8	3416
6-22	3465	422	75	9	3971
6-24	3572	433	76	9	4102
0-24	3631	446	77	9	4163
28/09/2024					
7-19	2714	252	46	2	3014
6-22	3066	272	50	2	3390
6-24	3154	280	50	2	3486
0-24	3248	297	50	2	3597
29/09/2024					
7-19	1863	170	19	1	2053
6-22	2064	194	20	1	2279
6-24	2123	198	20	1	2342
0-24	2187	215	23	1	2426
30/09/2024					
7-19	2231	324	66	3	2624
6-22	2549	362	67	3	2981
6-24	2595	372	67	3	3035
0-24	2651	379	69	4	3103
01/10/2024					
7-19	2385	319	57	10	2771
6-22	2779	362	59	11	3211
6-24	2834	368	59	11	3270
0-24	2886	373	59	11	3329
02/10/2024					
7-19	2385	346	71	9	2811
6-22	2796	382	72	14	3264
6-24	2842	387	72	14	3340
0-24	2925	394	73	14	3406
Average					
7-19	2430	300	57	6	2792
6-22	2799	338	59	7	3202
6-24	2873	345	59	7	3281
0-24	2936	357	60	7	3359



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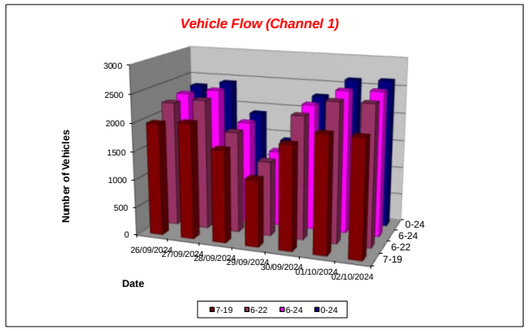
ices Ltd.

Pentir ATC 4, B4366

Produced by Road Data Services Ltd.

Channel 1 - hwestbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	12	13	13	27	2	10	10	9	12
2	9	3	10	11	4	7	14	7	8
3	4	5	7	3	6	15	12	8	7
4	4	5	7	6	2	10	9	6	6
5	5	4	4	6	6	13	15	9	8
6	9	10	5	5	18	27	17	16	13
7	24	22	13	12	25	31	32	27	23
8	114	81	31	26	103	115	105	104	82
9	188	184	83	36	184	210	220	197	158
10	140	130	110	67	121	161	130	136	123
11	129	125	141	94	132	110	119	123	121
12	133	131	210	125	115	105	152	127	139
13	137	150	174	122	127	107	145	133	137
14	123	148	153	109	106	147	120	129	129
15	161	225	163	122	154	175	170	177	167
16	206	241	160	154	219	210	213	218	200
17	296	258	161	165	230	283	259	265	236
18	227	219	145	88	224	277	263	242	206
19	134	150	100	69	116	154	156	142	126
20	102	133	63	54	113	169	145	132	111
21	75	74	44	49	144	131	139	113	94
22	42	45	44	35	66	78	102	67	59
23	38	41	22	22	43	47	58	45	39
24	18	29	23	9	24	22	31	25	22
7-19	1988	2042	1631	1177	1831	2054	2052	1993	1825
6-22	2231	2316	1795	1327	2179	2463	2470	2332	2112
6-24	2287	2386	1846	1358	2246	2532	2534	2402	2173
0-24	2330	2426	1886	1416	2284	2614	2636	2458	2227



Channel 1 - thwestbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	44.5	41.4	44.5	43.9	46.6	45.2	42.8
2	40.0	44.7	46.2	41.3	46.3	43.1	47.2
3	41.9	45.4	45.7	49.3	47.0	42.4	45.8
4	44.3	50.3	42.4	49.0	39.0	44.2	40.9
5	50.9	47.1	56.1	46.4	42.8	48.0	42.9
6	44.3	45.1	43.9	42.2	45.3	43.1	44.7
7	43.0	43.9	42.2	49.5	41.9	44.4	40.6
8	42.9	43.8	44.1	40.7	43.7	43.0	43.5
9	42.4	43.4	42.8	43.9	43.7	43.4	43.0
10	42.4	44.2	44.2	44.5	43.0	42.5	42.5
11	41.9	43.9	42.2	43.1	41.3	43.2	41.8
12	42.5	43.3	43.0	43.3	42.3	43.7	42.9
13	41.6	43.4	43.8	44.0	41.0	43.5	43.8
14	41.7	42.9	43.3	42.9	42.1	43.3	42.0
15	42.3	42.5	42.2	45.0	41.5	41.8	42.9
16	42.9	43.0	43.0	43.5	41.4	44.5	43.0
17	42.2	43.8	44.2	43.0	41.3	42.5	43.3
18	43.4	44.2	43.8	44.1	42.8	44.1	43.8
19	43.2	43.6	44.4	43.2	44.1	44.4	44.2
20	42.2	42.1	43.2	43.7	42.1	42.8	43.9
21	43.0	43.3	44.2	42.7	43.2	44.5	44.0
22	42.7	44.3	43.9	42.4	43.9	45.8	45.2
23	43.1	42.4	45.7	42.6	44.5	44.7	45.6
24	42.7	42.6	46.6	50.4	43.8	42.1	47.5
10-12	41.8	43.8	42.7	43.2	41.8	43.5	42.4
14-16	42.7	42.8	42.8	44.1	41.3	43.1	42.9
0-24	42.5	43.4	43.5	43.6	42.5	43.5	43.4

Mean (ALL): 43.2
Weekday Inter-Peak: 42.6

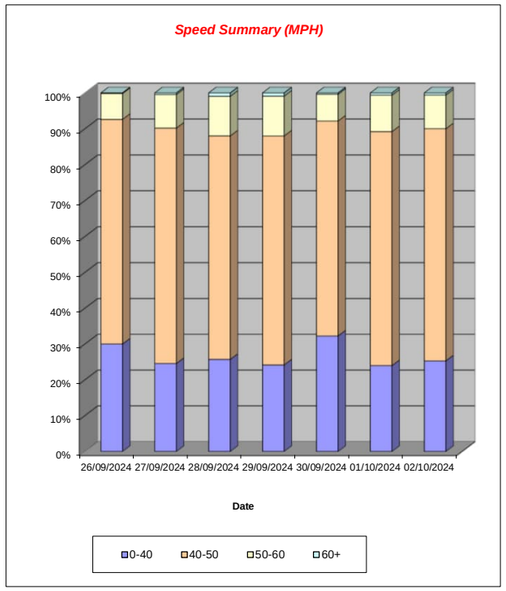
Channel 1 - thwestbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	48.9	47.3	53.6	48.9	50.9	52.0	49.1
2	45.1	52.5	54.3	46.4	49.1	51.6	53.5
3	46.2	49.9	50.2	57.1	55.8	50.3	52.6
4	50.3	57.7	49.8	50.7	47.8	53.4	47.3
5	57.4	52.8	74.7	51.3	47.9	55.2	51.8
6	49.1	49.1	50.5	50.8	50.4	51.1	48.5
7	48.9	53.2	48.3	58.3	47.7	50.7	49.5
8	48.9	50.8	50.7	50.0	48.8	48.3	49.6
9	48.4	48.9	48.3	50.7	49.1	49.3	48.7
10	47.9	49.6	51.2	52.3	49.1	48.3	49.3
11	47.0	49.1	48.7	49.5	47.1	48.8	47.0
12	48.0	49.2	49.3	49.8	48.3	48.8	49.3
13	47.4	50.3	50.4	49.3	47.1	48.3	48.6
14	48.3	48.7	49.1	48.8	47.6	49.9	47.4
15	48.1	48.3	47.7	52.4	47.3	48.9	49.7
16	48.3	49.0	50.2	49.6	47.3	50.7	49.1
17	48.2	49.1	49.8	48.9	46.7	49.4	48.5
18	48.5	49.8	50.5	49.5	48.0	50.2	50.3
19	49.4	50.4	51.0	49.5	50.4	50.8	50.2
20	46.7	47.8	49.7	49.5	49.2	49.8	50.2
21	49.7	50.3	50.1	49.7	51.4	51.0	49.9
22	47.7	49.6	50.3	48.9	51.6	53.5	51.2
23	48.3	47.6	52.1	47.1	49.7	52.9	53.4
24	47.5	47.7	53.3	60.2	51.3	47.4	55.1
10-12	47.6	49.2	49.1	49.7	47.7	48.6	48.3
14-16	48.3	48.7	49.8	50.1	47.9	50.1	48.9
0-24	48.3	49.4	50.0	50.1	48.6	50.0	49.6

85th %ile (ALL): 49.4
Weekday Inter-Peak: 48.6

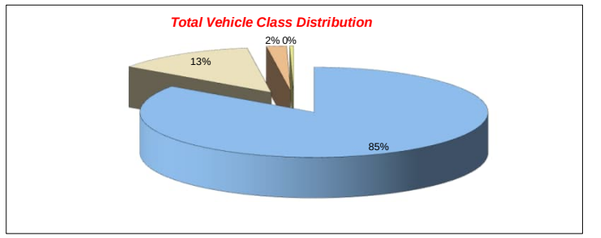
Channel 1 - thwestbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	699	596	485	342	737	627	667
40-50	1459	1592	1175	904	1368	1705	1706
50-60	168	227	208	157	170	265	247
60+	4	11	18	13	9	17	16
TOTAL	2330	2426	1886	1416	2284	2614	2636



Channel 1 - Southwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	1632	304	50	2	1988
6-22	1856	328	50	2	2231
6-24	1905	333	50	2	2287
0-24	1939	337	53	2	2330
27/09/2024					
7-19	1701	289	43	9	2042
6-22	1943	317	48	11	2316
6-24	2011	317	48	11	2386
0-24	2047	320	48	11	2426
28/09/2024					
7-19	1457	150	19	5	1631
6-22	1611	160	20	5	1795
6-24	1665	161	20	5	1840
0-24	1690	170	21	5	1886
29/09/2024					
7-19	1081	91	4	1	1177
6-22	1211	108	5	1	1327
6-24	1241	107	5	1	1358
0-24	1292	116	7	1	1416
30/09/2024					
7-19	1471	303	48	9	1831
6-22	1739	339	58	10	2179
6-24	1801	347	84	14	2246
0-24	1852	357	87	14	2288
01/10/2024					
7-19	1707	302	38	6	2054
6-22	2058	357	42	6	2463
6-24	2126	361	43	6	2532
0-24	2180	375	48	13	2614
02/10/2024					
7-19	1694	303	52	3	2052
6-22	2078	331	55	6	2470
6-24	2150	339	58	6	2559
0-24	2209	358	59	10	2636
Average	1772	249	37	4	1825
7-19	1789	277	39	7	2112
6-22	1887	290	42	8	2227
6-24	1944	296	44	8	2173
0-24	1887	290	42	8	2227

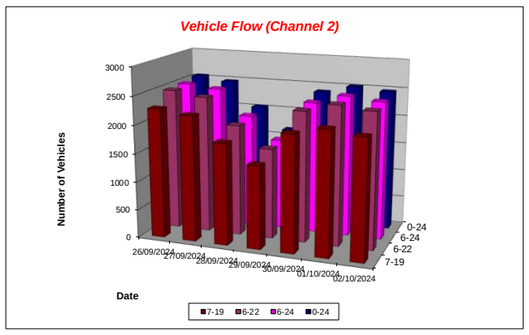


Pentir ATC 4, B4366

Produced by Road Data Services Ltd.

Channel 2 - theastbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	5	3	16	19	2	1	1	2	7
2	3	0	4	3	1	4	1	2	2
3	5	0	3	9	5	0	3	3	4
4	7	9	5	3	12	8	17	11	9
5	14	7	5	5	18	13	12	13	11
6	16	13	10	12	38	23	23	22	19
7	64	37	21	20	71	85	80	67	54
8	192	162	65	40	163	195	168	176	141
9	287	244	134	51	285	301	270	277	225
10	184	166	162	125	187	183	174	179	169
11	152	180	174	166	136	128	146	148	153
12	174	136	197	171	161	166	126	153	162
13	120	142	187	181	137	140	134	135	149
14	163	169	169	137	142	143	156	155	154
15	151	199	165	131	137	147	153	157	155
16	191	242	160	134	185	184	203	201	186
17	270	211	129	122	213	211	236	228	199
18	245	198	144	111	194	244	201	216	191
19	144	152	95	84	101	120	122	128	117
20	89	84	77	57	96	105	100	95	87
21	38	46	33	36	57	53	61	51	46
22	21	34	38	21	25	32	45	31	31
23	10	22	27	8	17	25	26	20	19
24	3	20	19	6	10	10	13	11	12
7-19	2273	2201	1781	1453	2041	2162	2089	2153	2000
6-22	2485	2402	1950	1587	2290	2437	2375	2398	2218
6-24	2486	2444	1996	1601	2317	2472	2414	2429	2249
0-24	2548	2475	2039	1652	2393	2521	2471	2482	2306



Channel 2 - ortheastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	40.5	40.1	44.5	46.5	40.8	50.7	40.4
2	49.0	-	40.7	40.5	40.9	41.1	37.0
3	44.6	-	50.5	42.1	37.4	-	44.6
4	38.4	36.8	48.7	54.1	42.2	43.6	43.1
5	50.4	50.4	46.2	49.7	44.2	47.3	49.4
6	47.4	45.0	44.5	44.7	43.1	44.6	45.7
7	45.0	46.3	42.2	45.8	44.5	44.9	45.3
8	42.7	42.5	43.9	44.5	43.2	43.1	43.4
9	41.4	40.3	43.2	43.4	41.6	41.7	42.4
10	41.0	42.3	41.8	42.7	41.8	41.2	41.0
11	39.2	41.1	41.1	42.8	41.4	41.6	41.1
12	40.9	40.5	41.3	42.6	39.8	40.0	39.6
13	39.6	40.9	42.2	41.6	41.1	40.8	41.3
14	41.3	42.5	40.9	42.9	40.8	40.2	39.8
15	41.8	40.3	41.6	42.3	41.5	39.4	41.2
16	40.0	41.1	41.2	42.2	40.6	40.6	39.8
17	40.0	42.4	41.0	41.8	39.5	40.4	41.8
18	40.9	42.2	42.3	42.3	42.1	42.5	42.5
19	37.9	42.3	43.9	43.3	41.7	41.9	42.9
20	38.7	41.9	42.5	43.1	40.0	42.5	42.5
21	38.2	43.1	43.0	41.9	39.8	40.1	42.6
22	38.9	43.6	42.6	40.5	44.0	44.7	44.7
23	45.2	41.2	44.7	43.0	43.2	43.1	44.9
24	45.8	42.3	43.2	44.8	47.9	46.8	47.0
10-12	40.1	40.8	41.7	42.7	40.5	40.7	40.4
14-16	40.8	40.7	41.3	42.5	41.0	40.1	40.3
0-24	40.8	41.7	42.0	42.6	41.4	41.5	41.9

Average (ALL): 41.6
Weekday Inter-Peak: 40.6

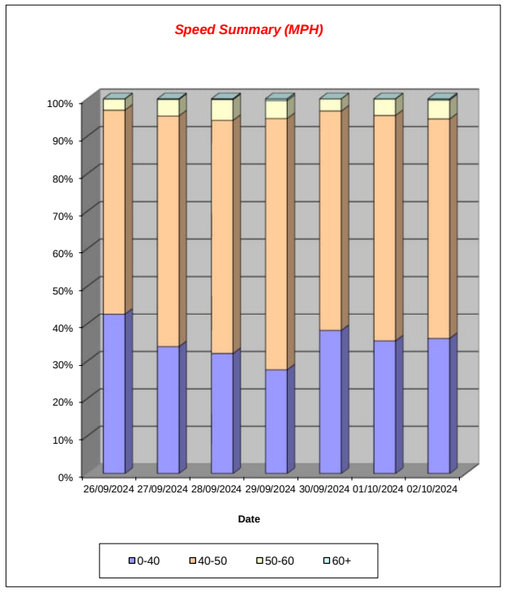
Channel 2 - ortheastbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	46.9	42.0	52.0	53.5	42.4	-	-
2	53.0	-	46.0	50.1	-	42.0	-
3	49.3	-	51.0	47.4	40.1	-	46.0
4	40.7	40.6	55.0	62.5	47.7	49.1	48.6
5	55.3	55.5	51.4	56.2	49.4	52.8	54.7
6	51.9	49.4	51.5	54.7	48.0	50.9	51.8
7	50.5	51.5	46.9	52.0	49.3	49.4	51.2
8	48.1	47.7	49.7	51.0	48.6	47.9	49.5
9	46.8	47.0	49.1	48.7	46.8	46.5	46.9
10	46.9	48.1	47.3	47.6	47.0	47.2	46.5
11	44.7	45.5	47.5	47.7	46.7	46.2	46.3
12	45.5	44.9	46.4	47.6	45.1	45.5	45.1
13	46.8	46.7	46.7	46.5	45.8	45.9	47.3
14	45.8	48.2	46.6	48.3	46.2	46.6	44.9
15	46.0	47.0	48.9	47.0	46.0	46.1	45.6
16	45.0	47.0	47.5	47.1	45.0	47.2	45.8
17	45.3	47.4	46.3	46.0	45.3	47.6	47.5
18	46.0	47.2	47.7	46.4	47.2	47.4	47.7
19	43.2	47.0	49.3	47.8	46.5	47.4	48.4
20	43.5	47.9	47.8	49.7	45.6	48.4	47.2
21	41.6	49.2	49.3	47.1	45.6	46.8	49.0
22	43.5	49.9	48.4	45.7	51.4	51.4	49.7
23	50.0	48.7	49.8	49.5	49.6	51.1	54.9
24	51.3	49.1	49.9	50.8	54.4	51.9	52.4
10-12	45.2	45.2	47.0	47.6	45.8	45.8	45.8
14-16	45.8	47.0	48.1	47.0	45.8	46.8	45.8
0-24	46.3	47.4	47.9	47.8	46.8	47.4	47.6

85th %ile (ALL): 47.3
Weekday Inter-Peak: 46.0

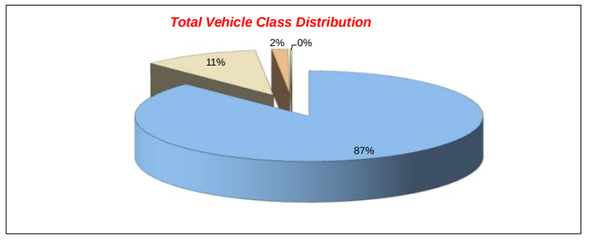
Channel 2 - ortheastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	1085	839	654	458	915	893	892
40-50	1386	1523	1268	1107	1400	1516	1446
50-60	76	109	113	79	78	111	125
60+	1	4	4	8	0	1	8
TOTAL	2548	2475	2039	1652	2393	2521	2471



Channel 2 - Northeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	1953	254	56	4	2273
6-22	2164	263	59	4	2489
6-24	2173	264	59	4	2498
0-24	2213	268	57	4	2548
27/09/2024					
7-19	1920	240	34	4	2201
6-22	2106	251	40	5	2402
6-24	2147	252	40	5	2444
0-24	2171	256	40	6	2470
28/09/2024					
7-19	1591	167	20	3	1781
6-22	1741	180	23	3	1950
6-24	1781	180	23	3	1996
0-24	1827	186	23	3	2039
29/09/2024					
7-19	1327	121	8	0	1453
6-22	1454	127	8	0	1587
6-24	1482	128	8	0	1601
0-24	1515	131	6	0	1652
30/09/2024					
7-19	1735	258	43	5	2041
6-22	1959	278	50	3	2290
6-24	1986	280	50	3	2317
0-24	2043	281	51	3	2383
01/10/2024					
7-19	1849	273	33	7	2162
6-22	2101	294	35	7	2437
6-24	2138	295	35	8	2472
0-24	2178	302	35	8	2521
02/10/2024					
7-19	1781	276	28	4	2089
6-22	2041	302	28	5	2375
6-24	2077	308	29	5	2414
0-24	2129	308	29	5	2471
Average	1772	228	33	4	2000
7-19	1737	228	33	4	2000
6-22	1939	242	34	4	2218
6-24	1964	243	34	4	2249
0-24	2012	249	34	4	2300



B4409

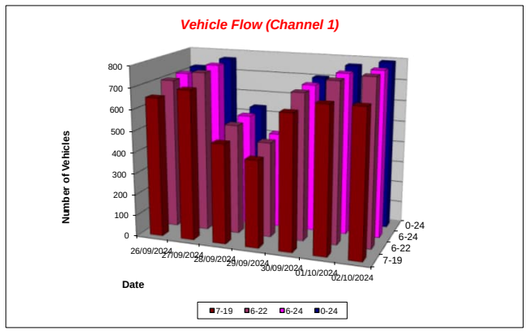
ices Ltd.

Pentir ATC 5, B4409

Produced by Road Data Services Ltd.

Channel 1 - hwestbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	1	0	4	2	0	1	2	1	1
2	0	0	2	3	0	0	0	0	1
3	0	0	1	0	0	1	0	0	0
4	3	2	2	0	1	1	2	2	2
5	0	0	0	0	2	1	2	1	1
6	4	4	1	3	4	6	5	5	4
7	16	16	8	7	13	19	19	17	14
8	56	40	15	6	49	52	42	48	37
9	90	94	40	19	99	104	108	99	79
10	48	46	42	35	54	65	63	55	50
11	54	66	48	44	38	47	36	48	48
12	47	49	56	48	52	39	42	46	48
13	52	40	39	47	35	50	48	45	44
14	48	51	43	43	44	37	47	45	45
15	44	58	52	27	55	61	55	55	50
16	75	85	39	34	68	71	65	73	62
17	44	56	34	44	50	46	63	52	48
18	58	77	35	36	50	68	69	64	56
19	37	37	25	25	38	41	44	39	35
20	17	20	21	15	27	25	38	25	23
21	8	9	10	13	8	15	25	13	13
22	12	7	10	6	10	13	16	12	11
23	5	9	6	3	6	4	1	5	5
24	2	2	5	0	0	2	1	1	2
7-19	653	699	468	408	632	681	682	669	603
6-22	708	751	517	449	690	753	780	736	664
6-24	718	767	526	462	696	769	792	742	670
0-24	721	768	538	460	703	769	793	751	679



Channel 1 - rthwestbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	27.2	-	41.7	40.2	-	29.5	31.4
2	-	-	38.8	32.2	-	-	-
3	-	-	-	-	-	-	-
4	38.7	38.0	32.0	-	33.8	31.3	33.6
5	-	-	-	-	33.7	34.3	33.4
6	40.9	35.8	39.8	36.0	32.2	35.9	35.7
7	37.2	33.8	35.1	34.5	36.5	37.1	38.4
8	36.6	36.1	35.6	36.2	36.2	36.5	37.0
9	36.0	36.0	37.8	36.8	34.9	35.2	35.3
10	35.2	35.6	36.2	37.1	34.8	34.9	33.6
11	32.9	35.4	35.4	35.0	33.8	34.1	33.1
12	34.6	34.9	35.0	36.7	33.0	33.8	35.8
13	33.4	34.3	35.9	34.5	35.1	34.8	35.8
14	35.4	35.2	34.7	35.6	34.9	33.0	32.3
15	35.2	33.9	34.7	34.6	33.5	33.4	36.0
16	35.4	35.5	33.6	34.5	35.7	36.0	36.2
17	35.3	34.4	36.2	33.3	35.0	34.5	36.1
18	35.3	34.7	36.3	32.0	35.5	36.3	36.1
19	32.9	35.5	35.1	33.5	35.5	36.1	35.2
20	34.5	34.0	32.3	33.5	34.9	36.9	35.4
21	31.3	34.4	35.0	28.6	33.8	34.4	34.8
22	32.8	34.3	30.9	36.4	34.9	35.0	35.4
23	36.5	33.2	35.7	33.9	36.5	40.0	49.2
24	34.0	37.2	39.2	-	-	47.2	44.3
10-12	33.7	35.2	35.7	35.3	33.3	34.6	34.8
14-16	35.3	34.9	34.5	34.5	34.7	34.9	34.3
0-24	35.0	35.1	35.4	34.7	34.8	35.2	35.4

Mean (ALL): 35.1
Weekday Inter-Peak: 34.7

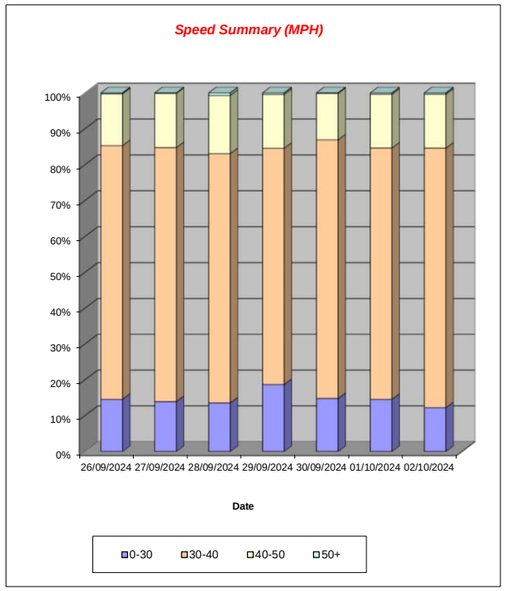
Channel 1 - rthwestbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	-	-	46.4	47.2	-	-	33.1
2	-	-	42.3	32.5	-	-	-
3	-	-	-	-	-	-	-
4	46.8	39.3	32.1	-	-	-	34.5
5	-	-	-	-	36.8	-	35.9
6	44.3	42.1	-	42.7	34.8	40.8	39.7
7	43.7	39.4	39.3	36.7	40.7	41.6	42.3
8	41.5	41.7	41.0	38.9	41.8	41.2	41.5
9	40.1	40.6	43.8	42.7	40.5	40.3	40.8
10	41.0	41.6	41.8	42.9	39.4	40.1	38.5
11	38.2	40.7	41.6	40.2	38.8	39.4	37.7
12	40.2	39.7	41.1	41.9	38.5	39.0	40.5
13	40.5	39.5	40.7	40.5	39.3	40.9	41.4
14	41.0	40.5	39.5	42.0	40.2	39.6	38.7
15	40.4	39.5	40.4	39.6	39.6	39.9	41.7
16	40.4	41.5	39.7	40.2	40.0	40.6	41.9
17	40.9	38.4	42.3	39.9	41.5	39.9	41.0
18	41.0	39.8	40.9	39.1	41.3	42.2	42.6
19	38.3	41.4	41.4	36.9	41.4	41.5	40.2
20	39.0	40.4	37.5	37.8	40.5	42.0	40.7
21	38.4	41.5	38.7	33.3	39.0	39.9	42.1
22	37.1	40.3	34.7	43.5	41.0	40.5	38.8
23	39.3	38.6	42.5	37.8	41.5	45.4	-
24	38.5	42.1	43.6	-	-	49.6	-
10-12	39.2	40.3	41.3	41.2	38.6	39.2	39.4
14-16	40.4	40.8	40.1	39.1	40.8	40.8	41.8
0-24	40.6	40.5	41.2	40.7	40.3	40.8	41.0

85th %ile (ALL): 40.7
Weekday Inter-Peak: 40.2

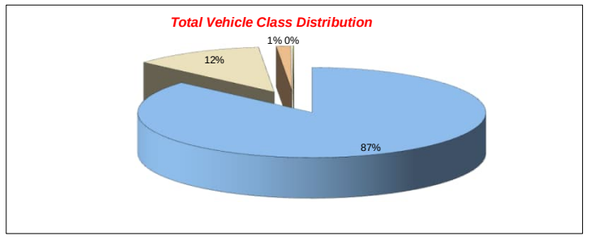
Channel 1 - rthwestbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-30	105	107	73	86	104	112	97
30-40	510	544	374	303	507	539	574
40-50	104	116	87	69	91	115	119
50+	2	1	4	2	1	3	3
TOTAL	721	768	538	460	703	769	793



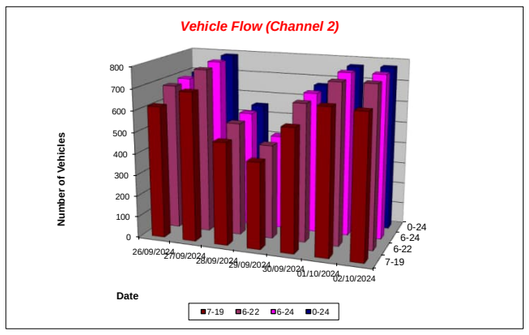
Channel 1 - Northwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	570	70	13	0	653
6-22	610	80	14	0	706
6-24	631	80	14	0	713
0-24	655	87	14	0	721
27/09/2024					
7-19	680	88	18	1	699
6-22	647	95	8	1	751
6-24	665	96	9	1	762
0-24	683	96	9	1	769
28/09/2024					
7-19	413	48	6	1	468
6-22	459	51	6	1	517
6-24	473	52	6	1	528
0-24	477	54	6	1	538
29/09/2024					
7-19	368	39	1	0	408
6-22	400	42	1	0	449
6-24	409	42	1	0	452
0-24	415	43	1	0	460
30/09/2024					
7-19	523	88	13	0	632
6-22	579	99	12	0	690
6-24	586	98	12	0	696
0-24	593	99	13	0	705
01/10/2024					
7-19	585	85	10	1	681
6-22	644	96	10	1	753
6-24	649	99	10	1	759
0-24	658	99	10	2	769
02/10/2024					
7-19	584	87	10	1	682
6-22	669	100	10	1	780
6-24	674	100	10	1	792
0-24	681	101	10	1	793
Average					
7-19	523	77	9	1	603
6-22	574	80	9	1	664
6-24	587	81	9	1	679
0-24	587	82	9	1	679



Channel 2 - theastbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	2	3	3	4	0	0	3	2	2
2	1	1	0	1	2	0	0	1	1
3	0	2	3	0	0	0	0	0	1
4	0	2	1	1	1	0	2	1	1
5	0	0	0	1	0	1	0	0	0
6	2	1	1	0	5	2	1	2	2
7	5	4	1	0	9	6	3	5	4
8	25	25	7	8	26	31	21	26	20
9	48	52	13	17	52	54	61	53	42
10	38	58	28	18	24	50	44	43	37
11	49	41	43	39	34	40	25	38	39
12	34	47	57	33	41	45	49	43	44
13	51	45	60	41	56	52	44	50	50
14	39	51	37	40	46	41	47	45	43
15	46	59	50	50	57	64	73	60	57
16	77	109	43	46	56	78	69	78	68
17	82	81	61	55	70	70	70	75	70
18	74	84	33	35	74	97	92	84	70
19	54	42	47	22	36	52	70	51	46
20	27	28	27	16	26	24	39	29	27
21	24	22	10	5	23	33	31	27	21
22	11	20	13	16	16	14	15	15	15
23	6	9	10	3	11	12	11	10	9
24	2	4	5	2	5	3	3	3	3
7-19	617	694	479	404	572	674	665	644	586
6-22	688	768	530	441	646	751	753	720	653
6-24	695	781	545	446	662	766	787	734	666
0-24	697	788	552	456	670	769	773	739	672



Channel 2 - utheastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	29.5	31.1	33.2	29.9	-	-	28.1
2	31.9	34.1	-	28.8	29.7	-	-
3	-	-	-	30.2	31.8	-	-
4	-	34.8	25.1	33.7	31.2	-	37.2
5	-	-	-	36.0	-	43.5	-
6	40.0	29.2	34.7	-	32.8	29.7	20.8
7	36.4	35.5	35.2	-	31.6	32.3	35.0
8	33.9	33.2	33.0	35.1	31.3	32.4	33.5
9	33.0	32.5	30.7	32.8	31.5	31.6	31.7
10	32.2	31.8	29.6	30.2	33.3	31.7	31.2
11	32.4	30.9	31.6	29.9	31.1	30.8	29.6
12	30.6	31.4	31.6	32.7	32.5	29.6	29.6
13	31.2	32.0	32.0	29.9	30.0	31.1	29.4
14	31.1	31.1	32.3	31.1	30.0	30.4	32.6
15	31.7	32.1	33.1	32.3	31.2	30.7	31.3
16	30.9	31.3	30.6	31.4	32.7	32.5	32.7
17	32.8	32.0	31.9	32.4	32.8	33.2	33.0
18	33.2	32.5	32.8	31.4	33.0	34.0	34.1
19	32.1	33.0	31.2	31.6	33.1	32.9	32.3
20	29.8	30.0	32.8	29.7	31.0	30.9	31.2
21	31.4	28.9	30.4	30.3	30.3	31.8	31.9
22	29.7	31.9	29.8	29.2	33.3	32.1	32.4
23	30.7	35.5	33.5	29.6	31.3	30.8	31.7
24	29.5	35.5	32.1	29.6	36.0	36.0	36.2
10-12	31.6	31.2	31.8	31.3	31.5	30.1	29.6
14-16	31.3	31.6	32.5	31.8	31.9	31.5	32.0
0-24	32.0	31.8	31.8	31.3	31.8	31.9	31.8

Average (ALL): 31.8
Weekday Inter-Peak: 31.4

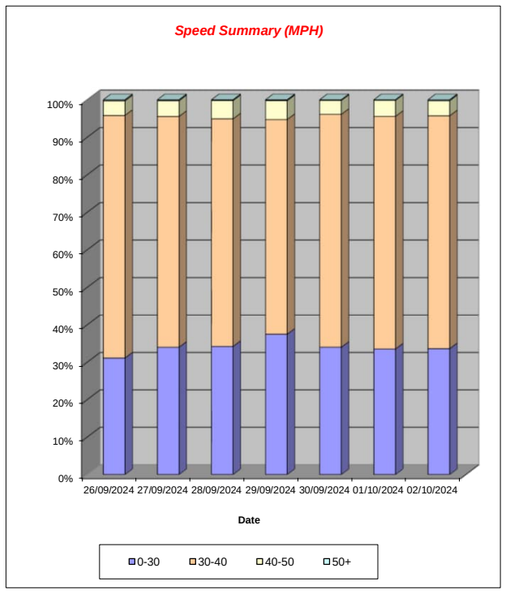
Channel 2 - utheastbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	31.7	34.2	40.1	33.1	-	-	29.1
2	-	-	-	-	34.1	-	-
3	-	-	36.0	34.1	-	-	-
4	-	36.3	-	-	-	-	37.4
5	-	-	-	-	-	-	-
6	43.1	-	-	-	37.6	36.0	-
7	39.7	37.6	-	-	36.8	36.2	37.4
8	37.8	38.3	37.8	38.5	35.7	37.7	38.3
9	37.4	37.3	36.5	38.5	37.0	37.6	37.0
10	36.8	38.5	34.2	38.8	38.3	37.3	35.8
11	39.2	35.6	36.8	37.3	36.8	36.3	35.6
12	35.3	36.1	36.4	38.2	36.7	34.8	34.9
13	37.6	38.0	38.6	35.7	34.5	35.4	35.6
14	36.8	36.3	38.2	36.7	36.0	34.6	36.7
15	36.3	36.7	38.9	37.8	36.0	36.2	35.3
16	35.6	37.2	36.7	38.5	36.8	37.0	37.5
17	37.1	37.9	37.8	37.4	37.0	38.0	38.2
18	38.6	38.7	37.6	35.4	39.1	38.9	37.8
19	37.7	38.4	39.1	35.3	38.2	39.5	38.8
20	35.1	38.3	39.2	35.0	35.9	36.1	37.4
21	37.1	34.3	36.3	34.3	35.0	37.7	37.9
22	35.8	37.6	34.9	34.3	38.6	38.2	37.6
23	37.0	39.4	39.0	35.1	35.4	33.8	36.4
24	38.7	37.6	36.0	31.0	41.4	37.2	46.8
10-12	37.7	35.9	36.6	38.0	36.5	35.6	35.2
14-16	36.8	37.1	38.1	36.8	36.4	36.1	36.5
0-24	37.4	37.6	37.8	37.2	37.0	37.3	37.3

85th %ile (ALL): 37.4
Weekday Inter-Peak: 36.5

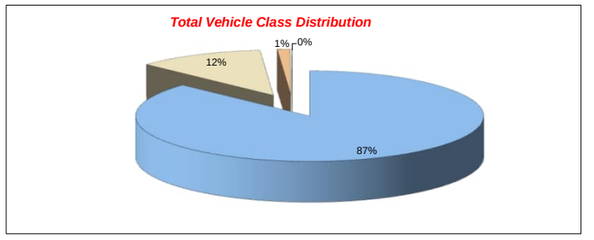
Channel 2 - utheastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-30	217	268	189	171	228	258	260
30-40	451	485	335	261	416	477	480
40-50	27	33	27	23	25	33	31
50+	2	2	1	1	1	1	2
TOTAL	697	788	552	456	670	769	773



Channel 2 - Southeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	531	75	10	1	617
6-22	580	85	10	1	684
6-24	599	85	10	1	692
0-24	601	85	10	1	697
27/09/2024					
7-19	581	92	11	0	684
6-22	661	96	11	0	768
6-24	671	97	11	0	781
0-24	679	98	11	0	788
28/09/2024					
7-19	433	40	6	0	479
6-22	473	45	6	0	530
6-24	488	48	6	0	545
0-24	497	49	6	0	552
29/09/2024					
7-19	372	32	0	0	404
6-22	407	34	0	0	441
6-24	413	34	0	0	446
0-24	422	34	0	0	456
30/09/2024					
7-19	474	91	8	0	572
6-22	540	97	8	0	645
6-24	554	99	8	0	662
0-24	561	100	8	0	670
01/10/2024					
7-19	582	84	8	0	674
6-22	655	90	8	0	751
6-24	667	91	8	0	766
0-24	670	91	8	0	769
02/10/2024					
7-19	568	87	10	0	665
6-22	645	98	10	0	753
6-24	654	99	10	0	767
0-24	662	98	12	1	773
Average					
7-19	507	72	8	0	588
6-22	569	79	8	0	653
6-24	579	79	8	0	668
0-24	585	79	8	0	672



A4244

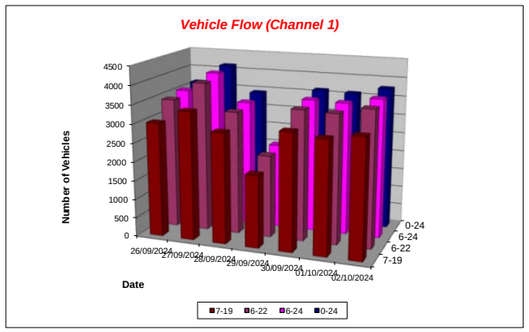
ices Ltd.

Pentir ATC 6, A4244

Produced by Road Data Services Ltd.

Channel 1 - hwestbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	17	18	24	28	19	19	31	21	22
2	18	10	22	27	21	21	23	19	20
3	10	7	12	8	11	6	11	9	9
4	5	11	15	9	6	5	6	7	8
5	5	5	10	12	5	7	6	6	7
6	24	16	16	11	26	24	27	23	21
7	73	57	44	30	61	65	54	62	55
8	189	195	108	50	204	185	189	192	160
9	271	301	179	82	333	281	350	307	257
10	220	203	211	110	225	208	230	217	201
11	205	219	272	136	213	196	217	210	208
12	211	242	352	202	208	215	199	215	233
13	232	232	281	180	211	222	215	222	225
14	197	260	253	185	221	188	216	216	217
15	219	298	285	214	220	221	239	239	243
16	290	369	281	230	252	291	250	290	280
17	402	423	272	244	372	393	378	394	355
18	376	383	223	158	406	379	395	388	331
19	208	264	203	116	223	207	244	229	209
20	166	247	124	100	119	163	254	190	168
21	113	146	85	86	94	118	86	111	104
22	85	111	81	53	89	86	80	90	84
23	60	85	49	41	60	56	58	64	58
24	30	39	34	21	16	30	16	26	27
7-19	3020	3389	2920	1907	3088	2986	3122	3121	2919
6-22	3457	3950	3254	2176	3451	3418	3596	3574	3329
6-24	3547	4078	3337	2236	3527	3504	3670	3664	3414
0-24	3626	4141	3436	2333	3615	3586	3774	3748	3502



Channel 1 - thwestbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	49.9	50.1	49.9	54.3	49.2	50.6	49.1
2	48.8	55.6	52.5	51.0	48.6	47.0	47.7
3	52.9	57.9	52.1	55.0	53.3	50.1	51.6
4	52.7	55.2	49.7	51.7	51.3	52.1	54.0
5	57.9	54.1	59.4	53.5	59.4	55.4	57.4
6	50.4	53.8	50.7	57.0	50.5	48.4	51.0
7	51.5	51.1	51.3	52.7	52.4	50.8	51.7
8	49.9	51.2	50.4	51.2	50.4	49.7	51.0
9	47.8	48.5	48.9	49.8	47.2	47.6	47.4
10	47.0	48.8	48.3	50.6	45.8	47.6	46.0
11	47.1	48.7	47.9	47.8	46.6	47.2	46.7
12	47.2	49.6	47.4	47.9	48.0	47.3	47.6
13	47.4	48.6	48.9	49.3	48.1	47.4	48.3
14	48.9	48.7	49.8	49.2	48.3	49.4	48.0
15	49.0	48.0	48.6	49.7	47.5	49.3	46.9
16	47.7	47.8	48.5	49.3	45.8	47.5	45.4
17	47.2	48.6	49.7	50.2	45.5	47.4	45.8
18	47.9	49.4	50.9	48.7	47.1	47.9	47.1
19	47.9	49.9	50.4	49.6	49.4	47.9	49.5
20	46.8	47.7	51.1	48.0	47.9	46.6	48.3
21	46.0	45.6	51.1	47.5	48.1	46.9	47.6
22	48.5	47.1	50.0	45.8	48.6	49.3	48.6
23	49.2	48.0	50.8	49.0	51.8	49.1	50.6
24	49.8	52.4	51.6	50.5	50.1	49.9	49.3
10-12	47.1	49.2	47.8	47.5	47.3	47.3	47.1
14-16	48.3	47.8	48.5	48.1	48.9	48.3	48.2
0-24	47.9	48.8	49.3	49.3	47.6	48.0	47.6

Mean (ALL): 48.3
Weekday Inter-Peak: 47.6

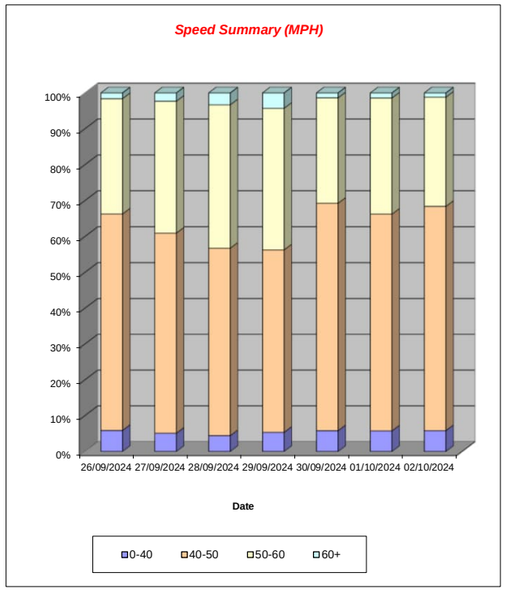
Channel 1 - thwestbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	54.6	57.3	57.7	62.6	53.8	54.7	53.2
2	54.7	64.7	63.1	56.6	55.4	51.8	53.8
3	63.1	65.9	60.7	61.5	63.2	57.5	60.3
4	56.0	64.7	54.6	59.3	54.9	55.8	57.4
5	65.6	59.1	70.5	62.5	66.3	59.9	62.9
6	57.2	63.9	57.3	66.9	58.6	54.1	58.0
7	59.0	58.9	59.5	62.9	59.6	56.8	58.9
8	55.8	57.3	55.5	57.9	56.1	56.4	56.7
9	53.6	54.0	54.8	55.4	52.6	54.0	52.7
10	52.7	55.3	53.4	58.0	51.5	53.5	52.1
11	52.7	54.3	54.6	54.3	51.9	52.7	52.2
12	52.1	55.5	53.7	54.8	53.6	52.0	52.9
13	53.6	54.2	54.5	55.5	53.1	53.7	53.4
14	54.6	54.6	56.2	54.7	53.6	55.0	53.8
15	55.7	53.5	55.4	56.3	52.9	55.5	52.5
16	52.9	53.5	54.8	55.2	52.9	52.7	52.8
17	52.8	54.3	55.5	56.7	51.9	52.7	52.3
18	53.6	54.7	56.9	54.4	51.9	53.7	52.0
19	53.8	55.7	56.2	57.1	54.2	53.9	54.8
20	53.9	54.2	57.7	54.5	54.0	53.6	54.1
21	52.0	52.9	59.1	54.0	54.5	53.3	54.0
22	55.0	53.1	56.3	52.3	54.3	55.9	53.6
23	56.2	54.4	59.5	56.5	59.0	55.7	58.0
24	57.6	61.3	57.5	56.5	56.5	57.4	55.4
10-12	52.4	55.0	54.1	54.6	52.5	52.4	52.5
14-16	54.3	53.6	55.1	55.1	53.0	54.1	52.8
0-24	54.0	54.9	55.8	56.0	53.6	54.0	53.6

85th %ile (ALL): 54.5
Weekday Inter-Peak: 53.5

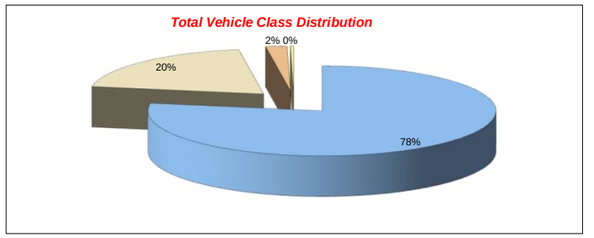
Channel 1 - thwestbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	213	211	152	125	210	206	220
40-50	2190	2313	1798	1188	2294	2169	2361
50-60	1165	1521	1372	920	1061	1160	1148
60+	58	96	114	100	50	51	45
TOTAL	3626	4141	3436	2333	3615	3586	3774



Channel 1 - Southwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	2292	650	66	12	3020
6-22	2641	735	69	12	3457
6-24	2711	748	78	13	3547
0-24	2777	783	73	13	3626
27/09/2024					
7-19	2965	729	83	12	3389
6-22	3013	832	91	15	3950
6-24	3113	853	94	15	4074
0-24	3161	880	96	15	4141
28/09/2024					
7-19	2334	530	56	6	2920
6-22	2600	588	53	6	3254
6-24	2678	603	50	6	3337
0-24	2740	636	54	6	3436
29/09/2024					
7-19	1552	335	17	3	1907
6-22	1762	393	19	3	2176
6-24	1811	403	20	3	2236
0-24	1877	430	23	3	2333
30/09/2024					
7-19	2371	632	73	13	3088
6-22	2654	708	77	12	3451
6-24	2723	714	77	13	3527
0-24	2771	730	83	13	3615
01/10/2024					
7-19	2304	604	66	12	2986
6-22	2657	680	68	13	3418
6-24	2726	693	69	14	3504
0-24	2787	712	73	14	3586
02/10/2024					
7-19	2392	640	78	12	3122
6-22	2763	740	81	12	3596
6-24	2828	749	83	11	3670
0-24	2906	769	85	14	3774
Average					
7-19	2258	589	62	10	2919
6-22	2585	668	69	11	3329
6-24	2655	681	69	11	3414
0-24	2720	701	69	11	3502



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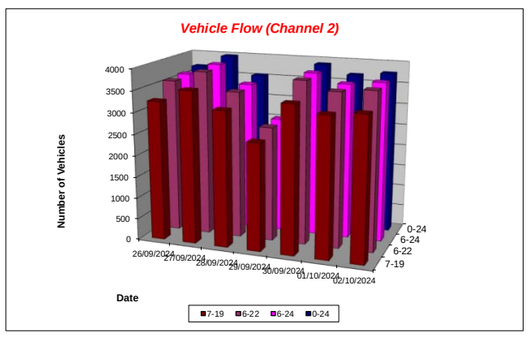
ices Ltd.

Pentir ATC 6, A4244

Produced by Road Data Services Ltd.

Channel 2 - theastbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	5	4	26	19	7	7	9	6	11
2	8	5	11	5	9	9	6	7	8
3	5	2	8	8	6	6	7	5	6
4	6	12	4	6	5	7	6	7	7
5	13	12	7	7	12	14	10	12	11
6	33	48	26	15	36	31	32	36	31
7	102	95	29	26	114	105	110	105	83
8	285	263	76	25	292	262	288	278	213
9	402	390	233	81	396	422	400	402	332
10	237	267	275	172	324	226	325	276	261
11	235	293	329	310	258	237	250	255	273
12	249	246	289	299	246	237	249	245	259
13	195	222	299	302	204	207	190	204	231
14	202	266	304	285	217	189	205	216	238
15	249	347	318	248	220	262	220	260	266
16	305	342	271	241	315	303	283	310	294
17	387	338	283	244	413	372	370	376	344
18	309	342	272	169	340	320	329	328	297
19	196	231	207	124	191	196	203	203	192
20	107	124	124	69	133	108	118	118	112
21	70	43	63	42	74	80	64	66	62
22	55	30	51	27	49	57	56	49	46
23	27	32	22	12	28	24	31	28	25
24	7	20	19	11	7	7	7	10	11
7-19	3250	3547	3156	2500	3416	3233	3312	3352	3202
6-22	3588	3839	3423	2664	3786	3583	3660	3690	3506
6-24	3618	3897	3446	2687	3821	3614	3688	3728	3542
0-24	3688	3974	3545	2747	3896	3688	3768	3803	3615



Channel 2 - ortheastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	45.1	43.4	45.0	46.3	44.1	45.1	44.9
2	45.8	47.7	47.9	45.6	44.3	45.4	43.5
3	51.8	47.1	49.5	50.1	55.1	55.2	55.0
4	45.1	44.6	53.8	50.7	44.6	45.5	44.4
5	46.4	52.8	45.1	45.1	44.3	45.3	43.4
6	51.8	48.6	47.4	46.9	53.1	50.8	52.3
7	47.2	46.2	43.4	45.9	47.1	47.0	47.0
8	46.8	46.1	47.5	43.0	46.6	46.7	46.8
9	45.5	45.7	44.3	44.8	45.2	45.5	45.5
10	45.9	44.8	44.7	42.7	44.4	46.2	44.7
11	44.8	44.3	45.2	43.7	43.9	45.4	43.7
12	44.3	44.8	44.7	44.3	45.0	44.3	45.2
13	44.8	44.3	45.7	44.3	44.5	44.7	44.6
14	46.7	44.9	43.8	44.5	44.9	46.1	44.7
15	45.8	44.7	44.3	43.8	46.4	45.8	46.8
16	44.0	44.7	43.8	43.9	44.6	43.9	44.2
17	44.9	44.7	44.4	42.8	43.2	45.1	43.2
18	45.8	44.6	44.2	43.8	45.0	45.7	44.9
19	43.7	45.3	44.9	44.2	46.3	43.6	46.2
20	42.6	43.8	43.3	42.5	46.4	42.7	45.8
21	40.9	44.3	43.6	41.3	45.9	41.5	45.5
22	42.3	45.2	43.7	41.9	45.0	41.6	45.3
23	45.9	40.6	45.1	46.2	49.2	44.8	48.5
24	50.4	42.5	45.4	41.1	45.5	46.3	43.9
10-12	44.5	44.5	45.0	44.0	44.5	44.8	44.5
14-16	44.8	44.7	44.0	43.7	45.3	44.9	45.2
0-24	45.2	44.9	44.6	43.9	45.2	45.2	45.2

Average (ALL): 44.9
Weekday Inter-Peak: 44.8

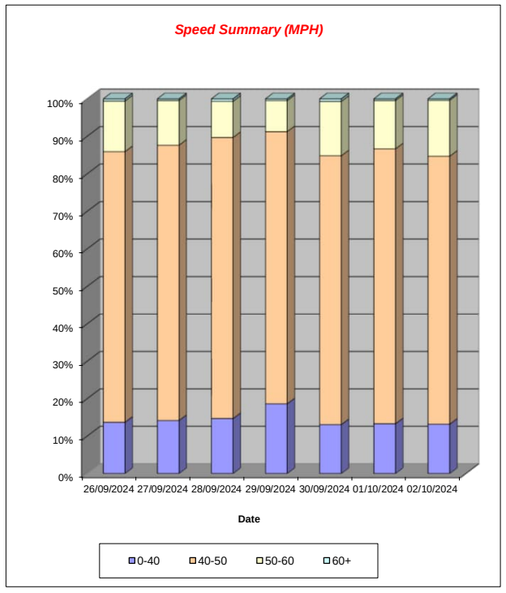
Channel 2 - ortheastbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	48.9	46.1	52.6	51.2	47.8	47.7	49.1
2	51.2	50.8	56.3	47.8	49.2	50.1	45.6
3	56.3	48.0	59.6	60.4	59.0	60.5	58.5
4	50.4	52.7	65.6	56.7	50.4	50.4	48.3
5	53.7	61.6	49.5	52.1	49.5	50.2	48.1
6	57.9	54.7	54.2	58.5	59.8	56.4	58.1
7	53.9	53.3	50.0	53.7	53.7	52.8	53.1
8	52.2	51.3	54.7	48.7	51.7	51.8	51.8
9	50.6	50.5	49.2	49.3	50.4	50.4	50.6
10	50.8	50.1	49.8	47.6	49.5	51.1	49.6
11	50.2	49.6	50.0	48.1	49.6	51.0	49.0
12	49.5	50.0	49.6	49.4	50.7	49.1	51.4
13	50.2	49.2	50.5	49.2	49.9	50.3	49.8
14	53.0	49.6	49.0	49.5	50.2	51.8	50.0
15	51.1	49.3	49.6	49.4	52.2	50.7	52.3
16	50.1	50.2	50.0	49.9	51.1	49.6	50.3
17	49.8	51.6	50.3	48.0	50.3	50.0	50.4
18	51.1	49.7	50.0	50.3	50.5	51.1	50.5
19	48.5	50.9	50.1	50.0	52.3	48.7	51.7
20	48.0	50.5	50.3	48.5	53.4	48.1	51.6
21	45.6	52.3	49.9	48.1	52.6	46.6	52.3
22	47.5	51.2	51.7	47.4	55.6	47.0	55.0
23	52.9	47.5	50.9	52.6	55.9	49.6	54.6
24	59.1	48.9	50.3	47.2	51.0	50.9	48.1
10-12	49.8	49.8	49.8	48.8	50.2	50.2	50.4
14-16	50.8	49.8	49.7	49.7	51.7	50.1	51.3
0-24	50.8	50.5	50.2	49.4	51.3	50.6	51.1

85th %ile (ALL): 50.6
Weekday Inter-Peak: 50.4

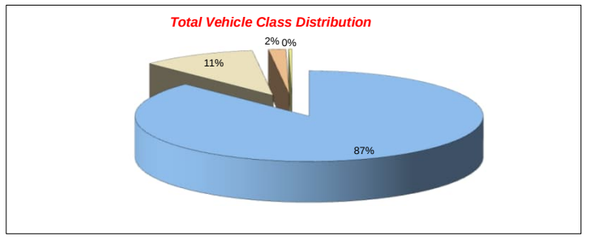
Channel 2 - ortheastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	505	563	521	512	510	491	497
40-50	2663	2920	2659	1995	2795	2705	2694
50-60	497	473	341	227	564	475	562
60+	23	18	24	13	27	17	15
TOTAL	3688	3974	3545	2747	3896	3688	3768



Channel 2 - Northeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	2746	422	71	11	3250
6-22	3053	447	72	12	3584
6-24	3085	454	73	12	3618
0-24	3132	456	76	14	3688
27/09/2024					
7-19	3125	380	54	8	3567
6-22	3388	384	53	9	3839
6-24	3442	392	54	9	3891
0-24	3500	396	58	12	3974
28/09/2024					
7-19	2867	247	35	7	3156
6-22	3113	256	40	8	3423
6-24	3168	258	40	8	3464
0-24	3230	266	41	8	3545
29/09/2024					
7-19	2303	165	28	4	2500
6-22	2451	177	31	4	2664
6-24	2473	178	31	4	2687
0-24	2531	179	32	4	2747
30/09/2024					
7-19	2867	458	61	10	3416
6-22	3220	493	63	10	3786
6-24	3276	499	64	10	3821
0-24	3317	507	67	10	3896
01/10/2024					
7-19	2753	402	66	12	3233
6-22	3073	430	67	13	3583
6-24	3096	433	67	13	3614
0-24	3162	439	71	16	3688
02/10/2024					
7-19	2817	432	56	7	3312
6-22	3133	461	60	8	3660
6-24	3184	464	60	8	3698
0-24	3226	467	64	11	3768
Average					
7-19	2785	355	53	8	3202
6-22	3083	378	56	9	3506
6-24	3135	381	56	9	3542
0-24	3160	386	59	11	3615



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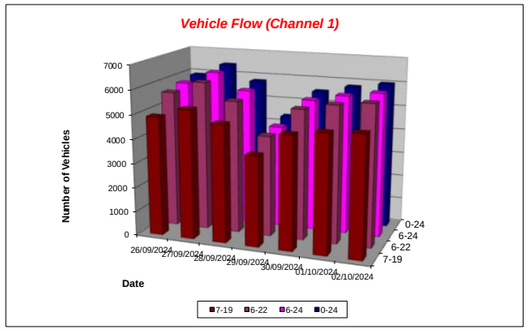
ices Ltd.

Pentir ATC 7, A5

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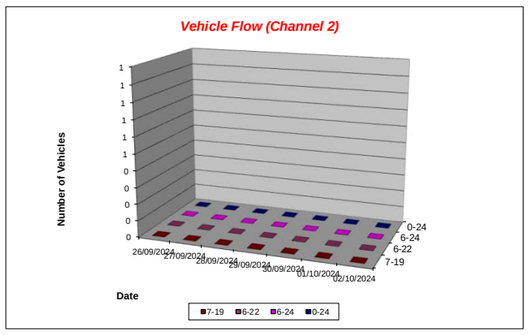
Channel 1 - /heastbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	25	30	51	48	15	17	22	22	30
2	28	13	23	21	13	18	14	17	19
3	6	11	19	15	8	11	5	8	11
4	10	7	18	13	6	7	9	8	10
5	11	11	14	20	9	3	12	9	11
6	35	40	28	17	40	46	46	41	36
7	76	85	48	25	90	91	113	91	75
8	187	180	95	44	192	199	194	190	156
9	323	350	292	148	338	334	338	337	303
10	322	342	394	281	327	327	344	332	334
11	321	407	440	292	311	313	278	326	337
12	316	386	456	388	331	357	324	343	365
13	391	386	461	434	317	370	365	366	389
14	368	444	494	412	379	359	383	387	406
15	426	500	465	367	431	380	409	429	425
16	501	582	445	445	478	469	519	510	491
17	628	660	458	403	557	638	673	631	574
18	671	624	471	266	614	724	649	656	574
19	450	443	354	220	372	364	443	414	378
20	278	325	250	177	281	350	316	310	282
21	223	236	188	146	199	197	275	226	209
22	154	182	145	96	120	133	142	146	139
23	123	128	110	41	67	55	84	91	87
24	34	54	73	34	26	41	46	40	44
7-19	4904	5304	4825	3700	4647	4834	4919	4922	4733
6-22	5635	6132	5456	4144	5337	5605	5785	5695	5439
6-24	5792	6314	5636	4218	5430	5701	5894	5826	5570
0-24	5907	6426	5792	4353	5521	5803	6003	5932	5686



Channel 2 - /hwestbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	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	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
7-19	0	0	0	0	0	0	0	0	0
6-22	0	0	0	0	0	0	0	0	0
6-24	0	0	0	0	0	0	0	0	0
0-24	0	0	0	0	0	0	0	0	0



Pentir ATC 7, A5

Produced by Road Data Services Ltd.

Channel 1 - utheastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	44.3	45.9	44.4	47.3	43.9	42.0	45.8
2	42.0	48.0	45.0	49.5	46.0	39.1	43.2
3	45.1	46.9	49.7	46.3	45.3	46.6	47.4
4	47.3	45.6	50.5	50.5	48.9	44.6	43.4
5	45.8	46.5	44.3	46.5	46.0	46.8	40.0
6	45.6	46.3	47.5	47.3	45.2	42.3	45.4
7	45.1	45.1	41.9	45.6	43.5	46.2	45.3
8	44.3	43.2	44.0	43.7	43.6	42.5	43.5
9	42.9	43.0	43.2	42.9	42.8	42.9	43.3
10	42.2	42.3	42.8	43.3	42.2	41.9	42.1
11	41.9	42.0	42.6	42.2	42.2	41.8	41.8
12	42.1	42.7	41.8	42.3	42.7	42.0	42.6
13	41.9	42.8	43.0	43.0	42.5	42.5	42.1
14	42.2	42.6	43.0	43.1	41.9	41.8	41.8
15	42.0	41.9	43.0	43.4	41.8	43.2	42.2
16	42.1	42.2	42.9	42.8	42.3	42.9	42.2
17	42.7	43.5	43.7	43.0	41.9	42.7	43.1
18	42.3	43.3	43.1	43.9	43.5	42.8	43.3
19	42.6	43.5	43.7	42.9	44.0	43.7	43.4
20	44.2	43.9	44.1	42.9	43.2	42.2	43.5
21	43.2	43.6	45.2	43.0	43.2	44.2	44.9
22	43.7	44.6	45.4	41.6	44.4	44.3	43.5
23	44.0	45.1	45.8	43.6	43.6	43.9	44.0
24	47.1	46.0	49.5	42.0	44.9	45.3	43.8
10-12	42.0	42.4	42.7	42.3	42.4	41.8	42.2
14-16	42.1	42.1	42.8	43.1	42.1	43.1	42.2
0-24	42.7	43.1	43.4	43.1	42.8	42.8	42.9

Mean (ALL):	43.0
Weekday Inter-Peak:	42.2

Channel 1 - utheastbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	53.5	53.5	50.2	55.1	49.3	48.0	55.2
2	49.0	53.0	53.6	59.7	54.6	46.0	52.3
3	52.2	52.6	57.0	55.6	50.7	53.2	55.8
4	53.2	57.5	56.5	59.3	52.4	49.2	55.1
5	54.2	53.9	53.8	53.3	57.0	53.6	48.6
6	55.4	52.8	55.9	57.6	53.4	50.3	53.6
7	53.0	52.6	48.6	54.6	52.3	53.5	51.8
8	52.0	50.3	50.3	53.1	50.3	49.0	49.3
9	49.3	49.9	50.3	49.8	48.6	48.4	50.1
10	48.6	48.4	49.9	51.3	48.2	48.6	48.3
11	48.2	48.5	49.1	48.2	48.4	47.9	48.0
12	47.6	48.7	48.5	49.9	48.5	48.6	49.2
13	48.0	49.2	49.2	49.5	49.0	48.4	48.9
14	48.0	49.5	49.1	49.8	47.4	48.8	48.7
15	48.4	47.7	50.0	50.9	47.7	50.1	47.8
16	47.5	47.9	49.5	49.5	48.1	49.5	48.7
17	48.3	49.5	50.4	49.2	47.2	49.1	49.1
18	47.7	50.2	49.5	51.0	49.2	48.7	49.3
19	49.4	50.4	50.2	50.3	51.7	50.3	49.9
20	50.9	51.5	51.6	50.0	49.3	49.2	50.8
21	50.1	50.4	53.2	51.0	51.7	51.0	52.0
22	50.6	51.6	52.7	47.9	51.7	52.4	51.4
23	50.9	51.5	53.1	50.6	50.2	51.5	52.3
24	54.0	51.9	60.2	50.0	51.9	54.2	51.0
10-12	47.9	48.7	48.8	49.3	48.4	48.3	48.6
14-16	47.9	47.9	49.7	50.1	47.9	49.8	48.3
0-24	49.0	49.7	50.3	50.3	49.1	49.4	49.5

85th %ile (ALL):	49.6
Weekday Inter-Peak:	48.3

Channel 2 - /hwestbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	-	-					-
2	-	-					-
3	-	-					-
4	-	-					-
5	-	-					-
6	-	-					-
7	-	-					-
8	-	-					-
9	-	-					-
10	-	-					-
11	-	-					-
12	-	-					-
13	-	-					-
14	-	-					-
15	-	-					-
16	-	-					-
17	-	-					-
18	-	-					-
19	-	-					-
20	-	-					-
21	-	-					-
22	-	-					-
23	-	-					-
24	-	-					-
10-12							
14-16							
0-24	-	-					-

Average (ALL):	-
Weekday Inter-Peak:	-

Channel 2 - /rthwestbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	-	-					-
2	-	-					-
3	-	-					-
4	-	-					-
5	-	-					-
6	-	-					-
7	-	-					-
8	-	-					-
9	-	-					-
10	-	-					-
11	-	-					-
12	-	-					-
13	-	-					-
14	-	-					-
15	-	-					-
16	-	-					-
17	-	-					-
18	-	-					-
19	-	-					-
20	-	-					-
21	-	-					-
22	-	-					-
23	-	-					-
24	-	-					-
10-12							
14-16							
0-24	-	-					-

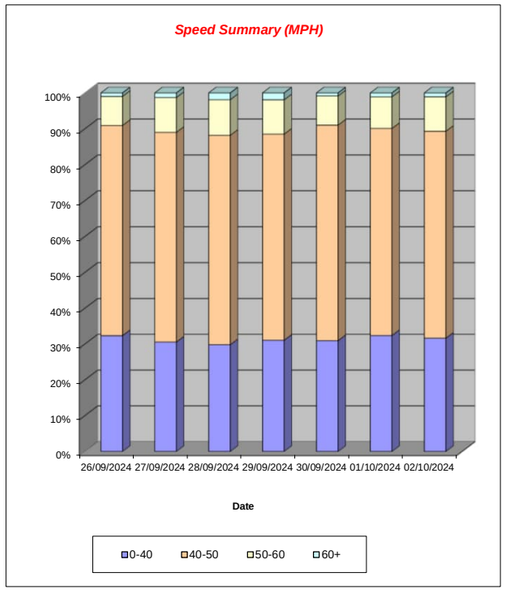
85th %ile (ALL):	-
Weekday Inter-Peak:	-

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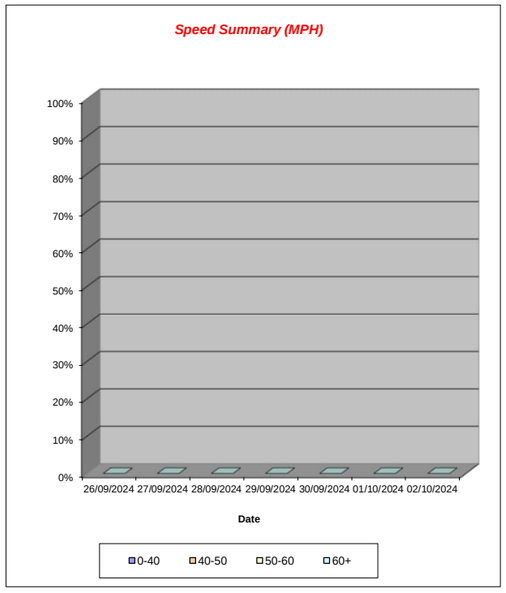
Channel 1 - utheastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	1911	1963	1727	1352	1709	1880	1899
40-50	3460	3757	3381	2501	3316	3348	3463
50-60	478	623	574	416	448	511	575
60+	58	83	110	84	48	64	66
TOTAL	5907	6426	5792	4353	5521	5803	6003



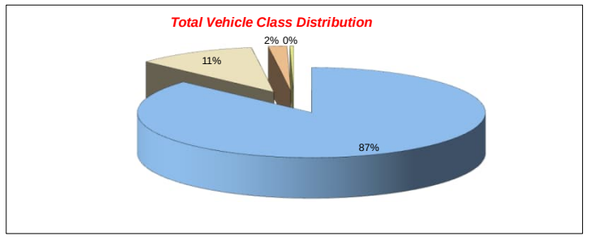
Channel 2 - /rthwestbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	0	0	0	0	0	0	0
40-50	0	0	0	0	0	0	0
50-60	0	0	0	0	0	0	0
60+	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0



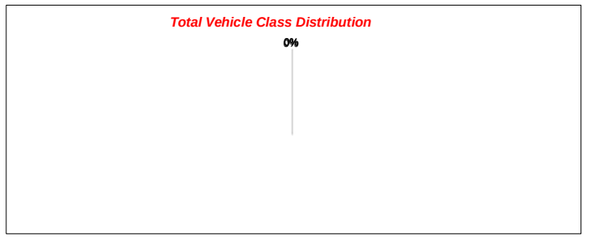
Channel 1 - Southeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	4192	599	98	15	4904
6-22	4843	667	108	17	5635
6-24	4995	671	109	17	5792
0-24	5083	687	115	22	5907
27/09/2024					
7-19	4540	633	108	18	5304
6-22	5273	723	118	18	6132
6-24	5441	736	124	13	6314
0-24	5578	740	124	18	6426
28/09/2024					
7-19	4349	412	56	8	4825
6-22	4927	456	65	8	5456
6-24	5098	467	67	8	5639
0-24	5225	487	70	10	5792
29/09/2024					
7-19	3359	302	33	6	3700
6-22	3766	330	38	8	4144
6-24	3818	340	50	8	4218
0-24	3953	358	39	8	4353
30/09/2024					
7-19	3963	574	85	15	4647
6-22	4578	637	108	14	5337
6-24	4666	643	104	17	5430
0-24	4738	666	110	17	5521
01/10/2024					
7-19	4091	621	101	21	4834
6-22	4783	690	109	23	5605
6-24	4874	693	113	23	5701
0-24	4947	711	115	30	5803
02/10/2024					
7-19	4114	682	102	21	4919
6-22	4875	750	115	45	5785
6-24	4956	759	119	60	5894
0-24	5082	772	119	30	6003
Average					
7-19	4098	548	84	15	4733
6-22	4721	608	94	16	5439
6-24	4837	614	94	17	5570
0-24	4937	631	98	20	5686



Channel 2 - Northwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
27/09/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
28/09/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
29/09/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
30/09/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
01/10/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
02/10/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
Average					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0



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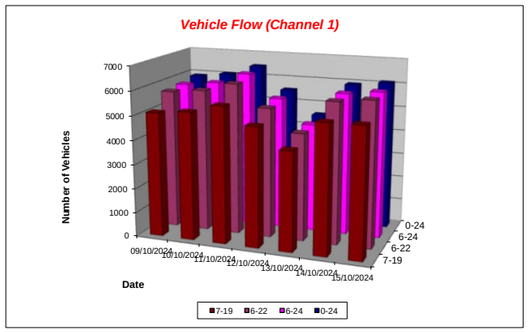
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Channel 1 - hwestbound — Vehicle Flow — Week 1

Hr Ending	09/10/2024 Wednesday	10/10/2024 Thursday	11/10/2024 Friday	12/10/2024 Saturday	13/10/2024 Sunday	14/10/2024 Monday	15/10/2024 Tuesday	Weekday Average	Average
1	17	15	9	32	24	5	7	11	16
2	7	8	4	10	23	6	7	6	9
3	12	2	6	9	11	2	4	5	7
4	9	11	6	7	8	7	9	8	8
5	19	25	21	19	14	18	16	20	19
6	70	75	51	24	22	72	71	68	55
7	174	145	142	64	34	150	174	157	126
8	517	515	452	181	98	486	484	491	390
9	728	740	714	297	176	712	788	736	594
10	482	525	508	426	288	471	504	498	458
11	344	301	370	465	406	374	356	349	374
12	378	355	365	468	381	355	336	358	377
13	365	368	377	504	502	375	355	368	407
14	357	339	425	487	427	397	379	379	402
15	320	390	449	419	405	362	362	377	387
16	415	476	546	460	417	466	452	471	462
17	426	457	534	455	394	428	479	465	453
18	452	446	496	414	331	463	461	464	438
19	329	328	348	317	239	373	317	339	321
20	187	226	236	177	160	169	232	210	198
21	109	153	134	98	89	128	121	129	119
22	132	85	107	86	65	72	131	105	97
23	44	49	79	69	34	37	42	50	51
24	18	35	100	55	22	16	17	37	38
7-19	5113	5240	5584	4893	4064	5262	5273	5294	5061
6-22	5716	5849	6203	5318	4412	5781	5931	5896	5601
6-24	5771	5931	6285	5442	4468	5834	5990	5983	5689
0-24	5911	6069	6479	5543	4570	5944	6104	6101	5803



Channel 1 - rthwestbound — Average Speed — Week 1

Hr Ending	09/10/2024 Wednesday	10/10/2024 Thursday	11/10/2024 Friday	12/10/2024 Saturday	13/10/2024 Sunday	14/10/2024 Monday	15/10/2024 Tuesday
1	39.5	41.6	43.8	45.6	46.1	42.1	47.1
2	43.9	47.0	45.4	40.1	49.5	45.6	43.0
3	37.7	45.8	46.3	45.0	48.7	47.3	45.5
4	46.7	48.6	52.3	52.8	46.6	51.8	51.9
5	42.9	45.3	47.8	46.8	47.1	47.9	47.0
6	43.2	45.2	46.1	43.9	46.6	45.2	46.0
7	42.2	39.6	44.1	45.0	46.5	42.9	43.0
8	40.0	36.4	42.9	43.8	45.2	40.8	40.6
9	38.4	31.3	39.0	43.5	46.4	39.6	38.4
10	40.0	33.7	40.3	42.8	44.5	40.5	40.1
11	42.1	33.7	42.2	42.4	43.0	42.3	38.5
12	40.5	35.1	41.1	41.4	42.7	41.4	39.7
13	39.9	37.9	42.5	42.2	42.3	42.2	40.5
14	39.7	38.5	42.4	42.0	43.4	43.3	41.5
15	40.4	37.8	42.4	43.3	43.7	42.9	41.1
16	40.4	39.4	42.0	42.7	43.8	42.1	42.1
17	40.6	42.6	41.8	41.8	43.7	43.1	40.5
18	40.7	42.2	43.5	43.4	44.7	42.0	41.8
19	40.8	43.5	42.5	43.7	42.6	42.3	39.8
20	39.3	40.8	41.7	42.3	42.0	42.1	35.3
21	42.5	42.6	44.4	45.1	42.3	43.0	36.0
22	39.9	45.5	43.7	45.7	43.8	43.2	38.2
23	43.2	45.9	45.4	43.2	43.9	46.6	35.1
24	39.6	44.5	41.4	43.8	44.1	47.0	35.9
10-12	41.3	34.5	41.8	41.9	42.8	41.6	39.1
14-16	40.4	38.7	42.3	43.0	43.7	42.8	41.7
0-24	40.3	38.0	42.0	42.8	43.6	41.9	40.1

Mean (ALL): 41.1
Weekday Inter-Peak: 40.5

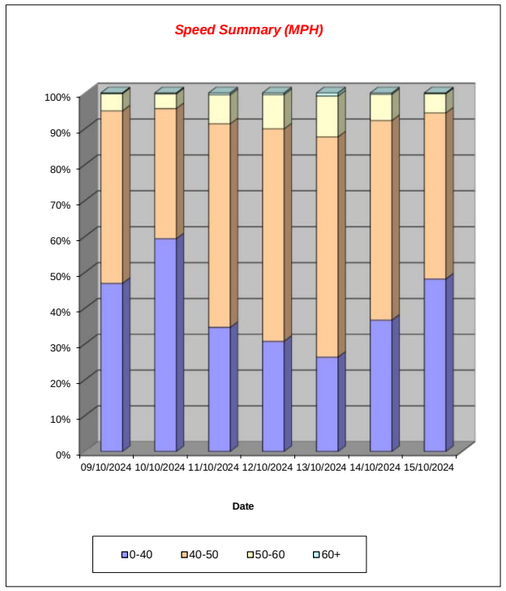
Channel 1 - rthwestbound — 85th Percentile

Hr Ending	09/10/2024 Wednesday	10/10/2024 Thursday	11/10/2024 Friday	12/10/2024 Saturday	13/10/2024 Sunday	14/10/2024 Monday	15/10/2024 Tuesday
1	47.7	48.7	50.8	51.1	51.5	51.5	59.0
2	51.0	54.1	49.7	47.2	55.5	52.1	47.9
3	47.2	49.2	53.0	49.8	54.8	49.7	51.8
4	53.2	56.3	56.1	62.8	54.6	60.0	67.5
5	51.3	54.6	57.3	56.1	56.5	54.7	54.2
6	50.2	52.0	53.8	51.3	51.7	51.3	53.8
7	48.3	47.0	51.6	51.9	55.6	50.0	49.4
8	45.7	42.9	49.0	49.4	51.2	48.1	46.8
9	45.1	41.2	47.6	50.0	53.5	46.0	45.5
10	46.0	41.0	46.9	48.8	50.4	47.3	46.4
11	48.1	41.9	48.6	48.2	49.7	47.8	45.8
12	47.5	41.6	48.0	47.8	49.6	47.9	47.4
13	46.4	45.1	48.7	48.6	48.8	47.6	46.3
14	46.1	45.2	49.3	47.5	49.7	49.0	48.6
15	47.3	44.0	48.4	49.3	49.7	48.8	47.0
16	46.7	46.3	49.2	48.7	49.0	48.1	47.8
17	47.4	48.6	48.6	48.8	49.0	50.2	46.7
18	48.1	48.9	49.9	49.7	51.2	49.3	48.2
19	47.5	49.5	49.3	49.5	49.7	49.1	46.5
20	46.3	47.5	48.1	48.1	48.7	48.4	41.9
21	48.5	49.7	50.8	51.5	49.5	49.8	42.6
22	45.5	53.3	50.3	52.9	51.3	49.5	46.2
23	50.3	52.6	52.1	49.7	50.3	54.2	42.9
24	50.0	52.0	47.0	51.1	50.2	56.8	43.0
10-12	47.9	41.9	48.3	48.0	49.6	48.0	46.7
14-16	46.8	45.4	48.9	48.1	49.3	48.3	47.5
0-24	46.9	46.4	49.0	49.1	50.1	48.6	47.1

85th %ile (ALL): 48.3
Weekday Inter-Peak: 47.5

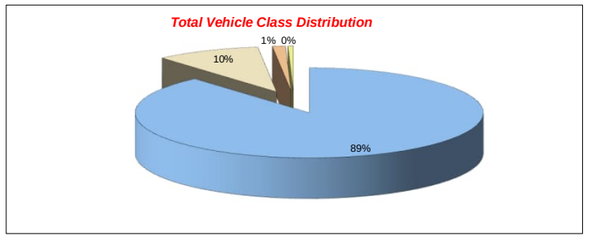
Channel 1 - rthwestbound — Speed Summary — Week 1

Speed (MPH)	09/10/2024 Wednesday	10/10/2024 Thursday	11/10/2024 Friday	12/10/2024 Saturday	13/10/2024 Sunday	14/10/2024 Monday	15/10/2024 Tuesday
0-40	2775	3605	2246	1706	1204	2181	2941
40-50	2840	2200	3676	3282	2806	3306	2822
50-60	283	248	522	528	520	434	327
60+	13	16	35	27	40	23	14
TOTAL	5911	6069	6479	5543	4570	5944	6104



Channel 1 - Northwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
09/10/2024					
7-19	4484	544	61	24	5113
6-22	5043	581	60	30	5715
6-24	5095	585	60	31	5771
0-24	5209	610	69	29	5911
10/10/2024					
7-19	4591	560	52	32	5240
6-22	5143	606	68	34	5849
6-24	5277	611	63	34	5931
0-24	5374	630	70	35	6069
11/10/2024					
7-19	4887	581	80	36	5584
6-22	5452	622	90	39	6203
6-24	5611	639	93	39	6382
0-24	5692	655	93	39	6479
12/10/2024					
7-19	4503	333	48	9	4893
6-22	4886	369	53	10	5318
6-24	5041	378	53	10	5482
0-24	5089	391	54	10	5543
13/10/2024					
7-19	3732	293	22	11	4064
6-22	4068	312	23	11	4412
6-24	4113	314	24	11	4462
0-24	4207	321	27	11	4570
14/10/2024					
7-19	4552	590	78	42	5262
6-22	5023	627	86	45	5781
6-24	5075	634	87	46	5834
0-24	5155	656	87	46	5944
15/10/2024					
7-19	4561	605	79	28	5273
6-22	5143	661	92	35	5931
6-24	5198	663	93	36	5990
0-24	5294	680	95	35	6104
Average					
7-19	4473	502	61	29	5061
6-22	4965	540	68	29	5601
6-24	5049	549	70	30	5689
0-24	5139	564	71	29	5803

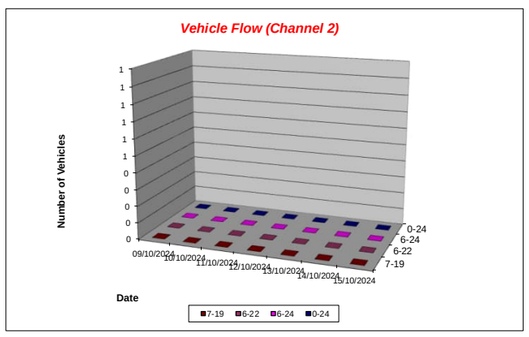


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Channel 2 - theastbound — Vehicle Flow — Week 1

Hr Ending	09/10/2024 Wednesday	10/10/2024 Thursday	11/10/2024 Friday	12/10/2024 Saturday	13/10/2024 Sunday	14/10/2024 Monday	15/10/2024 Tuesday	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	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
7-19	0	0	0	0	0	0	0	0	0
6-22	0	0	0	0	0	0	0	0	0
6-24	0	0	0	0	0	0	0	0	0
0-24	0	0	0	0	0	0	0	0	0



Channel 2 - >utheastbound — Average Speed — Week 1

Hr Ending	09/10/2024 Wednesday	10/10/2024 Thursday	11/10/2024 Friday	12/10/2024 Saturday	13/10/2024 Sunday	14/10/2024 Monday	15/10/2024 Tuesday
1	-	-					-
2	-	-					-
3	-	-					-
4	-	-					-
5	-	-					-
6	-	-					-
7	-	-					-
8	-	-					-
9	-	-					-
10	-	-					-
11	-	-					-
12	-	-					-
13	-	-					-
14	-	-					-
15	-	-					-
16	-	-					-
17	-	-					-
18	-	-					-
19	-	-					-
20	-	-					-
21	-	-					-
22	-	-					-
23	-	-					-
24	-	-					-
10-12							-
14-16							-
0-24							-

Average (ALL): -
Weekday Inter-Peak: -

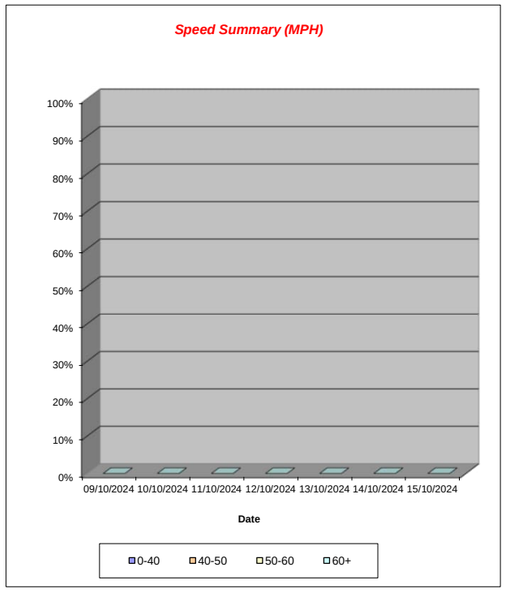
Channel 2 - >utheastbound — 85th Percentile

Hr Ending	09/10/2024 Wednesday	10/10/2024 Thursday	11/10/2024 Friday	12/10/2024 Saturday	13/10/2024 Sunday	14/10/2024 Monday	15/10/2024 Tuesday
1	-	-					-
2	-	-					-
3	-	-					-
4	-	-					-
5	-	-					-
6	-	-					-
7	-	-					-
8	-	-					-
9	-	-					-
10	-	-					-
11	-	-					-
12	-	-					-
13	-	-					-
14	-	-					-
15	-	-					-
16	-	-					-
17	-	-					-
18	-	-					-
19	-	-					-
20	-	-					-
21	-	-					-
22	-	-					-
23	-	-					-
24	-	-					-
10-12							-
14-16							-
0-24							-

85th %ile (ALL): -
Weekday Inter-Peak: -

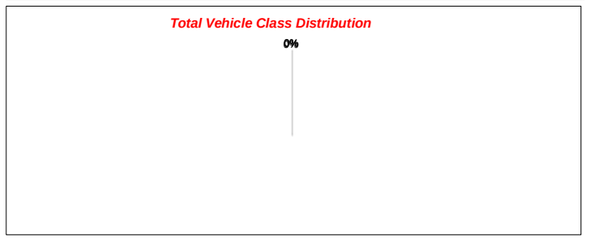
Channel 2 - >utheastbound — Speed Summary — Week 1

Speed (MPH)	09/10/2024 Wednesday	10/10/2024 Thursday	11/10/2024 Friday	12/10/2024 Saturday	13/10/2024 Sunday	14/10/2024 Monday	15/10/2024 Tuesday
0-40	0	0	0	0	0	0	0
40-50	0	0	0	0	0	0	0
50-60	0	0	0	0	0	0	0
60+	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0



Channel 2 - Southeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
09/10/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
10/10/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
11/10/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
12/10/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
13/10/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
14/10/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
15/10/2024					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0
Average					
7-19	0	0	0	0	0
6-22	0	0	0	0	0
6-24	0	0	0	0	0
0-24	0	0	0	0	0



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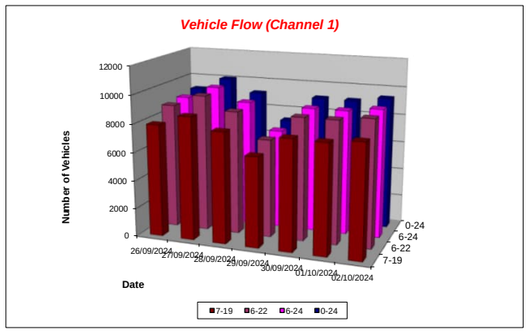
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Produced by Road Data Services Ltd.

Channel 1 - hwestbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	28	22	64	66	39	33	25	29	40
2	37	24	41	37	18	21	39	28	31
3	16	17	28	39	18	23	29	21	24
4	17	22	25	18	29	23	25	23	23
5	40	43	31	34	48	34	36	40	38
6	86	105	51	45	112	100	129	106	90
7	280	274	113	65	260	296	289	280	225
8	744	693	256	163	643	757	743	716	571
9	1074	1038	518	261	1077	1063	1117	1074	878
10	656	681	608	529	741	688	709	695	659
11	574	653	728	700	614	584	549	595	629
12	608	627	784	680	616	587	596	607	643
13	586	629	750	783	617	582	572	597	646
14	573	688	820	723	594	544	577	595	646
15	615	750	776	650	591	594	582	626	651
16	672	818	688	595	630	628	699	689	676
17	743	770	703	521	684	633	687	703	677
18	643	749	673	447	559	666	643	652	626
19	445	587	540	306	422	410	509	475	460
20	288	354	390	257	326	321	347	327	326
21	170	198	192	141	168	178	174	178	174
22	144	139	168	103	136	153	165	147	144
23	80	103	112	62	79	90	94	89	89
24	53	71	90	39	54	53	48	56	58
7-19	7933	8683	7844	6358	7788	7736	7983	8025	7761
6-22	8815	9648	8707	6924	8678	8684	8958	8957	8631
6-24	8946	9827	8976	7025	8811	8827	9106	9102	8777
0-24	9172	10055	9146	7264	9075	9061	9383	9349	9023



Channel 1 - rthwestbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	28.2	28.8	27.2	29.0	26.1	24.0	23.8
2	24.8	26.4	27.4	29.7	27.5	22.9	21.9
3	29.1	26.9	30.6	28.2	25.0	22.6	21.9
4	26.6	26.1	27.5	27.7	27.8	24.9	24.2
5	26.6	28.2	29.6	28.3	26.3	25.7	26.0
6	26.8	27.6	25.1	27.1	27.5	26.0	26.8
7	26.7	27.0	27.2	27.8	26.8	26.6	26.5
8	25.7	26.1	28.0	27.9	25.9	25.5	26.1
9	24.9	24.8	26.6	26.8	24.1	24.1	24.0
10	25.9	25.8	26.2	26.6	24.9	24.8	25.0
11	25.7	25.3	25.8	25.9	24.9	24.5	25.3
12	25.0	25.6	25.4	26.0	25.0	24.6	25.3
13	25.0	25.5	25.9	26.2	24.7	24.8	25.4
14	26.0	25.8	25.5	25.7	24.6	25.1	25.6
15	25.5	25.8	26.0	26.5	25.3	25.1	25.8
16	25.5	25.6	26.5	26.4	25.2	25.3	25.4
17	25.7	25.7	26.1	26.4	25.7	25.7	26.0
18	25.9	26.4	26.6	27.3	26.1	26.0	26.2
19	25.7	26.4	26.9	27.2	25.4	24.8	25.2
20	26.7	26.6	27.3	27.5	20.4	22.0	21.5
21	27.4	26.9	28.2	27.8	24.0	23.2	24.1
22	27.0	27.8	28.2	27.4	23.6	23.9	23.6
23	27.5	28.3	27.8	27.8	27.9	23.9	23.6
24	26.7	27.0	27.9	27.4	22.6	25.4	25.4
10-12	25.3	25.4	25.8	26.0	24.9	24.8	25.3
14-16	25.8	25.7	26.2	26.5	25.3	25.2	25.6
0-24	25.7	25.9	26.4	26.6	25.0	24.9	25.2

Mean (ALL): 25.6
Weekday Inter-Peak: 25.3

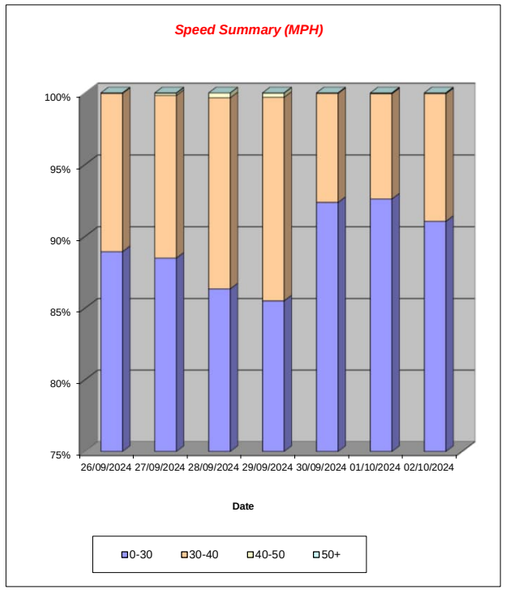
Channel 1 - rthwestbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	35.4	35.4	31.7	33.9	31.4	29.3	28.8
2	30.1	31.4	33.2	37.3	32.0	29.1	27.6
3	35.7	32.0	36.9	33.4	30.5	26.7	27.8
4	31.5	31.2	32.9	33.0	33.1	28.9	30.0
5	31.3	32.8	34.0	33.4	31.1	29.3	31.5
6	31.7	31.8	30.3	31.6	31.6	31.1	31.4
7	31.1	30.9	32.1	32.1	31.5	31.2	31.6
8	30.3	30.1	32.5	33.1	30.0	29.6	30.2
9	29.5	29.4	30.9	31.4	28.6	28.5	28.7
10	30.2	30.5	30.2	30.5	29.1	29.0	29.1
11	30.1	29.7	29.8	29.8	29.5	28.9	29.4
12	29.4	30.3	29.9	30.2	29.5	29.3	29.4
13	29.4	30.0	30.0	30.2	28.9	28.7	29.7
14	30.1	30.0	29.8	29.8	28.8	29.2	29.7
15	29.8	30.0	30.5	30.8	29.1	29.3	30.1
16	29.6	29.9	30.4	30.6	29.4	29.4	29.7
17	29.8	30.1	30.6	30.5	29.7	29.8	30.1
18	30.1	30.6	30.7	31.7	30.0	30.4	30.3
19	30.1	30.5	31.2	31.3	29.7	29.7	29.8
20	31.1	31.4	31.9	31.8	26.0	26.3	26.7
21	31.9	31.1	33.1	32.0	28.5	28.6	28.7
22	31.6	32.3	33.3	32.0	28.8	28.7	29.0
23	32.5	32.9	32.8	32.0	28.6	28.4	28.8
24	32.7	31.4	32.8	32.6	27.6	29.5	29.9
10-12	29.7	30.0	29.8	30.1	29.5	29.1	29.4
14-16	29.8	30.0	30.4	30.3	29.3	29.3	29.8
0-24	30.1	30.3	30.8	30.9	29.5	29.3	29.7

85th %ile (ALL): 30.1
Weekday Inter-Peak: 29.6

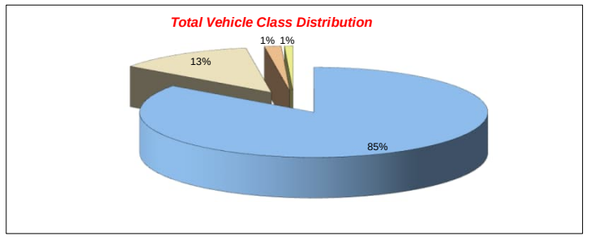
Channel 1 - rthwestbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-30	8158	8899	7898	6212	8383	8392	8544
30-40	1011	1138	1217	1030	689	664	834
40-50	3	16	31	21	3	5	5
50+	0	2	0	1	0	0	0
TOTAL	9172	10055	9146	7264	9075	9061	9383



Channel 1 - Northwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	6580	1139	147	67	7933
6-22	7338	1237	161	81	8815
6-24	7462	1245	164	89	8948
0-24	7621	1284	171	96	9172
27/09/2024					
7-19	7359	1134	142	51	8683
6-22	8173	1254	158	59	9648
6-24	8339	1264	164	60	9822
0-24	8610	1296	168	75	10055
28/09/2024					
7-19	6931	796	90	27	7844
6-22	7705	871	94	33	8707
6-24	7886	892	96	34	8909
0-24	8072	928	101	40	9146
29/09/2024					
7-19	5681	599	58	20	6358
6-22	6194	648	64	20	6924
6-24	6284	669	65	21	7025
0-24	6487	681	72	24	7264
30/09/2024					
7-19	6481	1116	128	58	7786
6-22	7253	1210	148	68	8678
6-24	7371	1224	154	68	8811
0-24	7571	1270	156	72	9070
01/10/2024					
7-19	6459	1083	126	74	7736
6-22	7256	1204	137	87	8684
6-24	7405	1212	143	90	8827
0-24	7565	1252	148	96	9061
02/10/2024					
7-19	6599	1174	137	73	7983
6-22	7431	1288	157	82	8958
6-24	7593	1293	165	84	9106
0-24	7791	1329	167	96	9383
Average					
7-19	6585	1008	117	53	7781
6-22	7338	1103	131	61	8631
6-24	7486	1113	134	63	8777
0-24	7662	1148	140	71	9022

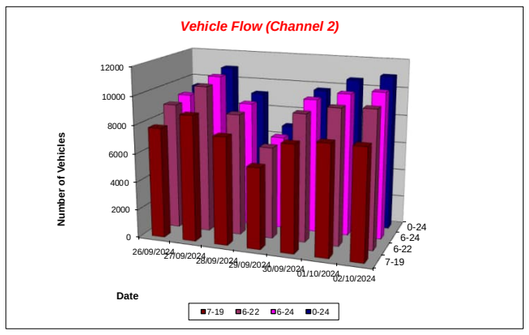


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Produced by Road Data Services Ltd.

Channel 2 - theastbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	48	54	96	88	35	138	223	100	97
2	62	30	56	53	34	68	91	57	58
3	17	22	37	32	20	65	56	36	36
4	23	30	37	31	20	51	75	40	38
5	23	30	25	43	28	72	86	48	44
6	82	86	53	35	86	158	134	109	91
7	180	198	128	70	177	182	213	190	164
8	395	435	242	116	382	374	404	398	335
9	573	668	518	253	584	632	622	616	550
10	568	585	614	398	550	564	572	568	550
11	551	670	705	453	539	545	470	555	562
12	525	653	759	582	557	608	569	582	608
13	656	665	719	640	590	604	619	627	642
14	584	707	696	601	628	583	606	622	629
15	626	803	730	550	639	572	599	648	646
16	761	906	712	668	716	731	756	774	750
17	969	1068	681	638	835	911	968	950	867
18	962	947	670	433	911	1013	939	954	839
19	603	726	523	365	567	623	630	630	577
20	422	618	376	300	481	737	664	584	514
21	319	399	275	247	474	484	590	453	398
22	233	312	227	148	357	389	432	345	309
23	194	211	173	92	289	301	347	268	230
24	76	98	117	65	211	190	313	178	153
7-19	7773	8833	7569	5697	7498	7760	7754	7924	7555
6-22	8927	10369	8575	6462	8987	9552	9653	9496	8931
6-24	9187	10669	8865	6619	9487	10043	10313	9942	9313
0-24	9452	10921	9169	6901	9710	10595	10978	10331	9675



Channel 2 - ›utheastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	29.4	29.4	29.7	31.3	28.6	27.4	26.6
2	27.8	29.5	29.8	29.7	28.6	27.5	28.1
3	30.6	31.2	29.3	29.0	27.9	28.4	28.5
4	31.2	30.4	30.5	29.8	29.7	28.6	27.8
5	31.3	32.8	30.7	31.1	28.4	29.2	28.6
6	29.2	31.4	31.7	29.9	28.1	27.7	29.4
7	30.0	30.0	31.2	30.3	30.2	30.2	30.2
8	29.1	28.4	29.7	29.4	28.3	28.6	28.5
9	27.5	27.9	29.3	29.4	28.0	28.0	27.8
10	27.7	28.2	28.7	28.9	27.9	27.1	27.9
11	27.6	27.4	27.8	28.1	27.7	27.9	27.9
12	27.5	28.0	27.2	27.5	28.0	27.5	27.9
13	27.4	28.1	28.2	28.1	27.7	27.8	27.5
14	28.4	28.0	27.7	28.0	27.1	27.5	27.3
15	28.1	27.1	28.0	28.4	26.9	27.5	27.8
16	27.5	27.2	27.4	28.2	27.6	27.5	27.6
17	26.8	27.5	28.5	28.4	27.3	27.3	27.3
18	27.4	28.2	28.4	28.9	27.4	26.9	27.9
19	28.3	28.6	28.5	28.6	27.7	26.6	28.4
20	28.7	28.3	28.6	27.8	25.5	26.0	26.1
21	28.4	28.4	29.2	28.0	26.7	27.0	26.7
22	29.2	29.2	29.9	27.9	26.8	27.0	26.7
23	29.7	29.2	29.4	28.6	26.6	27.4	26.6
24	29.9	30.2	30.3	29.8	27.0	28.2	28.1
10-12	27.5	27.7	27.9	27.8	27.9	27.7	27.9
14-16	27.8	27.6	27.7	28.1	27.3	27.3	27.5
0-24	27.9	28.1	28.4	28.4	27.4	27.4	27.6

Average (ALL): 27.9
Weekday Inter-Peak: 27.6

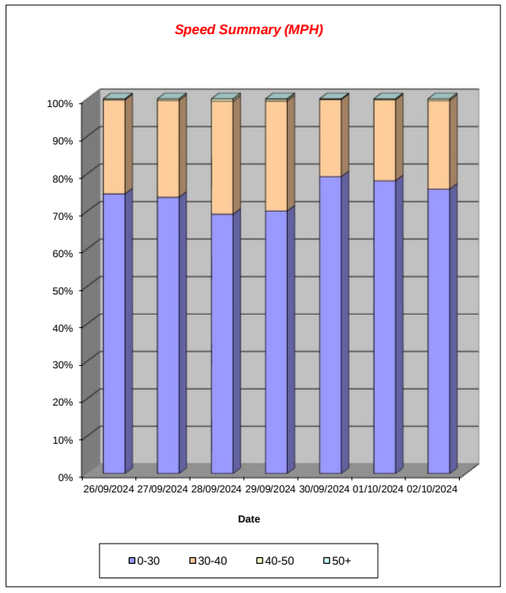
Channel 2 - ›utheastbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	34.5	34.2	33.6	37.4	33.0	32.1	31.4
2	32.1	34.3	34.5	35.4	33.2	32.1	33.2
3	33.9	35.4	33.2	34.8	33.1	32.7	33.7
4	35.7	35.6	34.8	34.2	34.9	32.3	31.2
5	36.2	37.7	35.2	37.0	33.6	34.2	33.4
6	34.1	36.5	36.5	34.5	33.7	33.2	34.7
7	34.6	34.5	36.6	34.9	34.8	34.8	35.0
8	33.3	32.8	33.8	33.7	32.2	32.8	32.9
9	31.9	32.1	33.3	33.7	31.7	32.0	32.4
10	31.6	32.0	32.9	33.2	32.2	31.4	31.9
11	31.4	31.6	32.1	32.6	31.9	32.0	31.9
12	31.8	32.1	31.2	31.9	32.2	31.2	32.1
13	31.5	32.6	32.6	32.2	31.6	31.8	31.8
14	32.6	32.6	32.6	32.1	31.1	31.6	31.7
15	32.3	31.6	32.3	32.5	31.4	32.0	32.2
16	31.5	31.4	31.7	32.4	31.3	31.7	31.9
17	31.3	31.9	33.0	32.5	31.2	31.5	31.8
18	31.5	32.9	32.6	33.1	31.2	31.4	32.4
19	32.3	32.6	33.0	33.1	31.6	31.3	32.5
20	33.1	32.1	32.7	32.1	30.6	30.7	30.9
21	32.0	32.2	33.0	32.4	31.2	31.4	31.5
22	33.5	33.6	33.0	32.6	30.7	31.6	31.1
23	33.8	33.7	34.1	33.9	30.9	32.0	31.0
24	35.2	34.9	35.4	34.8	31.8	33.2	32.4
10-12	31.5	31.9	31.8	32.3	32.1	31.6	32.0
14-16	31.8	31.4	32.1	32.4	31.3	31.6	31.9
0-24	32.2	32.5	32.8	32.8	31.6	31.8	32.1

85th %ile (ALL): 32.3
Weekday Inter-Peak: 31.8

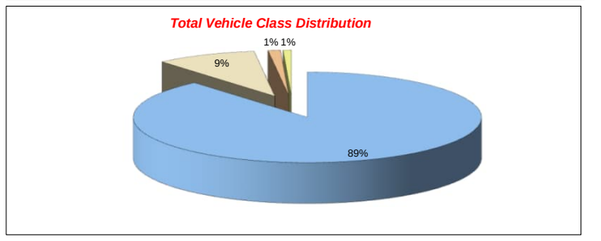
Channel 2 - ›utheastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-30	7057	8055	6349	4838	7696	8280	8335
30-40	2367	2818	2761	2022	1997	2286	2591
40-50	28	47	59	36	16	28	51
50+	0	1	0	5	1	1	1
TOTAL	9452	10921	9169	6901	9710	10595	10978



Channel 2 - Southeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	6848	801	82	42	7773
6-22	7894	894	89	50	8827
6-24	8165	903	93	56	9197
0-24	8352	937	98	61	9452
27/09/2024					
7-19	7872	798	117	46	8833
6-22	9296	877	135	52	10360
6-24	9585	893	137	52	10669
0-24	9790	939	141	61	10931
28/09/2024					
7-19	6881	589	64	35	7569
6-22	7831	636	69	39	8575
6-24	8104	648	70	40	8865
0-24	8373	676	76	44	9169
29/09/2024					
7-19	5242	411	29	15	5697
6-22	5953	459	38	12	6462
6-24	6092	478	38	11	6619
0-24	6335	503	35	18	6901
30/09/2024					
7-19	6844	748	82	43	7498
6-22	7927	844	94	72	8987
6-24	8407	884	102	94	9487
0-24	8587	920	111	92	9710
01/10/2024					
7-19	6842	812	70	31	7760
6-22	8436	972	89	55	9552
6-24	8873	994	98	78	10043
0-24	9313	1056	111	115	10595
02/10/2024					
7-19	6489	1075	140	50	7754
6-22	8190	1216	167	81	9653
6-24	8614	1243	169	80	10312
0-24	9360	1303	188	127	10978
Average					
7-19	6688	747	82	37	7555
6-22	7941	843	96	52	8931
6-24	8266	882	101	61	9313
0-24	8588	903	111	73	9675



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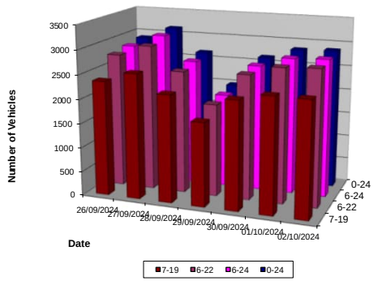
Pentir ATC 9, B4547

Produced by Road Data Services Ltd.

Channel 1 - /heastbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	6	9	16	23	1	4	6	5	9
2	5	6	6	5	5	5	3	5	5
3	2	1	7	5	3	4	1	2	3
4	5	5	12	11	1	2	1	3	5
5	6	3	9	4	3	6	5	5	5
6	38	21	8	6	24	25	29	27	22
7	43	44	23	13	40	39	49	43	36
8	138	154	76	40	123	135	122	134	113
9	151	182	110	61	158	147	153	158	137
10	139	131	141	84	133	157	160	144	135
11	121	190	189	127	138	127	144	144	148
12	171	190	205	171	140	147	141	158	166
13	176	212	233	191	177	160	166	178	188
14	192	161	205	198	164	180	179	175	183
15	207	229	194	212	212	209	199	211	209
16	249	314	242	240	231	248	241	257	252
17	305	293	236	198	281	325	323	305	280
18	306	285	229	108	294	344	327	311	270
19	211	232	151	92	176	182	201	200	178
20	163	172	121	71	123	145	168	154	138
21	128	125	91	57	125	120	137	127	112
22	69	80	75	39	48	89	77	73	68
23	46	66	41	23	25	32	33	40	38
24	19	35	35	12	14	14	9	18	20
7-19	2366	2573	2211	1722	2227	2361	2356	2377	2258
6-22	2768	2994	2521	1902	2563	2754	2787	2773	2613
6-24	2831	3066	2597	1937	2602	2800	2824	2832	2670
0-24	2895	3140	2655	1991	2639	2846	2874	2879	2720

Vehicle Flow (Channel 1)



Pentir ATC 9, B4547

Produced by Road Data Services Ltd.

Channel 1 - utheastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	41.9	38.4	39.3	42.0	50.0	40.0	39.2
2	37.0	36.2	40.6	36.2	36.0	39.9	41.5
3	29.5	44.8	41.0	41.8	40.6	47.8	47.0
4	35.1	40.3	40.5	40.2	36.3	52.6	38.8
5	36.4	36.6	41.9	38.1	37.6	46.8	42.1
6	38.8	42.2	40.5	38.5	42.7	39.4	42.9
7	39.7	39.5	37.4	38.8	38.9	40.0	41.7
8	38.5	35.5	39.2	42.0	40.8	36.8	40.3
9	35.6	36.1	39.4	39.2	39.8	39.5	41.3
10	35.2	38.1	37.0	38.8	38.9	37.9	37.7
11	34.2	38.4	36.8	38.4	36.3	37.2	36.9
12	36.1	38.3	38.4	38.4	37.7	37.6	38.3
13	36.9	36.9	37.5	39.2	36.7	39.0	37.7
14	35.6	36.6	39.7	37.9	38.3	38.0	38.1
15	34.5	37.9	38.6	38.1	37.3	36.7	38.6
16	36.1	34.8	38.4	38.3	35.0	38.0	38.8
17	32.5	38.1	38.8	38.4	35.4	37.9	37.4
18	35.8	38.0	39.2	38.6	36.6	39.3	39.9
19	35.2	38.3	39.8	37.2	38.8	38.4	39.6
20	35.7	36.8	38.3	38.2	38.0	37.6	37.8
21	37.5	37.1	40.8	40.2	39.8	39.5	38.2
22	37.0	36.7	38.7	40.4	37.7	40.2	38.7
23	39.8	37.7	40.9	41.0	38.4	40.2	40.3
24	38.7	39.9	42.5	41.7	40.8	40.3	46.9
10-12	35.2	38.3	37.8	38.4	37.6	37.4	37.8
14-16	35.4	36.1	38.5	38.1	38.2	37.8	38.7
0-24	35.7	37.3	38.8	38.6	37.6	38.3	38.8

Mean (ALL): 37.8
Weekday Inter-Peak: 36.9

Channel 1 - utheastbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	47.9	46.9	45.0	48.6	-	45.1	44.6
2	41.8	39.6	45.8	38.1	44.6	44.4	46.6
3	31.1	-	48.7	45.9	42.3	60.8	-
4	40.5	45.1	50.9	45.5	-	53.0	-
5	39.9	40.5	48.6	46.2	42.1	49.4	44.7
6	48.0	48.4	44.3	42.5	48.5	46.2	50.5
7	46.3	44.7	43.8	47.7	45.9	46.7	48.4
8	44.7	42.4	45.2	48.8	47.2	44.5	47.5
9	44.3	41.6	44.9	45.2	46.5	46.0	47.0
10	42.3	45.3	43.6	45.6	44.7	44.2	44.2
11	42.1	44.3	43.8	46.5	43.2	43.5	44.9
12	41.9	44.6	45.0	45.1	44.1	44.0	44.6
13	42.2	43.0	44.3	45.3	43.4	44.8	45.0
14	39.8	43.7	45.8	45.7	43.2	43.9	44.9
15	42.0	43.4	45.0	43.8	44.1	43.3	44.9
16	41.4	43.9	44.3	44.0	43.7	44.4	44.3
17	38.7	44.8	44.8	43.6	42.8	44.5	43.1
18	40.8	43.0	45.9	44.8	45.4	44.4	45.8
19	40.4	43.9	45.7	44.0	43.4	44.5	45.7
20	41.2	43.5	45.6	45.0	43.5	43.6	43.3
21	43.6	43.1	47.7	49.0	46.1	45.3	44.5
22	41.9	42.0	45.9	48.5	44.6	47.2	44.6
23	44.6	45.1	50.2	48.6	46.0	49.9	47.1
24	44.3	50.6	50.8	50.5	49.0	45.5	52.8
10-12	42.1	44.4	44.4	45.7	43.7	43.8	44.8
14-16	41.8	44.1	44.7	43.9	44.0	43.9	44.8
0-24	42.0	44.0	45.4	45.3	44.8	44.7	45.2

85th %ile (ALL): 44.5
Weekday Inter-Peak: 43.9

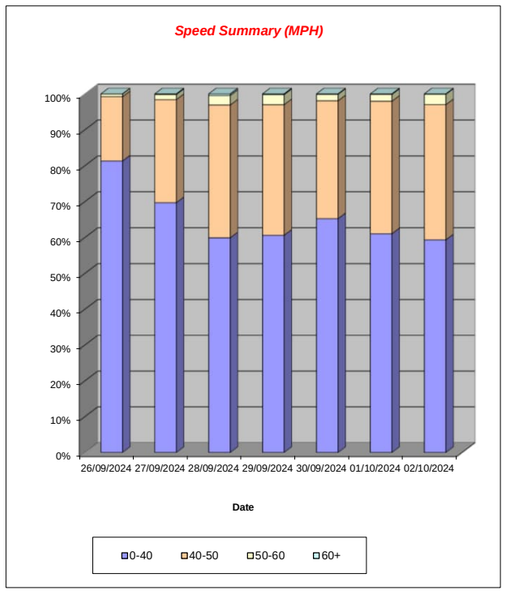
Pentir ATC 9, B4547

Produced by Road Data Services Ltd.

Channel 1 - utheastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	2354	2189	1591	1207	1722	1738	1706
40-50	518	901	982	724	866	1050	1082
50-60	22	45	70	56	48	54	83
60+	1	5	12	4	3	4	3
TOTAL	2895	3140	2655	1991	2639	2846	2874

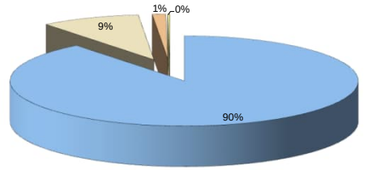
Speed Summary (MPH)



Channel 1 - Southeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	2077	237	48	4	2366
6-22	2452	263	48	4	2769
6-24	2511	267	48	4	2833
0-24	2565	277	48	4	2895
27/09/2024					
7-19	2233	278	52	5	2753
6-22	2653	300	33	6	2994
6-24	2748	304	34	7	3095
0-24	2780	312	36	7	3140
28/09/2024					
7-19	2012	171	25	3	2211
6-22	2301	191	24	4	2521
6-24	2379	199	25	4	2597
0-24	2418	207	25	4	2655
29/09/2024					
7-19	1581	128	12	1	1722
6-22	1741	138	14	1	1902
6-24	1781	139	16	1	1937
0-24	1834	142	14	1	1991
30/09/2024					
7-19	1941	240	38	8	2227
6-22	2253	268	38	4	2563
6-24	2291	267	38	4	2602
0-24	2323	269	37	4	2639
01/10/2024					
7-19	2089	241	28	5	2361
6-22	2464	258	26	6	2754
6-24	2508	261	26	6	2800
0-24	2548	265	27	6	2846
02/10/2024					
7-19	2069	231	46	10	2356
6-22	2457	273	47	10	2787
6-24	2498	278	43	10	2829
0-24	2535	280	49	10	2874
Average					
7-19	2006	218	33	5	2259
6-22	2333	242	33	5	2613
6-24	2395	244	34	5	2670
0-24	2431	250	34	5	2720

Total Vehicle Class Distribution



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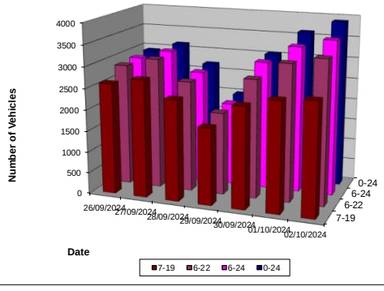
Pentir ATC 9, B4547

Produced by Road Data Services Ltd.

Channel 2 - /hwestbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	5	2	14	13	1	78	105	38	31
2	2	5	0	3	0	11	14	5	5
3	1	1	5	3	0	11	14	5	5
4	0	0	5	5	0	12	25	7	7
5	6	3	4	6	4	32	43	18	14
6	24	19	11	8	29	46	47	33	26
7	45	52	20	14	57	48	65	53	43
8	226	185	78	51	197	225	218	210	169
9	360	350	130	83	356	398	419	377	299
10	234	224	196	125	201	235	219	223	205
11	186	221	217	185	166	175	202	190	193
12	180	190	231	211	192	149	184	179	191
13	187	180	224	235	161	169	154	170	187
14	185	199	233	199	170	191	184	186	194
15	203	292	229	200	187	209	218	222	220
16	195	242	225	190	202	194	225	212	210
17	256	222	225	119	208	240	229	231	214
18	201	220	215	111	187	220	186	203	191
19	188	228	162	87	139	153	184	178	163
20	114	140	110	64	117	260	274	181	154
21	50	65	60	32	127	181	225	130	106
22	53	55	39	26	112	145	168	107	85
23	20	22	32	8	122	146	132	88	69
24	8	20	27	14	105	81	131	69	55
7-19	2601	2753	2365	1796	2366	2558	2622	2580	2437
6-22	2863	3065	2594	1932	2779	3192	3354	3051	2826
6-24	2921	3137	2653	1954	2826	3419	3613	3208	2950
0-24	2929	3137	2692	1992	3040	3613	3899	3324	3043

Vehicle Flow (Channel 2)



Pentir ATC 9, B4547

Produced by Road Data Services Ltd.

Channel 2 - rthwestbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	37.3	47.6	43.2	46.1	40.1	37.8	40.4
2	36.2	45.3	-	41.7	-	37.0	40.9
3	45.7	43.2	45.3	45.4	-	39.4	40.3
4	-	-	41.0	45.3	-	42.6	41.0
5	41.8	43.2	48.2	42.4	42.2	38.2	40.4
6	44.8	47.2	47.2	40.6	43.6	40.1	42.9
7	44.0	42.2	40.9	45.2	42.1	44.0	44.8
8	43.4	42.7	44.4	45.8	42.2	43.2	43.3
9	42.2	41.5	43.0	42.4	41.6	42.7	42.4
10	40.3	41.8	41.3	41.8	41.6	41.6	42.0
11	39.7	40.7	41.6	42.0	41.3	41.4	40.9
12	39.4	39.1	41.3	41.6	40.0	41.6	41.6
13	39.6	41.2	41.2	42.9	40.5	41.1	40.4
14	41.2	41.5	41.7	41.6	39.1	41.6	42.3
15	41.7	40.1	41.0	41.4	40.0	40.7	42.5
16	40.7	41.5	42.0	41.4	39.8	40.9	41.6
17	40.2	41.7	42.9	41.8	40.5	43.2	43.4
18	40.9	41.7	41.8	42.8	41.8	42.0	43.7
19	39.7	40.7	43.6	41.8	41.5	42.3	43.0
20	39.8	41.4	40.7	40.7	41.0	39.7	40.2
21	40.7	42.2	42.5	42.3	40.1	40.7	39.8
22	40.0	41.4	44.9	41.2	40.4	40.9	41.1
23	42.4	45.8	43.7	42.7	37.7	41.1	40.7
24	41.9	43.2	44.3	41.9	39.7	39.0	39.6
10-12	39.5	40.0	41.5	41.8	40.6	41.5	41.2
14-16	41.2	40.9	41.8	41.8	39.8	40.8	42.5
0-24	40.9	41.3	42.1	42.0	40.7	41.5	41.8

Average (ALL): 41.4
Weekday Inter-Peak: 40.8

Channel 2 - rthwestbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	42.0	49.4	46.9	52.4	-	43.5	47.0
2	37.1	49.4	-	47.9	-	43.1	47.5
3	-	-	49.1	48.6	-	46.9	46.6
4	-	-	46.8	54.1	-	49.4	46.6
5	46.3	48.7	54.9	48.7	50.6	44.1	46.3
6	51.0	52.3	52.7	49.3	48.7	47.9	49.9
7	50.0	48.9	48.0	51.6	47.4	50.0	51.0
8	48.9	48.4	49.8	52.1	47.2	48.2	49.1
9	46.9	46.4	48.8	49.7	46.4	47.8	47.6
10	45.8	46.9	47.1	48.0	47.0	46.5	47.2
11	44.8	45.6	46.3	47.7	46.2	46.4	46.2
12	44.9	45.3	46.8	48.6	45.4	46.6	47.6
13	44.9	46.6	46.5	48.2	45.7	46.6	46.8
14	46.2	47.4	47.0	47.1	44.4	46.7	48.7
15	46.8	45.3	45.8	48.2	44.6	46.9	47.7
16	46.3	47.1	47.2	48.1	44.8	46.1	47.7
17	44.8	48.0	48.7	46.8	45.4	48.0	48.6
18	45.6	47.2	47.5	48.1	46.8	47.6	48.9
19	44.1	45.5	48.9	48.0	46.1	47.5	47.8
20	44.6	46.9	46.4	45.4	46.4	45.1	45.9
21	47.6	47.2	48.8	49.1	46.8	47.4	45.6
22	47.2	48.5	50.5	48.2	46.3	47.3	48.2
23	49.4	54.4	49.7	52.3	45.2	48.5	46.7
24	48.6	49.8	49.7	45.9	44.7	45.8	46.0
10-12	44.8	45.6	46.7	48.2	45.8	46.5	46.8
14-16	46.4	46.2	46.5	48.1	44.7	46.5	47.7
0-24	46.3	46.9	47.6	48.2	46.1	47.2	47.7

85th %ile (ALL): 47.1
Weekday Inter-Peak: 46.3

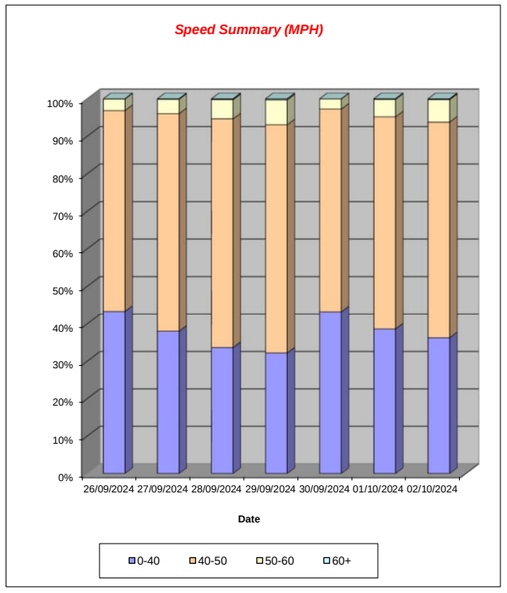
Pentir ATC 9, B4547

Produced by Road Data Services Ltd.

Channel 2 - rthwestbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	1268	1193	907	642	1313	1396	1415
40-50	1569	1819	1641	1212	1644	2043	2242
50-60	90	121	138	132	82	169	233
60+	2	4	6	6	1	5	9
TOTAL	2929	3137	2692	1992	3040	3613	3899

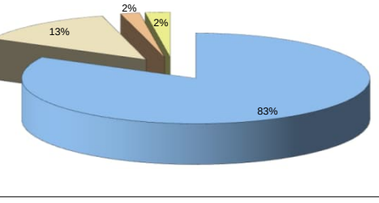
Speed Summary (MPH)



Channel 2 - Northwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	2169	377	52	3	2601
6-22	2398	408	54	3	2863
6-24	2427	413	54	3	2891
0-24	2452	416	55	4	2929
27/09/2024					
7-19	2333	378	38	5	2753
6-22	2600	417	43	5	3065
6-24	2683	421	43	5	3107
0-24	2668	433	43	5	3137
28/09/2024					
7-19	2064	271	25	5	2365
6-22	2260	294	26	5	2594
6-24	2313	304	26	5	2651
0-24	2357	304	26	5	2692
29/09/2024					
7-19	1569	215	11	1	1796
6-22	1685	229	13	1	1932
6-24	1702	231	13	1	1954
0-24	1742	235	12	1	1992
30/09/2024					
7-19	2003	311	72	8	2366
6-22	2320	364	52	43	2779
6-24	2405	395	64	52	3006
0-24	2477	401	73	89	3040
01/10/2024					
7-19	2142	367	44	5	2558
6-22	2641	444	56	51	3192
6-24	2786	466	67	100	3419
0-24	2865	493	80	175	3613
02/10/2024					
7-19	2183	386	50	3	2622
6-22	2767	475	65	47	3354
6-24	2814	498	73	121	3617
0-24	3062	534	98	205	3899
Average					
7-19	2066	330	38	4	2437
6-22	2381	376	44	22	2826
6-24	2485	401	49	36	2950
0-24	2518	401	54	70	3043

Total Vehicle Class Distribution



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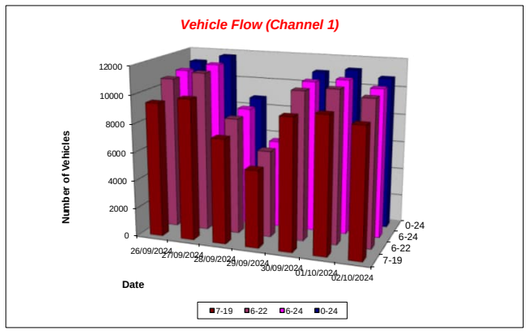
ices Ltd.

Pentir ATC 10, A487

Produced by Road Data Services Ltd.

Channel 1 - hwestbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	57	48	98	94	58	52	53	54	66
2	48	47	63	98	43	59	51	50	58
3	33	24	60	52	25	15	31	26	34
4	20	17	37	42	23	20	23	21	26
5	24	24	19	18	24	25	29	25	23
6	118	112	61	42	103	124	114	114	96
7	244	237	99	58	252	221	237	238	193
8	531	543	179	68	532	522	481	522	408
9	886	892	349	189	819	866	904	873	701
10	732	753	506	308	719	750	678	726	635
11	630	596	626	455	625	593	608	610	590
12	721	659	715	621	696	709	662	689	683
13	730	749	722	617	694	761	714	730	712
14	710	732	736	549	706	725	660	707	688
15	816	903	862	667	779	842	801	828	810
16	1013	1027	831	585	955	962	959	983	905
17	1071	1238	817	606	1132	1171	1033	1129	1010
18	946	1081	590	457	951	1035	951	993	859
19	650	700	423	302	610	612	598	634	556
20	440	487	330	239	448	387	443	441	396
21	347	382	249	245	328	340	335	346	316
22	231	256	172	160	226	229	224	233	214
23	158	155	136	81	151	147	130	148	137
24	64	69	87	34	52	70	66	64	63
7-19	9436	9873	7356	5424	9218	9548	9049	9425	8558
6-22	10698	11235	8206	6126	10472	10725	10288	10684	9679
6-24	10920	11459	8429	6241	10675	10942	10484	10896	9879
0-24	11220	11731	8767	6587	10951	11237	10785	11185	10183



Channel 1 - thwestbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	60.1	60.0	59.4	59.3	59.8	59.8	59.8
2	57.7	57.7	56.2	57.8	57.8	57.8	60.1
3	57.6	56.1	57.8	56.8	55.8	57.8	56.8
4	58.5	59.3	59.2	58.9	56.4	58.8	59.6
5	57.5	57.6	55.0	57.1	55.0	57.9	56.7
6	58.2	58.5	58.5	58.2	58.3	59.1	58.1
7	58.3	58.5	58.2	59.4	58.1	58.5	58.5
8	56.1	56.3	56.8	56.1	55.7	56.3	55.8
9	53.5	53.7	53.4	55.0	52.9	53.4	53.5
10	54.6	54.5	55.3	54.7	55.3	54.4	54.5
11	56.0	55.1	55.7	55.5	56.0	56.1	56.2
12	54.2	53.1	54.3	53.3	54.5	52.7	54.4
13	55.4	53.9	55.8	53.9	55.1	54.2	55.5
14	55.5	55.3	55.4	55.6	55.4	54.7	55.5
15	54.5	54.2	54.6	54.4	54.2	54.6	54.2
16	53.2	52.5	53.2	52.1	52.9	52.5	53.0
17	52.3	50.5	52.2	50.1	52.3	50.9	52.3
18	53.6	53.9	52.9	53.9	53.3	53.6	53.3
19	56.6	57.0	57.1	57.0	57.7	56.6	56.7
20	56.2	56.2	55.7	56.4	55.9	56.0	56.3
21	57.2	57.3	57.3	57.8	57.3	57.2	56.1
22	57.9	58.0	57.3	58.0	58.1	57.7	57.8
23	58.7	58.6	58.2	58.3	58.3	59.8	59.5
24	59.0	58.7	58.7	59.9	58.7	59.8	58.5
10-12	55.0	54.3	55.0	54.3	55.2	54.3	55.2
14-16	53.8	53.3	53.8	53.1	53.9	53.8	53.5
0-24	54.9	54.5	55.0	54.6	54.8	54.4	54.8

Mean (ALL): 54.7
Weekday Inter-Peak: 54.0

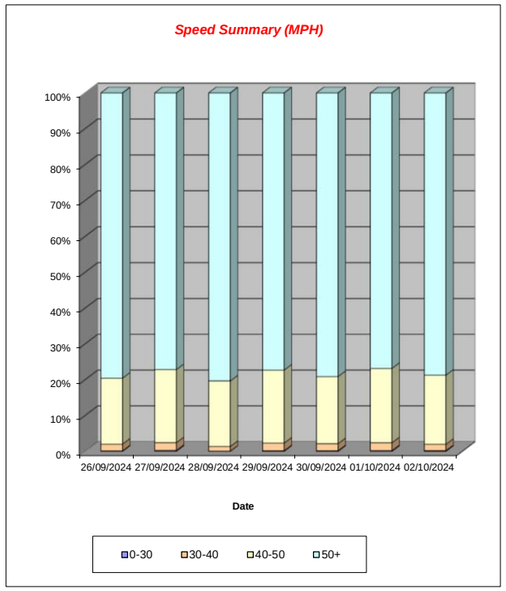
Channel 1 - thwestbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	65.3	65.7	64.9	65.1	65.8	64.5	65.1
2	63.8	63.3	63.2	63.1	63.0	62.5	64.2
3	64.4	62.2	64.6	63.6	63.4	63.6	63.1
4	64.0	64.6	64.7	63.9	61.9	63.8	64.3
5	63.8	64.2	62.3	64.5	61.6	64.7	63.7
6	63.6	63.3	63.9	63.7	63.8	63.7	63.4
7	63.3	64.0	63.0	64.2	63.3	63.6	63.6
8	62.5	62.5	62.4	61.9	62.4	62.5	62.7
9	61.6	61.7	60.7	62.4	61.3	61.5	61.0
10	61.1	61.2	61.4	61.8	61.6	61.3	61.4
11	61.9	61.4	61.5	61.5	61.9	61.8	61.9
12	60.3	59.5	60.4	59.8	60.5	59.1	60.3
13	61.4	60.5	61.7	60.6	61.1	60.7	61.5
14	60.8	61.0	60.6	61.1	60.6	60.4	61.0
15	60.9	61.0	61.0	61.1	60.6	61.4	60.7
16	59.8	59.5	59.5	59.5	59.8	59.8	59.5
17	59.2	57.8	58.9	57.7	59.4	58.1	59.2
18	60.2	60.0	59.7	59.9	60.3	59.5	60.1
19	62.7	62.4	62.8	62.4	63.0	62.3	62.6
20	62.5	62.6	61.8	62.2	62.0	62.3	63.1
21	62.8	62.8	62.7	63.1	62.6	62.9	62.3
22	63.6	63.4	62.6	63.6	63.4	63.4	63.6
23	63.8	63.7	63.4	64.0	63.5	64.4	64.4
24	64.1	64.2	64.0	63.7	64.0	64.8	63.5
10-12	61.1	60.6	61.0	60.7	61.2	60.7	61.1
14-16	60.3	60.2	60.3	60.1	60.3	60.1	60.0
0-24	61.5	61.4	61.4	61.4	61.5	61.3	61.5

85th %ile (ALL): 61.4
Weekday Inter-Peak: 60.6

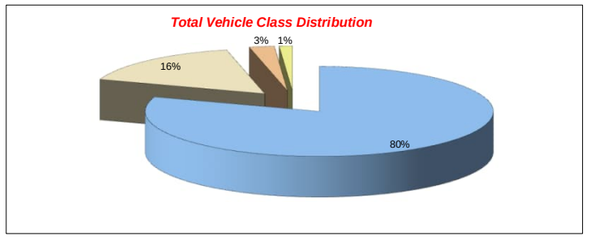
Channel 1 - thwestbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-30	19	34	7	13	22	27	24
30-40	212	255	115	141	217	246	192
40-50	2065	2394	1604	1343	2050	2334	2083
50+	8924	9048	7041	5090	8662	8630	8486
TOTAL	11220	11731	8767	6587	10951	11237	10785



Channel 1 - Southwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	7402	1687	252	95	9436
6-22	8459	1872	270	109	10698
6-24	8623	1903	281	113	10920
0-24	8837	1956	288	129	11220
27/09/2024					
7-19	7854	1687	242	90	9873
6-22	8973	1884	273	107	11235
6-24	9156	1916	277	110	11459
0-24	9244	1976	291	171	11731
28/09/2024					
7-19	6209	971	113	64	7356
6-22	6940	1070	124	70	8206
6-24	7138	1094	132	75	8429
0-24	7396	1149	137	85	8767
29/09/2024					
7-19	4659	665	67	33	5424
6-22	5300	703	73	50	6126
6-24	5411	712	77	42	6241
0-24	5705	756	77	49	6587
30/09/2024					
7-19	7201	1668	248	100	9218
6-22	8209	1868	288	110	10472
6-24	8371	1891	294	119	10675
0-24	8553	1928	302	144	10951
01/10/2024					
7-19	7571	1656	223	98	9548
6-22	8509	1832	251	133	10725
6-24	8666	1865	262	149	10942
0-24	8865	1928	274	169	11237
02/10/2024					
7-19	7091	1608	242	108	9049
6-22	8066	1836	264	122	10288
6-24	8229	1868	280	136	10484
0-24	8441	1895	277	172	10785
Average					
7-19	6855	1420	198	84	8558
6-22	7777	1580	223	100	9679
6-24	7946	1609	229	105	9879
0-24	8165	1657	237	124	10183

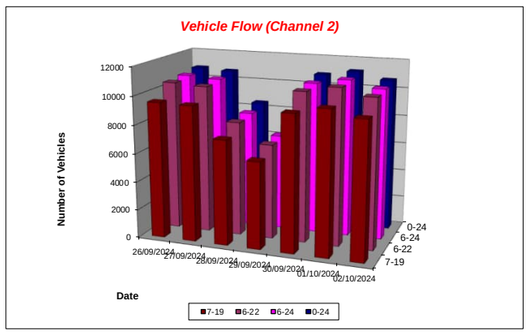


Pentir ATC 10, A487

Produced by Road Data Services Ltd.

Channel 2 - theastbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	27	25	60	63	38	21	17	26	36
2	24	28	64	63	20	27	15	23	34
3	10	10	25	26	11	10	14	11	15
4	22	26	48	41	34	17	19	24	30
5	35	32	32	22	36	30	23	31	30
6	85	85	51	35	76	78	88	82	71
7	250	251	114	56	257	262	245	253	205
8	673	682	222	123	722	726	608	682	537
9	1147	1077	412	234	1142	1158	1165	1138	905
10	898	872	590	433	877	874	917	888	780
11	760	785	742	622	684	731	714	735	720
12	769	789	843	861	803	799	827	797	813
13	753	779	844	722	781	773	762	770	773
14	806	762	774	661	771	806	821	793	771
15	798	781	759	712	792	822	774	793	777
16	775	809	647	549	784	872	766	801	743
17	919	881	643	517	865	928	845	888	800
18	827	816	548	417	850	950	909	870	760
19	423	453	331	246	430	535	391	445	401
20	333	306	254	212	371	325	346	336	307
21	188	175	164	154	198	176	162	180	174
22	170	144	142	134	159	163	165	160	154
23	86	85	96	47	103	78	92	89	84
24	42	39	60	25	33	24	27	33	36
7-19	9547	9486	7355	6097	9501	9974	9499	9601	8780
6-22	10488	10362	8029	6653	10486	10900	10437	10531	9619
6-24	10616	10486	8135	6729	10627	11052	10558	10652	9739
0-24	10819	10692	8465	6975	10837	11185	10712	10849	9955



Channel 2 - ortheastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	55.6	54.6	57.2	55.0	56.8	55.5	53.7
2	57.4	57.1	56.4	57.7	55.2	58.8	57.8
3	53.2	52.6	50.5	48.7	53.0	50.9	50.5
4	54.2	57.3	57.0	57.3	51.1	53.0	51.4
5	56.2	58.2	58.3	58.9	57.9	59.6	56.5
6	55.3	55.6	54.5	56.6	54.9	54.3	55.0
7	55.1	55.1	55.9	55.8	54.1	54.1	55.5
8	52.1	52.2	52.2	51.5	52.5	51.9	52.4
9	50.1	50.2	50.0	50.3	49.7	50.1	50.2
10	50.1	50.1	50.3	49.7	49.5	49.7	49.8
11	50.9	51.0	50.7	51.1	50.7	51.1	50.9
12	51.2	50.0	51.2	50.2	51.1	49.9	51.1
13	50.3	51.1	50.7	51.2	51.1	51.3	49.9
14	50.7	50.9	50.5	50.7	50.3	51.0	50.7
15	49.7	51.7	49.7	51.2	49.1	51.8	50.0
16	49.9	50.4	50.0	50.6	49.7	50.5	49.6
17	51.0	50.3	51.3	50.3	50.6	50.0	50.6
18	53.4	51.4	52.9	51.8	53.5	51.4	53.2
19	56.4	53.6	56.6	53.7	57.3	53.5	56.4
20	54.3	54.4	54.3	54.2	53.8	54.4	54.7
21	55.6	55.3	55.5	55.6	54.2	56.2	55.8
22	54.4	54.3	52.5	53.8	54.4	54.4	54.8
23	56.4	56.5	58.0	55.4	57.8	56.3	56.2
24	54.1	54.8	51.6	51.0	53.4	54.9	54.2
10-12	51.0	50.5	51.0	50.6	50.5	50.4	51.0
14-16	49.8	51.0	49.8	50.8	49.8	51.1	49.8
0-24	51.5	51.4	51.6	51.4	51.4	51.3	51.4

Average (ALL): 51.4
Weekday Inter-Peak: 50.5

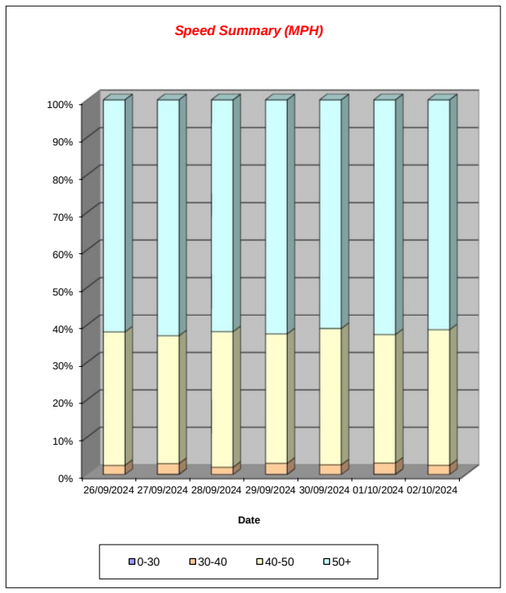
Channel 2 - ortheastbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	60.5	59.1	61.7	59.5	62.0	60.6	57.9
2	61.8	61.4	60.6	62.6	59.3	64.4	61.9
3	60.8	58.5	54.9	51.5	59.3	55.4	53.9
4	59.8	63.9	63.2	63.3	56.1	58.0	55.5
5	62.7	64.7	64.4	65.4	63.7	65.3	62.8
6	61.5	61.8	62.5	63.4	61.1	61.7	62.5
7	60.5	60.5	61.4	60.5	59.4	59.3	61.0
8	57.8	57.7	58.4	57.1	58.5	57.7	58.0
9	55.8	55.9	55.8	56.0	55.1	55.5	55.6
10	56.3	56.4	56.8	55.8	56.0	56.0	56.2
11	56.8	56.8	56.3	56.7	56.5	57.1	56.6
12	55.9	57.1	56.0	56.8	55.7	57.6	55.7
13	56.4	57.0	56.5	57.5	57.2	57.1	56.0
14	56.5	56.3	56.5	56.0	56.2	56.4	56.4
15	55.4	56.7	55.3	56.1	54.8	56.7	55.7
16	55.2	55.7	55.0	56.3	55.0	56.1	54.8
17	56.1	55.6	56.5	55.6	55.5	55.7	55.9
18	58.9	57.4	58.7	57.7	59.2	57.1	59.0
19	62.3	59.3	62.2	58.8	62.7	58.7	62.5
20	60.1	60.1	60.6	59.8	59.5	60.1	60.5
21	61.1	60.9	60.9	61.4	59.8	62.2	60.9
22	60.2	60.3	58.1	60.2	60.1	60.2	60.1
23	62.0	61.7	63.0	60.7	62.9	61.8	61.4
24	60.5	60.7	56.2	56.9	59.1	62.3	60.4
10-12	56.4	57.0	56.2	56.8	56.1	57.4	56.1
14-16	56.8	56.2	56.3	56.1	54.9	56.4	53.9
0-24	57.5	57.4	57.6	57.4	57.4	57.4	57.4

85th %ile (ALL): 57.4
Weekday Inter-Peak: 56.2

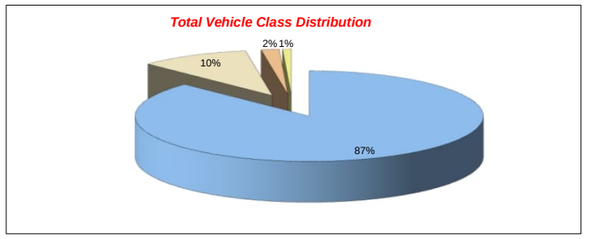
Channel 2 - ortheastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-30	1	7	1	4	1	8	1
30-40	265	306	165	205	283	336	265
40-50	3856	3650	3065	2413	3945	3841	3880
50+	6697	6729	5234	4353	6608	7000	6566
TOTAL	10819	10692	8465	6975	10837	11185	10712



Channel 2 - Northeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	8212	1093	172	70	9547
6-22	9040	1184	187	77	10488
6-24	9143	1204	189	80	10616
0-24	9303	1225	204	87	10819
27/09/2024					
7-19	8197	1030	177	82	9486
6-22	8971	1102	191	94	10362
6-24	9065	1111	194	96	10486
0-24	9240	1141	209	102	10692
28/09/2024					
7-19	6570	641	91	53	7355
6-22	7195	678	97	59	8029
6-24	7343	695	98	60	8195
0-24	7568	725	108	64	8465
29/09/2024					
7-19	5514	490	55	38	6097
6-22	6043	513	67	41	6653
6-24	6125	518	67	43	6725
0-24	6315	550	67	48	6975
30/09/2024					
7-19	8205	1051	169	77	9501
6-22	9070	1150	183	83	10486
6-24	9195	1159	184	83	10622
0-24	9362	1193	201	79	10837
01/10/2024					
7-19	8784	982	142	66	9974
6-22	9599	1070	154	75	10900
6-24	9698	1086	162	76	11002
0-24	9820	1111	173	81	11185
02/10/2024					
7-19	8166	1084	172	77	9499
6-22	8973	1178	182	81	10417
6-24	9076	1193	183	81	10536
0-24	9232	1193	204	83	10712
Average					
7-19	7664	910	140	66	8780
6-22	8411	982	151	73	9619
6-24	8513	997	154	74	9739
0-24	8690	1020	166	80	9955



Street

ices Ltd.

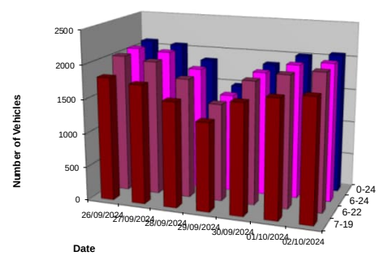
Pentir ATC 11, Bangor Street

Produced by Road Data Services Ltd.

Channel 1 - /heastbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	5	4	10	9	4	4	5	4	6
2	4	2	11	7	3	3	0	2	4
3	3	1	5	5	0	4	1	2	3
4	2	6	2	4	0	0	4	2	3
5	4	5	6	5	1	6	4	4	4
6	14	6	5	2	15	17	13	13	10
7	36	36	19	11	31	35	40	36	30
8	141	140	53	32	147	155	151	147	117
9	241	194	100	48	236	259	266	239	192
10	148	149	137	106	121	151	140	142	136
11	145	170	159	134	117	108	134	135	138
12	141	130	158	155	118	123	139	130	138
13	139	140	163	123	134	128	160	140	141
14	152	160	183	165	130	131	142	143	152
15	135	125	138	144	113	130	117	124	129
16	168	128	119	126	125	135	150	141	136
17	141	145	104	104	137	129	112	133	125
18	124	147	140	91	139	151	131	138	132
19	139	121	96	72	107	128	146	128	116
20	97	91	101	62	86	95	90	92	89
21	43	60	58	46	44	43	59	50	50
22	45	47	38	19	29	36	34	38	35
23	19	33	26	13	13	22	21	22	21
24	10	21	22	6	7	20	4	12	13
7-19	1814	1749	1550	1300	1624	1728	1788	1741	1650
6-22	2035	1983	1766	1438	1814	1937	2011	1956	1855
6-24	2064	2037	1814	1467	1834	1979	2036	1990	1889
0-24	2096	2061	1853	1489	1857	2013	2063	2018	1919

Vehicle Flow (Channel 1)



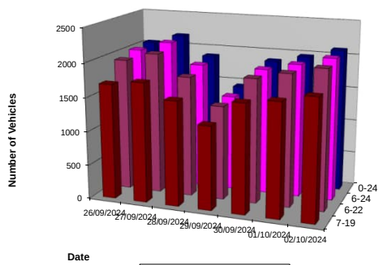
Pentir ATC 11, Bangor Street

Produced by Road Data Services Ltd.

Channel 1 - /heastbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	9	5	12	13	5	5	5	6	8
2	9	1	9	9	6	3	5	5	6
3	4	3	5	6	1	0	0	2	3
4	0	2	4	3	1	0	1	1	2
5	3	2	6	6	4	1	2	2	3
6	7	10	4	2	9	8	11	9	7
7	9	17	9	3	19	7	15	13	11
8	45	44	27	14	53	46	46	47	39
9	85	86	69	37	87	99	93	90	79
10	112	135	82	48	98	96	98	108	96
11	110	109	116	65	83	109	102	103	99
12	117	121	128	119	110	118	133	120	121
13	123	132	128	133	120	138	146	132	131
14	142	145	185	138	124	107	149	133	141
15	132	151	158	142	125	122	148	136	140
16	174	205	153	168	186	170	196	186	179
17	245	233	162	143	194	210	232	223	203
18	247	206	175	124	240	240	250	237	213
19	158	185	152	95	172	198	165	176	161
20	106	131	95	63	100	124	119	116	105
21	75	94	76	60	74	76	78	79	76
22	62	72	49	28	35	66	61	59	53
23	54	48	45	16	23	22	36	37	35
24	12	35	37	12	6	8	10	14	17
7-19	1690	1752	1535	1226	1592	1653	1758	1689	1601
6-22	1942	2056	1764	1380	1820	1926	2031	1957	1847
6-24	2008	2140	1846	1428	1849	1956	2037	2008	1899
0-24	2040	2172	1886	1447	1875	1973	2101	2032	1928

Vehicle Flow (Channel 2)



Pentir ATC 11, Bangor Street

Produced by Road Data Services Ltd.

Channel 1 - /rtheastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	34.3	41.9	42.0	36.8	48.1	35.9	38.9
2	35.4	41.3	43.6	39.6	37.3	36.4	-
3	36.5	48.0	46.2	41.5	-	33.1	58.4
4	31.7	39.9	33.8	37.9	-	-	45.2
5	37.8	45.3	36.8	45.3	44.2	45.4	41.6
6	35.7	38.7	37.6	44.2	39.8	39.8	34.2
7	40.8	41.5	43.1	40.7	40.2	41.2	41.3
8	39.0	38.5	40.7	42.8	38.8	39.1	38.8
9	37.7	37.5	38.0	39.2	37.2	37.9	36.0
10	36.8	37.4	38.8	37.7	36.4	37.4	37.1
11	36.2	35.4	37.0	37.3	36.9	36.4	37.5
12	34.8	36.2	36.2	36.4	36.6	37.1	37.6
13	37.0	36.7	37.5	37.2	35.8	37.2	37.1
14	36.0	37.0	36.8	36.8	36.4	36.1	36.6
15	35.0	36.2	34.7	37.7	36.0	37.3	36.9
16	35.6	36.4	37.2	35.5	37.0	36.9	35.7
17	35.2	37.4	37.6	35.8	33.9	35.7	36.3
18	36.1	37.0	36.2	38.1	36.6	35.6	35.8
19	36.1	37.3	38.0	37.2	37.3	38.5	37.7
20	36.5	36.1	35.0	37.6	36.7	36.4	35.9
21	37.2	35.6	37.9	35.5	37.6	39.2	36.7
22	37.5	35.2	38.2	34.4	36.1	36.1	35.6
23	37.5	39.4	37.6	36.2	39.1	37.1	39.8
24	41.4	38.1	38.6	40.8	41.4	38.4	37.3
10-12	35.5	35.8	36.8	36.8	36.7	36.8	37.8
14-16	35.6	36.2	35.6	36.7	36.6	37.1	36.2
0-24	36.5	37.0	37.2	37.2	36.8	37.3	37.0

Mean (ALL): 37.0
Weekday Inter-Peak: 36.3

Channel 1 - /rtheastbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	38.9	46.9	51.7	43.1	53.4	43.5	47.2
2	39.8	43.4	47.7	44.6	38.1	39.6	-
3	41.0	-	52.0	44.4	-	34.0	-
4	33.2	46.7	40.1	42.2	-	-	53.4
5	39.0	51.0	44.2	50.0	-	59.3	45.2
6	44.0	44.4	41.0	47.7	48.6	51.7	43.1
7	49.6	49.0	52.4	45.0	47.1	46.4	51.0
8	44.7	45.5	47.7	48.7	45.0	46.3	46.2
9	44.6	44.5	46.0	47.0	42.8	44.2	43.0
10	42.8	43.5	44.9	44.6	42.2	42.7	44.6
11	42.3	41.4	43.6	44.1	42.9	44.2	43.1
12	43.1	42.6	42.5	42.9	42.4	43.2	43.8
13	43.5	43.3	44.6	44.5	41.6	43.8	43.2
14	42.2	42.6	43.6	43.2	41.9	42.5	42.6
15	42.0	43.1	42.0	44.1	42.1	43.9	43.3
16	41.7	43.5	44.3	42.9	42.8	42.7	43.3
17	41.6	43.4	44.1	43.1	40.1	43.5	43.5
18	42.3	43.4	42.9	44.4	42.9	42.6	42.4
19	42.6	43.6	44.1	43.9	44.2	45.4	44.4
20	42.4	43.1	43.2	43.6	43.6	42.8	43.6
21	44.0	41.2	46.1	40.9	45.0	46.7	43.8
22	43.6	41.6	45.5	40.3	43.7	42.4	40.7
23	43.4	46.1	45.5	42.9	45.1	43.8	48.8
24	48.7	46.1	45.7	50.8	47.0	45.9	46.5
10-12	42.8	42.0	43.1	43.5	42.6	43.8	43.5
14-16	41.8	43.2	43.2	43.7	42.5	43.3	43.3
0-24	43.2	43.6	44.4	44.1	43.1	44.1	44.0

85th %ile (ALL): 43.8
Weekday Inter-Peak: 42.9

Pentir ATC 11, Bangor Street

Produced by Road Data Services Ltd.

Channel 2 - uthwestbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	36.8	42.3	39.9	40.3	40.3	31.4	36.8
2	35.4	44.0	42.8	41.8	40.7	37.3	31.1
3	42.6	45.2	41.4	44.6	41.6	-	-
4	-	40.7	42.4	34.9	36.6	-	27.8
5	42.0	43.6	38.8	44.5	36.6	37.5	32.0
6	41.9	40.6	40.8	45.1	43.4	39.3	43.4
7	38.5	39.7	35.9	41.9	38.1	40.3	41.5
8	38.5	39.2	39.9	43.7	39.1	37.6	39.8
9	39.2	38.7	39.3	41.1	37.7	37.5	38.5
10	38.8	39.9	39.8	38.8	40.6	39.6	38.7
11	38.6	38.9	38.5	38.6	38.8	38.4	38.5
12	37.4	37.9	39.2	39.9	37.6	39.1	37.8
13	39.1	39.4	39.3	40.1	39.4	38.7	39.0
14	39.5	39.9	39.8	39.4	39.3	39.5	39.1
15	39.1	38.6	40.0	41.1	39.3	39.9	39.2
16	39.4	39.7	39.6	40.3	38.5	39.3	38.4
17	38.9	39.5	39.5	40.0	39.8	39.2	39.8
18	38.4	39.4	40.4	40.4	38.8	39.4	39.2
19	38.9	39.3	39.7	40.0	38.2	41.3	39.5
20	38.2	37.3	38.4	37.1	37.5	38.3	39.6
21	37.8	37.3	38.4	38.6	39.3	36.9	38.3
22	38.8	38.2	39.2	38.2	35.9	38.6	37.8
23	40.3	38.9	42.2	38.7	39.0	40.3	36.8
24	38.9	39.1	40.8	40.8	34.7	38.3	42.0
10-12	38.0	38.4	38.9	39.5	38.1	38.8	38.1
14-16	39.0	39.2	39.8	40.1	38.9	39.6	38.9
0-24	38.8	39.1	39.6	39.9	38.8	39.1	39.0

Average (ALL): 39.1
Weekday Inter-Peak: 38.8

Channel 2 - uthwestbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	42.2	56.6	49.5	50.1	41.1	34.7	47.0
2	40.2	-	48.2	48.9	44.6	39.7	36.6
3	48.3	49.7	48.8	47.0	-	-	-
4	-	42.4	46.1	42.0	-	-	-
5	50.6	53.8	43.8	51.9	38.7	-	33.4
6	49.3	46.5	47.6	52.3	50.0	47.6	52.0
7	45.5	50.6	43.3	46.1	45.1	47.9	51.1
8	46.0	46.0	48.3	48.0	44.9	45.2	47.4
9	45.4	45.0	46.5	49.5	44.9	44.2	45.7
10	44.6	46.2	46.1	47.4	45.5	45.9	45.2
11	44.9	46.8	45.4	45.5	45.0	45.9	46.1
12	42.8	43.5	45.0	47.1	44.4	45.7	44.2
13	45.6	45.0	45.9	47.1	45.4	44.9	45.8
14	46.4	46.8	46.1	46.8	45.2	45.2	46.7
15	45.6	45.8	46.0	47.8	45.6	46.2	47.0
16	45.4	46.0	46.2	46.9	44.3	46.2	44.7
17	44.5	45.6	46.7	46.3	46.0	45.1	46.2
18	44.3	46.3	47.7	46.8	44.6	45.3	45.3
19	45.5	45.8	46.4	45.7	44.6	47.7	45.4
20	44.1	42.7	45.5	42.9	43.4	44.0	46.4
21	43.7	42.6	45.2	44.5	46.1	42.9	44.6
22	46.1	44.6	45.9	44.0	43.5	46.0	45.2
23	47.4	44.9	50.6	44.3	45.9	49.2	45.1
24	46.3	45.9	47.9	48.8	43.3	45.7	49.6
10-12	43.9	45.2	45.2	46.6	44.7	45.8	45.0
14-16	46.0	45.9	46.3	47.1	44.8	46.1	45.7
0-24	45.1	45.6	46.4	46.8	45.0	45.6	45.9

85th %ile (ALL): 45.7
Weekday Inter-Peak: 45.4

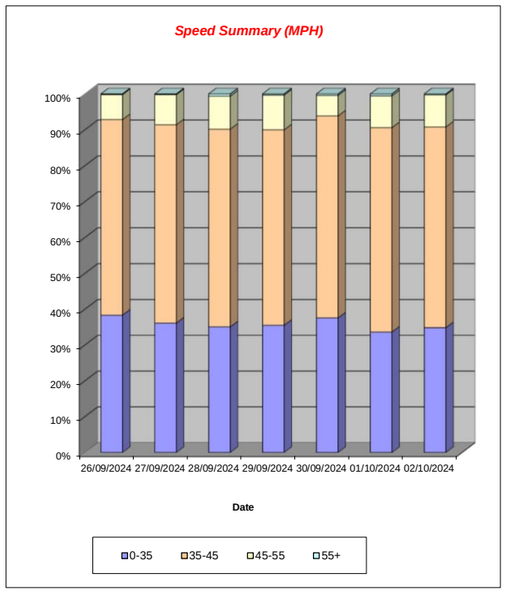
Pentir ATC 11, Bangor Street

Produced by Road Data Services Ltd.

Channel 1 - /rtheastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-35	804	745	650	529	698	677	719
35-45	1142	1139	1021	811	1045	1147	1154
45-55	146	173	170	144	106	178	184
55+	4	4	12	5	8	11	6
TOTAL	2096	2061	1853	1489	1857	2013	2063

Speed Summary (MPH)



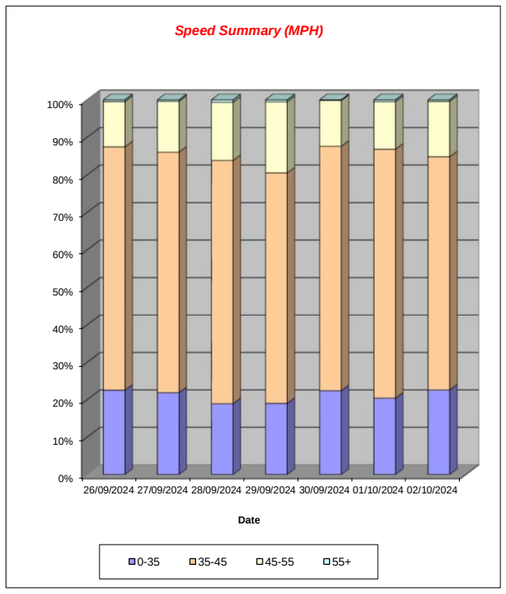
Pentir ATC 11, Bangor Street

Produced by Road Data Services Ltd.

Channel 2 - uthwestbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-35	460	475	357	275	420	403	475
35-45	1324	1394	1224	890	1223	1310	1307
45-55	246	294	292	274	229	250	310
55+	10	9	13	8	3	10	9
TOTAL	2040	2172	1886	1447	1875	1973	2101

Speed Summary (MPH)



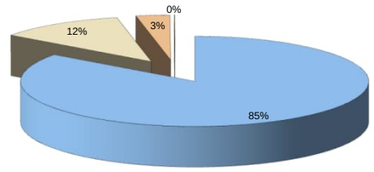
Pentir ATC 11, Bangor Street

Produced by Road Data Services Ltd.

Channel 1 - Northeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	1483	266	63	2	1814
6-22	1663	293	73	2	2035
6-24	1689	298	75	2	2064
0-24	1715	303	76	2	2096
27/09/2024					
7-19	1488	207	55	1	1749
6-22	1692	228	63	1	1983
6-24	1748	230	63	1	2037
0-24	1760	232	63	1	2061
28/09/2024					
7-19	1363	141	45	1	1550
6-22	1553	158	54	1	1766
6-24	1598	161	54	1	1814
0-24	1631	165	56	1	1853
29/09/2024					
7-19	1182	88	30	0	1300
6-22	1309	93	35	0	1438
6-24	1321	96	36	0	1457
0-24	1353	99	37	0	1489
30/09/2024					
7-19	1341	232	52	0	1624
6-22	1509	251	60	0	1814
6-24	1527	251	56	0	1834
0-24	1632	251	74	0	1957
01/10/2024					
7-19	1430	236	56	3	1728
6-22	1618	257	59	3	1937
6-24	1658	263	63	3	1979
0-24	1681	267	62	3	2011
02/10/2024					
7-19	1494	237	55	2	1788
6-22	1690	258	63	2	2011
6-24	1711	260	65	2	2036
0-24	1736	259	66	2	2063
Average					
7-19	1398	201	50	1	1650
6-22	1578	220	58	1	1855
6-24	1609	221	59	1	1889
0-24	1631	226	60	1	1919

Total Vehicle Class Distribution



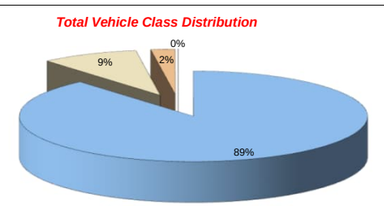
Pentir ATC 11, Bangor Street

Produced by Road Data Services Ltd.

Channel 2 - Southwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	1453	197	48	0	1698
6-22	1673	224	49	0	1942
6-24	1739	227	49	0	2008
0-24	1762	233	45	0	2040
27/09/2024					
7-19	1543	188	43	0	1752
6-22	1838	182	46	0	2066
6-24	1913	184	44	0	2149
0-24	1938	187	48	0	2173
28/09/2024					
7-19	1409	93	33	0	1535
6-22	1623	101	39	1	1764
6-24	1688	108	40	1	1846
0-24	1737	107	41	1	1886
29/09/2024					
7-19	1135	70	21	0	1226
6-22	1283	71	26	0	1380
6-24	1321	78	28	0	1408
0-24	1340	81	26	0	1447
30/09/2024					
7-19	1393	101	38	0	1532
6-22	1560	222	38	0	1820
6-24	1586	227	36	0	1849
0-24	1609	232	37	0	1878
01/10/2024					
7-19	1441	167	44	1	1653
6-22	1695	181	49	1	1926
6-24	1729	184	43	1	1956
0-24	1734	186	52	1	1973
02/10/2024					
7-19	1540	179	39	0	1758
6-22	1798	193	42	0	2031
6-24	1816	199	43	0	2077
0-24	1854	200	47	0	2101
Average					
7-19	1411	153	38	0	1601
6-22	1639	168	41	0	1847
6-24	1686	171	41	0	1899
0-24	1710	174	43	0	1928

Total Vehicle Class Distribution



B4547

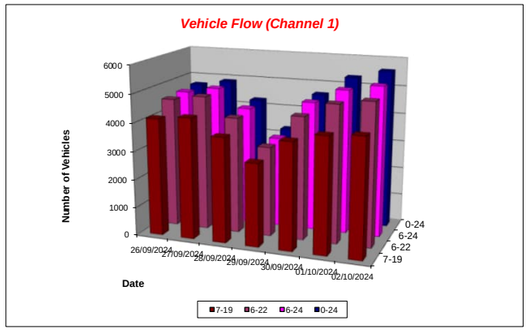
ices Ltd.

Pentir ATC 12, B4547

Produced by Road Data Services Ltd.

Channel 1 - /hwestbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	11	5	20	17	5	85	114	44	37
2	6	6	11	7	3	21	46	16	14
3	4	2	8	8	0	15	13	7	7
4	0	6	7	9	0	10	30	9	9
5	9	7	11	11	4	38	45	21	18
6	36	23	17	9	41	61	55	43	35
7	80	85	39	25	83	91	96	87	71
8	349	318	129	80	324	364	361	343	275
9	582	549	222	124	576	644	663	603	480
10	369	376	318	215	321	378	353	359	333
11	321	371	365	308	283	273	321	314	320
12	311	309	354	347	294	255	301	294	310
13	311	305	381	343	283	273	294	293	313
14	316	340	391	332	283	311	298	310	324
15	315	389	354	336	285	321	317	325	331
16	330	348	322	295	309	307	344	328	322
17	367	326	300	204	316	333	308	330	308
18	290	323	329	187	282	338	283	303	290
19	284	310	235	152	210	260	305	274	251
20	188	211	184	112	194	324	330	249	220
21	84	115	108	70	160	201	258	164	142
22	90	88	69	41	132	165	181	131	109
23	37	49	53	18	132	156	154	106	86
24	18	31	43	16	113	96	136	79	65
7-19	4145	4264	3700	2923	3766	4057	4148	4076	3858
6-22	4587	4763	4100	3171	4335	4838	5013	4707	4401
6-24	4643	4843	4196	3205	4586	5090	5304	4892	4551
0-24	4708	4892	4270	3266	4633	5320	5606	5032	4671



Channel 1 - rtheastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	40.4	45.0	45.2	41.8	52.9	34.6	35.7
2	39.1	49.9	48.6	42.2	46.9	33.6	34.9
3	44.9	48.0	49.5	43.7	-	33.0	36.1
4	-	46.3	41.3	40.5	-	32.3	38.1
5	39.7	50.6	49.0	46.4	39.3	35.5	36.1
6	41.6	42.8	43.5	43.4	42.9	38.2	39.4
7	45.2	45.1	44.5	43.3	44.1	43.2	44.1
8	41.1	40.9	44.2	46.9	42.0	41.8	41.0
9	39.1	38.8	42.5	41.9	39.7	39.3	38.9
10	38.4	40.5	41.1	41.6	40.0	39.4	40.2
11	38.9	39.5	40.6	40.8	39.9	40.1	40.1
12	38.0	39.2	40.3	40.4	39.3	40.3	40.6
13	39.9	40.5	40.0	40.5	39.8	40.4	40.1
14	39.4	40.8	39.7	40.1	39.0	40.5	39.9
15	39.1	39.0	39.2	39.1	39.6	40.2	39.7
16	38.8	40.8	40.5	40.2	40.3	39.8	38.9
17	38.9	41.7	41.1	40.8	39.3	40.6	41.2
18	39.3	40.6	41.1	42.5	41.2	40.5	41.0
19	39.2	40.1	42.4	42.9	41.1	42.0	41.9
20	39.4	40.0	41.0	41.0	40.6	38.2	37.9
21	41.0	40.2	43.5	42.3	39.5	36.8	37.9
22	40.1	40.9	44.7	39.3	37.4	37.7	37.9
23	45.0	45.1	44.4	45.0	37.0	37.4	37.2
24	42.2	43.3	45.3	42.3	34.5	37.3	32.7
10-12	38.5	39.3	40.5	40.6	39.6	40.2	40.3
14-16	39.0	39.8	39.8	39.8	40.0	40.0	39.3
0-24	39.4	40.3	41.1	41.0	39.9	39.7	39.4

Mean (ALL): 40.0
Weekday Inter-Peak: 39.6

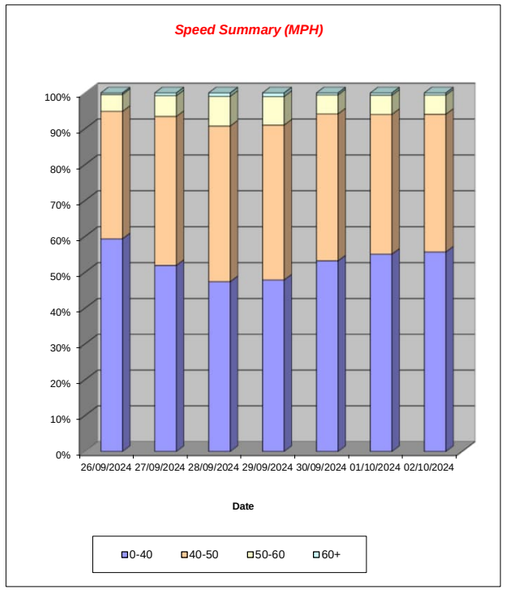
Channel 1 - rtheastbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	47.7	48.7	55.2	50.6	60.9	40.8	44.4
2	45.6	56.1	55.2	48.4	51.1	41.2	42.6
3	53.2	52.7	56.6	49.1	-	37.4	50.7
4	-	54.5	49.4	47.0	-	36.3	46.8
5	43.4	60.6	59.9	54.1	44.5	43.4	47.1
6	51.2	49.7	47.3	55.2	50.6	48.8	48.1
7	55.2	55.5	54.9	51.3	52.5	50.0	54.9
8	47.8	47.9	52.8	57.2	48.0	48.8	48.6
9	45.1	45.6	50.6	49.9	45.6	45.6	45.0
10	45.2	47.0	47.7	48.3	46.7	45.8	46.4
11	45.5	44.8	46.1	47.4	46.2	46.6	46.6
12	44.8	46.1	47.1	49.0	44.8	46.1	47.1
13	46.9	47.0	46.5	46.6	45.3	47.3	47.4
14	45.3	47.7	46.5	47.3	45.2	46.9	46.8
15	44.9	46.0	45.9	45.4	45.7	47.7	46.3
16	45.3	47.1	46.7	47.3	46.8	46.6	46.0
17	44.4	48.1	47.5	48.8	45.8	47.1	47.3
18	45.3	47.1	47.3	49.2	48.5	47.3	46.7
19	46.0	47.1	48.8	51.3	47.4	49.3	48.8
20	45.7	46.7	48.5	47.7	47.8	45.8	45.6
21	47.9	46.6	52.4	51.7	49.3	45.3	46.0
22	47.6	48.3	53.1	46.9	45.7	45.9	45.6
23	53.4	55.8	51.7	54.4	46.1	47.2	45.4
24	50.4	53.8	54.8	50.5	41.6	46.4	39.6
10-12	45.2	45.4	46.7	48.3	45.6	46.4	46.8
14-16	46.2	46.7	46.7	46.1	46.3	47.3	46.2
0-24	46.0	47.2	48.2	48.5	46.8	47.0	46.7

85th %ile (ALL): 47.1
Weekday Inter-Peak: 46.1

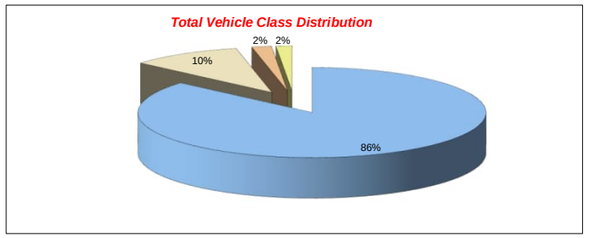
Channel 1 - rtheastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	2795	2542	2025	1564	2466	2931	3123
40-50	1670	2029	1851	1409	1896	2070	2150
50-60	222	282	353	260	245	284	299
60+	21	39	41	33	26	35	34
TOTAL	4708	4892	4270	3266	4633	5320	5606



Channel 1 - Northeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	3593	466	79	7	4145
6-22	3999	497	68	7	4587
6-24	404	50	9	1	4643
0-24	4107	507	93	7	4708
27/09/2024					
7-19	3742	428	72	4	4264
6-22	4215	461	79	4	4763
6-24	4299	467	81	4	4843
0-24	4343	464	81	4	4892
28/09/2024					
7-19	3314	339	47	0	3700
6-22	3671	374	55	0	4100
6-24	3759	382	55	0	4196
0-24	3828	385	57	0	4270
29/09/2024					
7-19	2644	250	28	1	2923
6-22	2877	267	26	1	3171
6-24	2911	269	25	1	3205
0-24	2957	274	34	1	3266
30/09/2024					
7-19	3312	362	87	5	3766
6-22	3788	430	99	18	4335
6-24	3931	461	84	10	4586
0-24	3971	470	93	12	4633
01/10/2024					
7-19	3495	484	73	5	4057
6-22	4127	569	91	51	4838
6-24	4299	648	113	127	5090
0-24	4413	618	114	175	5320
02/10/2024					
7-19	3553	516	75	4	4148
6-22	4267	603	96	48	5013
6-24	4451	638	109	121	5303
0-24	4617	656	129	204	5606
Average					
7-19	3385	409	63	4	3858
6-22	3845	457	73	21	4401
6-24	3975	482	78	46	4551
0-24	4034	482	85	69	4671

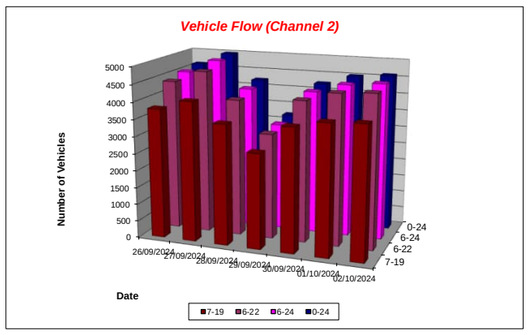


Pentir ATC 12, B4547

Produced by Road Data Services Ltd.

Channel 2 - /hwestbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	16	14	23	29	6	12	18	13	17
2	13	7	15	11	11	12	7	10	11
3	6	4	10	11	5	4	0	4	6
4	3	7	16	13	2	0	3	3	6
5	8	4	17	10	5	6	5	6	8
6	44	27	12	8	30	33	33	33	27
7	49	59	32	15	53	50	58	54	45
8	169	186	98	51	152	169	163	168	141
9	227	267	168	91	225	242	213	235	205
10	231	261	203	112	223	252	249	243	219
11	228	285	296	176	219	227	235	239	238
12	272	295	306	276	231	245	256	260	269
13	286	323	344	303	293	278	287	293	302
14	306	293	373	309	267	273	306	289	304
15	321	347	333	350	328	306	322	325	330
16	398	502	367	395	392	387	399	416	406
17	510	478	373	316	455	505	529	495	452
18	510	455	370	210	483	544	534	505	444
19	333	378	275	183	317	354	335	343	311
20	250	277	185	121	209	234	247	243	218
21	190	206	153	110	191	177	193	191	174
22	125	127	114	62	76	141	119	120	111
23	96	110	81	37	44	45	67	72	69
24	31	60	67	21	22	15	18	29	33
7-19	3791	4070	3506	2772	3585	3782	3829	3811	3619
6-22	4405	4749	3990	3080	4114	4384	4445	4419	4167
6-24	4535	4919	4138	3138	4180	4444	4538	4521	4269
0-24	4622	4982	4231	3220	4239	4511	4596	4590	4343



Channel 2 - uthwestbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	40.9	43.4	46.8	43.4	45.4	40.3	43.7
2	42.7	37.7	45.4	45.5	42.1	39.1	43.0
3	39.3	48.7	44.4	42.3	40.1	42.5	-
4	35.9	46.4	45.2	44.0	43.1	-	51.9
5	45.7	42.0	46.0	44.3	41.1	42.6	41.4
6	44.8	45.7	48.6	43.2	43.1	44.1	47.3
7	44.4	44.9	43.9	43.8	43.1	44.9	44.3
8	43.8	43.1	44.3	45.8	43.3	42.4	43.1
9	43.5	41.0	43.6	43.4	41.9	42.5	43.8
10	42.9	41.8	42.9	42.9	43.1	42.6	42.1
11	41.7	41.9	41.7	41.4	41.9	41.2	40.9
12	41.3	41.4	41.3	41.8	41.7	41.8	41.4
13	42.3	41.4	41.7	42.1	41.1	41.4	41.8
14	41.9	41.6	42.0	42.1	42.1	41.6	41.4
15	42.4	41.5	42.4	42.3	41.5	42.1	41.8
16	41.8	41.0	42.0	41.9	40.3	41.7	40.5
17	40.9	42.5	42.9	42.0	40.7	41.8	42.6
18	41.1	41.8	43.2	43.7	41.4	41.8	42.4
19	41.9	42.4	42.8	41.9	41.5	42.1	42.5
20	39.9	39.5	41.3	42.2	40.8	40.9	42.4
21	40.9	40.8	41.6	42.0	41.8	42.1	40.2
22	40.7	41.4	43.2	42.2	41.8	41.7	42.1
23	43.4	41.9	44.7	43.5	43.0	44.6	44.5
24	41.8	42.3	44.9	48.7	41.1	44.0	43.8
10-12	41.5	41.6	41.8	41.7	41.8	41.5	41.2
14-16	42.1	41.2	42.1	42.1	40.8	41.8	41.5
0-24	41.8	41.7	42.5	42.3	41.5	41.9	42.1

Average (ALL): 42.0
Weekday Inter-Peak: 41.5

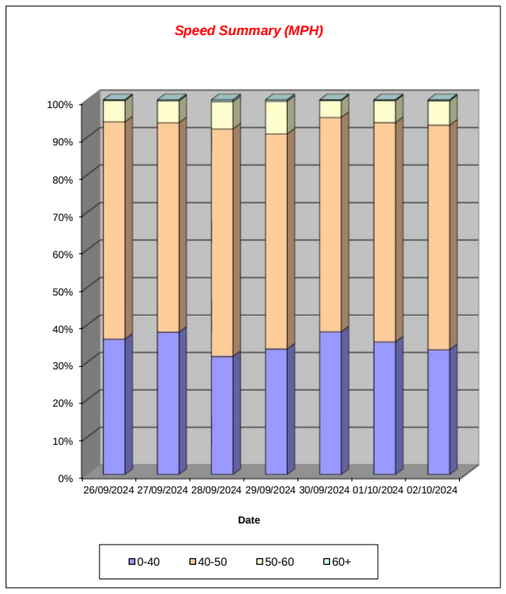
Channel 2 - uthwestbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	47.7	52.5	54.7	51.9	51.7	47.7	49.5
2	49.1	42.1	52.2	53.5	45.7	43.7	45.8
3	48.8	53.1	52.0	48.7	49.8	44.1	-
4	40.4	51.1	49.7	51.2	44.3	-	53.9
5	51.2	44.3	50.9	53.7	44.8	45.6	47.0
6	51.8	52.0	55.9	48.1	49.8	49.5	54.4
7	50.5	51.0	48.5	49.8	48.6	50.3	50.4
8	50.5	49.5	51.4	51.9	49.2	49.7	48.8
9	48.9	46.4	49.0	51.6	48.0	47.8	49.6
10	48.1	47.6	48.5	49.3	48.4	48.5	47.8
11	47.5	48.1	48.0	48.1	47.4	49.0	49.3
12	46.8	47.2	47.2	47.7	47.4	47.3	47.4
13	47.9	47.4	47.2	48.8	46.9	46.7	47.8
14	48.2	49.0	47.9	48.4	47.6	48.0	49.0
15	48.4	47.1	48.3	48.8	46.7	47.6	48.2
16	47.0	47.4	47.4	47.5	46.6	48.0	48.0
17	46.3	48.0	48.1	48.3	46.6	47.3	47.7
18	46.4	47.9	48.3	50.2	46.9	47.1	47.9
19	47.5	48.1	48.8	47.3	47.1	47.7	48.1
20	45.9	44.9	47.7	48.9	46.3	46.7	48.6
21	46.7	47.0	48.1	48.0	47.9	48.8	46.6
22	48.8	47.6	50.1	48.9	50.0	48.6	49.0
23	50.0	46.9	52.4	51.7	49.6	53.6	52.0
24	48.7	49.2	51.6	54.9	46.4	49.0	49.6
10-12	47.2	47.6	47.6	47.9	47.4	48.2	48.5
14-16	47.1	47.5	47.9	48.1	46.8	47.9	48.2
0-24	47.7	47.8	48.5	48.8	47.3	47.9	48.5

85th %ile (ALL): 48.1
Weekday Inter-Peak: 47.7

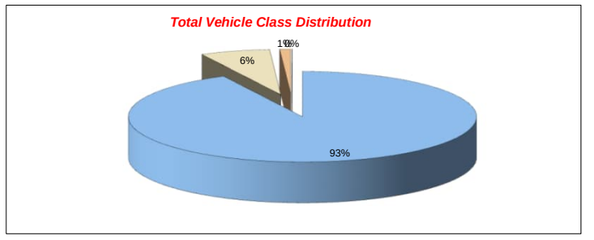
Channel 2 - uthwestbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	1673	1894	1335	1080	1617	1598	1533
40-50	2677	2783	2568	1847	2423	2639	2752
50-60	263	290	307	280	191	264	298
60+	9	15	21	13	8	10	13
TOTAL	4622	4982	4231	3220	4239	4511	4596



Channel 2 - Southwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	3477	260	51	3	3791
6-22	4063	293	53	3	4405
6-24	4183	296	53	3	4532
0-24	4269	298	52	3	4622
27/09/2024					
7-19	3742	274	51	3	4070
6-22	4391	301	54	3	4749
6-24	4551	307	56	3	4919
0-24	4614	310	55	3	4982
28/09/2024					
7-19	3290	187	29	0	3506
6-22	3745	209	31	1	3990
6-24	3896	214	28	1	4138
0-24	3975	223	32	1	4231
29/09/2024					
7-19	2610	144	17	1	2772
6-22	2900	153	20	1	3080
6-24	2962	158	20	1	3138
0-24	3049	159	20	1	3220
30/09/2024					
7-19	3255	268	57	3	3585
6-22	3757	314	43	2	4114
6-24	3875	314	44	2	4180
0-24	3878	316	43	2	4239
01/10/2024					
7-19	3447	280	46	0	3782
6-22	4031	306	47	0	4384
6-24	4098	308	47	0	4444
0-24	4156	308	47	0	4511
02/10/2024					
7-19	3469	309	49	1	3828
6-22	4034	345	62	1	4445
6-24	4113	348	62	1	4530
0-24	4192	349	54	1	4596
Average					
7-19	3327	250	40	1	3619
6-22	3849	274	42	2	4167
6-24	3944	279	43	2	4269
0-24	4017	281	43	2	4343



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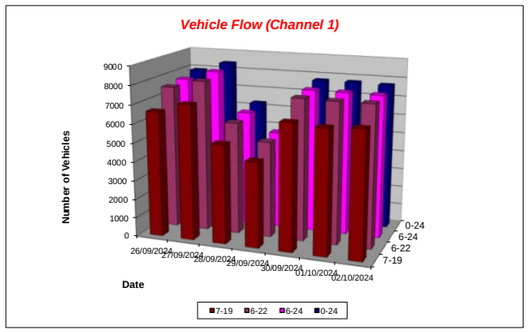
ices Ltd.

Pentir ATC 13, A487

Produced by Road Data Services Ltd.

Channel 1 - Southbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	15	24	39	53	12	18	7	15	24
2	33	17	22	34	24	38	15	25	26
3	21	15	30	18	19	14	25	19	20
4	8	17	12	12	3	4	8	8	9
5	16	25	25	9	21	16	22	20	19
6	124	70	36	20	110	125	112	110	87
7	163	170	74	54	174	163	183	171	140
8	378	416	160	109	405	370	402	394	320
9	601	624	293	192	560	594	544	585	487
10	515	498	377	265	457	519	408	479	434
11	410	501	466	387	459	410	457	447	441
12	479	494	519	391	490	453	431	469	465
13	503	542	495	478	515	514	508	516	508
14	462	504	525	533	494	466	494	484	497
15	547	615	560	499	515	537	546	552	546
16	773	845	566	560	773	719	782	778	717
17	828	892	527	445	856	802	912	858	752
18	684	735	404	358	654	675	660	682	596
19	448	456	338	282	446	445	466	452	412
20	362	330	280	251	270	345	276	317	302
21	267	222	224	181	250	272	221	246	234
22	168	161	128	88	159	162	162	162	147
23	79	148	101	65	61	78	52	84	83
24	38	78	78	23	29	28	26	40	43
7-19	6628	7122	5230	4499	6624	6504	6610	6698	6174
6-22	7588	8005	5936	5073	7477	7446	7452	7594	6997
6-24	7766	8231	6116	5181	7567	7652	7636	7717	7123
0-24	7922	8408	6279	5307	7756	7767	7719	7914	7308



Channel 1 - Southbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	41.6	40.9	44.4	44.9	39.2	43.8	37.4
2	39.9	40.2	45.1	45.6	44.8	38.9	46.5
3	39.3	43.0	47.9	40.2	43.7	43.1	43.9
4	42.4	44.2	41.0	43.0	37.7	38.3	39.0
5	42.9	43.2	45.6	38.3	42.8	42.5	42.9
6	44.8	45.2	46.1	47.0	44.2	44.0	45.0
7	45.8	43.9	43.5	43.0	43.6	45.9	44.0
8	41.4	41.8	42.7	45.4	41.2	41.0	41.9
9	39.4	40.1	41.5	42.1	39.2	39.5	39.2
10	39.2	39.2	41.1	41.7	38.1	38.9	38.5
11	39.4	39.6	40.3	40.7	38.5	39.4	38.5
12	38.0	39.4	38.9	40.7	37.3	37.7	37.0
13	38.8	38.5	39.6	39.6	38.8	39.0	39.2
14	39.2	39.4	38.9	39.7	39.9	39.5	39.1
15	37.6	38.6	39.1	39.7	38.8	37.3	38.9
16	37.6	37.1	39.1	38.9	37.3	37.3	37.4
17	34.6	38.2	39.5	39.6	35.6	34.7	35.6
18	35.3	38.0	42.6	40.3	34.9	35.0	34.9
19	39.0	40.2	40.4	40.2	39.8	39.4	40.1
20	39.6	39.6	41.2	39.9	38.7	38.8	38.9
21	38.4	39.6	39.4	39.8	39.2	38.1	38.6
22	40.5	40.6	40.9	42.4	41.2	41.0	41.3
23	41.7	41.9	42.2	42.8	41.9	41.6	41.7
24	42.6	42.6	43.6	43.1	41.0	40.6	42.2
10-12	38.7	39.5	39.8	40.7	37.8	38.5	37.8
14-16	37.8	37.8	39.1	39.1	37.9	37.9	38.0
0-24	38.5	39.3	40.3	40.4	38.4	38.3	38.5

Mean (ALL): 39.0
Weekday Inter-Peak: 38.0

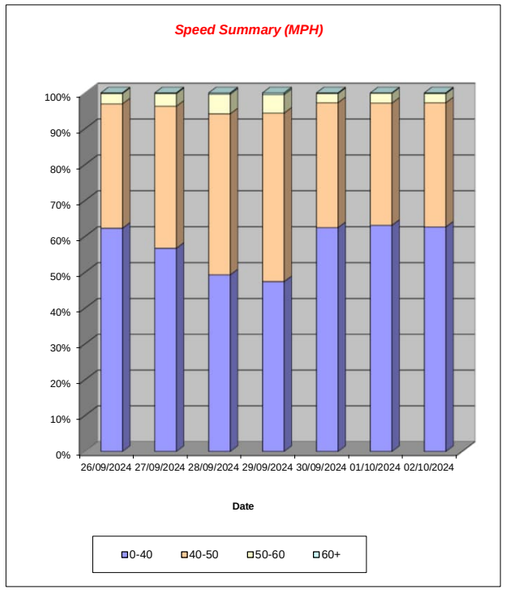
Channel 1 - Southbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	49.7	51.3	55.4	53.0	47.9	51.4	46.2
2	49.9	45.0	53.6	55.5	56.1	46.7	56.6
3	56.6	50.8	56.3	46.5	51.6	52.2	50.8
4	46.7	50.8	45.6	47.5	39.9	43.2	41.6
5	53.0	56.3	53.0	45.4	50.1	51.3	50.0
6	51.3	52.5	55.0	57.3	51.1	50.2	50.6
7	53.5	51.7	52.8	50.6	51.0	52.4	51.2
8	47.7	47.8	49.7	54.2	47.5	47.2	48.2
9	44.8	45.8	48.6	49.8	44.5	44.5	44.1
10	44.6	44.9	47.2	48.5	44.2	44.5	44.6
11	45.2	46.1	46.9	46.9	43.9	45.4	43.9
12	44.2	45.3	44.7	47.1	45.1	43.8	44.3
13	44.6	45.0	45.3	45.9	45.0	45.1	45.1
14	44.8	45.2	44.9	45.8	45.1	45.5	44.6
15	43.8	44.3	44.9	45.2	44.8	43.4	44.6
16	42.7	42.9	45.2	45.0	42.6	42.4	42.6
17	40.1	43.7	45.8	46.0	41.3	40.2	41.4
18	41.5	44.3	49.9	47.1	40.8	41.1	40.8
19	45.3	46.5	46.7	47.2	46.0	46.0	46.1
20	45.6	45.9	48.5	46.2	44.9	44.7	45.2
21	44.4	46.0	46.2	46.3	46.0	43.6	45.1
22	46.7	48.4	48.3	50.5	48.2	47.3	48.2
23	49.7	49.2	49.8	51.6	52.5	48.7	50.7
24	50.5	51.5	51.9	48.7	49.7	47.6	49.3
10-12	44.8	45.7	45.8	47.0	44.7	44.6	44.3
14-16	43.2	43.6	45.3	45.1	43.8	43.8	43.5
0-24	44.9	45.7	47.0	47.1	45.0	44.7	44.9

85th %ile [ALL]: 45.6
Weekday Inter-Peak: 44.0

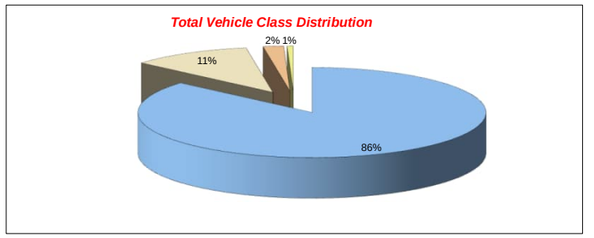
Channel 1 - Southbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	4936	4770	3098	2517	4846	4903	4838
40-50	2744	3326	2815	2491	2698	2643	2669
50-60	230	297	344	274	199	214	198
60+	12	15	22	25	13	7	14
TOTAL	7922	8408	6279	5307	7756	7767	7719



Channel 1 - Southbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	5678	784	122	44	6628
6-22	6539	870	135	49	7588
6-24	6623	881	139	49	7705
0-24	6816	910	144	50	7922
27/09/2024					
7-19	6060	848	142	54	7122
6-22	6835	958	153	61	8005
6-24	7043	970	153	65	8231
0-24	7193	991	167	57	8408
28/09/2024					
7-19	4647	467	91	25	5230
6-22	5283	525	104	24	5936
6-24	5481	537	100	28	6116
0-24	5587	557	108	29	6279
29/09/2024					
7-19	4087	351	54	7	4499
6-22	4622	378	63	10	5073
6-24	4701	380	65	35	5181
0-24	4841	392	65	9	5307
30/09/2024					
7-19	5561	848	172	44	6624
6-22	6309	936	188	40	7477
6-24	6388	941	184	48	7567
0-24	6502	960	179	51	7756
01/10/2024					
7-19	5518	832	117	37	6504
6-22	6368	917	129	40	7446
6-24	6452	934	133	40	7652
0-24	6632	957	138	40	7767
02/10/2024					
7-19	5587	828	151	44	6610
6-22	6326	918	162	46	7452
6-24	6388	928	168	48	7636
0-24	6557	948	166	48	7719
Average					
7-19	5305	711	121	36	6174
6-22	6035	788	133	40	6997
6-24	6155	794	134	40	7123
0-24	6311	816	139	42	7308

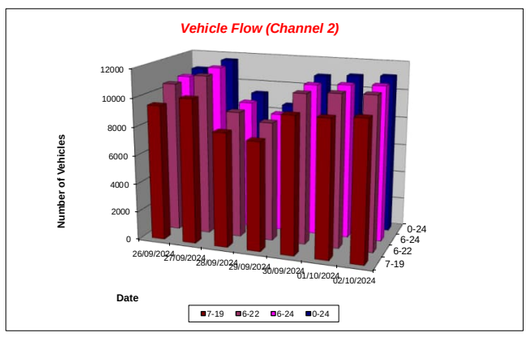


Pentir ATC 13, A487

Produced by Road Data Services Ltd.

Channel 2 - Northbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	29	22	51	42	19	48	20	28	33
2	19	17	37	21	16	17	21	18	21
3	10	17	23	6	14	17	12	12	14
4	20	30	36	28	21	16	30	23	26
5	28	42	38	27	43	25	38	35	34
6	103	71	55	36	113	106	112	101	85
7	251	241	111	91	263	262	298	263	217
8	798	781	297	236	859	826	847	822	663
9	1333	1178	497	317	1346	1380	1320	1311	1053
10	898	820	645	521	800	922	789	846	771
11	724	904	762	672	681	742	723	755	744
12	747	862	826	817	799	688	806	780	792
13	730	815	926	876	790	739	749	765	804
14	826	851	871	877	809	772	872	826	840
15	775	897	707	784	788	813	832	821	799
16	795	849	648	888	825	815	857	828	811
17	761	759	693	722	735	709	772	747	736
18	536	756	660	518	597	531	589	602	598
19	540	620	446	364	485	565	521	546	506
20	410	486	382	347	366	471	373	421	405
21	230	236	236	192	177	224	189	211	212
22	183	176	170	102	158	175	163	171	161
23	99	113	119	53	107	112	108	108	102
24	42	91	95	42	68	43	69	63	64
7-19	9463	10092	7978	7592	9514	9502	9677	9650	9117
6-22	10537	11231	8873	8324	10478	10634	10700	10716	10112
6-24	10678	11436	9091	8418	10653	10788	10837	10886	10277
0-24	10888	11627	9325	8596	10871	11015	11115	11103	10491



Channel 2 - Northbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	40.9	41.2	42.2	41.8	46.3	39.6	44.1
2	38.6	42.8	43.1	43.6	40.7	35.8	40.4
3	35.7	33.0	42.7	42.5	38.7	36.5	40.1
4	39.7	39.9	40.4	41.5	42.2	38.1	41.0
5	44.4	43.8	45.5	48.2	45.0	46.2	46.0
6	41.4	41.8	42.1	41.4	40.7	41.3	40.1
7	42.1	42.1	43.9	41.5	41.9	41.9	41.7
8	37.4	36.9	42.0	41.2	35.6	37.2	35.4
9	26.8	33.2	40.4	41.7	28.3	26.9	27.9
10	31.8	35.9	37.9	39.0	34.4	31.7	33.9
11	35.5	33.8	37.4	38.2	34.7	35.6	34.3
12	34.1	34.9	36.8	36.1	34.7	34.1	34.8
13	34.8	34.1	37.6	36.1	34.3	34.4	34.1
14	33.6	36.3	36.3	36.2	33.8	33.5	33.9
15	33.8	35.5	37.5	36.8	34.5	34.3	34.6
16	33.5	36.5	38.7	33.7	34.3	33.7	34.3
17	19.3	37.2	38.9	36.5	28.3	19.3	28.1
18	23.5	36.4	37.3	39.5	20.8	23.4	20.7
19	35.6	38.7	40.1	39.9	37.0	35.7	37.4
20	35.8	36.9	37.9	37.2	36.1	35.5	36.8
21	36.5	39.4	39.6	39.6	37.5	36.2	37.8
22	37.1	40.6	40.5	40.0	37.6	37.0	37.7
23	41.5	41.3	40.9	41.7	38.7	40.4	37.0
24	40.5	41.4	43.3	41.9	37.9	39.4	41.1
10-12	34.8	34.4	37.1	37.0	34.7	34.8	34.8
14-16	33.7	36.0	38.0	35.7	34.1	34.1	34.5
0-24	32.4	36.1	38.4	37.4	33.2	32.5	33.2

Average [ALL]: 34.6
Weekday Inter-Peak: 34.6

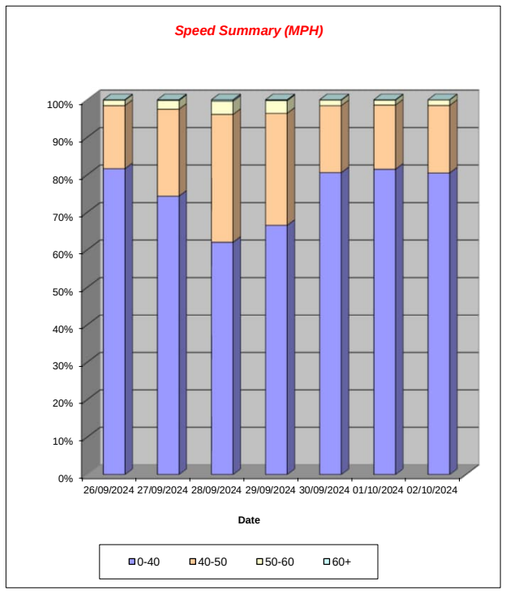
Channel 2 - Northbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	45.9	48.8	48.1	47.6	53.0	45.4	52.4
2	46.5	50.7	51.8	50.5	44.3	41.0	44.0
3	41.0	38.5	51.3	49.0	43.0	42.9	44.1
4	47.0	47.0	47.0	50.3	48.4	42.5	47.7
5	50.5	55.0	55.2	59.1	50.8	52.3	52.0
6	49.2	49.1	49.2	50.2	47.1	48.8	46.9
7	50.5	50.4	51.3	48.2	48.6	50.1	48.0
8	44.5	44.2	49.0	47.9	43.0	44.3	43.0
9	37.3	40.5	47.2	48.9	37.6	37.4	37.2
10	41.4	42.9	45.6	46.4	42.4	41.2	41.7
11	41.8	40.3	43.7	45.0	41.9	41.8	41.6
12	40.7	41.4	43.2	43.3	42.0	41.0	42.3
13	41.8	42.6	44.0	44.1	41.9	41.3	41.4
14	40.7	43.1	42.7	44.1	40.8	40.5	41.1
15	41.2	42.2	44.6	43.8	41.5	42.0	41.3
16	41.1	43.5	45.6	42.3	40.9	41.3	41.1
17	30.2	43.2	46.2	43.5	39.3	30.1	39.3
18	34.4	43.0	44.1	45.7	32.8	34.1	33.1
19	42.5	44.7	46.6	46.5	43.8	43.1	44.2
20	43.0	43.8	45.3	43.3	44.2	43.0	44.6
21	44.0	46.3	47.0	46.7	44.7	43.7	45.7
22	43.5	46.8	47.9	46.8	44.3	43.4	44.3
23	48.0	48.9	49.3	49.4	45.2	47.3	42.0
24	47.6	49.8	51.3	48.0	45.9	44.8	48.1
10-12	41.3	41.0	43.6	44.1	41.8	41.8	42.0
14-16	41.2	42.9	45.1	43.1	41.2	41.3	41.3
0-24	42.5	43.4	45.5	45.1	42.5	42.5	42.6

85th %ile [ALL]: 43.7
Weekday Inter-Peak: 41.6

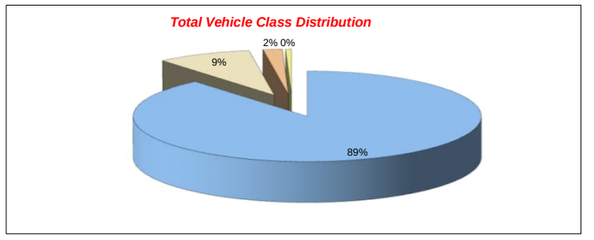
Channel 2 - Northbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	8888	8643	5785	5721	8762	8975	8947
40-50	1834	2693	3177	2567	1941	1887	2002
50-60	156	272	329	291	161	144	163
60+	10	19	34	17	7	9	3
TOTAL	10888	11627	9325	8596	10871	11015	11115



Channel 2 - Northbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	8343	895	181	44	9463
6-22	9313	974	203	48	10537
6-24	9433	989	207	49	10678
0-24	9622	1003	213	50	10888
27/09/2024					
7-19	8898	939	188	71	10092
6-22	9938	1012	203	78	11231
6-24	10014	1013	204	55	11436
0-24	10092	1032	213	80	11627
28/09/2024					
7-19	7206	625	124	26	7978
6-22	8027	682	138	30	8877
6-24	8273	694	146	30	9091
0-24	8440	709	146	30	9325
29/09/2024					
7-19	6987	501	87	17	7592
6-22	7661	548	100	17	8324
6-24	7747	551	103	18	8419
0-24	7900	565	105	20	8596
30/09/2024					
7-19	8348	921	191	53	9514
6-22	9223	987	205	57	10478
6-24	9375	1009	209	66	10653
0-24	9552	1032	218	71	10871
01/10/2024					
7-19	8390	905	173	36	9502
6-22	9394	996	194	50	10634
6-24	9558	1008	200	63	10789
0-24	9707	1026	205	77	11015
02/10/2024					
7-19	8458	989	179	51	9677
6-22	9391	1047	203	62	10700
6-24	9548	1053	205	71	10877
0-24	9730	1091	217	77	11115
Average					
7-19	8090	825	160	43	9117
6-22	8893	892	172	49	10112
6-24	9043	901	181	52	10277
0-24	9323	923	188	58	10491



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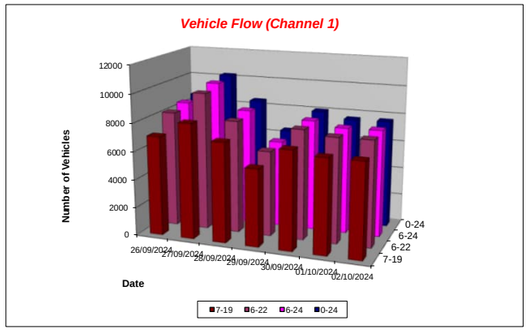
ices Ltd.

Pentir ATC 14, A4087

Produced by Road Data Services Ltd.

Channel 1 - hwestbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	59	38	68	58	38	13	8	31	40
2	30	28	32	47	29	14	7	22	27
3	19	14	40	52	12	9	4	12	21
4	16	16	34	46	12	11	8	13	20
5	18	22	28	24	28	9	15	18	21
6	58	59	39	33	52	35	50	51	47
7	141	133	76	50	161	122	145	140	118
8	304	277	149	90	297	280	326	297	246
9	513	478	302	126	516	490	506	501	419
10	504	519	429	215	471	495	428	483	437
11	496	513	560	367	456	448	423	467	466
12	575	627	668	587	537	488	538	553	574
13	561	746	730	673	633	577	584	620	643
14	620	701	752	632	659	572	591	629	647
15	665	847	713	695	698	634	648	698	705
16	693	840	780	768	694	648	663	708	727
17	746	881	808	642	724	803	731	777	782
18	734	892	674	376	703	689	672	738	677
19	639	837	504	298	587	552	572	637	570
20	449	655	353	229	354	293	326	415	380
21	352	496	245	190	199	223	214	297	274
22	222	311	228	112	97	134	112	175	174
23	197	191	159	65	63	56	77	117	115
24	68	120	114	43	23	30	21	52	60
7-19	7050	8158	7069	5469	6975	6676	6682	7108	6868
6-22	8214	9753	7971	6050	7786	7448	7479	8136	7814
6-24	8479	10064	8244	6158	7872	7534	7625	8305	7990
0-24	8679	10241	8485	6418	8043	7625	7669	8451	8166



Channel 1 - ..thwestbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	54.6	55.6	56.1	58.0	54.9	54.2	55.7
2	51.4	52.5	53.4	55.4	54.1	50.7	46.9
3	54.8	56.0	52.8	58.2	55.8	58.0	65.5
4	55.9	55.9	58.7	56.8	56.4	57.5	54.9
5	53.2	55.7	50.7	58.2	51.6	53.4	53.6
6	53.8	52.1	51.7	55.2	54.2	52.3	55.0
7	52.5	52.8	53.7	57.9	51.4	53.8	53.0
8	51.8	52.6	54.6	55.2	51.8	52.3	52.3
9	50.4	50.1	52.6	53.8	50.4	50.2	50.7
10	49.4	50.2	51.4	52.9	50.4	48.7	49.8
11	48.4	49.3	50.3	51.1	50.1	47.1	49.7
12	47.8	48.9	48.7	49.6	48.2	49.6	49.4
13	49.5	48.2	47.6	50.6	47.9	48.4	49.0
14	47.8	48.6	48.6	50.5	47.3	49.4	49.4
15	48.4	47.1	49.0	49.7	47.7	47.9	49.6
16	49.2	40.0	49.1	49.0	47.2	49.2	48.3
17	47.8	36.3	49.2	49.3	47.3	48.6	47.9
18	48.6	42.2	48.8	53.0	48.8	48.9	46.7
19	48.6	48.8	50.4	51.3	48.6	49.4	50.1
20	47.3	46.7	49.0	50.6	49.0	49.4	51.1
21	47.8	48.2	52.5	53.2	51.5	52.1	49.8
22	50.5	49.3	51.8	53.2	52.7	53.0	52.4
23	49.4	51.8	52.6	55.0	53.8	54.1	53.6
24	53.5	51.5	56.9	55.9	51.6	58.5	58.7
10-12	48.1	49.1	49.5	50.2	49.1	48.4	49.5
14-16	48.8	43.5	49.0	49.1	47.5	48.8	48.9
0-24	49.0	46.6	49.9	51.0	48.9	49.4	49.5

Mean (ALL): 49.0
Weekday Inter-Peak: 47.9

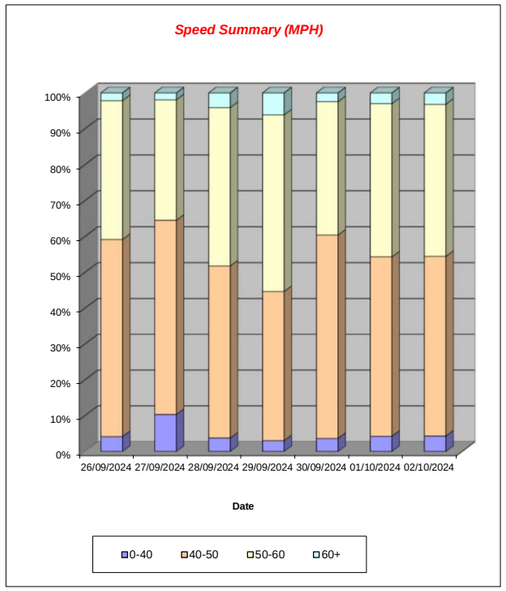
Channel 1 - ..thwestbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	61.6	62.8	64.6	67.0	62.9	62.2	64.4
2	58.7	59.5	58.8	65.3	62.7	57.1	55.3
3	61.4	64.3	61.5	66.3	62.2	66.5	73.6
4	63.4	63.9	67.3	65.6	66.2	68.3	62.1
5	61.4	62.3	56.9	66.6	57.8	59.3	60.2
6	60.9	59.4	59.9	63.7	62.4	59.8	63.1
7	59.6	59.9	60.7	65.3	58.7	61.2	59.9
8	57.4	59.9	61.0	61.8	58.5	58.6	58.5
9	56.3	55.9	59.5	61.6	55.9	55.9	56.3
10	54.7	55.9	58.1	59.5	56.3	54.7	55.9
11	54.3	55.7	56.1	58.0	55.6	58.0	54.7
12	53.7	54.1	54.1	56.1	54.1	55.1	55.4
13	55.0	53.9	54.8	56.3	53.1	54.5	55.0
14	52.9	54.2	54.4	56.0	54.5	55.1	55.5
15	53.3	52.3	54.7	55.5	52.8	53.9	54.9
16	54.4	55.6	54.9	54.7	52.4	55.0	53.7
17	53.4	52.5	54.1	55.7	53.0	54.3	53.2
18	54.3	54.9	55.0	60.0	53.8	54.5	53.2
19	54.0	54.4	56.8	57.8	54.5	54.8	56.3
20	53.6	52.2	56.1	59.2	55.5	55.9	58.0
21	54.6	54.4	60.0	60.7	57.7	59.1	57.1
22	58.2	55.7	59.4	60.1	61.0	61.6	60.0
23	56.3	57.0	60.1	60.7	61.9	63.9	62.3
24	61.1	59.3	65.5	63.6	62.1	67.4	67.4
10-12	54.0	54.9	55.1	56.5	54.5	57.0	55.1
14-16	53.6	56.7	54.7	55.1	52.7	54.5	54.3
0-24	55.0	56.8	56.5	57.8	55.1	56.0	55.8

85th %ile (ALL): 56.4
Weekday Inter-Peak: 55.3

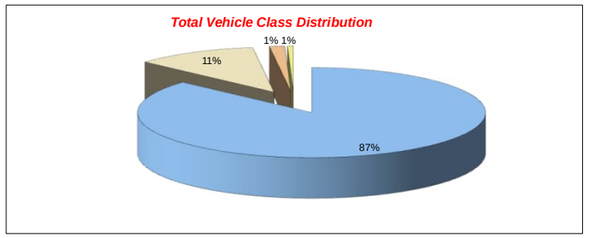
Channel 1 - ..thwestbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	361	1059	320	195	294	325	331
40-50	4776	5548	4076	2672	4564	3818	3847
50-60	3354	3436	3740	3157	2988	3253	3247
60+	188	198	349	394	197	229	244
TOTAL	8679	10241	8485	6418	8043	7625	7669



Channel 1 - Southwestbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	5956	925	135	35	7050
6-22	6978	1048	147	45	8214
6-24	7223	1063	148	44	8478
0-24	7378	1091	152	58	8679
27/09/2024					
7-19	7080	920	123	35	8158
6-22	8506	1058	148	43	9753
6-24	8796	1080	143	45	10064
0-24	8929	1110	153	51	10241
28/09/2024					
7-19	6413	582	57	17	7069
6-22	7227	659	63	22	7971
6-24	7484	677	66	17	8244
0-24	7684	704	68	32	8485
29/09/2024					
7-19	5002	418	41	8	5469
6-22	5534	454	50	10	6050
6-24	5634	468	50	10	6158
0-24	5863	490	52	13	6418
30/09/2024					
7-19	5861	970	89	40	6975
6-22	6574	1054	112	46	7786
6-24	6651	1057	113	48	7872
0-24	6787	1069	120	56	8043
01/10/2024					
7-19	5605	901	136	40	6676
6-22	6295	964	143	46	7448
6-24	6374	969	143	48	7534
0-24	6449	980	148	50	7625
02/10/2024					
7-19	5623	909	109	41	6682
6-22	6312	998	121	47	7479
6-24	6400	1004	123	47	7577
0-24	6477	1017	123	52	7669
Average					
7-19	5934	804	99	31	6868
6-22	6775	891	113	37	7814
6-24	6933	901	113	37	7990
0-24	7080	926	116	44	8166



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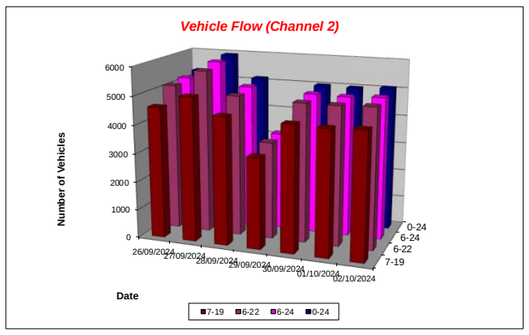
ices Ltd.

Pentir ATC 14, A4087

Produced by Road Data Services Ltd.

Channel 2 - theastbound — Vehicle Flow — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday	Weekday Average	Average
1	9	7	19	28	10	9	26	12	15
2	3	3	14	20	4	10	0	7	10
3	3	3	15	16	5	11	5	5	8
4	6	8	9	21	5	4	7	6	9
5	18	19	22	12	20	22	27	21	20
6	39	32	18	10	35	30	39	35	29
7	93	92	55	23	113	104	82	97	80
8	194	198	98	52	188	214	190	197	162
9	380	421	227	84	377	428	421	405	334
10	403	409	346	194	362	366	374	383	351
11	383	404	431	365	341	315	365	362	372
12	378	424	515	450	385	368	355	382	411
13	404	470	476	402	417	370	374	407	416
14	376	454	483	445	402	367	348	389	411
15	388	463	468	422	370	333	353	381	400
16	382	490	442	326	364	365	367	394	391
17	537	480	377	181	457	460	491	485	426
18	523	448	353	142	481	517	469	488	419
19	257	377	250	121	249	244	295	284	256
20	224	267	184	92	175	201	200	213	192
21	113	174	115	57	97	121	121	125	114
22	108	144	109	47	77	78	90	99	93
23	49	94	69	20	45	39	52	56	53
24	24	50	43	12	33	24	21	30	30
7-19	4605	5038	4466	3184	4393	4347	4402	4557	4348
6-22	5143	5715	4929	3403	4855	4851	4896	5092	4827
6-24	5216	5809	5041	3475	4919	4914	4968	5178	4909
0-24	5305	5934	5138	3542	5012	5000	5072	5265	5000



Channel 2 - ortheastbound — Average Speed — Week 1

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	47.4	49.8	49.9	51.5	48.3	49.9	48.3
2	48.9	55.5	50.6	49.1	47.0	43.2	
3	48.4	46.6	49.2	53.4	46.9	47.7	50.1
4	46.3	50.7	49.8	52.5	51.3	48.6	56.3
5	45.8	51.8	51.7	51.7	47.9	49.9	51.7
6	49.8	51.7	49.0	53.0	48.4	50.1	50.5
7	49.6	49.3	49.5	48.9	48.6	47.7	49.2
8	48.7	48.3	49.7	51.3	47.8	48.6	49.1
9	47.4	46.5	47.6	49.3	47.0	47.1	47.0
10	45.5	46.9	46.8	48.3	46.8	46.2	46.9
11	44.4	45.3	46.0	48.2	45.7	45.6	46.4
12	44.0	45.4	45.6	45.4	44.9	45.5	45.4
13	44.7	45.3	46.4	46.8	44.1	45.4	45.8
14	45.2	45.3	45.7	47.2	44.6	46.0	45.8
15	45.1	45.8	46.3	46.9	44.7	46.2	44.8
16	45.7	45.3	46.4	46.5	45.0	46.1	46.4
17	44.4	45.4	47.8	47.4	44.2	46.2	45.7
18	45.5	46.0	47.0	50.3	45.3	45.5	45.5
19	45.9	46.8	48.4	49.7	47.7	48.3	47.6
20	44.6	45.0	47.7	47.0	46.1	47.1	48.4
21	43.3	46.0	50.1	46.8	49.6	49.7	48.6
22	45.9	46.5	48.3	46.6	48.5	49.2	49.4
23	48.0	48.1	51.3	47.0	49.2	53.7	49.9
24	50.5	49.5	52.3	44.3	47.0	52.0	52.9
10-12	44.2	45.4	45.8	46.7	45.3	45.6	45.9
14-16	45.4	45.5	46.1	46.7	44.8	46.1	45.7
0-24	45.5	46.1	47.0	47.4	45.7	46.6	46.6

Average (ALL): 46.4
Weekday Inter-Peak: 45.4

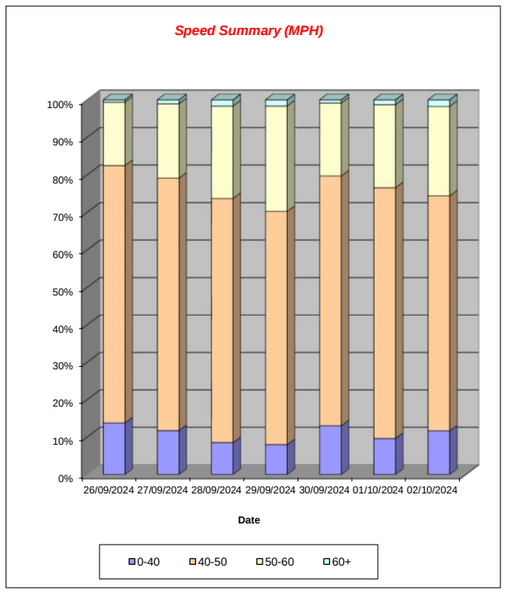
Channel 2 - ortheastbound — 85th Percentile

Hr Ending	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
1	56.1	55.1	55.3	59.7	55.7	61.2	56.4
2	53.7	64.3	55.0	54.7	54.6	52.5	
3	54.3	50.2	58.1	61.8	52.0	50.9	53.9
4	56.0	55.1	57.5	59.1	60.0	52.7	71.3
5	50.7	61.0	55.7	57.1	54.2	57.1	58.6
6	56.4	59.1	55.8	61.1	54.7	56.4	58.9
7	55.2	55.1	57.1	57.0	55.1	53.2	56.6
8	54.2	54.6	55.9	58.4	53.6	54.7	55.9
9	52.3	52.3	53.7	56.4	52.3	52.7	53.0
10	51.0	52.7	52.7	54.2	52.5	51.5	53.2
11	50.5	51.0	51.5	53.5	50.9	50.7	52.3
12	49.2	50.9	51.2	52.0	50.5	51.3	51.5
13	50.0	51.6	51.8	52.3	49.8	51.1	51.6
14	51.3	51.2	51.4	52.6	50.4	51.9	51.8
15	50.9	50.8	51.6	52.6	50.9	51.8	50.7
16	51.4	50.7	52.2	52.6	50.6	51.3	52.3
17	49.7	52.1	53.6	52.4	49.6	51.8	52.1
18	50.9	51.9	53.1	57.2	50.9	51.3	53.0
19	51.0	52.8	53.9	55.8	54.1	53.9	53.8
20	49.7	50.7	54.7	53.1	53.0	53.3	55.9
21	49.5	52.2	59.6	54.4	56.1	57.7	56.4
22	52.2	52.8	56.3	53.9	55.7	56.3	59.3
23	58.9	56.2	59.9	55.4	54.9	62.9	56.5
24	58.8	54.7	61.3	51.6	54.4	59.8	60.0
10-12	49.9	51.0	51.8	52.8	50.7	51.3	51.9
14-16	51.2	50.7	51.8	53.5	50.7	51.5	51.7
0-24	51.3	52.2	53.2	53.6	51.7	52.6	53.3

85th %ile (ALL): 52.6
Weekday Inter-Peak: 51.1

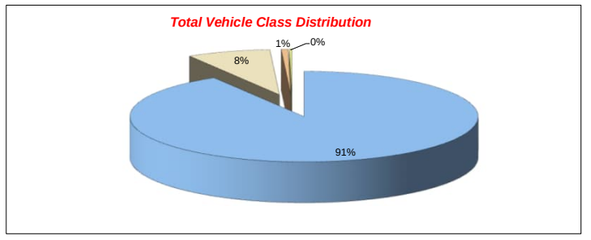
Channel 2 - ortheastbound — Speed Summary — Week 1

Speed (MPH)	26/09/2024 Thursday	27/09/2024 Friday	28/09/2024 Saturday	29/09/2024 Sunday	30/09/2024 Monday	01/10/2024 Tuesday	02/10/2024 Wednesday
0-40	731	697	439	283	654	481	593
40-50	3643	3998	3348	2205	3341	3347	3180
50-60	896	1175	1265	995	973	1106	1208
60+	35	64	86	59	44	66	91
TOTAL	5305	5934	5138	3542	5012	5000	5072



Channel 2 - Northeastbound — Vehicle Class — Week 1

Classes / Day / Time	Car / LGV / Caravan - 1	MGV - 2	OGV1 / Bus - 3,5,6,7,12	OGV2 - 4,8,9,10,11,13	TOTAL - 1-13
26/09/2024					
7-19	4149	421	28	8	4605
6-22	4648	457	27	11	5143
6-24	4713	462	29	11	5216
0-24	4793	467	30	15	5305
27/09/2024					
7-19	4634	380	30	8	5038
6-22	5266	399	42	8	5715
6-24	5356	403	44	8	5859
0-24	5464	417	44	9	5934
28/09/2024					
7-19	4183	264	15	4	4466
6-22	4611	289	17	4	4929
6-24	4773	293	17	4	5041
0-24	4810	304	20	4	5138
29/09/2024					
7-19	2969	208	7	0	3184
6-22	3177	220	10	0	3402
6-24	3253	223	10	0	3486
0-24	3299	233	10	0	3542
30/09/2024					
7-19	3991	353	39	10	4393
6-22	4418	386	38	15	4855
6-24	4485	395	38	15	4933
0-24	4582	401	39	15	5012
01/10/2024					
7-19	3950	362	25	10	4347
6-22	4405	398	29	19	4851
6-24	4468	401	29	15	4914
0-24	4534	411	34	21	5000
02/10/2024					
7-19	3922	437	32	11	4402
6-22	4377	474	32	12	4895
6-24	4419	480	34	11	4968
0-24	4520	486	43	23	5072
Average					
7-19	3972	344	28	7	4348
6-22	4411	375	29	10	4827
6-24	4486	382	29	10	4909
0-24	4567	389	32	12	5000



2.13.A Pentir Works Climate Change Risk Assessment

nationalgrid

1. Pentir Climate Change Risk Assessment

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 Pentir 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 Pentir Works

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
Construction						
Extreme Heat	Extreme heat days result in ambient temperatures to rise above optimal design temperatures of construction equipment. This can cause the overheating of construction equipment, resulting in delay to construction programme, repairs, additional project costs and/or safety risks.	Construction equipment & site.	A Construction Environmental Management Plan (CEMP) will be prepared by the contractor and will outline measures for managing environmental impacts during construction. 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. The contractor will monitor weather forecasts to support short- to medium-term programme management, enabling the planning of works and timely implementation of mitigation measures to	Unlikely	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
			protect workers and resources from extreme weather conditions. Health and safety plans will include all necessary and appropriate measures to manage severe weather events, safeguarding staff and reducing risks to construction operations. The contractor should also consider the use of construction materials and equipment with enhanced durability and resilience to climate extremes			
Extreme Heat	Extreme heat events cause health and safety risks to the construction workforce, which could lead to sun stoke and dehydration, or in a worst-case scenario death.	Human health and safety (staff and visitors)	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. 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. Health and safety plans will include all necessary and appropriate measures to	Unlikely	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
			manage severe weather events, safeguarding staff and reducing risks to construction operations. 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			
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.	A CEMP will be prepared by the contractor and will outline measures for managing environmental impacts during construction. 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. Health and safety plans will include all necessary and appropriate measures to manage severe weather events, safeguarding staff and reducing risks to construction operations.	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	Increased heatwaves and dry periods raise the risk of wildfires, which could result in injury or fatality to personnel. The presence of combustible materials on-site, such as generator fuel, could further exacerbate this risk. .	Human health and safety (staff and visitors)	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. 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.	Rare	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
Temperature-related (Extreme cold)	Construction workers are at risk of hypothermia due to low temperatures.	Human health and safety (staff and visitors)	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 during periods of extreme cold. 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. All outdoor construction workers should have access to indoor facilities with adequate heating and opportunities to take regular warm breaks.	Moderate	Minor	Medium (Not Significant)
Temperature-related (Extreme cold)	Low temperatures can lead to ground areas becoming frozen. This can lead to delays and disruption to construction activities, as the areas will need to be de-iced.	Construction equipment & site.	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	Moderate	Minor	Medium (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
			protect workers and resources during periods of extreme cold. 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. All outdoor construction workers should have access to indoor facilities with adequate heating and opportunities to take regular warm breaks.			
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)	A CEMP will be prepared by the contractor and will outline measures for managing environmental impacts during construction. 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 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.	Moderate	Minor	Medium (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
Storm Events	Storms and severe weather can disrupt the construction of the proposed works and access to the site. Impacts include delays, damage to construction materials, and machinery. Flooding and blocked roads can also affect material delivery and personnel movement.	Construction equipment & site.	A CEMP will be prepared by the contractor and will outline measures for managing environmental impacts during construction. 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. 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. Where feasible, the contractor should consider the use of construction materials and equipment with enhanced durability and resilience to climate extremes.	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 Pentir 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.	Pentir Substation. Electrical Equipment. Underground Cables.	The Operational Environmental Management Plan (OEMP) for the Pentir Substation will be assessed to ensure measures to minimise the impacts of heatwaves during operation are appropriate to cover the proposed works The site does not have a direct hydraulic connection to the broader water environment. Minor works will be carried out within the existing Pentir Substation, located 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. The existing Pentir 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.	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,	Pentir Substation. Electrical Equipment. Underground Cables.	The Operational Environmental Management Plan (OEMP) for the Pentir Substation will be reviewed to ensure measures to minimise flood impacts during operation are appropriate to cover the proposed works Monitoring weather forecasts and emergency response planning should be integrated into health and safety plans to	Rare	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
	and the need for machinery repair or replacement. The presence of combustible materials on-site could further increase this risk .		support preparedness for potential fire incidents. Vegetation around key assets will be regularly monitored, pruned, and maintained to reduce the risk of fire, damage, and operational disruption.			
Wildfire Event	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.	Human health and safety (staff and visitors)	The Operational Environmental Management Plan (OEMP) for the Pentir Substation will be reviewed to ensure measures for mitigation and emergency response for wildfire events during operation are appropriate to cover the proposed works. Monitoring weather forecasts and emergency response planning should be integrated into health and safety plans to support preparedness for potential fire incidents. Vegetation around key assets will be regularly monitored, pruned, and maintained to reduce the risk of fire, damage, and operational disruption.	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 structures leading to damage.	Pentir Substation. Electrical Equipment. Underground Cables.	The Operational Environmental Management Plan (OEMP) for the Pentir 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.	Rare	Insignificant	Low (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
			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.			
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)	The Operational Environmental Management Plan (OEMP) for the Pentir 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. 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. Buildings should be equipped with HVAC systems capable of responding to cold temperatures, providing adequate heating and preventing occupant discomfort.	Rare	Insignificant	Low (Not Significant)
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	Human health and safety (staff and visitors)	The Operational Environmental Management Plan (OEMP) for the Pentir Substation will be assessed to ensure measures for mitigation and emergency response for storm events during operation are appropriate to cover the proposed works.	Moderate	Minor	Medium (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
	during storms, including injuries from falling debris, flooding, or high winds.		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. 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.			
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 necessary maintenance and repairs.	Pentir Substation. Electrical Equipment. Underground Cables.	The Operational Environmental Management Plan (OEMP) for the Pentir Substation will be assessed to ensure measures for mitigation and emergency response for storm events during operation are appropriate to cover the proposed works. 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. The Proposed Works will either be designed to accommodate the climatic conditions projected for the end of its design life—using appropriate design	Moderate	Minor	Medium (Not Significant)

Climate variable	Description of impacts	Receptor(s)	Planned Controls & Adaptation measures	Likelihood	Consequence	Risk Rating
			guidance where available—or adaptive capacity will be incorporated into the design.			