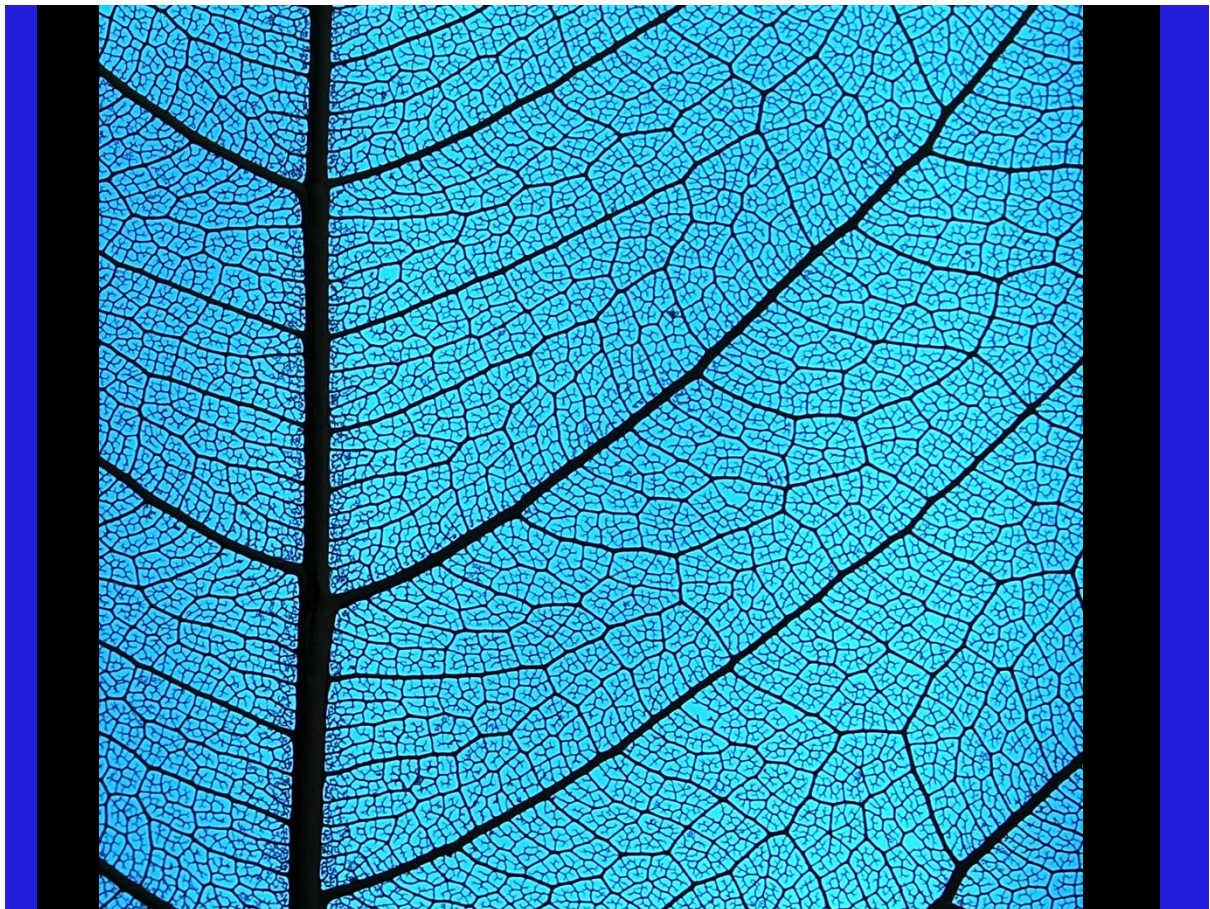


Substation Environmental Report

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Revision no: 04

National Grid Electricity Transmission
B2416603

Bodelwyddan Substation Extension
18 June 2025



Substation Environmental Report

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Contents

1.	Introduction.....	1
1.1	Context and Overview.....	1
1.2	Consenting Approach.....	3
1.3	Report Structure and Supporting Documentation.....	3
2.	Need for the Substation Extension	5
2.1	Bodelwyddan Substation Extension	5
2.2	Construction Sequencing.....	5
3.	Description of the Substation Extension	7
3.1	Introduction.....	7
3.2	Construction.....	7
3.3	Operation.....	9
3.4	Decommissioning.....	10
4.	Consultation	11
5.	Environmental Appraisal.....	12
5.1	Introduction.....	12
5.1.1	General Approach.....	12
5.2	Ecology and Biodiversity	13
5.2.1	Baseline.....	13
5.2.2	Measures to Avoid or Reduce Impacts.....	16
5.2.3	Potential Impacts	21
5.3	Landscape and Visual	23
5.3.1	Introduction.....	23
5.3.2	Assumptions and limitations	24
5.3.3	Baseline.....	25
5.3.4	Measures to Avoid or Reduce Impacts.....	35
5.3.5	Potential Impacts	35
5.3.6	Summary and conclusion	45
5.4	Traffic and Transport	45
5.4.1	Baseline.....	45
5.4.2	Measures to Avoid or Reduce Impacts.....	48
5.4.3	Potential Impacts	48
5.4.4	Summary and Conclusions.....	51
5.5	Archaeology and Cultural Heritage.....	52
5.5.1	Relevant Legislation, Policy and Guidance	52
5.5.2	Baseline.....	52
5.5.3	Measures to Avoid or Reduce Impacts.....	54
5.5.4	Potential Impacts	54
5.6	Socio-economic Effects	54
5.6.1	Baseline.....	54
5.6.2	Measures to Avoid or Reduce Impacts.....	56
5.6.3	Potential Impacts	56

5.7	Other Environmental Considerations	57
5.7.1	Baseline	57
5.7.2	Measures to Avoid or Reduce Impacts.....	59
5.7.3	Potential Impacts	61
6.	Planning Appraisal	64
6.1	Introduction	64
6.2	Policy and Legislative Documents.....	64
6.3	Planning Appraisal.....	64
6.3.1	Policy and Legislation	64
6.3.2	Planning Appraisal	66
6.4	Planning Assessment Conclusion	67
7.	Conclusion	68
	Acronyms, Abbreviations and References	69
	Acronyms and Abbreviations.....	69
	References.....	72

Appendices

	Appendix A. Works Site Plan	i
	Appendix B. Arboricultural Impact Assessment.....	ii
	Appendix C. Consultation	iii
C.1	Denbighshire County Council.....	iv
C.1.1	Landscape and Visual Assessment Proposals	iv
C.1.2	Permitted Development Letter.....	v
	Appendix D. Biodiversity Baseline	vi
	Appendix E. Habitats Regulations Assessment Screening	vii
	Appendix F. Landscape and Visual Methodology	viii
F.1	LVA Assessment Criteria.....	ix
F.1.1	Evaluation of Sensitivity	ix
F.1.2	Evaluation of Magnitude of Effect.....	x
F.1.3	Evaluation of Level of Effect	xiii
F.1.4	Cumulative Assessment Methodology	xiv
	Appendix G. Landscape Character and Constraints.....	xv
	Appendix H. Viewpoint Plan.....	xvi
	Appendix I. Zone of Theoretical Visibility	xvii
	Appendix J. Zone of Theoretical Visibility Methodology	xviii
J.1	Introduction	xix
J.2	Topography layer	xix
J.3	Point database/target points	xix
J.4	Theoretical range of visibility	xix
	Appendix K. Photomontages	xx
	Appendix L. Photomontage Methodology	xxi
L.1	Introduction	xxii
L.1.1	Viewpoint Locations.....	xxii

L.1.2	Visualisation Determination	xxii
L.1.3	Assumptions and Limitations	xxiii
L.2	Type 3 Visualisation Process Methodology	xxiii
L.2.1	Photography and Survey Data	xxiii
L.3	Panoramic Baseline Images	xxiii
L.4	Camera Matching Process.....	xxiv
L.5	3D Design Modelling	xxiv
L.5.1	Existing Site 3D Model.....	xxiv
L.5.2	Proposed layout design 3D Model.....	xxiv
L.5.3	Planting Mitigation Details.....	xxiv
L.6	Compilation of Type 3 Visualisations: Photomontages	xxv
L.7	Final Output.....	xxv
L.8	References.....	xxvi
Appendix M. Representative Viewpoints.....		xxvii
Appendix N. Landscape and Visual Effects Table		xxviii
Appendix O. Environmental Masterplan		xxxix
Appendix P. Heritage Appraisal		xl
Appendix Q. Construction Noise Statement.....		xli
Appendix R. Operation Noise Statement		xlii
Appendix S. Green Infrastructure Statement.....		xliii
Appendix T. Flood Consequences Assessment.....		xliv
Appendix U. Drainage Statement		xlv

Tables

Table 1-1: Overall Consenting Approach	3
Table 4-1: Summary of Consultation	11
Table 5-1: Measures to Avoid or Reduce Impacts on Species.....	18
Table 5-2: Representative Viewpoint Descriptions	29
Table 5-3: Combined Construction and Operational Visual Effects.....	40
Table 5-4: Personal Injury Accident Data Summary.....	46
Appendix Table 1: Landscape Sensitivity Criteria.....	ix
Appendix Table 2: Visual Sensitivity Criteria	ix
Appendix Table 3: Magnitude of Landscape Effects Criteria	xi
Appendix Table 4: Magnitude of Visual Effects Criteria	xii
Appendix Table 5: Level of Effect Matrix	xiii
Appendix Table 6: Landscape / Visual Level of Effect Criteria	xiii
Appendix Table 7: Landscape Effects Table	xxix
Appendix Table 8: Visual Effects Table.....	xxxix

Figures

Figure 1-1: Works Site Plan	2
Figure 5-1: Visibility Splays	47
Figure 5-2: Swept Path Analysis Egress.....	47
Figure 5-3: Swept Path Analysis Access	48

1. Introduction

1.1 Context and Overview

National Grid Electricity Transmission (NGET) ('the Applicant') operates the existing Bodelwyddan 400 kilovolt (kV) substation accessed from Glascoed Road, St. Asaph, in Denbighshire, north Wales. The Applicant is required to extend its existing substation to accommodate connection requests. The elements of work proposed comprise:

- a. Construction of a new bay and installation of new equipment in the existing substation under permitted development rights to allow connection of new generation prior to the substation extension;
- b. An extension outside the current operational demise of the substation to accommodate further connections, with a new fence;
- c. An upgrade to the fence around the existing substation so that it will match that for the substation extension; and
- d. Construction of two overhead lines which will connect to the substation (hereafter referred to as the 'overhead line works').

The Applicant will use its permitted development rights to construct a new bay and install new equipment in its existing substation but will not be able to extend its existing substation further to accommodate the further connections without planning permission.

The Applicant is making an application under the Town and Country Planning Act (TCPA) 1990 to Denbighshire County Council for an extension to the existing Bodelwyddan electricity substation and to upgrade the fence to the existing substation and is making two applications to the Secretary of State for Energy Security and Net Zero (DESNZ) for consent to build and operate two overhead lines which will connect to the extended substation formed from 'turning in' the existing overhead line south of the substation. The applications to DESNZ will include requests for deemed consent for overhead line works via Section 37 of the Electricity Act 1989. This Environmental Report relates to the proposed extension to the existing substation under the TCPA 1990.

The substation extension will allow the connection of new generation projects and an interconnector, each of which will be consented separately by their developers. The new overhead lines will replace the present 'turn-in' off the existing Connah's Quay to Pentir overhead line. The new overhead lines comprising short double-circuit connections from the existing overhead line will create a Connah's Quay to Bodelwyddan overhead line and a Bodelwyddan to Pentir overhead line. The overhead line works and substation extension are required together for the new connections.

Denbighshire County Council has not issued an Environmental Impact Assessment (EIA) Screening Opinion (after one was requested in August 2023) but in discussion indicated to NGET that the substation extension, taking account of the overhead line works required, does not comprise EIA development.

The proposed substation extension falls in the administrative boundary of Denbighshire County Council and is approximately 2 kilometres (km) west of St. Asaph and 1.3km south of Junction 26 of the North Wales A55 Expressway. The location of the substation extension and planning application site boundary (hereafter referred to as 'site boundary') is shown in Appendix A and **Figure 1-1**, and centred at Ordnance Survey (OS) Grid Reference SJ017735.

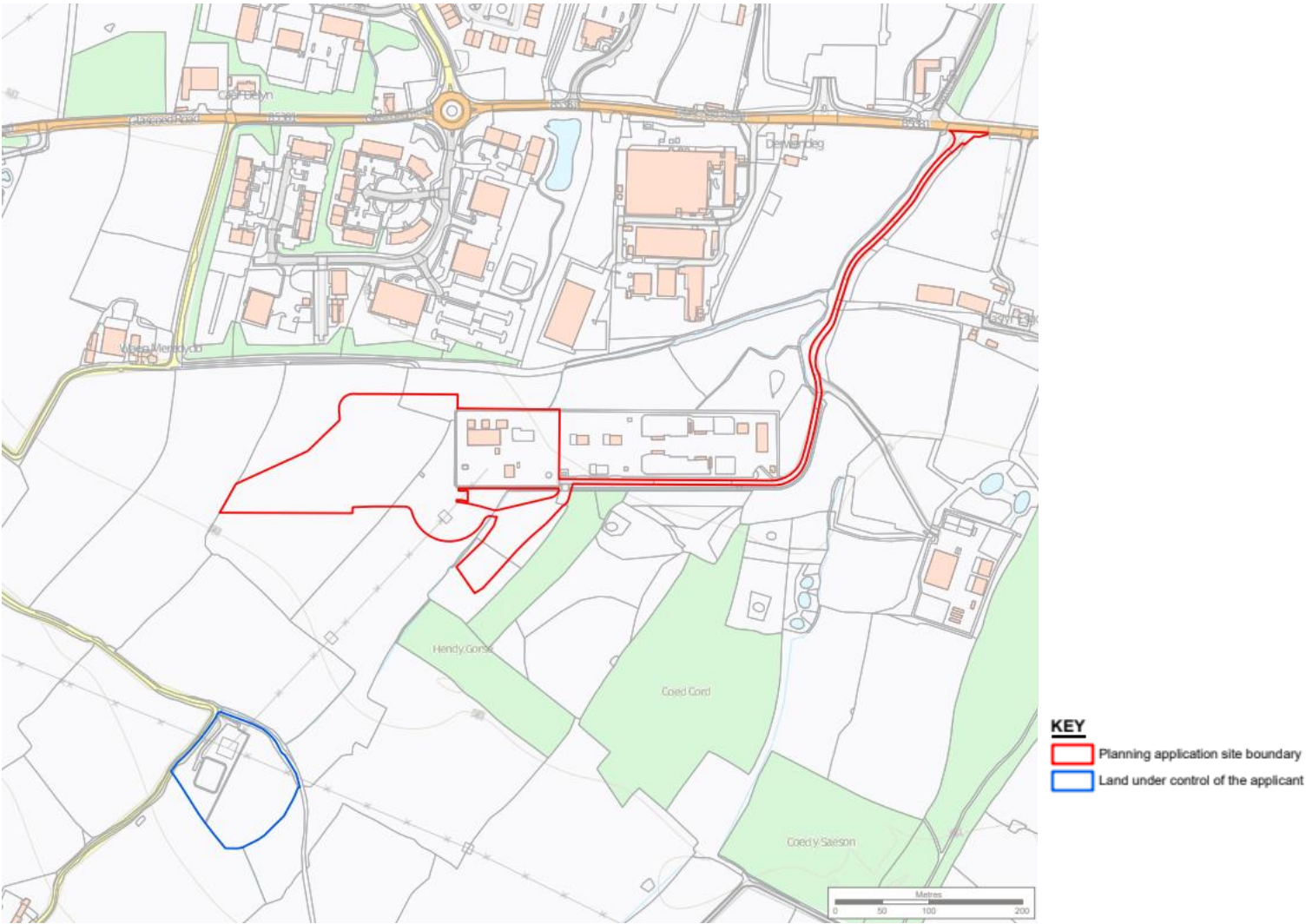


Figure 1-1: Works Site Plan

1.2 Consenting Approach

The overall consenting approach for the proposed substation extension, overhead line works, and other accompanying works required to facilitate the wider project is set out in Table 1-1. The substation extension and fencing upgrade reference number 1 in **Table 1-1** and shown in **Figure 1-1** and Appendix A are the subjects of the TCPA 1990 planning application. This Environmental Report accompanies the application for planning permission for the substation extension and fencing upgrade.

Table 1-1: Overall Consenting Approach

Ref:	Description of Works	Proposed Consenting Route
1.	Substation extension and fencing upgrade.	Planning application (pursuant to TCPA 1990).
2.	Overhead line works.	Section 37 consents including deemed planning permission.
3.	Other associated temporary enabling construction phase works including temporary access tracks and temporary compounds.	Planning application (pursuant to TCPA 1990).

1.3 Report Structure and Supporting Documentation

The remaining sections of this Environmental Report comprise the following:

- Section 2 – Need for the Substation Extension: explains that the substation extension is required together with the construction and operation of the overhead line works to accommodate additional load on the existing line which will arise from new connections;
- Section 3 – Description of the Substation Extension: including construction and operation;
- Section 4 – Consultation: explains the consultation undertaken to date;
- Section 5 – Environmental Appraisal: presents a summary of the assessment;
- Section 6 – Planning Appraisal: considers relevant planning policy and how the overhead line works accord; and
- Section 7 – Conclusion: outlines the outcomes of the appraisal.

Reference is made to the following supporting Appendices:

- Appendix A: Works Site Plan;
- Appendix B: Arboriculture Impact Assessment;
- Appendix C: Consultation;
- Appendix D: Biodiversity Baseline;
- Appendix E: Habitats Regulations Assessment Screening;
- Appendix F: Landscape and Visual Methodology;
- Appendix G: Landscape Character and Constraints;
- Appendix H: Viewpoint Plan;
- Appendix I: Zone of Theoretical Visibility;
- Appendix J: Zone of Theoretical Visibility Methodology;
- Appendix K: Photomontages;

- Appendix L: Photomontage Methodology;
- Appendix M: Representative Viewpoints;
- Appendix N: Landscape and Visual Effects Table;
- Appendix O: Environmental Masterplan;
- Appendix P: Heritage Appraisal;
- Appendix Q: Construction Noise Statement;
- Appendix R: Operation Noise Statement; and
- Appendix S: Green Infrastructure Statement.

An assessment of the electric and magnetic fields (EMFs) associated with the proposed Bodelwyddan substation and overhead line modifications has been undertaken by the Applicant. The separate report comprises a desktop analysis undertaken in accordance with Government policy and is based upon site-specific design information. The report concluded that the proposed 400kV substation extension is fully compliant with Government policy on EMFs. Specifically, all the fields produced would be below the relevant exposure limits. Therefore, there will be no significant EMF effects resulting from this proposed development and no mitigation is required.

2. Need for the Substation Extension

2.1 Bodelwyddan Substation Extension

The Applicant owns, builds and maintains the electricity transmission network in England and Wales. Under the Electricity Act 1989, the Applicant holds a transmission licence, through which it is required to develop and maintain an efficient, coordinated and economical electricity transmission system. It is required to offer connections to organisations which make valid applications to connect to the transmission system and identified an extension to the existing Bodelwyddan 400kV substation as an appropriate response to connection requests made. These new connections include the proposed Awel-y-Môr Offshore Wind Farm (The Planning Inspectorate National Infrastructure Planning Ref: EN010112), the proposed Mona Offshore Wind Farm (The Planning Inspectorate National Infrastructure Planning Ref: EN010137) and the proposed MaresConnect interconnector (planning applications proposed to be submitted in 2025).

Awel-y-Môr Offshore Wind Farm is required due to increasing energy demand and the need to mitigate the causes of climate change by achieving a carbon-neutral economy. The Welsh Government targets to generate 70% of electricity needs from renewable energy sources by 2030 and to reach net-zero by 2050. Awel-y-Môr Offshore Wind Farm Development Consent Order (DCO) was granted on 20 September 2023. Mona Offshore Wind Farm's DCO Examination closed in January 2025 and MaresConnect interconnector is expected to submit its planning applications in 2025.

Appendix A and **Figure 1-1** show the location of the substation extension and access routes, whilst also showing the overhead line works, existing Bodelwyddan substation, other existing substations to the east of the proposed substation extension and the general context of the site. It also shows the following aspects of the proposed overhead line works:

- Existing overhead single circuit connection from the adjacent overhead line which will be removed;
- Existing sealing end compound and underground cables single circuit connection from the adjacent overhead line. The cable sealing end, tower and tower (pylon) will be removed and the underground cables decommissioned;
- Two new overhead line connections between the existing adjacent overhead line and the proposed extended substation;
- Existing overhead line pylons to be removed; and
- Temporary compounds and car parking will utilise a combination of previously developed, operational land within the existing substation and undeveloped, non-operational land to the south and west of the substation extension for use in the overhead line works.

The overhead line works will include a temporary diversion to allow works to take place. The existing pylon adjacent the sealing end compound will be removed along with the two low height pylons between it and the existing substation. Four new pylons will be constructed.

2.2 Construction Sequencing

It is important that the substation extension and connection of the proposed double circuit overhead lines are delivered as early as feasible to accommodate the additional load on the existing line arising from the new connections.

Subject to planning permission, work is anticipated to commence on the substation extension during 2026 to deliver the wider project in time to accommodate the new connections and additional load. The substation extension will take approximately 24 to 28 months to construct. The overhead line works will take longer due to required outages (period of time when at least one circuit or one 'side' of the overhead line is not live, allowing works to take place). The availability of outages can vary dependent on system conditions, but the current sequence of works is as follows:

- Stage 1: Pre-outage assumes works commence 2026 with completion in April 2027;
- Stage 2: Pentir - Deeside - Bodelwyddan 2 circuit outage assumed 5 weeks;

- Stage 3: Pentir - Deeside - Bodelwyddan 1 circuit outage assumed 3 weeks;
- Stage 4: Pentir - Deeside - Bodelwyddan 2 circuit outage assumed 6 weeks subject to confirmation of remote end works;
- Stage 5: Pentir - Deeside - Bodelwyddan 1 circuit outage assumed 4 weeks subject to confirmation of remote end works; and
- Stage 6: Post outage and final arrangement.

The programme anticipates delivery of the overhead line works in late 2028 or early 2029, which would allow the new connections into the substation (subject to the connecting projects securing required consents) and accommodation of the additional load on the revised overhead lines arrangements following completion of the substation extension.

3. Description of the Substation Extension

3.1 Introduction

Figure 1-1 shows the location of the proposed substation extension, centred at OS Grid Reference SJ017735, including:

- The extent of the proposed permanent works of the substation extension;
- The access from the highway to the site of the works along the existing substation access road;
- Site boundary and working areas for the new substation extension around and to the west of the proposed substation extension;
- The land enclosing the existing substation where the fencing upgrade will take place; and
- Land under the control the applicant where the existing Cable Sealing Ends Compound is to be removed.

Appendix A also shows the substation extension and fencing upgrade works and proposed overhead line works outlined in Table 1-1.

The EIA Screening Opinion Request Letter (August 2023) included drawings for the substation extension which should be referred to in association with this report (Appendix B, PDD-32281-LAY-012 and PDD-32281-ELE-010).

The existing substation occupies an enclosed site approximately 0.9 hectares (ha) in area, with a private access some 680m in length from a junction off Glascoed Road. The majority of land surrounding the substation is used as farmland, with a commercial business park, roads, and some residential areas to the north.

The substation extension would be constructed to the west of the existing substation (centred at approximate OS Grid Reference SJ015735). The site is predominantly comprised of fairly flat land with the main land uses and habitats surrounding the proposed substation extension being buildings, electrical equipment, semi-improved grassland, modified grassland, species-poor hedgerow, species-rich hedgerow, arable fields, areas of scrub ruderal vegetation, and lowland mixed woodland.

A description of construction, operation and decommissioning is set out in the sections below.

The substation extension works are anticipated to require the removal of trees, habitats, hedgerows, and some pruning of overhanging branches, as outlined in Appendix B. Temporary hedgerow loss will be reinstated following completion of the substation extension. Where there is permanent loss of habitats, trees and hedgerow, offsite compensation is proposed to be secured by a commuted sum for works on Denbighshire County Council's Green Gates Farm Nature Reserve approximately 750m northeast of the proposed substation extension. It is not feasible to provide compensation habitats within the red line boundary or on immediately adjacent land. Awel-y-Môr Offshore Wind Farm's DCO rights have been granted to install cables through land around the substation and extension. Mona Offshore Wind Farm, MaresConnect interconnector and IGP Solar have proposals in the public domain to build and to route infrastructure through land around and close to the existing National Grid substation and proposed extension.

3.2 Construction

The proposed substation extension will include the following (see drawing PDD-32281-LAY-012 P06 and PDD-32281-LAY-016 P03 submitted with the application for elevations layouts):

- Telecommunications room – houses the communications connection which allows a connection to the control room and other substations for safety reasons;
- Control room – houses the relays, protection and control panels;
- Busbar protection relay room – houses the protection, control and supervision for busbar which conducts electricity;
- Battery room – facility used to house batteries for backup or uninterruptible power systems;

- Feeder protection relay room – houses the protection for overhead lines and cables to ensure the power grid continues to supply energy;
- Low voltage alternating current (LVAC) room – houses the LVAC supply distribution board; and
- Overhead line connection infrastructure and other infrastructure to support contracted user assets.

Removal of some buried cables will be required as part of the proposed substation extension.

The building extension will match the profile of the existing substation main building. Its maximum height will be 11.9 metres (m) falling to a height of 10.73m relative to the substation base (see drawing PDD-32281-ELE-010 P03 submitted with the application for elevations). The extension will be the same width as the existing substation main building at 15.5m, and will be 81.5m long (see drawing PDD-32281-ELE-010 P03 submitted with the application for dimensions). The extension will be clad in similar material and finish to the existing substation main building. There will be outdoor equipment comprising gas insulated bars and disconnectors with a height of 7.85m (see drawing PDD-32281-ELE-010 P03 submitted with the application for elevations). These comprise similar equipment to that already at the substation.

The total area of the proposed substation extension comprising the permanent development of the substation extension, temporary working areas and compound and temporary car parking is approximately 3ha (29,510 square metres (m²)), including the substation extension, adjoining access roads, temporary car parking area and the temporary construction compound site. The substation extension permanent works comprise approximately 0.9ha (9,420m²).

The working methods will be as follows:

- The majority of the Gas Insulated Substation (GIS) will be constructed in the main building and will not be visible during installation. The visible items will consist of Gas Insulated Busbars (GIB) and GIB enclosed cable sealing ends;
- Relay Rooms will be installed outside adjacent to the main building and the associated GIB. These are approximately 9m long by 4m wide and 4m high. The finish of these will be similar to the existing external relay rooms and to planning consent requirements;
- For the GIS/GIB it will require approximately 50 articulated low load lorries to the requirements in line with the Government Guidelines for 'Maximum length of vehicles used in the UK' and 'Road Vehicles (Construction and Use) Regulations 1986 (as amended); and
- External GIB are normally painted white. This helps to reduce any solar gain on the GIB and as a consequence keeps the gas pressure in the GIB within acceptable levels.

Design finishes of the substation extension will match or complement existing recessive finishes.

The substation site will be an Integrated Security Solution (ISS) Site, with fencing around the substation perimeter meeting the requirements set out in National Grid Technical Specification TS 2.10.14. The physical barrier will be a minimum height of 2.4m, with a monitored pulse electric fence backing 4.0m from the ground (i.e. extended 1.6m above the physical barrier) (see drawing PDD-32281-ELE-010 P03 submitted with the application for elevations, and PDD-32281-LAY-107 P01 submitted with the application for lighting layout).

The fencing upgrade to the existing substation will comprise works to install the additional monitored pulse electric fencing taking the total fencing height from the existing 2.4m to 4.0m (see drawing PDD-32281-ELE-010 P03 submitted with the application for elevations, and PDD-32281-LAY-107 P01 submitted with the application for lighting layout).

Based on currently available geotechnical information, the ground is not suitable for soakaway of new drainage. Therefore, new drainage is to be designed to take away rainwater from the roofs of the new GIS hall and ancillary buildings. Subject to an assessment of the capacity, the new drainage will connect in to the existing Bodelwyddan substation drainage system. If this is not viable, then a new adjacent outfall could be designed to direct the water, matching the philosophy of the existing system.

Drainage requirements during construction are not anticipated to be a problem as existing geotechnical information, including borehole and trial pit records, shows that groundwater was not encountered.

Construction working hours will typically be from 07:30am – 17:30pm, and may occasionally require weekend working between 08:00am – 17:00pm. Working during daylight hours will generally not require lighting, although lighting may be required in winter or if needed in work-specific areas, compounds and for security.

The construction programme is estimated between 24 and 28 months, where 12 to 14 months are required for building infrastructure and 12 to 14 months for the GIS switchgear and associated infrastructure construction. The GIS equipment cannot start construction until the building is substantially completed. The GIS section is likely to take longer to construct as outages are required on the incoming overhead lines diversions, which vary dependent on system conditions.

Assuming an average of 300mm depth of topsoil, the extension will result in approximately 2,800 cubic metres (m³) of topsoil to be taken off-site or re-used. Opportunity for topsoil to be re-used is likely to be limited due to the gas main, water main and customer cables surrounding the site (adding extra material in a bund above cables would de-rate them, and utility companies are unlikely to agree to extra material above their assets). Opportunities will be explored further to minimise material movement as far as reasonably possible. To optimise the cut/fill balance and minimise the volume of material to be removed from site, the finished substation level is proposed to fall from west to east at a gradient of 1 in 31 (within the maximum allowable gradient specified in National Grid Technical Specification 2.01) and tie in to the levels of the existing site. After topsoil removal, this results in a cut/fill balance of subsoil of approximately 235m³ fill. All volumes are subject to further, more detailed earthworks design by the contractor delivering the works.

Material storage is assumed to be in the temporary laydown area to the west of the substation extension. Preparatory earthworks for the substation extension will include:

- Stripping of topsoil – there is limited opportunity to re-use this topsoil for landscaping, therefore it is anticipated that the majority of it will be transported from site, thus reducing the need/duration of temporary stockpiles; and
- Re-grading subsoil – the design of the level and gradient of the substation extension will optimise the cut and fill balance as far as reasonably practicable, thus reducing the need/duration of temporary stockpiles.

Storage space is not anticipated to be a limiting factor based on information at this stage and therefore it is expected that any temporary material stockpiles would be in line with standard construction practice, with heights no more than 3-4m. The contractor would comply with the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (DEFRA, 2009).

The construction work of plant and the GIS building can be accommodated with the use of a 55 tonne (T) crane. This considers the height required to have suitable lifting space above the highest item of plant and equipment (12 to 15m) and the furthest distance away from the crane body to the equipment landing point. The height to the top of the crane during worst case scenarios for these operations is in the region of 25m.

The civil works associated with the substation construction are likely to require the typical plant and machinery for activities such as earthworks, foundations, ducting/cabling, drainage, roads and fences. This would include but may not be limited to excavators, dump trucks, concrete delivery lorries, telehandlers, and rollers. Based on currently available information, it is anticipated that foundations can be ground-bearing and will not require piling. However, if further work proves that piles are necessary, then a piling rig would also be required on site.

The anticipated construction vehicle numbers and a schedule of visits are outlined in Section 0.

3.3 Operation

During operation, the substation extension would be subject to routine maintenance checks, but this will not lead to any increase in the number of personnel working at the substation. Bodelwyddan substation is normally accessed daily by a substation attendant to carry out site routine inspections. There are statutory inspections at three years' intervals on various items of equipment and a team of personnel of around eight staff will be on site during this process. There may be equipment faults during the course of the year and a team will be dispatched to attend site but these are infrequent and by their nature not planned.

There will be no change in operational traffic and no new additional permanent access routes. The substation will be lit as per drawing PDD-32281-LAY-107 P01 (submitted with the application). Lighting columns already feature around the inside of the existing substation's perimeter fence for security, and there will be a requirement for additional lighting columns and Closed-circuit television columns around the substation extension. These

lights, in addition to additional lights local to the key items of equipment on site (task-lighting and street lighting), are also used by the maintenance staff to ensure safe access and egress in the event that staff are required to undertake non-routine maintenance outside of daylight hours.

The substation extension requires an extension to the existing fence line, as described, and installation of new plant and equipment. The Applicant will ensure compliancy with the relevant British Standards and ensure that minimum lux levels are met as defined within the Applicant's internal electrical specification (NG TS 2.10.14). The lighting shall be deployed so as to provide a minimum light level of 5 lux with an average to minimum ratio of no more than 3:1. The illumination shall be 100% of the perimeter of the site, from the fence to 5m inside the site. The maximum artificial light level shall not exceed 50 lux (see drawing PDD-32281-LAY-107 P01 submitted with the application for lighting layout).

The substation extension would be designed, constructed and operated in accordance with applicable health and safety legislation, complying with design safety standards including the National Electricity Transmission System Security and Quality Supply Standard, which sets out the criteria and methodology for planning and operating the National Electricity Transmission System. The substation extension will comply with the Electricity Safety, Quality and Continuity Regulations 2002. All electricity companies are bound by these rules, standards and technical specifications through their operator's licence.

3.4 Decommissioning

There are no plans to decommission the substation or the proposed extension as there would form integral parts of the electricity network.

If decommissioning were to be required, the present regulatory framework, good industry practices and the future baseline could have altered. The Applicant would consider and implement an appropriate decommissioning strategy taking account of good industry practice, its obligations to landowners under the relevant agreements and all relevant statutory requirements. The decommissioning works would follow the Applicant's processes at the time for assessing and reducing any environmental impacts and risks.

Decommissioning would be likely to involve removal using similar working methods to those outlined during construction. It is anticipated that any temporary access tracks and working areas required for decommissioning would be removed and the site reinstated to its former use. Decommissioning would follow the waste hierarchy such that materials would be reused where possible before recycling and disposal were considered.

4. Consultation

Consultation on the substation extension proposals has been undertaken with the local community and Denbighshire County Council (see Table 4-1).

A Pre-Application Consultation Report was prepared following a community representations period, and accompanies the planning application.

Table 4-1: Summary of Consultation

Consultation Body	Type of Consultation	Summary of Consultation
Denbighshire County Council Consulted on 23 June 2022 regarding landscape and visual surveys, and 1 August 2023 regarding EIA Screening Opinion Request Letter	Landscape and visual assessment proposals, substation extension and overhead line works EIA Screening Opinion Request Letter, substation extension Permitted development letter, substation extension TCPA application, substation extension	An enquiry about landscape and visual assessment proposals was responded to by Denbighshire County Council. The consultation can be viewed in Appendix C. The response was considered and applied to the landscape and visual assessment, included in Section 5.3, as well as the EIA Screening Opinion Request Letter. Although a formal EIA Screening Opinion has not been provided by Denbighshire County Council, it is understood that Denbighshire County Council has indicated to NGET that the substation extension, taking account of the overhead line works required, does not comprise EIA development. The letter considered the overhead line works in combination with the proposed substation extension to give a comprehensive understanding of the potential for likely significant cumulative effects resulting from the proposals as a whole. The Permitted Development letter for works to the existing substation has not yet been responded to by Denbighshire County Council. The request can be viewed in Appendix C.
Local community Consulted Q4 2023.	Community consultation events and representations period Pre-Application Consultation Report	The pre-application community consultation events, and the representations period following these, ended in Q4 2023.

Statutory Pre-Application Consultation on the substation extension will take place and be reported with the planning application when it is made.

National Grid is obliged to advertise its intention to make the applications under Section 37 of The Electricity Act 1989 for the overhead line turn-ins and invite representations to the Secretary of State for DESNZ. That will take place after the Pre-Application Consultation on the substation extension.

5. Environmental Appraisal

5.1 Introduction

5.1.1 General Approach

This section summarises the general approach to the environmental appraisal of potential impacts resulting from the substation extension, and methods to avoid or reduce them.

In accordance with good practice and to consider advice from Denbighshire County Council for the proposed substation extension, the following topics are considered within Sections 5.2-5.7 of this environmental appraisal:

- Ecology and Biodiversity;
- Landscape and Visual;
- Traffic and Transport;
- Archaeology and Cultural Heritage;
- Socio-economic Effects; and
- Other Environmental Considerations (air quality, noise and vibration, flood risk and water environment, and geology, soils, land contamination and waste).

The environmental appraisal firstly describes the baseline. This is the reference level of the environmental conditions without implementation of the substation extension and accompanying works, against which the potential impacts are assessed. Desk-based studies have been undertaken to inform the baseline using available data held in the public domain which is referenced throughout. Site surveys have also been undertaken to inform the appraisal. These are described in Sections 5.2-5.7 of this report where undertaken.

Where sensitive receptors are identified, the potential impact to the baseline is then assessed. The acceptability of the substation extension and their potential impacts are considered against local and national planning policy in Section 6.

The appraisal also takes into account good practice measures and construction methodologies to avoid or reduce potential impacts. These are set out in Sections 5.2-5.7 of this report.

The topic sections also consider the cumulative effects of the substation extension on the environment when considered with other developments. The other developments considered are existing and planned energy and electrical infrastructure in the vicinity of the substation extension, as requested for inclusion by Denbighshire County Council planning services (in response to landscape surveys and scope, 22nd July 2022).

The other developments advised to National Grid include:

- existing substations to the south of Glascoed Road (Bodelwyddan substation, Gwynt-y-Môr Offshore Wind Farm substation and Burbo Bank Extension Offshore Wind Farm substation);
- the existing Scottish Power Distribution Network substation on land to the east of St. Asaph Business Park;
- the existing flexible gas fired power station at TRB Drive on the St. Asaph business park;
- Elwy Solar Energy (Case Ref: DNS/3247619);
- Awel-y-Môr Offshore Wind Farm (The Planning Inspectorate National Infrastructure Planning Ref: EN010112);
- St. Asaph Solar Farm (Case Ref: CAS-01392-D2T3F3);
- Mona Offshore Wind Farm (The Planning Inspectorate National Infrastructure Planning Ref: EN010137);
- Morgan Offshore Wind Farm (The Planning Inspectorate National Infrastructure Planning Ref: EN010136); and

- IGP Solar Farm and battery energy storage system.

The associated proposed overhead line works are also considered for cumulative effects.

A pipeline diversion is also required to the south of the substation extension, which will be delivered by a third-party utility provider, and this is considered in the appraisal of the cumulative effects with the overhead line works. The pipeline owner and operator is Wales and West Utilities who will be utilising their permitted development rights to divert the pipeline and reinstate the land.

Morgan Offshore Wind Farm is proposed to connect to Pentwortham Substation in northwest England, will not have any assets in Denbighshire and is not anticipated to have any potential cumulative effects.

5.2 Ecology and Biodiversity

5.2.1 Baseline

5.2.1.1 Study Area

The proposed substation extension is set within a predominantly rural landscape, comprising agricultural fields, hedgerows, small areas of woodland and ditches (centred on OS Grid Reference SJ 01513 73567). A business park is approximately 50m to the north of the site boundary, and a wind farm substation also borders the substation 150m to the east.

The works area comprises the permanent and temporary working areas for the proposed substation extension and is referred to as the 'site boundary'. The spatial scope of the study area takes account of all areas where significant effects to ecological features could occur throughout the lifetime of the proposed substation extension including the construction footprint and locations of any ancillary works, compounds and varying Zones of Influence for the ecological receptors present.

The baseline for biodiversity is reported with Appendix D which details the methodologies and results of the desk study and field surveys. A summary is presented below. An importance valuation of ecological features identified has also been provided in accordance with the methodology outlined in Chartered Institute of Ecology and Environmental Management guidelines (2018).

5.2.1.2 Designated Sites

One Special Area of Conservation (SAC), for which bats are a qualifying feature, was identified within 30km of the proposed substation extension:

- Mwyngloddiau Forest Gwydir/Gwydyr Forest Mines SAC, approximately 25km southeast of the site boundary (central grid reference: SH795578) is a collection of small sites which support lesser horseshoe bat (*Rhinolophus hipposideros*). This site is of **International** importance.

The search for SACs, Special Protection Areas (SPA), Ramsar sites, National Nature Reserves, Sites of Special Scientific Interest (SSSI) and Local Nature Reserves within 2km of the proposed substation extension identified two sites (see Figure 1, Appendix D):

- Coedwigoedd Dyffryn Elwy/Elwy Valley Woods SAC, approximately 1.3km south of the site boundary (central grid reference: SJ020691). Annex I habitats that are a primary reason for selection of this site comprise Tilio-Acerion forest, an ancient semi-natural woodland. Coedwigoedd Dyffryn Elwy/Elwy Valley Woods SAC is of **International** importance for biodiversity.
- Coedydd ac Ogofâu Elwy a Meirchion SSSI, is also approximately 1.3km south of the site boundary and is a component part of the Coedwigoedd Dyffryn Elwy/Elwy Valley Woods SAC (see above). In addition to ancient woodland habitats, calcareous grassland and rare vascular plant assemblages are present. A diverse assemblage of bat species, including lesser horseshoe bat, have been recorded roosting in caves within the woodland. Coedydd ac Ogofâu Elwy a Meirchion SSSI is of **National** importance for biodiversity.

The desk study identified thirteen non-statutory designated sites, all Local Wildlife Sites (LWS) or candidate LWS, within 2km:

- The closest is Coed Cord and Coed y Saeson LWS comprised of three areas of ancient woodland which feature alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*), pedunculate oak (*Quercus robur*) and birch (*Betula* sp.) communities. The boundary of the Coed Cord parcel of the larger LWS is approximately 100m south of the existing substation at its closest point. This site is of **National** importance for biodiversity due to its irreplaceable ancient woodland habitats.
- The remaining twelve LWSs are greater than 600m from the site boundary (full details included in Appendix D).

5.2.1.3 Habitats

Habitats present within the site boundary comprised, see Figure 3, Appendix D (with habitat condition as per Natural England, 2022):

- cereal crops;
- modified grassland of poor condition;
- managed hedgerows with trees (a priority habitat) and scattered trees, of moderate condition. These habitats are considered to be of **local** importance for biodiversity (see Appendix B for more details);
- dense scrub (of **less than local** importance); and
- the existing substation which comprised areas of hardstanding with electrical infrastructure and buildings as well as small areas of modified grassland. These habitats have little to no ecological value and are considered to be of **negligible** importance.

The main access route would utilise the existing substation access from Glascoed Road, comprising a tarmac road bordered by other neutral grassland of moderate to poor condition and tall ruderal vegetation, species poor, managed hedgerows, dense scrub, and scattered trees.

Habitats surrounding the site boundary comprised agricultural fields of modified grassland with associated hedgerows and ditches. The ditches immediately adjacent to the site boundary were dry at the time of survey.

In addition to the Coed Cord and Coed y Saeson LWS described above, an area of restored ancient woodland (unnamed) is present within 20m of the site boundary. Areas of lowland mixed deciduous woodland (county importance) and other woodland (local importance) were recorded within 50m of the site boundary. Additional areas of ancient woodland habitats and traditional orchard and parkland priority habitats are also within 2km of the site boundary (see Figure 2, Appendix D).

5.2.1.4 Species

5.2.1.4.1 Great crested newts and other amphibians

Desk study data returned multiple records of great crested newt (GCN) and more common amphibians including common toad (*Bufo bufo*), common frog (*Rana temporaria*) and smooth newt (*Lissotriton vulgaris*) within 2km of the site boundary. An aerial assessment of the area identified no ponds or waterbodies within the site boundary but ten within 250m. Three ponds (ponds 1, 2 and 9, see Figure 4, Appendix D) returned positive eDNA results indicating likely presence of GCN.

However, the cropland, hard standing and poor agricultural grasslands within the site boundary provide sub-optimal terrestrial amphibian habitat with semi-natural habitats having a short sward and being intensively managed through regular ploughing, grazing and poaching. Nevertheless, field boundary features such as hedgerows, field margins (unmapped), and small areas of tall ruderal habitat (unmapped) provide more suitable terrestrial habitats for amphibians including GCN. GCN and other amphibians are of **local** importance for biodiversity.

5.2.1.4.2 Reptiles

The desk study returned nine records of grass snake (*Natrix helvetica*) within 2km of the site boundary. Suitable refugia and foraging habitat for reptiles, including grass snake, were recorded within the site boundary comprising hedgerows, tall ruderal vegetation and dry ditches. The cropland and grassland habitats within the site boundary

provided sub-optimal potential as reptile habitat due to their short sward and heavily managed nature. A small population of reptiles are assumed to be present and are of **local** importance for biodiversity.

5.2.1.4.3 Hazel dormouse

The desk study returned three records of hazel dormouse (*Muscardinus avellanarius*) within 2km of the site boundary. The closest record was approximately 1.2km south-west within Coed Plas Newydd woodland in 2013. Dormice are considered rare in this part of Wales (Wembridge *et al.*, 2016). The ancient woodland (Coed Cord and Coed y Saeson LWS), approximately 100m south-east of the survey area provided potential habitat for dormouse, with connectivity to the site boundary via the surrounding hedgerows. However, the hedgerows present were heavily managed by farming practices reducing suitability for dormouse.

The value of habitats within the site boundary for dormice are of **local** importance.

5.2.1.4.4 Bats

All buildings and structures (existing substation buildings and overhead line supports) within the site boundary were assessed as providing negligible suitability for roosting bats. Three trees with high or moderate bat roosting potential within 50m of the proposed substation extension were identified. Dusk emergence and dawn re-entry surveys were carried out in August and September 2022, and a combination of climbing and dusk emergence and dawn re-entry surveys were continued in April and May 2023. No bat roosts or evidence of bat presence were recorded in the three trees surveyed. Three trees with low bat roosting potential were identified within the footprint of the proposed substation extension.

Two bat roosts were identified south-west of the existing substation. These bat roosts of single number pipistrelle species were approximately 115m and 250m south of the proposed temporary construction area. Full results from bat surveys can be found in Appendix D and are shown in Figure 5.

Activity (foraging, commuting, or social calls) of a low number of common bats were recorded during all dusk/dawn surveys with a single fly-by of a lesser horseshoe bat also being recorded.

The bat ecological features at this location are of **local** importance for biodiversity.

5.2.1.4.5 Breeding birds

Scrub, hedgerow, and scattered trees across the site boundary had potential to support tree and shrub nesting birds. Grassland field margins and arable habitats had the potential to support ground-nesting birds. The site boundary also had potential to be used by foraging barn owl (*Tyto alba*) but there was negligible potential for roosting/nesting barn owl within buildings or trees within the site boundary.

Equipment near the transformer within the existing substation, such as surge arresters, provided suitable areas for nesting birds. However, no evidence of Schedule 1 (Wildlife and Countryside Act 1981 (as amended)) listed bird species was recorded during the field surveys. The value of the habitats within the site boundary for breeding birds is are of **local** importance.

5.2.1.4.6 Other notable fauna

A single disused badger sett (a single hole) was recorded in 2021, as part of the Preliminary Ecological Appraisal (not provided in Appendix D Biodiversity Baseline as superseded by more recent habitat and species survey). However, no evidence of this sett was recorded during the subsequent surveys in 2022 and 2023. A live badger was observed during a dusk emergence bat survey foraging along the road to the north of the site boundary. Badger is considered to be of **local** biodiversity importance.

No suitable habitats for otter (*Lutra lutra*), water vole (*Arvicola amphibius*) or white-clawed crayfish (*Austropotamobius pallipes*) were recorded within the site boundary. The habitats present and desk study do not indicate the presence of important invertebrate assemblages. These ecological features are not considered further within this report.

Small mammals including hedgehog (*Erinaceus europaeus*) are likely to be active across the site boundary particularly in hedgerows and scrub. The small mammal assemblage is of **local** importance.

5.2.2 Measures to Avoid or Reduce Impacts

5.2.2.1 Embedded Mitigation

Ecological advice has been provided in the early stages of development design and potential ecological constraints have been continually fed into the process. The proposed substation extension is designed to retain as many mature trees as practicable and avoid areas of woodland. To avoid/reduce the effects of local compaction of ground within the root protection zones of retained trees, or other accidental damage, appropriate tree protection measures would be implemented in accordance with BS 5837:2012 'Trees in relation to design, demolition and construction. Recommendations' (BSI, 2012).

Standard best practice construction guidelines to avoid or reduce impacts to the terrestrial, aquatic and riparian environment would be followed. It is predicted that this would be sufficient to prevent any impacts caused by accidental pollution incidents such as fuel spills and sediment release during construction activities as well as dust control. Active construction plant would result in release of vehicle emissions, but these would be minor and temporary such that no effect on ecological receptors is anticipated.

All works would commence during daylight hours. Where works occur during periods of low light, additional lighting may be needed in work-specific areas. Lighting columns already feature around the inside of the existing perimeter fence for security, further lighting may be required for compound security. These would be designed in accordance with best practice guidance to avoid adverse effects. Noise from construction activities would be unavoidably generated but this would be temporary and at a level that is unlikely to generate a disturbance response from noise sensitive species. In the unlikely event disturbance, for example, to birds were to occur, there is plentiful alternative habitat available nearby.

5.2.2.2 Designated Sites

While lesser horseshoe bat has been recorded within the site boundary, the intervening distance of over 25km between the site boundary and the Gwydyr Forest Mines SAC suggests that the site boundary does not provide important supporting habitats for the SAC bat population. The site boundary is close to the business park to the north and existing substation to the east, which do not provide suitable habitats for bats; it is unlikely that the lesser horseshoe bats or wider bat assemblage of the Coedydd ac Ogofau Elwy a Meirchion SSSI are reliant on the habitats immediately adjacent these areas where the substation extension is proposed. While a single pass of a lesser horseshoe bat was recorded during surveys, given the lack of suitable roosting features for lesser horseshoe (open cavities, mines, caves and old buildings etc.) and the distance of the site boundary to the SAC, the single recording is likely an isolated individual commuting in the distance. It is unlikely the proposal would negatively affect the qualifying species of the SAC, nor would it impact the conservation status of lesser horseshoe bat populations.

At approximately 1.3km south of the site boundary, the combined Elwy Valley Woods SAC and Coedydd ac Ogofau Elwy a Meirchion SSSI would not be directly impacted. There is no surface or ground water connectivity and the site is beyond 200m from the site boundary where potential changes in air quality could have an effect on sensitive vegetation (Institute of Air Quality Management, 2019).

A Screening Stage Habitats Regulations Assessment (HRA) assesses the potential for any likely significant effects on the two SACs. This is provided in Appendix E. In summary, due to the small-scale nature of the proposed substation extension and the relative location, distance and lack of connectivity, no impacts to designated sites are anticipated.

The Coed Cord and Coed y Season LWS is approximately 100m to the east of the proposed temporary construction area to the south of the existing substation. Separated by the linear woodland of Hendy Gorse (see Figure 2, Appendix D), no change in air quality through dust of vehicle emissions from the works is anticipated to be sufficient to affect any sensitive habitat of the LWS. No other pathways to effect were identified.

5.2.2.3 Habitats

In line with the mitigation hierarchy the design has avoided and minimised impacts on semi-natural habitats where practicable. However, to facilitate the works there will be some unavoidable permanent and temporary loss of some habitats. There would be a permanent loss of approximately 0.15ha of poor condition modified grassland, 0.63ha of cropland, seven individual trees (T21, T24, T25, T26, T28, T29 and T31); one tree group equating to

approximately 0.0123ha of canopy cover; and 89m of hedgerow H11 (priority habitat). See Arboricultural Impact Assessment report – Appendix B for more detail on trees/hedgerows within the proposed works footprint. Habitats temporarily lost to the construction and laydown area, and the temporary car park area would comprise approximately 0.63ha of modified grassland and 0.9ha of cropland. These would be reinstated once construction was complete.

An area of restored ancient woodland (un-named Figure 2, Appendix D – named Hendy Gorse on Figure 5, Appendix D) is present approximately 20m south of the existing substation. The temporary construction area to the west of this woodland has been offset with appropriate tree protection measures in accordance with BS 5837:2012 'Trees in relation to design, demolition and construction' (BSI, 2012).

Due to the small-scale and localised nature of the proposed substation extension and the best practice construction practices implemented, no significant change in air quality would occur and no impacts are expected on the woodland. Other ancient woodland and priority habitats shown in Figure 2, are beyond 200m from the site boundary which is considered the maximum distance where adverse changes in air quality could have a direct impact.

5.2.2.4 Species

Protected or notable species identified during the desk study and field surveys with potential to be impacted by the proposed substation extension include GCN and other common amphibians, reptiles, hazel dormouse, bats, breeding birds, badger, hedgehog, and other common small mammals. An outline of the relevant legislation, potential impact and measures to avoid or reduce impacts is provided in Table 5-1.

Table 5-1: Measures to Avoid or Reduce Impacts on Species

Species	Legislation	Potential Impact	Measures
GCN	<ul style="list-style-type: none"> Conservation of Habitats and Species Regulations 2017 (as amended) Wildlife and Countryside Act 1981 (as amended) S7 species in the Environment (Wales) Act 2016 	<p>Confirmed presence of GCN within 250m of the site boundary. Suitable terrestrial habitat within the site boundary present hedgerows, scrub, and tall ruderal vegetation.</p> <p>Permanent removal of approx. 89m of hedgerow and 0.15ha of modified grassland. Temporary loss of 0.63ha of modified grassland.</p>	<ul style="list-style-type: none"> The construction of the proposed substation extension would have a low impact on GCN. The majority of terrestrial habitat within the site boundary is sub-optimal for GCN as it is intensively grazed and poached grassland and cropland. The ponds where GCN presence has been confirmed are unlikely to form a single meta-population as they are separated by the existing substation which does not support suitable habitat for commuting newts. The hedgerow requiring removal is unlikely to be essential in the support of the local GCN or provide a significant refuge. However, a GCN mitigation licence would be sought. In accordance with NRW guidelines, it is considered that the eDNA survey results are sufficient survey data to inform a low impact GCN licence. An ecologist would provide a watching brief and perform hand-searching of the vegetation during clearance and other works in habitat areas suitable for amphibians. Two staged vegetation clearance to encourage amphibians to naturally move away from the works area. Any animals found would be relocated to alternative, undisturbed habitats nearby. All refugia or potential hibernation features would be disassembled by hand and relocated out of the work area during the amphibian active season (generally April-October).
Other amphibians: particularly common toad	<ul style="list-style-type: none"> Wildlife and Countryside Act 1981 (as amended) S7 species in the Environment (Wales) Act 2016 	<p>Suitable refuge habitat within the site boundary includes hedgerows, scrub, and tall ruderal vegetation.</p> <p>Permanent removal of approx. 89m of hedgerow and 0.15ha of modified grassland. Temporary loss of 0.63ha of modified grassland.</p>	<ul style="list-style-type: none"> An ecologist would provide a watching brief and perform hand-searching of the vegetation during clearance and other works in habitat areas suitable for amphibians. Two staged vegetation clearance to encourage amphibians to naturally move away from the works area. Any animals found would be relocated to alternative, undisturbed habitats nearby. All refugia or potential hibernation features would be disassembled by hand during the amphibian active season (generally April-October).
Reptiles: grass snake, slow worm, common lizard	<ul style="list-style-type: none"> Wildlife and Countryside Act 1981 (as amended) S7 species in the Environment (Wales) Act 2016 	<p>Suitable refuge habitat within the site boundary includes hedgerows, scrub, and tall ruderal vegetation.</p> <p>Permanent removal of approx. 89m of hedgerow and 0.15ha of modified grassland. Temporary loss of 0.63ha of modified grassland.</p>	<ul style="list-style-type: none"> An ecologist will provide a watching brief and perform hand-searching of the vegetation during clearance and other works in habitat areas suitable for reptiles. Two staged vegetation clearance to encourage reptiles to move away from the works area. Any animals found would be relocated to alternative, undisturbed habitats nearby. All refuge or potential hibernation features would be disassembled by hand and relocated out of the work area during the reptile active season (generally April-October).
Hazel dormouse	<ul style="list-style-type: none"> Conservation of Habitats and Species Regulations 2017 (as amended) 	<p>Permanent removal of approx. 89m of hedgerow.</p>	<p>A precautionary approach to hazel dormouse would be implemented. It is considered unlikely that hazel dormouse are present within the site boundary but the following measures would be implemented under a non-licensed method statement with the supervision of a licensed dormouse ecologist:</p> <ul style="list-style-type: none"> The hedgerows would be cut to a height of 10cm during the winter (October – March) when dormouse are hibernating. A hand search for dormouse nests would be undertaken before the clearance.

Species	Legislation	Potential Impact	Measures
	<ul style="list-style-type: none"> Wildlife and Countryside Act 1981 (as amended) S7 species in the Environment (Wales) Act 2016 	The hedgerow is considered to offer limited potential for dormouse as it is frequently cut, is 'gappy' and is not well connected to the more suitable habitat in the Coed Cord and Coed y Saeson LWS approximately 100m south-east of the site boundary.	<ul style="list-style-type: none"> Stumps/root balls removal should be done between May and October once dormice have emerged from hibernation. Alternatively, vegetation can be cleared in one stage in either May-June or October – mid November under the supervision of a licensed dormice ecologist. No vegetation clearance can occur during the breeding season (July-September). If signs of dormice are found, works will need to stop and a licence from NRW may be required before works could continue.
Bats (potential roosting, foraging and commuting)	<ul style="list-style-type: none"> Conservation of Habitats and Species Regulations 2017 (as amended) Wildlife and Countryside Act 1981 (as amended) S7 species in the Environment (Wales) Act 2016 	<p>Hedgerows in the site boundary offer potential for commuting bats. Permanent removal of approx. 89m of hedgerow.</p> <p>Loss of three trees with low bat roosting potential.</p> <p>There are two bat roosts more than 100m south of the section to be removed. These would be retained and no direct impact is anticipated.</p>	<ul style="list-style-type: none"> The three trees with low bat roost potential which require removal would be subject to a pre-works inspection by a suitably experienced ecologist before felling. Loss of potential roosting features would be compensated for by the installation of bat boxes on retained trees. Night-time works would not be undertaken. Artificial lighting would be kept to a minimum and restricted to the temporary construction areas for security purposes. Any lighting scheme to be installed would be designed under the principles as outlined in the Bat Conservation Trust (BCT) Guidance for Bats and Artificial Lighting in the UK (BCT, 2018), including: <ul style="list-style-type: none"> avoiding light spillage onto potential roosting features, woodland and hedgerow lights should be turned off when not needed warmer colour temperatures would be favoured which have a lesser impact on bats than white light with a greater blue/ultraviolet content.
Breeding birds	<ul style="list-style-type: none"> Wildlife and Countryside Act 1981 (as amended) S7 species in the Environment (Wales) Act 2016 	Vegetation clearance or decommission of existing substation infrastructure would reduce availability of habitat for breeding birds.	<ul style="list-style-type: none"> Vegetation clearance or decommission of existing infrastructure, if completed during the nesting bird season (the end of February to mid-August), would be subject to a pre-works check for nesting birds by a suitably experienced ecologist. Any active nests found within an area where there is a risk of damaging or destroying the nest, would result in work stoppage. The nest would be left with a suitable stand-off, to be agreed upon and assessed by the ecologist.
Badger, hedgehog, and other small mammals	<ul style="list-style-type: none"> Protection of Badger Act 1992 Wildlife and Countryside Act 1981 (as amended) S7 species in the Environment (Wales) Act 2016 	Hedgerows provide potential habitat for badger, hedgehog and other small mammals.	<ul style="list-style-type: none"> A preconstruction walkover survey will be undertaken to check for any change in protected species presence (e.g. badger setts). During construction, where excavations cannot be covered, features would be provided (such as timber planking or a ramp) to allow a means of escape for trapped animals. All stored materials which could be used as refugia by small mammals, would be suitably covered. Vehicle and plant access would aim to minimise tracking over habitats where small animals could be present.

Species	Legislation	Potential Impact	Measures
Invasive Species	<ul style="list-style-type: none">Wildlife and Countryside Act 1981 (as amended)	No Schedule 9 listed invasive plant species recorded within the site boundary but desk study identified presence of INNS within 2km.	<ul style="list-style-type: none">A pre-works walkover to check for newly established invasive non-native plant species and the development of a management plan setting out measures to be taken if their presence is found.

5.2.3 Potential Impacts

5.2.3.1 Construction

The duration and extent of the proposed construction programme for the substation extension, and removal of equipment will be 24 to 28 months. Access for the substation extension will be along the main site access road from Glascoed Road. The construction compound and temporary car park will be reinstated to the previous state after construction.

Where potential impacts have been avoided, as discussed in Section 5.2.2, these are not repeated here.

5.2.3.1.1 Designated Sites

The Screening Stage Habitats Regulations Assessment (HRA) fully assesses the potential for any likely significant effects on the two SACs. This is provided in Appendix E. In summary, due to the small-scale nature of the proposed substation extension and the relative location, distance and lack of connectivity, no impacts to designated sites are anticipated.

No significant adverse effects on designated sites are anticipated from the construction phase of the proposed substation extension.

5.2.3.1.2 Habitats

In line with the mitigation hierarchy, the design has avoided and minimised impact as much as possible. However, to facilitate the works there would be some permanent loss of approximately 89m of priority hedgerow habitat at one location.

The permanent loss of priority habitat hedgerow would be small scale and given the abundance and extent of hedgerows within adjacent habitats, the loss of hedgerow is not considered to be significant.

In addition, a permanent loss of modified grassland habitat would be expected within the footprint of the extended substation. However, land used temporarily for the construction works would be reinstated to its preconstruction condition and use, where practicable, bearing in mind any restrictions on planting.

The proposed development would result in limited tree and hedgerow loss, which is documented in the Arboriculture Impact Assessment (refer to Appendix B). The lengths of existing hedgerows removed to accommodate the proposed development would be reinstated where practicable.

The proposals for both the overhead line works and the substation extension developments are shown in Appendix O Environmental Masterplan and include the reinstatement of 198 linear m of hedgerow throughout the proposed development site.

Overall, no significant adverse effects on habitats are anticipated from the construction phase of the proposed substation extension.

5.2.3.1.3 Species

The proposed substation extension within site boundary could result in some adverse effects upon species during construction through activities such as vegetation clearance. However, these would either reduce or be avoided once measures (see Table 5-1 and Appendix D) have been applied. Development activities would be confined to two fields and their boundaries and the effects on species are therefore considered likely to be localised and negligible in magnitude.

The proposed substation extension would result in the permanent loss of a small area of cropland, modified grassland and approximately 89m of hedgerow. This is a permanent loss of supporting habitat for species that use it to forage, breed and commute, such as bat species, breeding birds, amphibians, reptiles and potentially badger and hazel dormouse. Within the local area, there is plentiful alternative, higher value habitat available for these species and the permanent loss of this habitat resource is not anticipated to negatively affect the conservation status of these species within the local area. Additionally, fragmentation and severance is anticipated to be minimal due to alternative retained hedgerow presence across the wider area. Loss of habitat is considered to be a **minor adverse** effect to protected and notable species that is not significant.

Construction activities for the proposed substation extension, such as vegetation clearance and groundworks, could lead to disturbance of some individuals of species. Disturbance could lead to avoidance of foraging habitats. However, as there is alternative foraging habitat within the local area and the disturbance will be temporary and short-term, disturbance is not considered to negatively affect the conservation status of any species.

Breeding birds, amphibians and reptiles are at risk of mortality during vegetation clearance and excavation work. However, measures in Table 5-1, with necessary GCN mitigation, would avoid this potential impact.

Overall, no significant adverse effects on species are anticipated from construction of the proposed substation extension.

5.2.3.2 Operation

During operation, the substation extension would be accessed through the existing substation. Outside of non-routine maintenance requests and security events, the operational substation would not be lit at night. It is not anticipated that there would be additional noise, emissions or discharges during operation.

The fencing upgrade proposed as part of the substation extension proposals is unlikely to have any negative effects in terms of ecology as it is already a physical barrier within the environment and will not result in any loss or fragmentation of habitat. In addition, it is already within a well-lit environment (i.e. the existing substation) so any additional lighting provided will be an overall minimal change and therefore is unlikely to affect species such as bats. The operation of the substation extension would not result in an adverse effect on statutory/non-statutory designated sites, habitats, or species.

5.2.3.3 Cumulative Effects

Due to the small scale of the substation extension and local value of ecological receptors identified within the site boundary, no significant adverse ecology and biodiversity effects from the proposed development are anticipated.

Although there are several other proposed developments (as listed in Section 5.1.1) as well as the associated proposed overhead line works planned, cumulative effects on ecology and biodiversity are highly unlikely in combination with the substation extension works. The scale of habitat affected (and therefore also any dependent species) by the substation extension works is relatively small. While there will be some inevitable minor permanent loss of habitat, this has been reduced to the minimum possible area and any temporarily impacted habitat would be reinstated upon completion of the works.

The other proposed developments in the area include Awel-y-Môr offshore Wind Farm, a new substation on land to the west of St. Asaph Business Park approximately 1.3km to the northwest of the substation; and a solar farm to the south. However, even with temporal overlap in timings of construction works the scale and nature of the Bodelwyddan substation development would not generate cumulative impacts with any other proposed works.

5.2.3.4 Net Benefit for Biodiversity

In line with the mitigation hierarchy, the design has avoided and minimised impacts on semi-natural habitats where practicable. This relates to the need to prioritise and protect any habitats within the site or immediate vicinity of ecological importance. There will be some unavoidable permanent and temporary loss of habitats, including poor condition modified grassland, cropland, seven individual trees, one tree group, and hedgerows. This would equate to a loss of 1.06ha of these semi-natural habitats and a permanent loss of 89m of hedgerow. This is a permanent loss of supporting habitat for species that use it to forage, breed and commute, such as bat species, breeding birds, amphibians, reptiles and potentially badger and hazel dormouse. Within the local area, there is plentiful alternative, higher value habitat available for these species and the permanent loss of this habitat resource is not anticipated to negatively affect the conservation status of these species within the local area.

Reinstatement of 198 linear m of hedgerow throughout the wider area associated with the overhead line proposal has been proposed to help reconnect fragmented hedgerows and maintain the existing multifunctional network of green infrastructure.

In order to deliver an overall improvement in biodiversity through the proposals, Net Benefit for Biodiversity has been considered throughout the design process and will be implemented through off-site mitigation. To achieve Net Benefit for Biodiversity, off-site compensation is proposed to be secured by a commuted sum for work on Denbighshire County Council's Green Gate Nature Reserve.

5.3 Landscape and Visual

5.3.1 Introduction

The purpose of this Landscape and Visual Appraisal (LVA) is to identify the potential effects associated with the construction and operation of the extension and fencing upgrade to the Bodelwyddan substation on landscape character and views. The approach to the LVA has been tailored to suit the type and scale of the proposed substation extension and the likely extent and nature of potential effects.

The topics of landscape and visual amenity have been considered individually. The European Landscape Convention defines landscape as *'an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors.'* Landscape takes its character from a combination of elements, including landform, watercourses, land use and pattern, land cover, vegetation, open space and cultural heritage influences.

To a large extent, people experience the landscape visually, and the quality of views can affect the quality of life. This appraisal addresses potential changes in the quality of existing views, considering the extent to which the proposed substation extension would be visible from surrounding residential properties, farms, footpaths and roads.

The following sections summarise the study area, the planning policy background of the substation extension and the methodology used for this assessment. This is followed by a description of the baseline conditions for each phase (construction and operation) and a summary of potential effects. Appendix F details the Landscape and Visual Appraisal methodology.

The LVA has been informed by UK legislation, National Policy Statements, Planning Policy Wales 12 (PPW12), and local development plans.

5.3.1.1 Study Area and Methodology

5.3.1.1.1 Study Area

Establishing the landscape and visual baseline initially comprised a desk top study informed by aerial photographs, mapping and collating information on heritage features and designations, land use, open spaces, and vegetation and cultural heritage influences, as well as the locations of any screening features and potential visual receptors.

The study area and search area for this landscape and visual appraisal have been informed by the guidance note GN46 'Using LANDMAP in Landscape and Visual Impact Assessments' and refined by site survey. The study area boundary is shown on drawings in Appendix G to Appendix I.

The study area for the proposed substation extension was initially set as 5km from the centre of the proposed substation extension site boundary with a wider search area set to 8km to cover the wider context in which the substation extension is located. This was the recommendation for the size of the structures in the proposed substation extension and the associated development of the overhead line works given in the GN46 guidance.

A zone of theoretical visibility (ZTV) of the proposed substation extension was generated using a bare earth terrain model combined with National Forest Inventory (NFI) data. The ZTV figure can be seen in Appendix I. The ZTV incorporates screening vegetation provided in the NFI, but it does not include other forms of screening vegetation (e.g. hedgerows and hedgerow trees or individual field trees) within this landscape. The ZTV does not incorporate other surface features (e.g., buildings and other built form), which would also have a screening effect for the overhead line works. The ZTV methodology is in Appendix J.

The extent of visibility was checked through a combination of desk study and site survey work to determine the visual receptors. The visibility from selected viewpoints, visual baseline, and Landscape Character Areas (LCAs) were checked on site in August 2022 and March 2023. It was determined that the visibility would not be greater than 2km and so the study area and search area were amended to 2km and 5km respectively.

5.3.1.1.2 Methodology

This appraisal identifies and evaluates the potential effects arising from the proposed substation extension upon the application site boundary and surrounding environment. A detailed methodology is included in Appendix F.

There is no requirement for an Environmental Impact Assessment to support this Application. In line with current guidance contained in GLVIA3 for non-EIA Landscape and Visual Appraisals such as this, the terms 'significant' and 'not significant' have not been used. However, it is important to set out the grading of the scale of the potential impacts based on the detailed information available regarding the nature of the proposed substation extension, the scale, duration and permanence of the change and the size of the resource or the area affected.

The level of effect is assessed through a combination of two considerations – the sensitivity of the landscape character and visual amenity (views) of identified receptors; and the magnitude of effect (an evaluation of the geographical extent, duration and severity of the impact upon the receptors) that will result from the proposed substation extension. Appendix F includes criteria for determining values for sensitivity and magnitude of effect and the appraisal process has used professional judgement based on these criteria throughout.

During the appraisal, each receptor has been assessed against a scale of 'high', 'medium' or 'low' sensitivity considering its value and susceptibility. The magnitude of effect for each receptor has then been assessed against a scale of 'major', 'moderate', 'minor' or 'negligible', considering the scale of the effect, its duration, and its geographical extent. The resulting landscape and visual effects have been determined through consideration of both the sensitivity of the landscape and visual receptors and the predicted magnitude of effect arising from the construction and operation of the proposed substation extension. Effects have been assessed based on the Level of Effect matrix in Appendix F and have been described as 'major', 'moderate', 'slight' or 'negligible' and as adverse or beneficial, for example whether the change detracts from an existing landscape, or view, or enhances it.

Effects on landscape character and views, resulting from the construction and operation of the overhead line works, have been described for construction, operation year 1 and operation year 15. The assessment of these effects can be found in Appendix N. The winter assessments are to show the worst-case scenario when trees are not in leaf, whereas the summer assessment illustrate any screening effects from existing vegetation.

The combined effect of the proposed development and other planned developments have been described for a winter's day during construction and winter's day in operation year 1. Best practice typically dictates that an assessment would be provided for the period following the establishment of landscape mitigation planting (e.g. a summer's day in operation year 15); however, due to the uncertainty around future and ongoing developments in the vicinity of Bodelwyddan substation, it is not feasible to state with certainty where mitigation planting would remain.

Four photomontages (Type 3 Visualisations as per LI TGN 06/19) have been prepared for sensitive visual receptors. The photomontages are presented in Appendix K, and the photomontage methodology is in Appendix L.

5.3.2 Assumptions and limitations

The following are a list of the assumptions and limitations associated with the LVA:

- All representative viewpoints have been restricted to publicly accessible areas. The assessment of changes to views from private and inaccessible viewpoints (e.g. private property), including upper storey views, have therefore been made using the professional judgement of a Chartered Landscape Architect, based on an assessment from a nearby representative viewpoint (e.g., adjoining PRoW or highway). Where publicly accessible viewpoints have been inaccessible during site surveys, the assessment of this viewpoint has been based on a combination of professional judgement, desktop surveys and site knowledge.
- Where planning applications have not been submitted (e.g. the proposed MaresConnect interconnector project and IGP Solar Farm and battery energy storage system project), and/or the details of proposed schemes are not publicly available, the proposed scheme has not been included in the cumulative assessment.
- The initial survey was conducted in summer 2022 due to requirements of the programme. A further survey to take photomontage photography from selected viewpoints was undertaken in March 2023 to assess the worst-case scenario vegetation without foliage.

- Public consultation was undertaken in late 2023 on the proposed development. The Consultation Report accompanying the application explains the feedback received and whether and how design responses were made.
- Night-time landscape character and visual receptors are considered unlikely to experience a notable change from the baseline during the hours of darkness. It has been confirmed that as for the existing substation and the substation extension would only be occasionally manned and would not typically be lit during normal operation. When maintenance visits are being undertaken during early morning and late afternoon in winter months, some external lighting would be used, when required, to allow safe movement between vehicles, buildings and equipment. This would be controlled, targeted and is designed to avoid glare and spillage. In the event of a fault requiring work on the substation during the hours of darkness, external lighting would be used to light working areas. As for the existing substation, permanently installed lighting would be targeted, shielded to avoid spillage and glare and used occasionally when absolutely required and for short durations.

5.3.3 Baseline

The following sections provide a description of the existing landscape context, LCA and views within the study area, supported by Appendix G and Appendix H.

The proposed substation extension site boundary is immediately to the west of the existing Bodelwyddan substation and adjoining Gwynt-y-Môr Offshore Wind Farm substation. The site boundary is surrounded by farmland to the north, west and south, with the southern farmland interspersed with two large blocks of woodland. The small strip of farmland to the north is bounded by a dense strip of woodland beyond which lies the St. Asaph Business Park. There are no national statutory landscape designations (e.g. National Parks, National Landscapes (formerly known as Areas of Outstanding Natural Beauty) or Heritage Coasts) within the 2km study area, although one local non-statutory landscape designation (Special Landscape Area (SLA)) is within the 2km study area to the east of the development (see Designated Sites below).

5.3.3.1.1 Designated Sites

There are no national statutory landscape designations within the 5km search area. The closest World Heritage Site (WHS) is Castles and Town Walls of King Edward I in Gwynedd, approximately 23km to the north-east. The closest National Park is Snowdonia, approximately 24km to the west. The closest National Landscape (formerly known as an AONB) is Bryniau Clwyd A Dyffryn Dyfrdwy/Clwydian Range And Dee Valley, situated approximately 5.5km to the east.

There are two local non-statutory landscape designations within the 5km search area and one is located within the 2km study area. The Afon Aled valley mosaic SLA is approximately 2.5km to the south east, and the Betws yn Rhos SLA is approximately 1.5km to the east of the site boundary.

There are several Registered Parks and Gardens within the 5km search area, including Llannerch to the south-east and Bodelwyddan Park and Kinmel Park to the north-west.

Viewpoints have been considered from Bryniau Clwyd A Dyffryn Dyfrdwy/Clwydian Range and Dee Valley National Landscape and Bodelwyddan Registered Park and Garden. Viewpoints have not been considered from any other designated sites listed above due to the local topography, distance, and intervening screening features.

5.3.3.1.2 Listed Buildings

Viewpoints from the following listed buildings and local tourist attractions have also been considered as part of this landscape and visual appraisal. Those relevant to this assessment, along with their corresponding viewpoints, are listed below.

- Rhuddlan Castle, a Grade I listed building, 5km to the north (VP18);
- St. Margaret's Church (The Marble Church), a Grade II* listed building 2.2km to the north-west (VP13);
- St. Asaph Cathedral, a Grade I listed building, 2.5km to the north-east (VP14); and
- St. Mary's Church, Cefn, a Grade II listed building 1.75km to the south-east (VP21).

5.3.3.1.3 Landscape

LCAs are distinctive areas with distinguishing characteristics, such as landform, vegetation, open spaces and land use. In the absence of an up-to-date published (local or regional) landscape character assessment for Denbighshire, these areas have been described for the study area through desk-based searches and on-site assessment. The relevant LCAs have been based on a combination of the descriptions of landscape units described in the published Conwy and Denbighshire Landscape Sensitivity and Capacity Assessment for Wind Energy Developments (2013) and current LANDMAP classifications. The LCAs were checked on site to determine the appropriateness for the landscape character baseline.

National

At a national level, the proposed substation extension site boundary is at the north-eastern fringe of the National Landscape Character Area (NLCA) 09, Rhos. This is a landscape characterised by undulating landform in a series of rural foothills and river valleys, mainly sheep-grazed pasture in a mixture of field patterns, with strongly delineated mature hedge boundaries and occasional woodland blocks. The neighbouring NLCAs are Vale of Clwyd 11 to the east and North Wales Coast 8 to the north. It is not likely that the NLCAs will be impacted by the overhead line works to any significant degree and they have therefore been scoped out of the assessment.

The study area is also covered by LANDMAP, a nationally complete GIS resource that maps and classifies the Welsh landscape. The five spatial datasets (Geological Landscape, Landscape Habitats, Visual & Sensory, Historic Landscape and Cultural Landscape) directly related to the overhead lines site boundary are listed below.

- Geological Landscape Aspect Area: Bodelwyddan – *"Gentle, north-facing slope of Westphalian Coal Measures with undulating topography, blanketed with Quaternary till. The slope is down from the limestone ridge in the south to the coastal plain and the alluvial Clwyd estuary";*
- Cultural Landscape Aspect Area: Cefn Estate – *"An area of mosaic rolling lowland where the attractive landscape quality of the aspect area whilst high, does not enable the overall evaluation of the area to achieve more than moderate due to the proximity of industrial development and frequency of this landscape type within the wider area";*
- Landscape Habitat Aspect Area: Cefn Improved Grassland – *"An intensively farmed improved grassland landscape with some arable, and a good network of hedges containing many mature trees, many small blocks of semi-natural broadleaved and planted mixed woodland, and some parkland";*
- Visual and Sensory Area: Cefn Estate – *"Wooded former estate landscape lying on the edge of St. Asaph and the industrial areas surrounding Bodelwyddan. The area displays a fine array of woodland blocks and a well-defined field pattern delineated by hedgerows with a high incidence of mature hedgerow trees. Settlements are limited to small hamlets/villages and scattered farmsteads although the more urban influence of St. Asaph forms a definite boundary to the north and east, the area still has a relatively enclosed nature";* and
- Historic Landscape Aspect Area: Pentre-Mawr – *"Organic enclosures south and west of St. Asaph, fieldscapes which have grown up over time, a predominantly rural environment".*

Local

At a local level, the LCAs listed below have been identified within the study area. These have been based on existing site knowledge, the LANDMAP information above, and the baseline landscape units identified within the Conwy and Denbighshire Landscape Sensitivity and Capacity Assessment for Wind Energy Development (2013).

- Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA;
- Limestone Farmlands (Abergele to Denbigh) LCA; and
- Vale Farmlands (Vale of Clwyd) LCA.

Following desktop studies and site visits, it was determined that only the Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA would be affected by the substation extension works and therefore at risk of encountering notable effects. This is due to the containment of views towards the substation extension, resulting from intervening landform within the local landscape, and the long distances between the proposed development and the other

neighbouring LCAs. The two other identified LCAs: Limestone Farmlands (Abergele to Denbigh) LCA and Vale Farmlands (Vale of Clwyd) have therefore been scoped out of the assessment of landscape effects.

The key characteristics of the Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA, and the corresponding assessment of its quality, value, susceptibility, and sensitivity are summarised below. The criteria used to determine sensitivity is described in Appendix F.

Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA – Key Characteristics

Gently undulating pastoral lowland of medium scale with cultural heritage interest. Mosaic of irregular and semi-regular medium sized pastures with frequent small broadleaved woodlands and vegetated river valley. Pastoral fields are bound by mature hedgerows that are themselves a characteristic feature that contribute to the short range and contained views that are typical of the locality. Man-made influence is evident in the managed landscape and frequency of dispersed farmstead and rural properties. Modern development is most notable along the A55, at St. Asaph Business Park and where pylon lines cross the landscape unit.

Distinctive skylines of the Clwydian Range lie to the east, but otherwise skylines are not prominent in this landscape unit. Skylines are occasionally punctuated by pylons and other built development. There is frequent road traffic along the Glascoed Road in the north of the character area. Views are typically enclosed and filtered by landform and vegetation (woodland blocks and hedgerow). There are few outward views, other than eastwards towards the Clwydian Range from the higher parts of the character area. There are views to and from important landscapes and cultural heritage features including The Bryniau Clwyd A Dyffryn Dyfrdwy/Clwydian Range and Dee Valley National Landscape and Bodelwyddan Registered Park and Garden.

Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA – Value & Susceptibility

LANDMAP classifications for this area are evaluated overall as Moderate Landscape Value and Moderate Cultural Heritage Value.

Quality (**moderate to high**): Scenic quality and character is typically moderate to high (LANDMAP evaluation) with views to and from important landscape features; the north coast can be seen as can the Clwydian Range from higher parts of the LCA. It is a typically attractive rural landscape with some modern development and human activity which lessen the sense of remoteness and tranquillity.

Value (**medium**): There are several landscape elements contributing to scenic and perceptual quality in this character area. These are the mosaic field pattern, intermittent woodland cover and defined hedgerow boundaries including mature trees. The undulating topography along with the trees and woodland just described provide a sense of enclosure within the valley and frame views from higher up the hillside. The pylon route that crosses the LCA, the busy Glascoed Road and the substation and Business Park are described as detracting elements that reduce the landscape value.

Susceptibility to proposed changes (**low to medium**): The LCA includes modern development including existing pylons crossing the LCA and there are plenty of field boundary trees and woodland blocks to offer screening, so there is some capacity for the LCA to accommodate proposed changes.

Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA – Sensitivity

Based on the above assessment, it has been determined that the landscape is of **medium sensitivity** with moderately valued characteristics considered reasonably tolerant of change. The LCA therefore has some ability to accommodate the overhead line works without undue harm.

5.3.3.1.4 Visual

The proposed substation extension site boundary and the surrounding predominantly agricultural landscape are relatively flat and low lying in the immediate vicinity and north towards the coast. To the south, the land rises up a small limestone hill range with agricultural fields and woodland blocks. The overhead lines site is well screened from the St. Asaph Business Park (located in the north) and from the south and east by mature trees and hedgerows delineating field boundaries and relatively large woodland blocks. Although, from the west, the substation extension site boundary is more open without the screening of large woodland blocks, the landscape is still populated frequently by individual mature trees within irregular field boundary hedgerows. Hedgerows are generally managed between 1.6-1.8m and are sometimes above head height due to the lie of the land.

Views from the higher ground are more open with views east to the Clwydian Range and north to the coast although the undulating topography and the intermittent tree blocks, field boundary trees and hedgerows often interrupt the wider views of the hills, and the views of the St. Asaph Business Park, pylon route and the settlement of St. Asaph.

The rural landscape is occasionally interrupted by commercial development and energy infrastructure features such as the existing substation, pylons, and overhead lines. The largest development is the St. Asaph Business Park, approximately 50m to the north of the site boundary. Residences within the study area are focussed on small settlements such as Pentre Mawr, and Groesfford Marli, with other small groups of dwellings on the Glascoed Road and on Lon Coed Esgob.

Residences are detached and semi-detached houses and farmsteads. Several residences to the south and west of the site boundary within these settlements are likely to have partial or filtered views of the proposed substation extension from their properties.

A representative viewpoint approach has been used to determine the potential for effects on people's views. The locations are shown on Viewpoint Plan in Appendix H and the relevant views can be seen on annotated photo sheets in Appendix M. Viewpoints from receptors have been recorded in a landscape and visual survey and are listed below. Where there were no views of the substation extension, the selected viewpoints have been scoped out of the assessment of effects and are noted in Table 5-2 below.

There is no accompanying photograph view for VP15 or VP23 because the viewpoint location was inaccessible at the time of the landscape and visual survey. Assessment for this viewpoint is based on a combination of professional judgement, desktop surveys and site knowledge.

Table 5-2: Representative Viewpoint Descriptions

Viewpoint	View from	Description	Sensitivity	Scoped In
VP1 Approx. dist. from site boundary: 1.9km	Bodelwyddan Registered Park and Garden	Open panoramic views south-east towards the hills of the Clwydian Range. Distant hills are occasionally screened by taller vegetation in the short distance. Partial glimpsed views of the distant Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines, where the tops of two existing pylons (to the west of 4ZB167 pylon) are partially visible above the skyline. The existing substation is not visible due to the screening from intervening woodland blocks and individual trees. It is therefore unlikely that the proposed extension would be visible from this location.	High	No (see Representative Viewpoint photosheets in Appendix M)
VP2 Approx. dist. from site boundary: 530m	Public Right of Way (PRoW) behind residential receptor Tyddyn Meredydd	Open panoramic views north to coast and Clwydian Range across open fields with hedges and mature boundary trees in middle distance. 4ZB167 pylon is a noticeable feature in the view in the middle distance, a third of which protrudes above the skyline of the hills. The existing GM001 and GM002 pylons are visible in the background of the view, as is the substation which is partially screened by field boundary trees. There are views towards the existing substation, which would be further screened in summer when intervening vegetation is in leaf.	High	Yes (see Photomontage Appendix K)
	Residential receptor Tyddyn Meredydd	The principal views from Tyddyn Meredydd are towards the south-east and north-west. There is also a view north-east from a conservatory extension on the east side of the house, which has a narrow view down into the valley across open fields. It is likely that the top of 4ZB167 pylon is visible above the hedgerows at middle distance. It is also likely the GM001 and GM002 pylons, and the existing substation, are partially visible behind intervening field boundary trees and hedges that offer some screening, although the majority of features would be present in the background. Commercial development and energy infrastructure features are a key characteristic of the views.	High	Yes (see Photomontage Appendix K)
VP3 Approx. dist. from site boundary: 0m	Entrance to PRoW off access road to existing Bodelwyddan and Gwynt-y-Môr Offshore	Short-distance views across the access road to the large mature trees on the west side of the access road, which screen views of the existing substation and nearby pylons. In summer, there would be more screening when the intervening vegetation is in leaf.	High	Yes (see Representative Viewpoint photosheets in Appendix M)

Viewpoint	View from	Description	Sensitivity	Scoped In
	Wind Farm substation			
VP4 Approx. dist. from site boundary: 130m	From PRoW including residences at Lon Coed Esgob	Partially open views south-west above the high hedges from the PRoW with distant top of the 4ZB167 pylon visible. The principal views from the residence are south facing. There are large mature screening trees on the western boundary of the property, which would likely filter views south-west to the corner of existing substation and access road from the property's upper storey windows. There are likely to be open views from upper and lower storey south to Burbo bank substation (150m from property), woodland blocks and hills to the south. There are also likely to be views to the existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines and associated pylons above the existing woodland block and against backdrop of hills.	High	Yes (see Representative Viewpoint photosheets in Appendix M)
VP5 Approx. dist. from site boundary: 470m	Group of residential receptors at Pentre Mawr	From the ground floor of the properties, the views north-east include the road and a tall hedge in the short distance, which screens the easterly views. Views become more open as the ground drops away to the north, revealing mature trees, 4ZB166 pylon and existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines in the middle distance. Views from the upper floor of the properties are likely to be open to the east and north-east with partial distant glimpsed views of the existing substation, through the mature hedgerow trees. There are likely to be full upper-storey views of the existing pylons associated with the Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines in the middle distance.	High	Yes (see Representative Viewpoint photosheets in Appendix M)
VP6 Approx. dist. from site boundary: 160m	Residential receptor The Cottage Villa at Glascoed Road	Principal views south-west are open across the busy Glascoed Road towards the regenerating scrub and agricultural buildings, mature trees and pylon in the middle distance. Views beyond are to the distant hills of fields and woodland. 4ZB167 pylon can be faintly seen in the distance against the backdrop of the hills. The existing substation cannot be seen due to the intervening vegetation, and it is therefore unlikely that the proposed extension would be visible from this location.	High	Yes (for overhead lines – see Representative Viewpoint photosheets in Appendix M)
VP7 Approx. dist. from site boundary: 200m	St. Asaph Business Park (Qioptic Ltd) south at Glascoed Road	Enclosed views south across Glascoed Road to Qioptic Ltd three storey building and small car park in the short distance. In summer, intervening mature trees and vegetation would wholly screen existing substation, which is located immediately to the south. However, there may be glimpsed views through to existing substation in winter when trees are not in leaf. Top of 4ZB167 pylon is visible above the trees. There are likely distant views from third floor to hills to the south, including partial views of existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines and the other associated pylons.	Low	Yes (see Representative Viewpoint photosheets in Appendix M)

Viewpoint	View from	Description	Sensitivity	Scoped In
VP8 Approx. dist. from site boundary: 1km	PRoW Faenol Broper south-east	Open, long-distance views to hills to the south, across rural grazing and arable fields with hedges, field boundary mature trees and woodland blocks, which are occasionally interrupted by pylons and building rooftops. There is no view to the existing substation due to layers of intervening vegetation in winter and summer. It is therefore unlikely that the proposed extension would be visible from this location.	High	Yes, for overhead lines (see Representative Viewpoint photosheets in Appendix M)
VP9 Approx. dist. from site boundary: 330m	PRoW Lon Coed Esgob	Open views above hedges lining PRoW to the south-west. Middle-distance views of woodland and long-distance views to hills and fields with more woodland blocks. The existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines, along with their associated pylons, are visible in the middle to long distance of views, often projecting above line of hills in the background. The existing substation is not be visible from this location and it is therefore unlikely that the proposed extension would be visible from this location.	High	Yes, for overhead lines (see Representative Viewpoint photosheets in Appendix M)
VP10 Approx. dist. from site boundary: 520m	PRoW Hillside	Open panoramic views north-east to distant coast and the hills of the Clwydian Range. Views to the hills and coast are partially screened in the short distance by field boundary trees. Views across arable and grazing fields are often broken up by hedges and mature trees with occasional woodland blocks and settlement. Commercial buildings, substation development and pylons are present in the middle distance. 4ZB166 and 4ZB167 pylons protrude above the skyline of hills and coast. There are long-distance views of pylon GM001, with the existing substation partially visible.	High	Yes (see Representative Viewpoint photosheets in Appendix M)
VP11 Approx. dist. from site boundary: 260m	PRoW Valley	Open panoramic views. Hedges and fields in the short distance with occasional mature trees. Middle-distance views across mainly woodland blocks with occasional low pylons (backgrounded by woods) and energy infrastructure buildings (end of existing substation building and gantries visible). The existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines, along with several pylons, are visible to the south-east in the middle to long distance. 4ZB167 pylon in the middle distance is backgrounded mostly by sky. There are long-distance panoramic views of the Clwydian Range.	High	Yes (see Photomontage Appendix M)
VP12 Approx. dist. from site boundary: 150m	Residential receptor at Waen Meredydd	Open principal views south-east to woodland and across fields delineated with hedges, occasional mature trees and farm gates in the short distance. In the middle distance, the existing substation can be seen and the existing GM001 and GM002 pylons protrude slightly above distant woodland block skyline. There are open oblique views south across nearby fields to wooded hills where the 4ZB167 pylon is a dominant feature.	High	Yes (see Photomontage Appendix K)
VP13	St Margaret's Church (The Marble Church)	Open views across laybys and road to stone wall and hedgerow with trees in the short distance. Hedge and trees partially screen more distant views, although there are occasional glimpsed views to fields and woodland blocks beyond. Very distant views (1.7km) of two pylons associated with the existing Deeside – Pentir Teed	Medium	No (see Representative Viewpoint

Viewpoint	View from	Description	Sensitivity	Scoped In
Approx. dist. from site boundary: 2.1km		Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines (neither of which are located near the site boundary). There is no visibility of the existing substation extension due to lie of the land and intervening woodland blocks and vegetation. It is therefore unlikely that the proposed extension would be visible from this location.		photosheets in Appendix K)
VP14 Approx. dist. from site boundary: 1.8km	St. Asaph Cathedral	Short-distance views from the cathedral grounds across the amenity lawn scattered with mature trees to tall brick boundary wall. Views towards the surrounding landscape are screened by nearby tall mature trees. A few neighbouring rooftops are visible. The existing substation and pylons cannot be seen from this location. It is therefore unlikely that the proposed extension would be visible from this location.	Medium	No (see Representative Viewpoint photosheets in Appendix M)
VP15 Note: No photograph view. Approx. dist. from site boundary: 830m	Residential receptor on Groesfford Marli Road.	Principal view east-west from property. Easterly views open towards distant Clwydian Range. Views across open fields broken up by hedgerows bordering Groesfford Marli Road to settlement of Pentre Mawr in the middle distance. Views to the buildings are partially screened by group of deciduous and evergreen trees to the north of the road. The existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines route can be seen with pylons stretching into the long distance. 4ZB147 pylon is visible but distant and mostly against the backdrop of the Clwydian Range. The existing substation is screened by the group of trees to the north of the road is unlikely to be visible in winter without leaf cover.	High	Yes, for overhead lines (no photograph view)
VP16 Approx. dist. from site boundary: 520m	PRoW west	Open and long-distance views to the south-west. Large woodland blocks screen views to the north and north-west. Views to the south-west are across fields with hedges and mature trees to the existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines and associated pylons, which are wholly visible across much of the open views. 4ZB167 pylon is visible from sections of the footpath but the existing substation is not. It is therefore unlikely that the proposed extension would be visible from this location. Pylons are a key characteristic of the open views to the south-west.	High	Yes, for overhead lines (see Representative Viewpoint photosheets in Appendix M)
VP17 Approx. dist. from site boundary: 1km	Residential receptors at Ty'n-y-fford-bach, west	Open views west across nearby road to hedges and horse paddock in the short distance. Partial views of the existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines, along with three associated pylons, which are partially visible above the skyline. 4ZB167 pylon is not visible nor is the existing substation due to topography and intervening vegetation of woodland blocks, hedgerows and mature trees. It is therefore unlikely that the proposed extension would be visible from this location. Pylons are a key characteristic of the view.	Medium	No (see Representative Viewpoint photosheets in Appendix M)
VP18 Approx. dist. from site boundary: 3.8km	Rhuddlan Castle south	Open views across the Clwyd River floodplain and associated embankments with scattered vegetation in the short distance. Long-distance views south to wooded hills. The existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines and associated pylons are faint elements in the long distance and visible against the backdrop of the hills (other than where two pylons rise up to St. Asaph). The	High	Yes, for overhead lines (see Representative Viewpoint

Viewpoint	View from	Description	Sensitivity	Scoped In
		skyline of distant hills is occasionally broken by mature trees in the middle distance. St. Asaph Cathedral tower is visible in the long distance above trees. Views to the existing substation are screened by intervening vegetation. It is therefore unlikely that the proposed extension would be visible from this location.		photosheets in Appendix M)
VP19 Approx. dist. from site boundary: 920m	Residential receptor Isfryn Farm north-west	Likely principal views north-west from hillside property down into the coastal plains across irregular fields with clearly defined boundary hedge and tree planting. Short-distance views of fields and mature trees that partially screen the middle-distance views of woodland blocks and the existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines and associated pylons. Distant views of coast and Offshore Wind Farm turbines interrupted by pylons and overhead lines. It is unlikely that the existing substation and the proposed substation extension would be visible due to intervening field boundary tree planting; however, the top of 4ZB167 pylon may be visible above trees. Energy infrastructure features are a key characteristic of the view.	High	Yes, for overhead lines (see Representative Viewpoint photosheets in Appendix M)
VP20 Approx. dist. from site boundary: 5.5km	PRoW at AONB Clwydian Range in Rhualt off B5429	Views south-west over mostly wooded landscape with occasional fields and rooftops of settlements visible. Telegraph poles and wires and some buildings in Rhualt are visible in the short distance amongst the mature trees. Long distance faint views to Bodelwyddan Castle and Park and St. Margret's Church (The Marble Church). In the long distance, the existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines and associated pylons can be faintly seen against the backdrop of the hills and valley to the south-west. The existing substation is not visible from this location, and it is unlikely that the proposed extension would be visible from here, or indeed higher up the Range, due to the intervening screening vegetation. The top of St. Asaph Cathedral is visible in the middle distance.	High	Yes, for overhead lines (see Representative Viewpoint photosheets in Appendix M)
VP21 Approx. dist. from site boundary: 1.8km	St Mary's Parish Church	Open panoramic views north across fields and settlements interspersed with trees and hedges towards the coast and coastal hills of the Clwydian Range. Short-distance views include agricultural buildings and fields with scattered mature field boundary trees. Middle-distance views include views of the existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines and associated pylons, which are mostly backgrounded by the darker wooded landscape. However, two pylons to the north-west are partially visible against the backdrop of the sea and sky. There are no views to the existing substation due to intervening vegetation. It is therefore unlikely that the proposed extension would be visible from this location.	Medium	No (see Representative Viewpoint photosheets in Appendix M)
VP22 Approx. dist. from site boundary: 480m	PRoW near Pentre Mawr residences	Open view north-east to the hills of the Clwydian Range. Short-distance views of fields and hedges with mature field boundary trees. 4ZB166 pylon is a dominant feature in the foreground with the existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines visible across much of the view. GM001 and GM002 pylons can be seen in the middle distance between a break in the mature trees. During winter, there are glimpsed views of the existing substation, although views would be mostly screened in summer. There is a partial view of the 4ZB167 pylon, which can be glimpsed through some intervening scrub in the foreground. Commercial development and energy infrastructure are a key characteristic of the view.	High	Yes (see Photomontage Appendix K)

Viewpoint	View from	Description	Sensitivity	Scoped In
VP23 Note: No photograph view Approx. dist. from site boundary: 750m	Hendy's Farm Residences to the south of public road	Access was not sought to residences on private land much higher up the hill, but from desk top studies of aerial photography the principal views from the two residences are to the north-west-south east and the east-west, which are not in the direction of the development. A woodland block, several individual trees and a hedge are also present to the north and north-east of the properties, providing screening for any non-principal or oblique views.	Medium	Yes (no photograph view)

5.3.4 Measures to Avoid or Reduce Impacts

Measures have been taken in the siting of the substation extension to retain as many trees as possible to ensure as much screening as possible remains.

Measures have also been taken in the design of the substation extension to ensure the height and width of the buildings and the materials and colours chosen to match the existing substation to reduce visual impact of the facility itself.

All works would commence during daylight hours. Where works occur during winter or in low light, additional lighting may be needed in work-specific areas. Lighting columns already feature around the inside of the existing perimeter fence for security, and further lighting may be required for compound security. These would be designed in accordance with best practice guidance to avoid adverse effects.

A permanent loss of vegetation would be expected within the footprint of the extended substation. However, land used temporarily for the construction works would be reinstated to its preconstruction condition and use, where practicable, bearing in mind any restrictions on planting (e.g. safety clearances from overhead line conductors), land use and future land requirements (see below).

The proposed development is likely to result in limited tree and hedgerow loss, which is documented in the Arboriculture Impact Assessment (refer to Appendix B). To assist with the screening of views and to help assimilate the proposed development into the surrounding landscape, the lengths of existing hedgerows removed to accommodate the proposed development would be reinstated where practicable.

Where there is permanent loss of trees and hedgerow, a commuted sum will be provided to fund works on Denbighshire County Council's Green Gates Farm Nature Reserve approximately 750m northwest of the overhead line to compensate the loss and meet Net Benefit for Biodiversity requirements. The proposals for both the overhead line works and the substation extension developments are shown in Appendix O Environmental Masterplan, and include:

- The reinstatement of 198 linear m of hedgerows throughout the proposed development site; and
- The reinstatement of 0.3ha of pastoral land at the cable sealing end compound.

The land immediately surrounding Bodelwyddan substation has existing constraints of a water pipeline to the north and a gas pipeline to the south. Before works on the substation extension begins, the operator will divert the gas pipeline to run south of the substation extension before turning northwest to connect to its existing route and continue running west. There would be future underground cable connections into the substation from other developments to the north, west and south of the substation extension. Due to the access for underground cables required by future connectors to the Bodelwyddan substation, no tree or shrub planting can be undertaken on the land adjacent and around the substation extension.

5.3.5 Potential Impacts

Impacts on landscape and visual receptors during construction would be caused by movement of plant and equipment on site, the building of the structures and equipment, temporary material stockpiles and the loss of seven individual trees; one tree group equating to approximately 0.0123ha of canopy cover; and 89 linear m of hedgerow would be removed to accommodate the proposed development. The site compound and temporary car parking would be established in a field within the woodland block, to the south of the existing substation, and the access road is unlikely to be seen by any residential receptors or affect the local landscape character.

Landscape and visual effects during operation would occur mostly from the increased scale of energy infrastructure features (primarily the built form and fencing upgrade of the substation extension) that can already be seen in the landscape and within views into the site. This would be particularly noticeable where there are no existing trees or woodland blocks to partially screen or filter the view.

The substation extension would match the profile of the existing substation main building. Its maximum height will be 11.9m falling to a height of 10.73m relative to the substation base. The extension would be the same width as the existing substation main building at 15.5m and will be 81.5m long. The extension would be clad in

similar material and finish to the existing substation main building. There would be outdoor equipment comprising gas insulated bars and disconnectors with a height of 7.85m. These comprise similar equipment to that already at the substation.

The full appraisal of landscape and visual effects for the substation extension is set out in Appendix N. The summary of landscape and visual cumulative effects is described below. The text below includes a description of cumulative effects of the substation extension and the proposed overhead line works because neither the substation extension, nor overhead line development, can exist in isolation. To avoid under-reporting the level of effects, the two developments have been combined in this way.

5.3.5.1 Cumulative Effects

The combined effect of the proposed development and other planned developments from representative viewpoints has been considered in the text that follows. The existing energy infrastructure such as pylons, overhead lines and existing substations (Gwynt-y-Môr Offshore Wind Farm substation and Burbo Bank Extension Offshore Wind Farm substation) were considered in the baseline conditions.

Denbighshire County Council have identified proposed energy infrastructure developments to be assessed in combination with the proposed substation extension (refer to Section 5). These have been reviewed for inclusion within this Section against the application status and outcomes; the available information regarding the proposals; the extent of the substation extension study and search areas; and the likely significant effects on identified landscape and visual receptors. The following projects have therefore been included in the assessment of cumulative effects in this Section:

- The proposed extension to the Bodelwyddan substation to enable the connection of two double circuit overhead lines, which are replacing the existing turn-in of the existing Connah's Quay to Pentir overhead line. This proposed overhead line work includes the replacement of two existing towers with taller towers, and the addition of new towers and lines. Overhead line works are expected to commence in Autumn 2026 and be completed by April 2027;
- The proposed Awel-y-Môr Offshore Wind Farm Nationally Significant Infrastructure Project: The development includes a new substation on land to the west of St. Asaph Business Park approximately 1.3km to the north-west of the National Grid overhead lines works boundary. The SoS granted development consent for this application in September 2023 (National Infrastructure Planning ref: EN010112). The DCO application included visualisations of the substation and proposed mitigation planting at year 0 and year 15 from Faenol Broper PRoW which is also one of the proposed substation extension viewpoints. The Awel-y-Môr development programme states that general construction on the whole development is due to start in 2026 and end in 2030. It is unknown when the Awel-y-Môr substation would be constructed within this timeframe.
- The proposed Mona Offshore Wind Farm Nationally Significant Infrastructure Project: The development includes a new onshore infrastructure that connects to the main offshore wind turbine generators and offshore sub-station. The new onshore infrastructure comprises transition joint bays (connecting the offshore and onshore cables), onshore underground cables, onshore substation and connection by underground cables into the extended Bodelwyddan National Grid Substation. The offshore export cables will make landfall in Llanddulas, North Wales and the Mona Onshore Cable Corridor will be approximately 15 km long culminating with a new substation. The DCO application post-examination stage and awaiting the recommendation to the Secretary of State from the Examination Authority. The application includes visualisations of the substation from locations included within the visual assessment and proposed mitigation planting at year 1 and year 15. The Mona Offshore Wind Farm project development programme states that general construction on the whole development is due to start in 2026 and end in 2030. The Onshore Substation construction is expected to take up to 33 months in total.

5.3.5.2 Construction

In a worst-case scenario, there may be up to three stages of sequential construction that overlap with the final months of construction of the proposed development, which is close to the proposed overhead line works. This

would mean that there is more construction activity, so effects may be slightly higher during this short period, but they are still likely to be low level.

The Awel-y-Môr development and Mona Offshore Wind Farm are currently programmed to commence in 2026 and to be operational by 2030. It is not known at what stage the Awel-y-Môr substation would be constructed within this programme. In a worst-case scenario, the Awel-y-Môr substation and Mona Offshore Wind Farm substation and underground cable laying would be in construction for a short period of the overhead line works.

The full appraisal of landscape and visual effects arising from the construction of the Bodelwyddan substation extension are set out in Appendix N Landscape and Visual Effects Table. The cumulative effects arising from other developments (as outlined in Section 5.3.5.1) during construction are described below and summarised in Table 5-3 below.

5.3.5.2.1 Landscape

The Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA would be directly impacted (albeit locally) by the construction activity for all four developments. Localised disturbance from construction plant and machinery would slightly alter the relatively tranquillity experienced in the vicinity of the works. Construction would require plant and machinery (e.g., cranes), which would be different to those typically present in the landscape as part of regular farming practice.

Construction methods adopted throughout the site boundary have sought to minimise impact on existing vegetation and protect existing hedgerows and trees, where practicable, although there would be some localised losses within the landscape. The Arboriculture Impact Assessment (refer to Appendix B) notes that in a worst-case scenario approximately seven individual trees; one tree group equating to approximately 0.0123ha of canopy cover; and 89 linear m of hedgerow would also require removal during construction of proposed Bodelwyddan Substation extension. An additional 198 linear m of hedgerow would be removed to facilitate construction of the overhead line works. The disruption of a field boundary and reduction in size of the field due to the footprint of the development would slightly alter the extent of the irregular, medium-sized scale of the mosaic field pattern that is characteristic of the LCA.

The construction works would largely result in short term, temporary changes that would be focused on localised parts of the landscape. The influence of the construction activity, including the combined construction effects from other development (overhead line works and Awel-y-Môr development and Mona Offshore Wind Farm substation and underground cable laying) would result in a localised change. Overall, this would result in a minor adverse change on the medium sensitivity LCA, resulting in a ***slight adverse*** landscape effect.

5.3.5.2.2 Visual

The undulating topography, existing woodland blocks and frequent field boundary trees and hedgerows would help to screen the proposed developments in some capacity from most viewpoints.

At construction, the majority of viewpoints and visual receptors would have filtered long-distance views of the construction activities. Most of these views towards the construction works would be screened by field boundary trees and/or high hedges, which are common features of the local landscape. These receptors would therefore experience a ***slight adverse*** cumulative visual effect.

At viewpoints VP2, VP11 and VP12 (see Photomontages VP2, VP11 and VP12 Appendix K), more of the proposed construction works would be visible.

VP11 and VP12 are predominantly open panoramic views with little existing vegetation in the short or middle distance to offer any screening of the proposed construction activity. Furthermore, vegetation clearance to facilitate construction for the overhead line works would provide clearer views of the construction works for the Bodelwyddan substation extension. Due to the scale of the change and the short duration of the works, the cumulative visual effects would be ***moderate adverse***.

The residents at Tyddyn Meredydd (see Photomontage VP2) would have short to long-distance views towards the construction works. Due to the high sensitivity of the visual receptor and the likelihood of views towards the development from the conservatory, these receptors would experience a ***moderate adverse*** cumulative visual

effect. The PRoW users associated with viewpoint VP2 would experience a **slight adverse** cumulative visual effect as the construction works would be visible from a short section of the route.

Work on the Awel-y-Môr development and Mona Offshore Wind Farm development may be concurrent with the end of construction activity for the overhead line works. The combined visual impact would be most noticeable from the viewpoint VP2, VP8, VP10, VP12 and VP22, which represents nearby residents and the users of the PRoW. The combined construction activities have the potential to result in **moderate or major adverse visual effects** described in Table 5-3.

5.3.5.3 Operation

The full appraisal of visual effects arising from the substation extension development are set out in Appendix N Landscape and Visual Effects Table. The cumulative visual effects during operation are summarised in Table 5-3 below.

5.3.5.3.1 Landscape

At commencement of operation, the landscape would remain disrupted by the construction of neighbouring projects (overhead line works and Awel-y-Môr development). The overhead line works would still be under construction until April 2029 and the Awel-y-Môr development would be under construction until 2030.

Landscape quality within the Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA would be impacted by the combined operational impacts of the developments along with the introduction of further energy infrastructure features, including the substation buildings and equipment and the increase of three pylons and more overhead lines. Despite the additional elements, they would not be considered incongruous given the type of energy infrastructure features that are already present within the Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA.

All four developments being considered in combination are in the Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA. Awel-y-Môr substation and Mona Offshore Wind Farm substation are planned for construction across several field boundaries requiring the removal of hedgerows and trees. The reduction of several medium scale fields for this development along with the field boundary will impact the LCA as they are key landscape elements that contribute to the scenic and perceptual quality of the character area. The Awel-y-Môr substation proposals include mitigation planting to the northern, eastern, southern and western boundaries. The Mona Offshore Wind Farm project substation proposals also include mitigation planting to the northern, eastern, southern and western boundaries and woodland planting to the western boundary. This would add to the intermittent woodland cover and hedgerows and therefore contribute to the scenic and perceptual quality of the LCA over time.

Locally, there would be a slight change within the Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA due to a slight overall increase in the scale and number of energy infrastructure features present in the landscape and the reduction in the medium-scale irregular field pattern. This would result in a very slight loss or alteration to the characteristic components of the LCA. Consequently, this would result in a negligible adverse impact on the medium sensitivity landscape receptors, leading to a reduced **slight adverse** landscape effect.

5.3.5.3.2 Visual

The undulating topography, existing woodland blocks and frequent field boundary trees and hedgerows would help to screen the four combined developments in some capacity.

Most viewpoints and visual receptors would experience a **slight adverse** cumulative visual effect during operation. The majority of these viewpoints and visual receptors would have long-distance filtered or partial views of the four proposed developments. For these visual receptors, views would be glimpsed or partially screened to some extent by field boundary trees and/or high hedges that are common features of the local landscape.

All viewpoint Photomontages are supplied within Appendix K. At viewpoints (VP) VP2, VP11 and VP12, more of the proposed overhead line works and substation development would be visible.

VP11 and VP12 are predominantly open panoramic views with limited existing vegetation in the near or middle distance to offer any screening of the new pylons, which would be viewed against the sky. A perceptible reduction in tree cover resulting from the vegetation clearance works for construction of the Bodewyddan substation extension would also remain. Although energy infrastructure features are a key characteristic of these views, the

operational impact of the new overhead lines in combination with the operational impact of Bodelwyddan substation extension is likely to alter the balance of elements in the view. The cumulative visual effects on these receptors associated with viewpoints VP11 and VP12 would therefore remain ***moderate adverse***.

The residents at Tyddyn Meredydd (VP2) would have short to long-distance views towards pylons 4ZB167B and GM1 and GMA1. In combination with the open, long-distance view of Bodelwyddan substation extension, the cumulative visual effect would remain ***moderate adverse***. This is due to the high sensitivity of the visual receptor and the likelihood of views towards the overhead line development from the conservatory. The PRoW users associated with viewpoint VP2 would continue to experience a ***slight adverse*** visual effect at operation as the overall impacts would only be seen over a short section of the route.

As mentioned above, the construction work on the Awel-y-Môr substation development may be concurrent during the operation of the overhead lines works. The cumulative visual impact during operation would be most noticeable for the users of a PRoW at Faenol Broper (see viewpoint VP8), where the combined effects would likely increase the scale of the change due to the proximity of Awel-y-Môr construction activities. However, given that the visual change is likely to be experienced from a short section of the route and over a short duration, the cumulative visual effect would remain ***slight adverse***. This impact would likely reduce once the Awel-y-Môr substation construction works are complete, and the mitigation planting is adequately established.

The construction of the Mona Offshore Wind Farm project is proposed to commence in 2026 and would be concurrent with the Bodelwyddan projects and the Awel-y-Mor substation development. Cumulative visual impacts would be most noticeable within 500m of the Bodelwyddan projects and Mona Offshore Wind project. Footpaths and residents at viewpoints locations VP2, VP10, VP12 and VP22 would experience a ***major or moderate adverse*** cumulative effect at year 15 when mitigation planting associated with those projects is considered to have sufficiently established for assessment.

Each project has its own methodology, so the projects are assessed in a slightly different ways. Overall, cumulative effects for the Bodelwyddan project (overhead line works and substation extension) and Mona Offshore Wind Farm project would not give rise to a more significant level of effect than would happen with the Mona project in isolation.

Table 5-3: Combined Construction and Operational Visual Effects

Viewpoint	Significance of Combined Visual Effects* (Residual effects)	Bodelwyddan Substation	Overhead Line Works	Awel-y-Môr Substation	Mona Offshore Wind Farm (substation and underground cabling)
VP2 – PRoW	Major adverse <i>(Mona Offshore Wind Farm substation would give rise to major adverse visual effect in isolation)</i>	Long-distance views of proposed substation extension, seen over short sections of the PRoW route. Small part of wide view.	Short to long-distance views of temporary works areas for all new pylons, seen over short section of the route in a small part of wide view. Most distant tower would be erected first.	Long-distance partial views of part of the construction works for the development. Mitigation planting would screen proposed development once established.	Short to medium distance open or partially filtered views to the substation construction and the completed substation, and cable laying seen over short section of the PRoW route. Mitigation planting would partially screen the substation once established although the substation would remain prominent in the view and constitute a major discordant element in the view.
VP2 – Residential	Major adverse <i>(Mona Offshore Wind Farm substation would give rise to major adverse visual effect in isolation)</i>	Open, long-distance views from a high sensitivity receptor of proposed substation extension. Small part of narrow view.	Open, middle to long-distance views from a high sensitivity receptor of 4ZB167B, GM1 and GMA1. Large part of narrow view.	Long-distance partial views of part of the construction works for the development. Mitigation planting would screen proposed development once established.	Short to medium distance open or partially filtered views to the substation construction and the completed substation, and cable laying. Mitigation planting would partially screen the substation once established although the substation would remain prominent in the view and constitute a major discordant element in the view.

Viewpoint	Significance of Combined Visual Effects* (Residual effects)	Bodelwyddan Substation	Overhead Line Works	Awel-y-Môr Substation	Mona Offshore Wind Farm (substation and underground cabling)
VP3	<i>Slight adverse</i>	Largely screened short-distance glimpsed views of distant proposed substation extension from very short section of the PRow. Screening from existing field boundary trees.	Glimpsed middle-distance views of pylons GM1 and GMA1 through existing mature trees in winter, which would be well screened in summer.	N/A	Largely screened but potentially glimpsed long-distance views of substation construction and the completed substation from very short section of the PRow. Unlikely to be any views of ground level cable laying activities. Screening from woodland blocks and existing field boundary trees.
VP4	<i>Slight adverse</i>	No views of proposed substation extension from this location due to screening vegetation. Oblique glimpsed views of the construction traffic.	Filtered oblique long-distance views of the tops of 4ZB167A and 4ZB167B pylons from the upper storey of the residence and the PRow. More screening in summer when the vegetation is in leaf.	N/A	Largely screened but potentially glimpsed long-distance views of substation construction and the completed substation from upper storey of the residential property. Unlikely to be any views of ground level cable laying activities. Screening from proposed mitigation, woodland blocks and existing field boundary trees.
VP5	<i>Slight adverse</i>	Middle-distance filtered views of proposed substation extension from upper storeys of residences.	Long-distance partial views of pylons GM1 and GMA1 and middle-distance partial to full views of 4ZB167A and 4ZB167B. Partial screening from existing intervening field boundary trees.	N/A	Partially screened medium-distance views, by intervening sloping landform, of substation construction and the completed substation from residential properties. Short and middle-distance views of ground level cable laying activities. Screening from existing field boundary trees and hedgerows, and mitigation planting once established.

Viewpoint	Significance of Combined Visual Effects* (Residual effects)	Bodelwyddan Substation	Overhead Line Works	Awel-y-Môr Substation	Mona Offshore Wind Farm (substation and underground cabling)
VP7	<i>Slight adverse</i>	Largely screened views of proposed substation extension in winter from low sensitivity receptors. Views towards the substation would be completely screened in summer when existing vegetation in leaf.	Middle-distance partial views of GM1 and GMA1 pylons from upper floors of low sensitivity receptors. Some screening from existing vegetation.	N/A	N/A
VP10	<i>Major adverse (Mona Offshore Wind Farm substation would give rise to major adverse visual effect in isolation)</i>	Largely screened, middle to long-distance views of proposed substation extension from short sections of the PRoW. Screening from existing field boundary trees.	Middle to long-distance views of the new pylons from a short section of route. Three pylons would be fully visible, and one would be partially visible. Mostly softened by backdrop of hills.	Long distance partial views of part of the construction works for the development. Mitigation planting would screen proposed development once established.	Short to medium-distance open or partially filtered views to the substation construction and the completed substation. Short distance views to cable laying seen over a part of the PRoW route. Mitigation planting would partially screen the sub-station once established although the substation would remain prominent in the view and constitute a major discordant element in the view.
VP11	<i>Slight adverse</i>	Proposed substation extension would be occasionally visible along the length of the route in the middle distance. Four existing field boundary trees would partially screen the new development. Development would comprise a small part of the view. Development would be in keeping with existing energy infrastructure features.	Middle to long-distance views of three tall pylons partially backgrounded by the sky. Increase in scale and number of energy infrastructure features. Visible for whole stretch of short route.	N/A	Short to medium-distance open or partially filtered views to the substation construction and the completed substation. Short distance views to cable laying seen over a part of the PRoW route. Existing hedgerow trees and a small part of the mitigation planting would mostly screen the sub-station once established. Seeding would establish across the cable corridor.

Viewpoint	Significance of Combined Visual Effects* (Residual effects)	Bodelwyddan Substation	Overhead Line Works	Awel-y-Môr Substation	Mona Offshore Wind Farm (substation and underground cabling)
VP12	<i>Moderate adverse (Mona Offshore Wind Farm substation would give rise to moderate adverse visual effect in isolation)</i>	Predominantly open, slightly oblique short-distance views of proposed substation extension from the principal view of the residence. Substation extension would represent a slight increase the visual prominence of the overall substation development to the south-east but would take up a small part of the overall view. Seven individual trees and a small tree group, forming part of the middle-distance views, would be removed during the construction phase.	Short to middle-distance views of the three tall pylons, which would be mostly backgrounded by the sky. Increase in scale and number of energy infrastructure features.	N/A	Medium to long-distance open or partially filtered views to the substation construction and the completed substation. Long distance views to cable laying seen over a part of the PRoW route. Some screening from intervening existing field boundary trees and small reduction in visibility due to proposed mitigation planting although the substation would perceptibly damage the view.
VP22	<i>Major adverse (Mona Offshore Wind Farm substation would give rise to major adverse visual effect in isolation)</i>	Largely screened, middle to long-distance views of proposed substation extension from a short section of PRoW and nearby residences.	Long-distance, partial views of part of the development. Small increase in scale of energy infrastructure features in the view.	N/A	Short to medium-distance open or partially filtered views to the substation construction and the completed substation. Short distance views to cable laying seen over a part of the PRoW route. Mitigation planting would partially screen the sub-station once established although the substation would remain prominent in the view and constitute a major discordant element in the view.

Viewpoint	Significance of Combined Visual Effects* (Residual effects)	Bodelwyddan Substation	Overhead Line Works	Awel-y-Môr Substation	Mona Offshore Wind Farm (substation and underground cabling)
VP23 Note: No photograph view.	<i>Slight adverse</i>	Largely screened, long-distance views of proposed substation extension from the non-principal view.	Long-distance partial views of part of the development, which would be screened by existing intervening vegetation. A small part of the development would be visible in the non-principal view.	Oblique long distance partial views of part of construction works for the development. Mitigation planting would predominantly screen proposed development once established.	Largely screened, long-distance views of proposed substation. No views of cable laying.

*Refers to the Project significance criteria for Landscape and Visual

5.3.6 Summary and conclusion

Man-made influence is already evident in the landscape of the Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA with commercial development most notable at St. Asaph Business Park and where overhead lines supported by pylons cross the managed landscape. The proposed overhead lines development and the Bodelwyddan substation extension and fencing upgrade would be located near to the existing energy infrastructure (i.e. existing substation and pylons), and they would therefore be characteristic of the local landscape. The two proposed schemes would slightly change the balance of energy infrastructure features (substation and pylons) within the landscape, although this increase is unlikely to result in a notable adverse change to landscape character.

In combination effects would arise between the overhead lines development and the Bodelwyddan substation extension and fencing upgrade with the Awel-y-Môr substation development and Mona Offshore Farm development, resulting in localised effects on the LCA during construction. This would be partially reduced once plant and machinery have been removed from site during operation. The Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA would experience a *slight adverse* cumulative landscape effect at operation.

The existing undulating landscape is frequently populated by trees and woodland blocks, and therefore in combination views of the four developments are likely to be limited. However, in combination views of the overhead lines development, the Bodelwyddan substation extension with the Mona Offshore Wind Farm development are likely to result in **moderate or major adverse** effects from some nearby locations during construction. PRow. These impacts are likely to continue through operation and receptors at VP2, VP10, VP 12 and VP22 are likely to experience **moderate an major adverse** visual effects, largely due to the impacts arising from the Mona Offshore Wind Farm development.

Mitigation measures are shown in Appendix O Environmental Masterplan and would be implemented to help screen views towards the development and assimilate it into the surrounding landscape. However, as no mitigation planting can be implemented in the immediate locale of the extended substation due to operational and land ownership constraints, there would be no material reduction in landscape and visual effects resulting from the Bodelwyddan substation extension during operation.

5.4 Traffic and Transport

5.4.1 Baseline

5.4.1.1 Site Location and Composition

5.4.1.1.1 Local Highway Network

The substation extension site boundary is accessed from the B5381 Glascoed Road via a private road to the north of the Bodelwyddan substation site boundary. The private road forms the minor arm of a priority T-junction with the B5381 Glascoed Road and a stop line is on the private road for vehicles wishing to access the B5381 Glascoed Road.

The B5381 Glascoed Road is a single-carriageway road running in an east-west direction and both lanes have a carriageway width of approximately 3.5m. The speed limit of the B5381 Glascoed Road is 40 miles per hour (mph) along the frontage of the private access road which reduces to 30mph to the immediate west of the site access. The B5381 Glascoed Road provides a direct vehicular connection to St. Asaph to the east and to various villages to the west.

The junction of Glascoed Road/Ffordd Richard Davies/Ffordd William Morgan is 500m to the west of the private access road and takes the form of a 4-arm roundabout. All four arms of the circulatory operate under priority control and provide two lanes on entry except for the western arm of the B5381 Glascoed Road which provides one lane. Ffordd William Morgan forms the northern arm of the roundabout, this road provides a connection between the A55 National Wales Expressway to the north with the B5381 Glascoed Road to the south.

A secondary access is proposed along the B5381 Glascoed Road, approximately 1.5km to the west of the 4-arm roundabout at the junction of B5381 Glascoed Road/Ffordd William Morgan. This section of the B5381 Glascoed Road is also a single-carriageway road and is approximately 5.5m wide. The speed limit of this section the B5381 Glascoed Road is 60 mph.

Ffordd William Morgan is a single carriageway road running in a north-south direction. Both lanes have a carriageway width of approximately 3.5m, with a 2m footway provided along the eastern side of the carriageway and cycle/footway provided along the western side of the carriageway. The speed limit of the Ffordd William Morgan is 30mph along its entire length. Ffordd William Morgan provides a direct vehicular connection to A55 North Wales Expressway to the north.

The A55 is the major road in the area which connects many towns and cities in North Wales. Junction 26 of the A55 North Wales Expressway is approximately a two-minute car journey north of the site access, it is envisaged that most of the traffic wishing to access the site boundary will travel via Junction 26 and along the roads described above.

5.4.1.1.2 Accident Data

The DfT document Guidance on Transport Assessments states that, "Critical locations on the road network with poor accident records should be identified. This is to determine if the proposed development will exacerbate existing problems or, if proposed, whether highway mitigation works, or traffic management measures will help to alleviate the problems" (DfT, unknown).

In order to identify critical locations on the network with poor accident record, the personal injury accident data from the most presently available 5-year period has been obtained from the online resource CrashMap.

A summary of the number and severity of the accidents at each junction in the study area is presented in **Table 5-4**.

Table 5-4: Personal Injury Accident Data Summary

Road	Fatal	Serious	Slight	Total
B5381 Glascoed Road	0	0	1	1
Ffordd William Morgan	0	2	0	2

B5381 Glascoed Road

One 'slight' severity accident occurred within the study area along the B5381 Glascoed Road over the five-year period. One accident over a five-year period is not considered to be an unusual frequency for this type of road. Therefore, the existing accident record on this road does not represent a material concern in the context of the development.

Ffordd William Morgan

Two 'serious' severity accidents occurred within the study area along the Fford William Road over the five-year period. Two accidents over a five-year period are not considered to be an unusual frequency for this type of road. It is important to note that the accidents occurred at different junctions along Fford William Morgon, therefore, the existing accident record on this road does not represent a material concern in the context of the development.

5.4.1.1.3 Site Access

The proposed substation extension will gain access from the existing private road to the north of the substation extension site boundary off the B5381 Glascoed Road. The private road forms the minor arm of a priority T-junction with the B5381 Glascoed Road. Existing safety measures are in place at the site access in the form of a stop line. Visibility to the west is restricted due to a hedgerow and fence line which runs along the southern side of Glascoed Road. As a result, visibility from the site access is impacted for vehicles wishing to turn left onto the B5381 Glascoed Road.

The speed limit of the B5381 Glascoed Road is 40mph along the frontage of the private access road which reduces to 30mph to the immediate west of the site access. According to Table 2 of the Design Manual for Roads and Bridges (DMRB) TD 9/93, the stopping sight distance (SSD) should be 101m for westbound traffic and 63m for eastbound traffic travelling along Glascoed Road. The site access provides visibility splays in excess of 2.4m x 101m along Glascoed Road to the east in accordance with the 40mph road, and 2.4m x 37m to the west (measured to the centreline of the carriageway), as presented in **Figure 5-1**. It is acknowledged that visibility to the west is below the SSD for a 30mph road, however, there have been no accidents based on the current

operation of the existing substation and there is therefore no reason to expect this to change as a result of the extension.

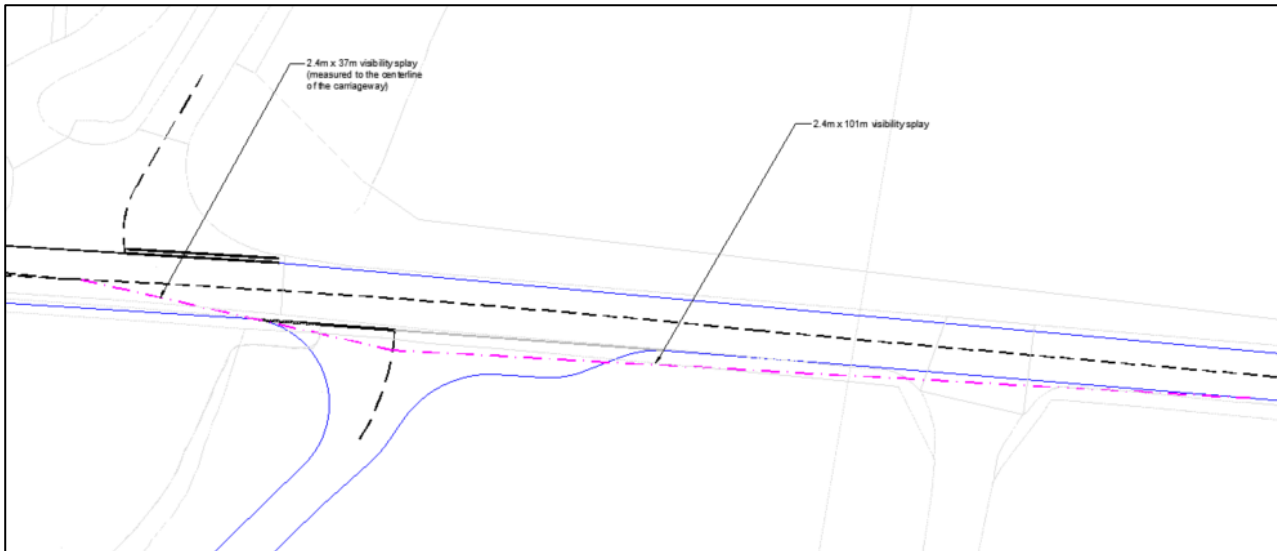


Figure 5-1: Visibility Splays

A swept path analysis of the private access road and Glascoed Road has been undertaken for a 16.5m long articulated heavy goods vehicle (HGV), which is the longest vehicle allowed on roads without a convoy, similar to what would be used to deliver materials to the substation extension. Whilst it is envisaged that HGV deliveries would access and egress the substation extension to the west, in the direction of Junction 26 of the A55, **Figure 5-2** and **Figure 5-3** illustrate an HGV accessing and egressing the private access road in all directions. **Figure 5-2** show a HGV crossing the centreline of Glascoed Road when making a left turn out of the private access road. However, it is important to note that the accident data shows no reported incidents in this area. Therefore, this is an indication that this manoeuvre will not impede vehicles making a left turn out of the private access road or vehicles travelling along Glascoed Road or exacerbate an existing road safety issue.



Figure 5-2: Swept Path Analysis Egress

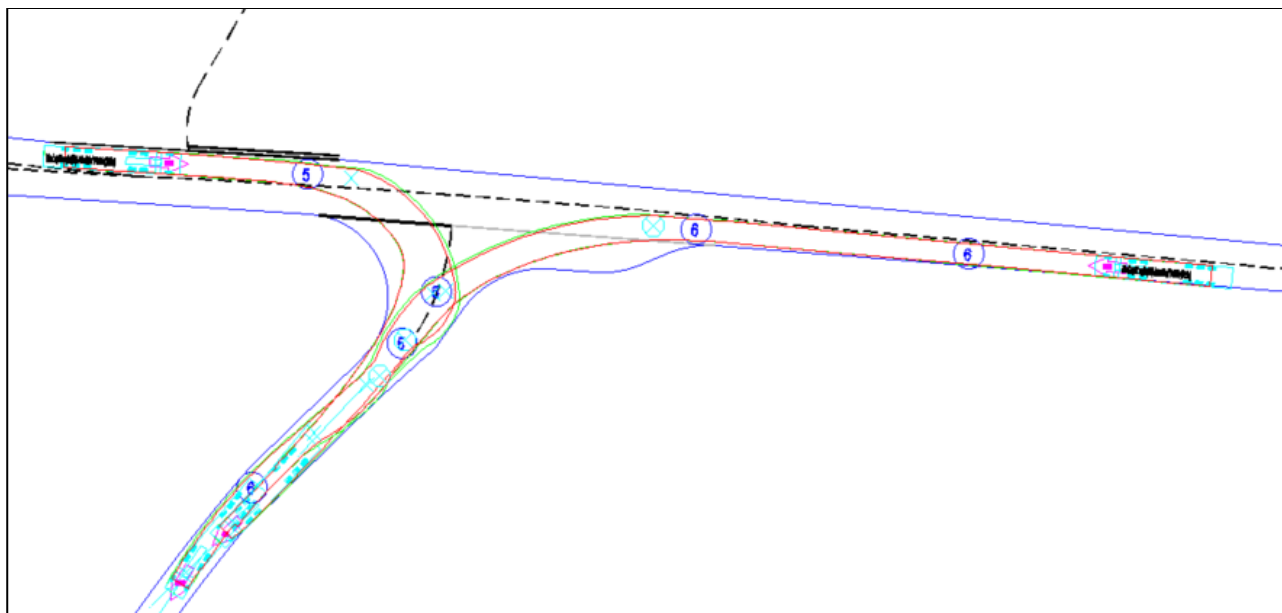


Figure 5-3: Swept Path Analysis Access

5.4.2 Measures to Avoid or Reduce Impacts

To ensure minimal impact with regard to traffic and transportation, a Construction Traffic Management Plan (CTMP) would be prepared. The purpose of a CTMP is to manage construction traffic on the public highway (including HGVs, staff vehicles and Light Goods Vehicles (LGVs) movements). It comprises management, implementation and enforcement plan to be used from the outset of construction and throughout the construction programme. A CTMP will provide key information on the anticipated construction programme of the substation extension such as construction worker numbers and timescales. A CTMP outlines appropriate measures for the mitigation of the impacts of any adverse environmental effects associated with construction traffic, in addition to, covering all aspects of construction-related traffic, including construction materials, equipment, and personnel.

The aim and objective of a CTMP is to identify those measures, over and above the overarching transport strategy, to reduce the effects of construction traffic. It also aims to minimise reliance on the use of private vehicles by promoting and encouraging the use of sustainable modes of transport.

It is envisaged that there would be no remaining potential impacts in relation to the construction of the substation extension following the implementation of a CTMP.

5.4.3 Potential Impacts

5.4.3.1 Construction

The substation extension construction phase is expected to last approximately 24 months with the final two months of the substation extension dedicated solely to commissioning. It is important to note that the estimated number of construction and staff vehicles has been determined by using engineering judgement.

During the peak of construction, it is expected that there will be a maximum of 25 personnel vehicles present on-site daily. In addition to this, during the peak of construction, there will be 10 HGVs per day which will require access to the development resulting in 20 two-way trips per day, it should be noted that these HGV trips will be spread out across the day. Table 5-5 outlines the total number of vehicles per day required to access the substation extension, assuming 20 working days per month.

Table 5-5: Construction Phase Schedule

Month	Daily No. of HGVs two-way	Daily No. of LGVs and Cars two-way	Total Daily No. of Vehicle trips two-way
1	22	50	70
2	20	50	70
3	20	50	70
4	8	50	58
5	8	50	58
6	8	50	58
7	2	50	52
8	2	50	52
9	2	50	52
10	2	50	52
11	2	50	52
12	2	50	52
13	2	50	52
14	2	50	52
15	2	50	52
16	2	50	52
17	4	50	54
18	4	50	54
19	4	50	54
20	0	20	20
21	0	20	20
22	0	20	20
23	0	18	18
24	0	18	18

Based on the data presented in Table 5-5, it has been determined that during the peak construction period, there will be a maximum of 72 two-way vehicle trips per day. It should be noted that 22 of these trips will be HGV trips delivering materials to the site which will likely be delivered outside of the peak network hours. Construction activities will be carried out over a period of nine hours on a typical weekday, which will enable HGV trips will be distributed uniformly throughout the day. To ensure minimal impact with regard to traffic and transportation, a Construction Traffic Management Plan would be prepared (see section 5.4.2).

Table 5-5 shows that up to 25 personnel vehicles will be present on site each day, and it is anticipated that all staff will drive to the site, in the worst-case scenario, however, in reality, some staff are likely to travel to site in a car share. Construction work will be carried out on weekdays from 07:30am-17:30pm, and occasionally on weekends between 08:00am-17:30pm.

Given the modest trip generation of the site of 70 vehicles per day during the peak, coupled with the short construction period of 24 months, it is not considered proportionate to undertake further assessment such as trip distribution or modelling.

5.4.3.2 Operation

A substation attendant carries out daily routine inspections at Bodelwyddan substation. Every three years, statutory inspections are conducted on different equipment items, with a team of around eight staff present. In case of equipment faults during the year, a team is dispatched to the site, but these are infrequent and unplanned. The substation extension's operational impact is limited, so there will be no significant adverse effect on the highway network, and no further assessment is required.

5.4.3.3 Cumulative Effects

The cumulative traffic impact of the overhead line works construction phase has been considered. Previous consultations with Denbighshire County Council identified consented planning applications that may have a cumulative effect on or in-combination with the overhead line works.

A review of the other developments has been undertaken. Where planning applications have not yet been submitted (e.g. the proposed MaresConnect interconnector project and IGP Solar Farm and battery energy storage system project), and/or the details of proposed schemes are not publicly available, the proposed scheme has not been included in the cumulative assessment.

The works share access with the Burbo Bank Offshore Wind Farm substation, which has been identified by Denbighshire County Council, as a cumulative development. It was not possible to obtain vehicle flow data for the Burbo Bank Offshore Wind Farm substation, but it is anticipated that it will generate a negligible number of vehicle trips based on its similarity to Bodelwyddan substation extension.

An Environmental Statement was produced in February 2024 for the Mona Offshore Wind Farm project. The construction phase is scheduled for 2026 and will coincide with the substation extension. The project's study area covers the road links within the substation extension study area, so a cumulative assessment has been undertaken for these road links.

Table 5-6 displays the daily baseline traffic flows for 2026 in comparison to the peak daily construction flows for the Mona Offshore Wind Farm project. Additionally, the table includes a comparison of the 2026 daily baseline traffic flows with the combined peak daily construction vehicle flows for the Mona Offshore Wind Farm project and the National Grid Substation Extension, taken from month 1 in **Table 5-5**.

Table 5-6 Cumulative Assessment Trip Generation Comparison

Link	2026 baseline traffic flows		Construction traffic Flows		% Increase	
	Total Vehicles	HGVs	Total Vehicles	HGVs	Total Vehicles	HGVs
Mona Offshore Wind Project vehicle flows						
B5381 Glascoed Road between Engine Hill and Ffordd William Morgan	1,811	241	261	101	14%	42%
B5381 Glascoed Road between Ffordd William Morgan and National Grid Substation Access	4,217	509	233	123	6%	24%

Link	2026 baseline traffic flows		Construction traffic Flows		% Increase	
Ffordd William Morgan between A55 and Carlton Court	4,111	420	535	218	13%	52%
Ffordd William Morgan between Carlton Court and B5381 Glascoed Road	6,373	531	535	218	8%	41%
Mona Offshore Wind Project vehicle flows + National Grid Bodelwyddan Substation Extension vehicle flows						
B5381 Glascoed Road between Engine Hill and Ffordd William Morgan	1,811	241	331 (+70)	123 (+22)	18% (+4%)	51% (+9%)
B5381 Glascoed Road between Ffordd William Morgan and National Grid Substation Access	4,217	509	303 (+70)	145 (+22)	7% (+1%)	28% (+4%)
Ffordd William Morgan between A55 and Carlton Court	4,111	420	605 (+70)	240 (+22)	15% (+2%)	57% (+5%)
Ffordd William Morgan between Carlton Court and B5381 Glascoed Road	6,373	531	605 (+70)	240 (+22)	9% (+1%)	45% (+4%)

Table 5-6 indicates that the Mona Offshore Wind project is projected to increase total vehicle traffic by 14% on the Glascoed Road to the west of Fford William Morgan, and by 6% on the section of Glascoed Road to the west of the substation access. As outlined in the Mona Offshore Wind Project Environmental Study, the anticipated construction traffic flow increases are expected to have a negligible to low impact on these road links.

Cumulatively, the daily vehicle flows from the National Grid Substation Extension will result in a 4% increase in total traffic on the Glascoed Road to the west of Fford William Morgan, and a 1% increase on the section of Glascoed Road to the west of the substation access. Therefore, the proposed vehicle flows will not have a significant impact on these road links and will not materially change the level of sensitivity.

5.4.4 Summary and Conclusions

The operational impacts of the substation will be negligible. A substation attendant will carry out daily routine inspections at Bodelwyddan substation. Every three years, statutory inspections are conducted on different equipment items, with a team of around eight staff present. Based on this limited operational impact of the substation extension it is deemed that there will be no material operational impact on the highways network.

The construction impacts associated with the substation extension are expected to occur over a total of 24 months, however, the final two months of the substation extension will be dedicated solely to commissioning. During the peak of construction, it is anticipated that the site will generate 22 HGV trips two-way and 50 LGV/car trips two-way per day. As such, it is envisaged that the proposed substation extension construction phase would not have a material impact cumulatively.

Therefore, there will be minimal transport impacts as a result of the construction phase for the extension to Bodelwyddan substation.

Overall, there are no material transport impacts as a result of the Bodelwyddan substation extension.

5.5 Archaeology and Cultural Heritage

5.5.1 Relevant Legislation, Policy and Guidance

Legislation, policy and guidance in respect of archaeology and cultural heritage (also identified as the historic environment) in Wales includes the following:

- The Ancient Monuments and Archaeological Areas Act 1979 (legislation);
- Planning (Listed Buildings and Conservation Areas) Act 1990 (legislation);
- Historic Environment (Wales) Act 2016 (legislation);
- PPW provides the national planning policy framework for the consideration of the historic environment supplemented by guidance contained in Technical Advice Note 24: The Historic Environment (policy); and
- Cadw, the Welsh Government's historic environment service, provide associated best practice guidance on the historic environment (guidance).

5.5.2 Baseline

The baseline for archaeology and cultural heritage is informed by the Heritage Appraisal included at Appendix P.

Data sources used to inform the baseline included:

- British Geological Survey (BGS);
- Cof Cymru (National Historic Assets of Wales) for information of designated heritage assets;
- Clwyd Powys Archaeological Trust (CPAT) Historic Environment Record (HER) for information on non-designated archaeological sites and monuments; non-designated historic buildings and previous archaeological investigations;
- Planning Inspectorate for information on consented and current DCO projects being examined in the planning system for information on supporting studies and investigations, for example the Awel y Môr and Mona Offshore Wind Farms;
- Denbighshire County Council for information on consented and ongoing projects within the planning system for information on supporting studies and investigations, for example the proposed Bodelwyddan BESS and Solar Farm;
- Portable Antiquities Scheme (PAS) for information on finds made by metal detectorists;
- National Library of Wales for historic tithe mapping;
- Historic mapping and aerial imagery available online, including the National Library of Scotland; and
- National Resources Wales online for Light Detection and Ranging data (LiDAR).

The study area for archaeology and cultural heritage comprises the footprint of the substation extension plus a 500m radius surrounding area. The study area excludes access routes and areas where limited heritage impacts would occur, e.g. works areas for pulling new conductor lines. The study area is considered appropriate due to the nature of the proposed works and anticipated sensitivity of the receiving environment. The 500m study area allows for identification of heritage assets that could be directly physically affected by the substation extension and those which could be impacted as a result of changes to their settings. In addition, assessment of known non-designated archaeological assets and previous investigations within the 500m study area allows for the potential for previously unknown archaeological remains (archaeological potential) to be gauged.

The baseline is discussed by three sub-topics: Archaeological Remains, Historic Buildings and Historic Landscapes.

5.5.2.1 Archaeological Remains

There are no designated archaeological assets recorded within the substation extension or within the 500m study area.

There is one non-designated archaeological asset recorded within the 500m study area of the substation extension (HER 143526) which relates to an area of former medieval ridge and furrow cultivation earthworks identified by CPAT from LiDAR data. The non-designated asset is approximately 350m southwest of the substation extension works boundary. Another area of ridge and furrow (HER 143532) lies to the immediate south. As these assets represent relict cultivation features that have already been recorded, they are considered of local archaeological interest at best (low value).

Within the 500m study area, 15 non-designated assets are recorded. Of these, 10 assets relate to areas of former ridge and furrow cultivation of limited archaeological interest; and four assets relate to the route of the former Roman Road which underlies the existing B5381 Glascoed Road approximately 300m to the north of the substation extension. The remaining asset represents a findspot of a post-medieval musket ball of limited archaeological interest.

In terms of archaeological potential, it is noted that a programme of archaeological monitoring (watching brief) was undertaken as part of one of the planning conditions (Condition 16) during the construction of the adjacent Gwynt-y-Môr Offshore Wind Farm Substation (Planning Reference 31/2008/1123/PF). No archaeological evidence was identified during the works.

The available OS mapping and aerial imagery shows the substation extension to have comprised part of a number of fields. Since the late 19th century, the historic mapping records some loss of historic field boundaries. Many of the remaining boundaries are likely to date from at least the medieval period due to their curving form.

Based on the findings of the previous archaeological investigation undertaken during the construction of the adjacent substation, and taking into consideration the evidence discussed above, the risk of encountering significant previously unknown archaeological remains within the substation extension can reasonably be identified as low. The substation extension has remained on the periphery of the known settlement cores from at least the medieval period and is likely to have been used as agricultural land. While there is some evidence of earlier prehistoric and Roman activity within the vicinity, no such evidence was found in the adjacent watching brief.

5.5.2.2 Historic Buildings

There are no designated or non-designated historic building assets recorded within the substation extension. There are also no designated historic building assets (Listed Buildings or Conservation Areas) within the 500m study area.

There are no locally listed building within the substation extension or 500m study area.

In the study area, there are four non-designated historic buildings recorded by the HER. These assets form a group at Waen Meredydd Farm approximately 230m to the west of the substation extension. All these assets are post-medieval agricultural buildings of local historical and architectural interest.

5.5.2.3 Historic Landscape

There are no designated historic landscape assets (WHS, Registered Battlefields or Registered Parks and Gardens) within the substation extension or study area.

The Historic Landscape Character (HLC) of the substation extension is identified to be irregular fieldscapes and woodland with hedgerow boundaries. This type of landscape is described as:

'Organic enclosures south and west of St. Asaph, fieldscapes which have grown up over time, a predominantly rural environment'.

The historic landscape is assessed to be of local (low) value.

5.5.3 Measures to Avoid or Reduce Impacts

Given the previous planning condition attached to the construction of the adjacent substation, and taking into consideration the assessment of archaeological potential, a programme of archaeological monitoring (watching brief) would be undertaken as mitigation during initial topsoil stripping within the footprint of the proposed substation. A formal record of the field boundary that would be lost as part of the works would be made during the watching brief.

5.5.4 Potential Impacts

5.5.4.1 Construction

Groundworks for the substation extension could result in the truncation or removal of previously unknown archaeological remains, albeit the risk of significant remains being present is identified to be low. As noted above, this impact would be mitigated through a programme of formal archaeological monitoring (watching brief).

There would be a change to the wider setting of the group of non-designated historic buildings identified at Waen Meredydd Farm approximately 230m to the west of the substation extension resulting from construction activities and the extension of the substation further to the west. However, the main view from this group to the south would be unaffected and the prevailing agricultural setting would be preserved. This impact is not considered significant and no impact on the historical and architectural interest of this non-designated group is predicted.

The construction of the substation extension would also result in the loss of part of a historic field boundary forming part of the wider HLC of irregular fieldscapes. A record of this boundary would be made during the formal archaeological monitoring.

5.5.4.2 Operation

No operational impacts on archaeology or cultural heritage are identified.

Given the above, the substation extension is considered to be compliant with the requirements of PPW and TAN 24 in relation to archaeology and cultural heritage.

5.5.4.3 Cumulative Effects

No significant cumulative effects on archaeology or cultural heritage are identified taking into account the other developments (existing and planned energy infrastructure) detailed in Section 5.1.1.

5.6 Socio-economic Effects

5.6.1 Baseline

The proposed substation extension is in an industrial area surrounded by agricultural land, south-east of the village of Bodelwyddan in the county of Denbighshire. Table 5-7 shows socioeconomic receptors within 5km and 500m of the proposed substation extension.

Table 5-7: Socio-economic receptors relative to the substation extension

Socio-economic receptor	Socio-economic receptor, subcategories	No. within 5km	No. within 500m	Receptor specific commentary (500m)
Commercial	Hotel	45	1	There are 639 commercial receptors within 5km of the site boundary, 138 of which are within 500m. There is
	Industrial Buildings	177	5	

Socio-economic receptor	Socio-economic receptor, subcategories	No. within 5km	No. within 500m	Receptor specific commentary (500m)
	Offices	254	128	one hotel within 500m, Staverton B&B.
	Retail	149	2	There are 671 commercial receptors within 5km of the site boundary, 138 of which are within 500m. There is one hotel within 500m, Staverton B&B.
	Restaurant	2	0	
	Workshop	12	2	The five industrial receptors and 128 offices within 500m are primarily in St Asaph Business Park and Caer Delyn buildings. The small and medium enterprises (SMEs) include Royal National Lifeboat Institution and Carbon Zero Renewables Ltd.
Residential	Residential Properties	6511	29	There are over 6,000 residential properties within 5km, 29 of which are within 500m. The closest are residential properties at Pentre Mawr Farm and along Glascoed Road.
Community	Community Centre	41	0	There are 190 community receptors within 5km of the site boundary, including community centres, leisure clubs, education facilities etc. There are no community receptors within 500m of the substation extension.
	Leisure	110	0	
	Public House	4	0	
	Police Station	2	0	
	Education	16	0	
	Emergency Services	4	0	
	Medical Facilities	12	0	
	Golf Course	1	0	
Tourism	Camping Site	3	0	There are 13 tourism receptors within 5km of the site boundary, including camping sites and self-catering holiday units. None of these receptors are within 500m of the substation extension.
	Guest House	1	0	
	Self-Catering Holiday Unit	8	0	
	Holiday Centre	1	0	

As shown in Table 5-7, the closest socio-economic (commercial) receptor of note is St Asaph Business Park, approximately 50m north of the proposed substation extension at its closest point. The business park extends to some 44.5ha and major occupiers include Qioptiq (high tech manufacturing), North Wales Police, Royal National Lifeboat Institution, Watkin Property Ventures, North Wales Ambulance Trust, Gyndwr Innovations/Optic (specialist engineering), and many other SMEs. Across these SMEs, over 3,000 people are employed within the 254 offices. Commercial workshops and premises within 500m of the site boundary are Carbon Zero Renewables Ltd and the workshops within the Caer Delyn buildings, with a total of 12 Workshop sites within 5km of the works boundary.

There are 6,511 residential properties within 5km of the substation and of these properties, 29 are situated within 500m of the substation; at Pentre Mawr Farm and along Glascoed Road.

In terms of community facilities, Wrexham Glyndwr University, a public research university with 5,500 students has one of three campus sites located within the St. Asaph Business Park, approximately 500m from the site boundary. Cefn Meiriadog County Primary School is also located within 500m of the substation as well as Denbighshire Memorial Park and Crematorium located off Glascoed road and, Cinan Church located in Groesffordd Marli, Abergele. There are 12 medical facilities including General Practitioner (GP) practises, specialist facilities, private medical care centres and four emergency services within 5km of the substation, including North Wales Fire and Rescue Service and North Wales Police and air support unit.

Tourism is an important economic sector in Denbighshire. In 2017, prior to the Covid-19 pandemic, tourism contributed £490m to the local economy and supported 6,200 jobs (Denbighshire County Council, 2016). There are a number of attractors for tourists in the coastal area approximately 5km north-west of the substation, including Rhyl Beach, Traeth Pensarn Beach, Tir Prince Fairground, and Rhuddlan Castle. Additionally, within 5km of Bodelwyddan, tourist attractions at St. Asaph include Brynbella Garden and St. Asaph Cathedral, as well as Bodelwyddan castle and park. There are also several holiday parks offering tourist accommodation adjacent to the coast, the closest ones being Parkdean Resorts Ty Mawr Holiday Park and Golden Sands Holiday Park. Tourist accommodation is also available in the villages of Bodelwyddan and St. Asaph, within 2km of the substation, including Warner Hotel, Talardy Hotel, The Plough Inn and Lyons Eryl Hall Caravan Park and Country Club. Within 5km, tourism receptors include: three camping sites, eight self-catering holiday premises and one golf course. There are no tourism receptors within 500m of the overhead lines.

5.6.2 Measures to Avoid or Reduce Impacts

Amenity is the term used to describe the character or attractiveness of an area. Amenity effects arise as a result of a combination of adverse impacts from traffic and transport, visual intrusion, noise, and/or a reduction in air quality (e.g. from increased vehicle emissions). Noise and air quality have been screened out of further assessment. Therefore, an amenity effect would only occur if a socio-economic receptor experienced a combination of visual intrusion and traffic and transport impacts. Measures employed as standard best practice would reduce amenity effects for socio-economic receptors as far as practicable.

No specific mitigation measures are identified for socio-economic receptors. It is expected that any additional specific measures identified for relevant topics (Traffic and Transport, and Landscape and Visual) would reduce potential impacts on amenity for socio-economic receptors. No effects on socio-economic receptors are anticipated during the operational phase, therefore mitigation measures have not been considered for this phase.

5.6.3 Potential Impacts

5.6.3.1 Construction

Amenity impacts arising during construction of the substation would be associated with the combined effects of traffic and transport, noise, air quality, landscape and visual impacts. Therefore, an amenity effect would only occur if a socio-economic receptor experienced a combination of significant visual, noise, air quality and traffic and transport impacts.

The duration of the construction period is estimated to be around 24 to 28 months, with 12 to 14 months being the building of infrastructure and 12 to 14 months being the provision of switchgear and associated infrastructure. Construction will typically occur during day light hours between 07:30am-17:30pm with potential for weekend working where necessary.

The construction of the substation will involve the use of a 55T Crane. PRowIn terms of visual impacts, the majority of viewpoints and visual receptors would have filtered long-distance views of the construction activities. Most of these views towards the construction works would be screened by field boundary trees and/or high hedges, which are common features of the local landscape. There will be some moderate or major adverse visual effects. The potential traffic impacts arising during the substation construction phase will be minimal, with workers entering and leaving sites during off-peak travel times.

It is possible that the combined visual and minor traffic impacts could result in **minor adverse** amenity effects for socioeconomic receptors however these are not expected to be at a scale or duration which would impact the functioning or viability of the receptor during the construction phase.

5.6.3.2 Operation

As per the construction phase, amenity impacts during operation of the substation could arise due to the combined impact of traffic and transport, landscape and visual, noise and air quality impacts.

Regarding traffic, it is anticipated that there will be a small number of visits throughout the year associated for maintenance which will have no material impact on the highway network.

Regarding visual impacts, the site during the substation operational hours will generally remain unlit, yet the extension to the existing fence line, and installation of new plant and equipment will require additional lighting for maintenance staff safe access and egress. Only a few viewpoints and visual receptors are likely to experience open near to middle-distance views of the substation extension and overhead lines development (Tyddyn Meredydd (VP2), Waen Meredydd (VP12), and the users of a nearby PRow (VP11)). There will be major or moderate adverse cumulative effects.

Whilst there could be visual impacts for socio-economic receptors, given impacts on traffic are negligible, there is no potential for an amenity effect during operation.

5.6.3.2.1 Cumulative Effects

As stated in Section 5.1.1 there are other developments within 2km of the substation extension.

The cumulative visual impact of coinciding other developments alongside the substation construction has the potential to cause adverse impacts for socio-economic receptors; during the construction phase. In combination with the overhead lines development, there would be localised effects on the local landscape during construction. This would be partially reduced once plant and machinery have been removed from site during operation.

There are not considered to be any significant cumulative effects from air quality, noise and vibration or traffic and transport during either the construction or operational phase. Overall, the scale and duration of cumulative impacts are not expected to affect the viability or functioning of socio-economic receptors.

5.7 Other Environmental Considerations

Other aspects of the environment that were considered to have no significant adverse effects include: air quality; noise and vibration; flood risk and water environment; and geology, soils, land contamination and waste. The consideration of these environmental aspects is outlined below.

5.7.1 Baseline

5.7.1.1 Air Quality

The air quality study area is based on an area up to 500m from the substation extension. Air Quality Management Areas (AQMA) are also considered within the wider road network which may be used by construction traffic. There are no current AQMAs declared in Denbighshire or the immediately adjacent local authorities.

The nearest sensitive receptors in relation to dust and atmospheric emissions are individual farms, the closest of which is approximately 190m north-east. There is also a business park approximately 50m north of the substation, and the Burbo Bank Offshore Wind Farm substation approximately 110m east. The nearest more densely populated residential areas are over 1.2km east in St. Asaph.

Ecological air quality receptors within the study area comprise Coed Cord and Coed y Saeson LWS. The boundary of the Coed Cord parcel of the larger LWS is approximately 100m south at its closest point.

5.7.1.2 Noise and Vibration

A construction noise and vibration assessment has been prepared for the substation extension works, see Appendix Q. The assessment is based on guidance contained within British Standard 5228:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites, Part 1 – Noise (BS5228-1). An operational noise and vibration assessment has also been prepared for the overhead line works, see Appendix R. The following noise and vibration sections summarise the information contained within these assessments.

The area of the works is rural with no major noise sources nearby, such as major trunk roads or railway lines. Existing baseline noise levels are expected to be relatively low.

The closest noise sensitive receptors to the project are the residential dwellings of Waen Meredydd which is approximately 160m west-northwest of the substation extension, and Plas Yr Esgob Farm, which lies approximately 155m east of the site access route. Immediately to the north of the existing and proposed substation extension lies a commercial area, and the Welsh Ambulance Service NHS Trust HQ is also considered in the assessment. This would not typically be considered as a noise sensitive receptor, but as there may be critical call centre activities being undertaken within the building it has been included in the assessment.

There are no sensitive receptors within 100m of the works, and so vibration from construction is not considered further.

5.7.1.3 Flood Risk and Water Environment

The study area for the water environment includes land and water features within 500m of the substation extension.

The site boundary is situated within the Pont Robin Cut (Bodelwyddan) Water Framework Directive River Waterbody Catchment. The Pengwern Drain, a Main River and Water Framework Directive River Waterbody, is approximately 1.1km north of the substation extension, and there are a number of smaller watercourses, drains, ditches and ponds in the immediate vicinity, the closest being approximately 50m south-east.

There is a groundwater Source Protection Zone approximately 4km south-east of the substation extension. The bedrock geology underlying the entire substation extension area comprises the Warwickshire Group, which is designated as a Secondary A aquifer. The superficial deposits comprise Till, which is designated as a Secondary (undifferentiated) aquifer.

A Flood Consequences Assessment has been prepared for the substation extension. The assessment was produced in accordance with PPW and TAN 15. A Drainage Statement has also been prepared for the substation extension, which was produced in accordance with Welsh Government Advice note 'SAB Applications for Single Dwellings, Extensions, and Parking and Access Areas' and the Welsh Government's 'Statutory national standards for sustainable drainage systems'. The following flood risk sections summarise the information contained within these assessments. See Appendix T and Appendix U for further information and details.

The proposed works are approximately 7.5km inland, 2.3km from the nearest tidal flood risk area and above 40 metres Above Ordnance Datum which further reduces flood risk. There is no area of tidal risk defined in the vicinity of the site.

The works are not in a fluvial flood risk zone. The nearest area of fluvial flood risk is associated with the River Elwy in the centre of St. Asaph approximately 1.2km to the east. Additionally, the works do not cross or interact with any mapped ordinary watercourses.

There are no permanent assets in surface water and small water courses flood risk extents; however, there are flood extents shown along the western boundary of the temporary construction compound boundary.

There are no recorded histories of groundwater flooding or information that provides evidence of future groundwater flood risk throughout the county.

There are no known incidences of flooding from sewers and artificial drainage sources in the vicinity of the works or known public sewers crossing the works.

The works are not at risk from reservoir flooding.

The nearest canal to the site is Chester Canal, approximately 40km to the south-east.

5.7.1.4 Geology, Soils, Land Contamination and Waste

The study area includes the land immediately adjacent to the substation extension.

There are no sites designated for geological importance (e.g. SSSIs designated for their geological importance) and no groundwater dependent terrestrial ecosystems (GWDTEs) within the study area.

The bedrock geology underlying the entire substation extension area comprises the Warwickshire Group, and the superficial deposits comprise Till.

There are no current or historic landfill sites within the study area, and the nearest historic landfill site is approximately 1.3km west of the substation extension.

The works are situated almost entirely on Predictive Agricultural Land Classification Grade 3b (moderate quality agricultural land) with some on non-agricultural land. Grade 3b is not considered Best and Most Versatile agricultural land and as such a soil survey was not undertaken in line with Welsh Government Guidance (Welsh Government, 2021).

5.7.2 Measures to Avoid or Reduce Impacts

5.7.2.1 Air Quality

There will be an increase in construction vehicles during the works and temporary implications for air quality, but these are anticipated to be negligible and not significant. Good practice measures that would avoid or reduce air quality impacts during construction include conforming to applicable standards for vehicle types, wash down of vehicles, wheel washing and soil management measures. Plant and equipment that avoid emissions or which produce low emissions will be considered to limit greenhouse gas emissions during construction.

There will be potential for dust impacts during construction, but these would be controlled through the adoption of standard good practice dust mitigation measures to prevent or reduce dust emissions.

Construction methods associated with soil stripping, creation of stockpiles and stockpile maintenance including measures to protect stockpiles and reduce the risk of dust generation from soils will be implemented to reduce impacts from dust.

Monitoring of weather forecasts and registration to weather warnings will aid preparation for earthwork operations. In dry conditions, appropriate water and dust suppression equipment will be available. In wet conditions, the site will be prepared with suitable cleaning equipment and silt controls.

Large earthworks and exposed areas or soil stockpiles will be managed to prevent windborne dust. For example, this could include covering, sealing with an excavator bucket or using water suppression.

During reinstatement, methods such as loosening the top of subsoil will be used to limit decompaction of the subsoil; this activity will avoid windy conditions and use water to damp down the surface.

Where possible, subsoil and topsoil will be returned at the earliest suitable time of year after construction has been completed. In the circumstances that work is delayed due to an unforeseen event, the measures listed above will be implemented.

During operation it is not anticipated that there will be any air quality implications. Measures to avoid or reduce impacts are not required.

5.7.2.2 Noise and Vibration

The use of Best Practicable Means during construction will be adopted on-site to minimise construction noise levels. This is standard sector practice in accordance with British Standard 5228-1. Examples of Best Practicable Means are as follows:

- Appropriate selection of plant and construction methods: only plant conforming with or better than relevant national or international standards, directives or recommendations on noise or vibration emissions will be used. Construction plant will be maintained in good condition with regard to minimising noise and vibration output.
- Construction plant will be operated and maintained appropriately, following manufacturer's written recommendations or using other appropriate operation and maintenance programmes that reduce noise and vibration emissions.
- Use of audible reversing warning systems on mobile plant and vehicles will be of a type which, whilst ensuring that they give proper warning, have a minimum noise impact.

- Stationary equipment e.g. pumps, compressors, generators, will be situated as far as practical from receptors, and where appropriate acoustic screens will be erected around them.
- Equipment known to emit noise strongly in one direction, where practical, will be orientated so that noise is directed away from noise sensitive areas.
- Screening will be used around piling equipment and plant will be maintained in good operational condition with all engines covered and noise control measures as provided in place.
- Equipment will be shut down when not in use.
- Haul roads will be well maintained and avoid, where feasible, the use of steep gradients.
- All site employees will be reminded of their obligation to minimise noise on site.
- Where possible, the contractor will consider the use of the quietest commercially available plant that is suitable for each specific operation.

5.7.2.3 Flood Risk and Water Environment

The construction management plan will set out temporary measures to ensure this existing surface water flow path is not impeded.

The substation extension works will include appropriately designed drainage systems accounting for the effects of climate change over its design life. A Drainage Strategy is included in Appendix U for the works with further information given within the associated Drainage Statement.

Risks to the water resource features from the substation extension generally are associated with the use of fuels and lubricants or other chemicals or additives used for construction plant and equipment. Spills of any kind may have potential significant detrimental impacts on the groundwater and surface water features. Appropriate good practice construction techniques and pollution control and management methods would be implemented throughout the works. For example, refuelling and maintenance of plant and equipment would be undertaken on areas of hardstanding with appropriately sized and well-stocked spill kits nearby or these activities will take place off-site where possible. Runoff across the site boundary will be controlled through a variety of methods including header drains, buffer zones around watercourses, on-site ditches, silt traps and bunding. Where new or additional surfacing is required on any access tracks and compound areas, these will be permeable surfaces where ground conditions allow. Land used temporarily will be reinstated where practicable (bearing in mind any restrictions on planting and land use) to its pre-construction condition and use. Boundary features will be reinstated to a similar style and quality to those that were removed, with landowner agreement. Existing land drainage regimes would also be reinstated following construction.

The risk of impact from flooding to the substation extension is not anticipated to be significant. Cumulative effects from flood risk are not anticipated to be significant due to the nature of the other developments proposals and the measures outlined to manage flood risk. The introduction of new assets removes the capacity of the surrounding land to act as a flood area, however, new structures should be designed to cope with and maintain operation within flood scenarios following current available guidance. Measures to avoid or reduce flood risk impacts include:

- where possible, remove existing redundant hard standing before creating new areas of hard standing, such that the overall total hard standing area is not increased during construction;
- contractor to sign up to Natural Resources Wales flood warnings and specify triggers and actions (in response to receipt of a flood warning) in a construction flood management plan;
- locate construction compounds in areas with lowest feasible flood risk; and
- apply appropriate water quality controls to construction compound runoff.

Operation of the substation extension is not considered to have significant adverse effects on flood risk. Measures to avoid or reduce impacts are not required.

5.7.2.4 Geology, Soils, Land Contamination and Waste

The contractor will adhere to all current waste and materials legislation and guidance along with the Applicant's standards for the works.

No significant impacts are currently anticipated from the substation extension, and good practice measures will be implemented to avoid or reduce impacts including training with regards to working with potentially contaminated materials, storage of fuels, oils and chemicals, and those related to pollution events.

No potential sources of contamination have been identified, however, there remains a residual risk that unidentified contamination is present. If unexpected, contaminated ground is uncovered during construction, it will be tested to determine the levels of contamination. Where contamination is confirmed, it will be reported to the local authority in writing. An investigation and risk assessment of the contamination will be undertaken. If the material is found to be unsuitable for reuse it will be segregated from other material and transported off-site in suitable vehicles for disposal. Vehicles will contain and cover the materials to prevent loss of leachate, dust or other material during transport. Ground arisings deemed unsuitable for reuse within the substation extension will be disposed of appropriately, for example to a soil treatment centre or landfill.

The topsoil and subsoil removed during construction work shall be replaced, where possible, to avoid permanent loss or sterilisation of agricultural land. The substation extension will require permanent loss of topsoil and subsoil. No permanent access roads or compounds will be required and those used for construction will be returned to agricultural land purposes following completion of the works.

No significant impacts on geology are currently anticipated, and no mitigation has been considered necessary.

5.7.3 Potential Impacts

The following potential impacts have been identified taking into account the measures identified in Section 5.7.2.

5.7.3.1 Construction

5.7.3.1.1 Air Quality

Dust is generated from construction activities from the handling of waste, movement of earth, the handling of materials and the tracking of vehicles. Dust can affect human health, local amenity or ecological receptors (through deposition) within the locality of the activities being undertaken. The concentrations of suspended dust particles reduce with increased distance from the construction works and the nearest residential property is 190m north-east. Section 5.7.2.1 includes a number of good practice measures that would reduce the generation of dust during construction.

Construction vehicles and plant would also generate emissions from vehicles delivering materials and construction workers to and from the construction site. Emissions could affect receptors close to the working area and also along construction routes along the local road network. The emissions would be short term at any given location within the construction period. Air emissions would also be reduced through the implementation of good practice measures as set out in Section 5.7.2.1.

Cumulative air quality and dust effects could be experienced during construction, but given that all other developments considered have either screened out these effects, assessed the effects to be not significant, or will require an assessment to determine no significant adverse effects, it is anticipated that through implementation of mitigation measures any cumulative air quality and dust implications will not have significant adverse effects.

5.7.3.1.2 Noise and Vibration

At the closest residential dwellings to the substation extension, the predicted daytime construction noise is below the threshold level of 65 decibels.

At the Welsh Ambulance Service NHS Trust HQ predicted construction noise levels are below the 65 decibels daytime threshold for all but one of the activities. The construction threshold of 65 decibels is met during the construction phase of ducting, when these works are occurring at the closest point to this receptor. As this phase is a transient activity, works will be occurring at this threshold level for a short period relative to the whole construction period.

The impact of noise during the construction of the substation extension is therefore considered to be not significant.

Predicted levels of noise from vehicles using the site access route during the peak construction traffic month are below the daytime construction noise threshold of 65 decibels. As fewer vehicles are expected to access the site in the other months of the 24-month construction period, noise from construction traffic will be lower during these periods. These predicted noise levels are low compared to those from the works and would not contribute to increase the predicted levels. The impact of noise from construction vehicles is therefore considered to be not significant.

5.7.3.1.3 Flood Risk and Water Environment

During construction, earthworks have the potential to cause deterioration of surface water quality through generation of silted or polluted runoff. Good practice measures would reduce the risk of pollution to the water environment during construction by removing the pathway between source and receptors identified in the baseline.

No impacts on the flow regime of any of the watercourses or drainage ditches are anticipated, as no new crossings or any other in channel works are required.

The proposed substation extension works are at low or negligible flood risk from tidal, fluvial, groundwater, sewers, reservoirs and canals.

The construction site of the proposed works lie partially within surface water flood extents. The impact on flood risk due to the works will inherently be temporary for the duration of the works period. Mitigation is to be provided in the associated construction management plan to avoid impeding or diverting flood water. Following implementation of the measures outlined in Section 5.7.2.3, potential impacts from flooding are negligible.

A Drainage Strategy has been developed to demonstrate how surface water will be managed at the substation extension in accordance with best practice avoiding exacerbation of surface water flood risks to third parties.

There is a residual risk to the substation extension of a larger than design event occurring and overwhelming the surface water drainage system which may result in surface water flooding within the boundary of the substation or uncontrolled runoff off site. Additionally, there is a risk of blockages or maintenance failures of the drainage assets which may also lead to flooding within the boundary of the substation or uncontrolled runoff off site. A maintenance plan has been provided within the associated Drainage Strategy document to mitigate this risk.

Cumulative effects during the construction period are not anticipated to be significant as the other developments similarly outline proposals to control and manage risk to water resources or will be required to set out how this will be done as part of their consent applications.

5.7.3.1.4 Geology, Soils, Land Contamination and Waste

There are no predicted impacts on construction workers, groundwater receptors, designated sites or GWDTE.

The contamination potential of the site is considered to be low. As no current source has been identified a source-pathway-receptor linkage has also not been identified and therefore there is not considered a risk to sensitive receptors.

Any risks from spills or accidents involving construction plant, would be managed through the good practice measures outlined in Section 5.7.2.4.

Agricultural land classification Grade 3b will be temporarily impacted by the construction works. As the agricultural land to be impacted by construction is not considered Best and Most Versatile, impacts are considered mitigable following good practice measures outlined in Section 5.7.2.4. There will be permanent loss of Grade 3b agricultural land.

5.7.3.2 Operation

5.7.3.2.1 Air Quality

There are unlikely to be any significant adverse air quality impacts on human receptors from operation traffic and maintenance plant and machinery for the substation extension.

No cumulative operational effects with other developments are anticipated as the other developments similarly outline proposals to control and manage risk to air quality or will be required to do so as part of their consent applications.

5.7.3.2.2 Noise and Vibration

As outlined in the construction noise and vibration assessment (Appendix Q) and the operational noise and vibration assessment (Appendix R), none of the proposed new infrastructure to be installed as part of the works would be classified as having significant noise sources.

Proposed auxiliary, control and security equipment items do not make significant noise, with the exception of the site alarm which would operate under emergency conditions only. Noise due to the operation of the substation is therefore considered not significant.

5.7.3.2.3 Flood Risk and Water Environment

No significant adverse impacts are expected from flood risk or on the water environment during the operation phase.

Cumulative effects during operation are not anticipated to be significant as the other developments will similarly be designed to cope with and maintain operation within flood scenarios.

5.7.3.2.4 Contaminated Land and Waste

No significant adverse impacts are expected for contaminated land and waste during the operation phase.

5.7.3.3 Cumulative Effects

There are not anticipated to be any significant cumulative effects from air quality, noise and vibration, flood risk and water environment, and contaminated land and waste with the proposed overhead line works nor other developments due to implementation of standard good practice construction methods identified in Section 5.7.2. Consideration of construction programmes for other developments to minimise construction duration overlaps will also mitigate any potential adverse effects. No significant cumulative effects with the proposed overhead line works or other developments during operation are anticipated. This is due to the proposals to control and manage risk to these environmental considerations which will be required (and/or are proposed) as part of the other developments' applications and consents.

6. Planning Appraisal

6.1 Introduction

This section considers the compliance and predicted effects of the proposed substation extension against current national and local planning policy and relevant legislation. It uses the environmental information outlined in Section 5 of this Environmental Report.

6.2 Policy and Legislative Documents

Future Wales – the National Plan 2040 is the highest tier of development plan – a national development framework plan with a strategy for addressing key national priorities through the planning system, including sustaining and developing a vibrant economy, achieving decarbonisation and climate-resilience, developing strong ecosystems and improving the health and well-being of communities.

Future Wales – The National Plan 2040 is a 20-year national development plan that covers the whole of Wales for the period up to 2040. It embeds the principles of the Well-being of Future Generations (Wales) Act 2015 and provides a strategy for addressing key national priorities through the planning system, covering big issues including the economy, low carbon energy and the environment. It shows where nationally significant developments like energy, transport, water and waste projects should take place and where growth should happen, what infrastructure and services are needed and how Wales can help fight climate change. It tries to make the best use of resources, create accessible healthy communities and protect our environment.

PPW Edition 12, February 2024, sets out the land use planning policies of the 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.

Denbighshire County Council Local Development Plan (LDP) 2006 – 2021, adopted in June 2013, forms part of a range of plans, policies and programmes which have an influence over development in Denbighshire. The local planning policies sit within the framework of national planning policies set out by the Welsh Government and are designed to take forward the LDP objectives, spatial strategy and vision for the County.

The LDP shows that the site boundary is outside a defined settlement, has no other land use designation and is therefore in the countryside for planning policy purposes.

The following legislation is referenced, where relevant.

- Well-being of Future Generations (Wales) Act 2015; and
- Environment (Wales) Act 2016.

6.3 Planning Appraisal

6.3.1 Policy and Legislation

Planning law and policies at a national and local level are generally supportive of the provision, operation and development of infrastructure and services and protecting, enhancing and sustainably developing Denbighshire's natural resources including renewable energy. The following policy and legislation accords with this approach, which is underscored by the national and global responsibility to protect the earth's resources by ensuring sustainable development.

The Well-being of Future Generations (Wales) Act 2015 sets out seven well-being goals for Wales, including making a positive contribution to global well-being and using the earth's resources efficiently and proportionately to contribute to climate change. Both the Well-being of Future Generations (Wales) Act 2015 and the Environment (Wales) Act 2016 require Local Authorities to maintain and enhance the biodiversity of the natural environment with healthy ecosystems which support social, economic as well as ecological resilience and which have the capacity to adapt to change.

Future Wales' spatial strategy places a strong emphasis on the need to make the best use of resources. The National and Regional Growth Areas and the ambitions for enhanced transport infrastructure will require clean

energy and an efficient means of providing heat and power to homes and workplaces. Policies 17 and 18 support the principle of developing renewable and low carbon energy to meet future energy needs. The infrastructure for the transmission and distribution of energy requires to be updated to facilitate this. There is an acceptance of this subject to a sensitive consideration of visual impact. Policy 17 states *"New strategic grid infrastructure for the transmission and distribution of energy should be designed to minimise visual impact on nearby communities. The Welsh Government will work with stakeholders, including National Grid and Distribution Network Operators, to transition to a multi-vector grid network and reduce the barriers to the implementation of new grid infrastructure."*

Policy 24 – North-West Wales and Energy states *inter alia* that the Welsh Government supports north-west Wales as a location for new energy development and investment where *"on-shore developments associated with off-shore renewable energy projects will be supported in principle"*.

Planning Policy Wales 12 (PPW 12) recognises that the growth in demand for power will result in significant investment being needed in energy generation, transmission and distribution infrastructure (para. 5.7.2). The planning system should accordingly integrate new renewable and low carbon energy generation with the provision of additional electricity grid network infrastructure and an integrated approach should be adopted towards planning for energy developments and additional electricity grid network infrastructure. Paragraphs 5.7.8-5.7.9 state *"in certain circumstances, additional electricity grid network infrastructure will be needed to support the Pre-Assessed Areas in Future Wales, but also new energy generating developments more generally. The Welsh Government's preferred position on new power lines is that, where possible, they should be laid underground. However, it is recognised that a balanced view must be taken against costs which could render otherwise acceptable projects unviable. Where undergrounding of lines is not possible or applicable, proactive engagement with energy companies and the public to mitigate the visual impact of any potential new transmission lines should take place"*.

With regard to the location of the proposed substation extension, in the countryside to the south of St. Asaph Business Park, Paragraph 3.60 of PPW 12 February 2024, states that all new development in the countryside should be of a scale and design that respects the character of the surrounding area. Paragraph 3.61 refers to supporting infrastructure. The policy states that adequate and efficient infrastructure, including, *inter alia*, electricity is crucial for economic, social and environmental sustainability, underpinning economic competitiveness and opportunities for people to achieve socially and environmentally desirable ways of living and working. However, infrastructure which is poorly designed or badly located can exacerbate problems rather than solving them.

Chapter 6. of PPW 12 is relevant to the proposals in relation to off-site compensatory land to address biodiversity loss. It places a strong emphasis on taking a proactive approach towards accommodating compensatory land and even consideration of cross border solutions in order to achieve the greatest benefit for biodiversity and resilient ecological networks.

As a public authority Denbighshire County Council must comply with Section 6 of the Environment (Wales) Act which requires authorities to *"seek to maintain and enhance biodiversity when carrying out their responsibilities"* and *"promote the resilience of ecosystems"*. Accordingly PPW 12 requires submission of a proportionate 'green infrastructure statements' with planning applications, describing how green infrastructure has been incorporated into the proposal and demonstrating how the 'step-wise' approach has been applied. Development proposals should be informed by the priorities identified in green infrastructure assessments and locally based planning guidance. It is however acknowledged in paragraph 6.2.13 that *"There are multiple ways of incorporating green infrastructure, depending on the needs and opportunities a site presents"*.

There are no directly related planning policies in respect of the proposals within the Denbighshire County Council LDP 2006 – 2021. However, its energy objective is to ensure that *"Denbighshire makes a significant contribution to reducing greenhouse gases through both supporting the principle of large wind farm development within identified zones and other suitable renewable energy technologies and, ensuring that all new developments are built to minimise their carbon footprint"*. By default, such developments need adequate grid connections to facilitate the distribution of energy.

While the Local Plan does not provide guidance on developing a Green Infrastructure Strategy, TAN 5 Nature Conservation and Planning 2009, provides general advice relating to nature conservation in development control, requiring information to be submitted with planning applications proportionate to the likelihood of effects on nature conservation interests and to their potential significance. Measures to protect, enhance, mitigate and compensate through planning conditions and obligations are necessary to deliver the protection and enhancement of nature conservation.

Denbighshire County Council's Supplementary Planning Guidance Note - Conservation and Enhancement of Biodiversity (July 2016) is a material planning consideration. It outlines Denbighshire County Council's expectations with regard to the biodiversity information to be submitted with a planning application and the scope and standards of submitted ecological surveys.

Denbighshire County Council's LDP Policy VOE 6 – Water Management, requires all new development to incorporate water conservation measures, where practicable to eliminate or reduce surface water run-off from site boundaries. The run-off rates from development sites should maintain or reduce pre-development rates.

6.3.2 Planning Appraisal

In principle, the proposed substation extension accords with national and local planning policy objectives and legislative requirements in that:

- The proposed substation extension (and related overhead line works) is required for the connection of a number of emerging renewable energy infrastructure schemes in the vicinity, and offshore, to facilitate the distribution of low carbon electricity across Wales and beyond. These include Awel-y-Môr Offshore Wind Farm (a DCO has been granted to install cables through land around the substation and extension); Mona Offshore Wind Farm (DCO Examination due to conclude February 2025); and, the MaresConnect interconnector (applications anticipated 2025). There has also been a recent scoping report submitted to Denbighshire County Council for the construction of a solar farm and battery storage on land to the west and southwest of the overhead lines and substation. Extending the substation will help facilitate the necessary shift away from fossil fuels and assist Wales's commitment to achieving 50GW or more of offshore wind connected to the network by 2030 maintaining essential infrastructure for electricity supply to meet the needs of present and future generations in accordance with national planning policy and law. This recognises the importance of the efficient use of resources and is supportive of north-west Wales as a location for new energy development and investment, including on-shore development associated with off-shore renewable projects.
- Decision makers are directed to give significant weight to the need to meet Wales's international commitment towards renewable energy projects, taking a strategic and long-term approach to inter alia decarbonisation and social, economic and environmental sustainability. The proposal will provide necessary updated grid infrastructure to support renewable energy generation and distribution to meet future need to support the defence against climate change as set out in the Well-being of Future Generations (Wales) Act 2015, the Environment (Wales) Act 2016, Future Wales – The National Plan, PPW12 and the Denbighshire County Council LDP.
- Future Wales and PPW 12 accept that the infrastructure for the transmission and distribution of energy requires to be updated to facilitate the future provision of energy, subject to considerations of visual impact, and that the Welsh Government will work with National Grid to reduce barriers to the implementation of new grid infrastructure.
- With regard to visual impact, Section 5 of this Environmental Report sets out the landscape and visual appraisal, which concludes that man-made influence is already evident in this area, most notably at St. Asaph Business Park and where overhead lines supported by pylons cross the landscape. As the proposed Bodelwyddan substation extension and fencing upgrade, and overhead lines development, would be located near to the existing energy infrastructure (i.e. existing substation and pylons), they would therefore be characteristic of the local landscape. While the proposals would slightly change the balance of energy infrastructure features within the landscape, this increase is unlikely to result in a notable adverse change to landscape character. Any cumulative impact with the Awel-y-Môr substation development and Mona Offshore Wind Farm development would, post construction, result in a slight adverse cumulative landscape effect. This would be mitigated by existing trees and woodland blocks making views of the developments, limited. Notwithstanding, there are some receptors who may experience moderate to major adverse visual effects at operational stage (largely due to the impacts arising from the Mona Offshore Wind Farm development). In accordance with Denbighshire County Council's Supplementary Planning Guidance, an ecological and biodiversity appraisal has been carried out (Section 5 of this Environmental Report). Due to the small scale of the substation extension and local value of ecological receptors identified within the site boundary, no significant adverse ecology and biodiversity effects from the proposed development are anticipated and cumulative effects on ecology and biodiversity are highly unlikely in combination with the substation extension works.

- While there will be some inevitable minor permanent loss of habitat, with regard to the provision of compensatory land in relation to biodiversity, there is limited scope for onsite habitat creation or enhancement of existing habitats due to restrictions in planting over buried services, i.e. the water pipeline to the north and a gas pipeline to the west, and the locations of future underground electricity cables which would ultimately tie into the proposed substation extension. However, in line with the proactive approach supported by PPW 12, National Grid has agreed with Denbighshire County Council that, where there is permanent loss of trees and hedgerow, a commuted sum would be provided to fund works on Denbighshire County Council's Green Gates Farm Nature Reserve, approximately 750m northwest of the substation and overhead line works, to compensate the loss and meet net benefit for biodiversity. (NB. With regard to the related overhead line works, the reinstatement of 198 linear m of hedgerow, where damage has occurred, within the works area is also proposed to help reconnect fragmented hedgerows and maintain the existing multifunctional network of green infrastructure). Agreement would be reached with Denbighshire County Council with regard to an appropriate mechanism to secure the off-site mitigation.
- During the operational phase, outside of non-routine maintenance requests and security events, the site would not be lit at night and it is not anticipated that there would be additional noise, emissions or discharges during operation. Operation of the substation extension and the upgraded fencing to the existing substation would not result in an adverse effect on statutory or non-statutory designated sites, habitats, or species.
- A Green Infrastructure Statement is submitted with the application, in accordance with PPW 12 (see Appendix S). It demonstrates how the proposed Bodelwyddan substation extension has applied the step-wise approach and because of operational restrictions will pay a commuted sum towards offsite works to provide Net Benefit for Biodiversity via an appropriate agreement with Denbighshire County Council.
- A transport appraisal has been carried out and found that the operational impact of the substation extension would be negligible. A substation attendant would carry out daily routine inspections and every three years, statutory inspections are conducted on different equipment items, with a team of around eight staff present. Based on the limited operational impact of the substation extension it has been deemed that there would be no material operational impact on the highway network.
- With regard to flooding and the water environment, because no new crossings or any other in channel works are required, no impacts on the flow regime of any watercourses or drainage ditches are anticipated. As the substation extension is partially in a Surface Water and Small Watercourses Low Flood Risk zone, there is a risk of flood risk during construction. Following implementation of mitigation measures, potential impacts from flooding are considered negligible (subject to preparation of a Flood Risk Assessment).
- Other aspects of the environment that were considered to have no significant adverse effects include: the historic environment; air quality; noise and vibration; and, geology, soils, land contamination and waste. The consideration of these environmental aspects is outlined in section 5 of this report.

6.4 Planning Assessment Conclusion

The proposed substation extension (and overhead line works) are part of a project to assist sustainable energy generation, enabling the connection and distribution of renewable energy by utilising and enhancing existing electricity infrastructure at a scale and design proportionate to the technical requirements of the facility.

The extension is adjacent to the existing substation within an area already subject to man-made influences. The environmental appraisal demonstrates that, with the adoption of embedded mitigation measures, off-site contributions to fund works at the Green Gates Farm Nature Reserve and good practice construction techniques, the proposed substation extension would not give rise to any conflicts with relevant planning policies, designations or national or local sustainability, health and wellbeing objectives and would contribute to Wales renewable energy and net zero targets.

On balance, it is suggested that the proposal is acceptable in planning terms, in accordance with national and local planning policy and legislation.

7. Conclusion

This report provides a description of the substation extension and presents an assessment of likely environmental effects, informed by the supporting appendices.

The assessment of potential environmental effects takes into account good practice measures and construction methodologies to avoid or reduce potential impacts. These are set out in the individual topic sections.

The environmental appraisal demonstrates that, with the adoption of embedded mitigation measures, specific mitigation measures, Net Benefit for Biodiversity and good practice construction techniques, the proposed substation extension would not give rise to any conflicts with relevant planning policies, designations or national or local sustainability, health and wellbeing objectives, and would serve to contribute to Wales' renewable energy and net zero targets.

Acronyms, Abbreviations and References

Acronyms and Abbreviations

AOB	Area of Outstanding Beauty
AONB	Area of Outstanding Natural Beauty
AQMA	Air Quality Management Area
BCT	Bat Conservation Trust
BGS	British Geological Survey
CIEEM	Chartered Institute of Ecology and Environmental Management
CPAT	Clwyd Powys Archaeological Trust
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
DESNZ	Department for Energy Security & Net Zero
DfT	Department for Transport
DMRB	Design Manual for Roads and Bridges
DNO	Distribution Network Operator
DNS	Development of National Significance
DTM	Digital terrain model
EMF	Electric and Magnetic Field
GCN	Great crested newt
GDPO	General Permitted Development Order
GIB	Gas Insulated Busbars
GIS	Gas Insulated Substation
GP	General Practitioner
GWDE	Groundwater dependent terrestrial ecosystem
ha	Hectares
HER	Historic Environment Record
HGV	Heavy goods vehicle
HLC	Historic Landscape Character
HRA	Habitats Regulations Assessment
ISS	Integrated Security Solution
km	Kilometre
kV	kilovolt
LCA	Landscape character areas

LDF	Local Development Framework
LDP	Local Development Plan
LGV	Light goods vehicle
LiDAR	Light Detection and Ranging data
LVA	Landscape and Visual Assessment
LVAC	Low voltage alternating current
LWS	Local Wildlife Sites
m	Metre
m ²	Square metres
m ³	Cubic metres
mph	Miles per hour
NFI	National Forest Inventory
NGET	National Grid Electricity Transmission
NLCA	National Landscape Character Area
NPA	Noise Priority Area
NPS	National Policy Statement
NSR	Noise Sensitive Receptor
OS	Ordnance Survey
PAS	Portable Antiquities Scheme
PEDW	Planning and Environment Decisions Wales
PPW	Planning Policy Wales
PRoW	Public rights of way
EIA	Environmental Impact Assessment
SAC	Special Area of Conservation
SLA	Special Landscape Area
SME	Small and medium enterprises
SPA	special protection area
SSD	Stopping sight distance
SSSI	Sites of Special Scientific Interest
T	Tonne
TAN	Technical Advice Note
TCPA	Town and Country Planning Act
WHS	World Heritage Site
ZTV	Zone of Theoretical Visibility

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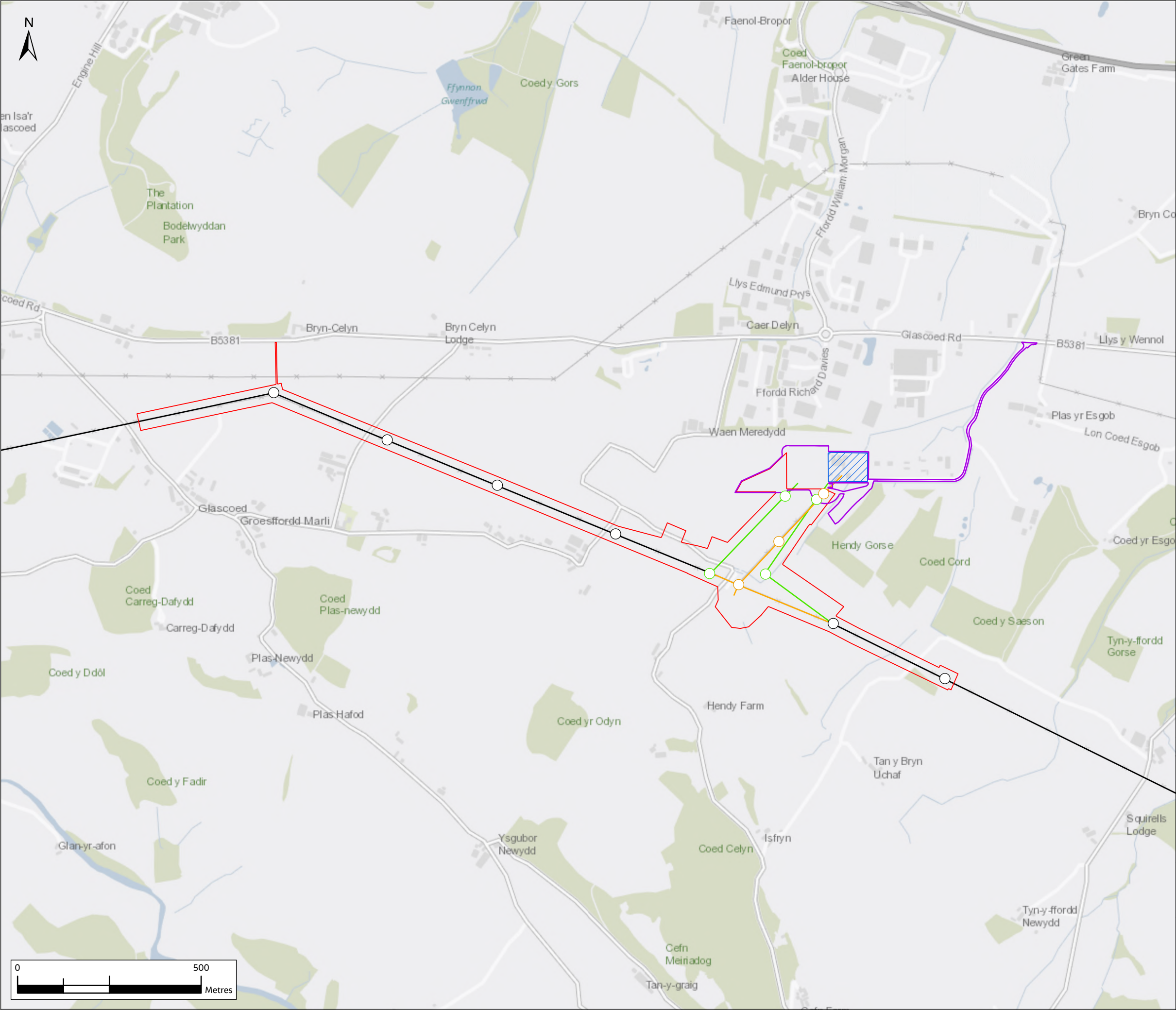
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Appendix A. Works Site Plan



Legend

Overhead Line Works and Access Boundary

Substation Extension Application Boundary (includes access road and existing substation)

Existing Substation Boundary

Existing Overhead Line and Towers - Retained

Existing Overhead Lines and Towers - Removed

New Overhead Lines and Towers



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03	6/17/2025	FINAL	WW	TW	TW	KW
Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

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ProjectBODELWYDDAN SUBSTATION

Drawing TitleWORKS SITE PLAN

Drawing No. B2416603/BODEL/SLP/001	Drawing Status FINAL
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APPENDIX A

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Appendix B. Arboricultural Impact Assessment



THE
ENVIRONMENT
PARTNERSHIP



BODELWYDDAN SUBSTATION EXPANSION

BODELWYDDAN

ARBORICULTURAL IMPACT ASSESSMENT

FEBRUARY 2025

Document Title	Arboricultural Impact Assessment
Prepared for	National Grid
Prepared by	TEP - Warrington
Document Ref	9037.01.001

Author	[REDACTED]
Date	February 2025
Checked	[REDACTED]
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4.0	20/02/25	AAB	JGS	Update for Pre-Application Consultation	Final

CONTENTS	PAGE
Executive Summary	1
1.0 Scope	2
2.0 Baseline	3
3.0 Effects	12
4.0 Mitigation	15

TABLES	PAGE
Table 1 Existing canopy coverage	3
Table 2 Summary of BS 5837 quality categorisation	6
Table 3 Veteran trees	9
Table 4 Reference number and location of features that would be removed	12
Table 5 Quantity and percentage of trees to be removed	13
Table 6 Summary of effects and mitigation	15

FIGURES	PAGE
Figure 1 Site location and approximate boundary (OS Open Map – Local (Raster) 1:10,000)	3
Figure 2 Example of typical field boundary trees within hedgerows	4
Figure 3 Veteran tree T44 showing retrenchment and stag-heading	5

APPENDICES

- APPENDIX A: Arboricultural Survey Data
APPENDIX B: Survey Method

DRAWINGS

- Drawing 1 - Tree Constraints Plan
Drawing 2 - Tree Works Plan
Drawing 3 - Tree Protection Plan
Drawing 4 - Tree Protection Fencing Specification

Executive Summary

1. TEP has been commissioned by National Grid to conduct a survey of land adjacent to Bodelwyddan Substation in Denbighshire and a review of designations, policies and other instruments of relevance to arboriculture. This report presents the results and effects of proposed development.
2. 66 individual trees; 7 groups of trees; 1 woodland compartment; and 23 hedges were recorded within the wider application site.
3. The tree population comprises a large number of hedgerow oaks, distributed throughout the site, with occasional outgrown hedges forming groups. There is a single woodland towards the eastern edge of the site that extends beyond the survey boundary.
4. The desktop review and site survey identified no Tree Preservation Orders; no trees within a Conservation Area; no ancient woodland; 1 veteran tree; no trees within a Community Forest; and Habitats of Principal Importance including Broadleaved, Mixed and Yew Woodland and Hedgerow.
5. The proposed development comprises an extension of the existing substation with associated removal and replacement of pylons and overhead lines. This report covers the application for the substation expansion only.
6. 7 individual trees; 1 tree group equating to approximately 0.0123ha of canopy cover; and 89m of hedgerow would be removed to accommodate the proposed development. At the population level tree losses are relatively minimal, although the removal of 2 high quality (Category A) trees is unavoidable.
7. The development would give rise to no adverse effects that cannot be mitigated. A scheme of new planting should be required, including native tree planting that will achieve a large mature size.
8. Tree protection measures to be observed during construction are proposed in the form of a Tree Protection Plan on Drawing 3 with recommended specifications provided on Drawing 4 to 5 of this report. The correct installation and maintenance of temporary barrier fencing should be a condition of any planning consent.
9. Root pruning to the southern extent of the Root Protection Area of T31 will be undertaken to disconnect the root structure within the area of excavation from the roots that will be retained in a controlled manner. This prevents further damage being caused to retained parts during mechanical excavation. The process is illustrated on Drawing 6. If during this process large roots, over 25mm diameter, are found works should cease and the project arboriculturist should be consulted.
10. This report constitutes a valid basis for the evaluation of impacts on trees resulting from the proposed development for a period not exceeding 2 years from the survey date. After this, it would be necessary to review baseline data and conclusions to ensure reliability.

1.0 Scope

- 1.1 TEP has been commissioned by National Grid to conduct an arboricultural survey of land adjacent to Bodelwyddan Substation in Denbighshire, North Wales, and to make an assessment in accordance with BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations.
- 1.2 This report has been produced to support a planning application. It describes the findings of field and desktop surveys; the effects that granting planning permission would have on arboriculture; and measures that are and/or should be incorporated in the proposed development.

Survey

- 1.3 The survey was undertaken on 27th June 2023 in accordance with BS 5837 by qualified arboriculturists. The survey method is included at Appendix B.
- 1.4 A topographical survey covered a small part of the site (immediately adjacent to the existing substation) and was used to record the position of trees and vegetation in that area (drawing reference: 106823). Most of the site was not covered by this topographical survey and therefore the majority of tree locations were estimated.
- 1.5 Trees on private land outside the application boundary, and at inaccessible locations¹ were surveyed insofar as was practicable. Whilst reasonable effort has been made to ensure the accuracy and comprehensiveness of such records, it cannot be guaranteed.

Limitation

- 1.6 This report relates to a specific development proposal and should not be interpreted as advice in any other circumstance, including but not limited to the promotion or assessment of alternative schemes; the design of foundations; management of tree risk; and tree-related subsidence.
- 1.7 This report constitutes a valid basis for the evaluation of impacts on trees resulting from the proposed development for a period not exceeding 2 years from the survey date. After this, it would be necessary to review baseline data and conclusions to ensure reliability.
- 1.8 Where the recommendations of this report have been followed, any future deterioration in tree condition shall not be attributable to the development.

¹ Limitations to the survey are described at Appendix A

2.0 Baseline

The Site

- 2.1 The site comprises a number of agricultural field parcels to the south and west of the operational Bodelwyddan Substation. It is bordered to the north by an industrial estate, to the east by agricultural field parcels and woodland, and the south and west by further agricultural field parcels. It is centred on UK Grid Reference SJ014734



Figure 1 Site location and approximate boundary (OS Zoomstack – Local (Raster) 1:5,000)

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- 2.2 The survey area is generally flat with a gentle slope towards the south. At the time of the survey, land outside the existing substation compound site was in agricultural use as both arable and pasture.

Tree Survey

- 2.3 66 individual trees; 7 groups of trees; 1 woodland compartments; and 23 hedges were recorded within influencing distance of the wider application site.
- 2.4 Feature locations, their quality categories, canopy spreads and root protection areas are shown on Drawing 1. The following table provides the total canopy area for mapped trees and the total length of mapped hedgerow on Drawing 1. In some cases this may be more than the absolute area of cover due to canopy overlap between adjacent features.

Table 1 Existing canopy coverage

Trees	Groups	Woodland	Hedgerow
0.6618ha	0.8319ha	0.6826ha	2663m

- 2.5 All arboricultural information recorded during the survey is presented at Appendix A.

Overview

- 2.6 The tree population is extensive and comprises numerous large, well-established oak trees situated in linear groups throughout the hedgerow network. There are occasional smaller trees and groups, often where hedges have lapsed from management. Large areas of continuous tree canopy cover are limited to the woodland in the east of the site.



Figure 2 Example of typical field boundary trees within hedgerows

- 2.7 Large mature oak trees are common on site but most of them are showing some amount of decline or retrenchment with stag-heading in many examples. Several of these trees are in better condition with few defects and good vigour such as T16, T17 and T23.
- 2.8 Tree T10, growing on the edge of woodland W1, is distinguished by its upright form compared to the broad squat open grown trees. It has some failed limbs and some that have been removed, leaving retained stubs with small decay pockets forming. It is tall and broad and visually prominent from the rest of the wooded area.
- 2.9 Tree T4 is a very large oak at the edge of a small substation compound. It has a heavily burred stem and some retrenchment in the upper canopy with large dead branches giving a stag-headed form. It has some veteran characteristics but lacks the complex assemblage of features that would enable it to be considered as such. It is likely to continue to develop these features and, given time, may achieve veteran status in the future.
- 2.10 Tree T44 is another very large tree, situated in a gap between 2 sections of field boundary hedgerow. It has numerous features associated with veteran trees including retrenchment with stag-heading, hollowing and cavity formation, large diameter dead wood, and signs of wood-decay fungi. Despite the physical defects the tree has excellent vigour and is good example of a veteran field boundary oak that is visually prominent and provides high habitat value.



Figure 3 Veteran tree T44 (left tree) showing retrenchment and stag-heading

- 2.11 Woodland W1 is a mixture of well-established large oaks with younger plantation trees, such as Scots pine and Norway spruce, and regeneration of silver birch and thorn species. It has a good age and size structure and forms a large area of continuous canopy cover extending well beyond the site boundary to the east.
- 2.12 This woodland forms a continuous canopy with group G4 which comprises almost exclusively large oaks with occasional small hawthorns. It has no significant understorey or ground cover with evidence of heavy grazing and ground compaction. The age and size profile of this group is narrow with most trees large and well-established.

Tree Quality

- 2.13 Under BS 5837 trees are objectively assigned one of four categories to describe their quality. The table below includes a description of each category and the amount of trees within it. This information is presented by canopy area to allow comparison between features of varying size and maturity. Hedgerows have not been categorised.

Table 2 Summary of BS 5837 quality categorisation²

Category	Description	Total existing
A	Trees of high quality, typically with a long remaining life expectancy; and with clear and identified merit as specimens, visually, culturally or for conservation.	0.1569ha
B	Trees of moderate quality, typically with at least a medium remaining life expectancy; with remediable defects only; or low quality but with collective merit.	1.8193ha
C	Trees of low quality, typically with at least a short remaining life expectancy; unremarkable trees; young or small trees that could be replaced.	0.1442ha
U	Trees that cannot realistically be retained in the current land use for 10 years; with serious and irreparable defects, pathogens or decline.	0.0532ha

2.14 The greatest proportion of tree cover is of moderate quality (Category B) with around 84% of tree cover falling into this category by area. This figure is somewhat inflated by the presence of two large areas of tree cover (W1 and G4) adjacent to the eastern boundary, but Category B features are still most common numerically. The remaining tree cover is fairly evenly distributed between high quality (Category A) and low quality (Category C) with a small amount of trees falling into Category U.

2.15 These qualities are largely derived from their landscape and habitat value with a smaller number of trees displaying arboricultural value.

Root Protection Areas

2.16 Using the results of the field survey a Root Protection Area (RPA) has been calculated in accordance with BS 5837 using each tree's stem diameter at 1.5 metres³. The RPA represents the minimum area around each tree that must be left undisturbed to ensure its survival.

2.17 Where a tree's rooting pattern is considered to have been influenced by site conditions the RPA has been adjusted or offset to most accurately represent the likely spread of roots⁴. On this site, influences on root morphology are considered to be existing roads, ditches, and agricultural practices.

² Refer to Appendix B for the full table

³ Refer to Appendix A for RPA area calculations

⁴ See Drawing 1 for RPA shapes

Policy, designations and protection

Planning Policy

- 2.18 All trees are a material consideration in the planning process. Effects on trees will therefore be considered by the consenting authority. Adverse effects that cannot be mitigated and which are not acceptable on balance against other benefits may weigh against the granting of planning permission.
- 2.19 There should be a common sense ambition to limit tree loss to that which is strictly required to facilitate the proposal, and to achieve a good design. Trees which are retained should not be harmed and the proposal should present a reasonable account of the prospects for tree retention in accordance with BS 5837.

Planning Policy Wales

- 2.20 Planning Policy Wales states that planning authorities should 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 and identified green infrastructure function⁵.
- 2.21 There is a strong policy presumption against loss or deterioration of irreplaceable natural resources such as semi-natural woodlands, ancient woodland and individual ancient, veteran or heritage trees. These trees should be afforded protection from development which would result in their loss or deterioration unless there are significant and clearly defined public benefits⁶.

Local Planning Policy

- 2.22 Denbighshire County Council has a Local Development Plan (adopted June 2013); however this does not contain any specific policies of relevance to trees. It contains a policy relating to Nature Conservation, policy VOE 5, which is of relevance to this site and is recreated below.

Policy VOE 5 – Conservation of natural resources

Development proposals that may have an impact on protected species or designated sites of nature conservation will be required to be supported by a biodiversity statement which must have regard to the County biodiversity aspiration for conservation, enhancement and restoration of habitats and species.

Where the overall benefits of a development outweigh the conservation interest of a locally protected nature site, mitigation and enhancement measures in or adjacent to these sites should be an integral part of the scheme.

If necessary, measures required to mitigate likely adverse effects on the qualifying features of statutory designated sites should be put in place prior to the commencement of development. Measures required to offset any likely adverse effects will be secured by planning conditions and/ or planning obligations.

⁵ Planning Policy Wales paragraph 6.4.25

⁶ Planning Policy Wales paragraph 6.4.26

Planning permission will not be granted for development proposals that are likely to cause significant harm to the qualifying features of internationally and nationally designated sites of nature conservation, priority habitats, priority species, regionally important geodiversity sites, or to species that are under threat.

- 2.23 In addition, the council has published supplementary information that gives guidance on the interpretation and application of local planning policy. In particular, the Tree and Landscaping SPG (July 2016) is of relevance.

Tree Preservation Orders

- 2.24 A check with the local authority was undertaken on 13th July 2023. The online mapping system confirmed that no trees within or adjacent to the site are protected by Tree Preservation Order.

Conservation Areas

- 2.25 A check with the local authority was undertaken on 13th July 2023. The online mapping system confirmed that no trees within or adjacent to the site are within a Conservation Area.

Ancient Woodland

- 2.26 Ancient Woodland is defined in Wales as sites that have been continuously wooded since before 1600AD⁷ and is regarded as 'irreplaceable'⁸. The distribution of Ancient Woodland has been assessed on the basis of Natural Resources Wales Ancient Woodland Inventory 2021 via DataMapWales (gov.wales)⁹. There is no ancient woodland within or adjacent to the site.

Veteran Trees

- 2.27 Veteran trees are defined as those which, because of great age, size or condition, are of exceptional value culturally, within the landscape, or for wildlife¹⁰. All ancient trees are veteran trees. Not all veteran trees are ancient, though they tend to be relatively old for the species. Ancient and veteran trees are regarded as 'irreplaceable'¹¹.
- 2.28 There is no comprehensive national register of veteran trees. The Woodland Trust maintains an inventory of significant trees which includes some ancient and veteran individuals¹². At the time of writing, it contained no records of relevance to the site.
- 2.29 An assessment of each tree was made by a qualified arboriculturist as part of the tree survey. There is 1 veteran tree within the site. This is listed in the table below.

⁷ Woodlands for Wales: Glossary (p.52)

⁸ Planning Policy Wales paragraph 6.4.26

⁹ [New map | DataMapWales \(gov.wales\)](#)

¹⁰ Woodlands for Wales: Glossary (p.55)

¹¹ Planning Policy Wales paragraph 6.4.26

¹² <https://ati.woodlandtrust.org.uk/>

Table 3 Veteran trees

Survey reference ¹³	Species	Veteran characteristics
T44	Pedunculate oak	Retrenchment, hollowing and decay, large size

- 2.30 Not all mature trees or those of high habitat interest are veterans. Trees with individual or simple assemblages of features typically associated with veteran trees were also noted¹⁴. Such trees may become veterans but should not be treated as such for the purposes of impact assessment. This is the case for tree T4, a very large pedunculate oak which, although large and old, has only a small number of features associated with veteran trees.
- 2.31 To comply with planning policy¹⁵, development must not result in loss or deterioration of ancient and veteran trees unless there are significant and clearly defined public benefits. In practice, harm to such trees would constitute grounds for refusal of the majority of planning applications that cannot demonstrate the public benefits would outweigh the loss or harm of these trees.
- 2.32 No prescriptive guidance is provided with regards to protection of ancient and veteran trees within national planning policy. Therefore all protection recommendations, with the central objective being the avoidance of harm to ancient and veteran trees, are based on professional judgement, experience and relevant guidance.

Habitats of Principal Importance

- 2.33 A list¹⁶ of habitats which are of principal importance for the purpose of maintaining and enhancing biodiversity is published by Welsh Ministers¹⁷, the definitions of which appear to be based on the UK Biodiversity Action Plan (UK BAP)¹⁸. The list includes habitat types that are defined by woody vegetation, which are listed below. All features surveyed have been assessed against these definitions and those that meet the definition of a Habitat of Principal Importance have been listed in accordance with their habitat type below.
- 2.34 Habitats of Principal Importance provide a means of evaluating effects on biodiversity, and thereby a metric to demonstrate the discharge of this duty. In the context of planning, adverse effects on Habitats of Principal Importance that cannot be mitigated are material to decision making.

¹³ See Appendix A

¹⁴ See Appendix A

¹⁵ Planning Policy Wales paragraph 6.4.26

¹⁶ <https://www.biodiversitywales.org.uk/File/57/en-GB>

¹⁷ Environment (Wales) Act 2016, 7 (1)

¹⁸ <http://jncc.defra.gov.uk/page-5706>

- 2.35 There is no mapping available of Habitats of Principal Importance for Wales. Habitat surveys were not completed as part of the tree survey. The tree survey was limited to include only trees within influencing distance of the site boundary. It is therefore not possible to be definitive with regards to the location and extents of each of the arboreal Habitats of Principal Importance. The features listed below are the result of a reasonable interpretation using professional judgement, experience, and the information available.

Broadleaved, Mixed and Yew Woodland

- 2.36 Five distinct types of woodland¹⁹ are amalgamated in the Section 7 list of Habitats of Principal Importance²⁰ under the habitat type 'Broadleaved, Mixed and Yew Woodland'.
- 2.37 Survey feature W1 appears to best fit the description of a Broadleaved, Mixed and Yew Woodland Habitat of Principal Importance (HoPI).

*Wood Pasture and Parkland*²¹

- 2.38 Wood-pasture and parkland are mosaic habitats valued for their trees, especially veteran and ancient trees, and the plants and animals that they support. They are exclusively associated with some species of insects, lichens and fungi which depend on dead and decaying wood. Grazing animals and continuity of management are fundamental to the existence of the habitat and it can be a type of ancient woodland.
- 2.39 No surveyed features appear to fit the description of Wood Pasture and Parkland HoPI.

*Traditional Orchards*²²

- 2.40 Traditional orchards are defined, for priority habitat purposes, as groups of fruit and nut trees planted on vigorous rootstocks at low densities in permanent grassland; and managed in a low intensity way. Habitat structure rather than vegetation type, topography or soils, is the defining feature of the habitat.
- 2.41 No surveyed features appear to fit the description of Traditional Orchard HoPI.

*Hedgerow*²³

- 2.42 Hedgerow is any boundary line of trees or shrubs over 20m long and less than 5m wide, and where any gaps are less than 20m wide. It may include banks, walls, ditches, herbaceous vegetation, climbing plants or trees within 2m of the centre line. All hedgerows which comprises at least 80% woody native species are included.
- 2.43 The survey identified 23 hedgerows²⁴. Of these, all appear meet the description of the Habitat of Principal Importance. In addition, tree group G5 is a linear boundary feature that should be regarded as also meeting this description.

¹⁹ Upland oak woodland; Lowland beech and yew woodland; Upland mixed ash woodland; Wet woodland; Lowland mixed deciduous woodland

²⁰ <https://www.biodiversitywales.org.uk/File/57/en-GB>

²¹ http://jncc.defra.gov.uk/docs/UKBAP_BAPHabitats-65-WoodPastureParkland2011.doc

²² http://jncc.defra.gov.uk/Docs/UKBAP_BAPHabitats-56-TraditionalOrchards.doc

²³ http://jncc.defra.gov.uk/Docs/UKBAP_BAPHabitats-17-Hedgerows.doc

²⁴ See Appendix A

Protected Species

- 2.44 No assessment of the presence of protected species has been made during the production of this report. Features of possible interest that were observed incidentally during the tree survey are recorded in Appendix A.
- 2.45 Works to and around trees have the capacity to affect protected species where present, particularly including birds, bats, great crested newts, badgers, dormice, otters and water voles. Contractors should be familiar with the locations and sensitivities of any protected species that are present and take reasonable avoidance measures or comply with the requirements of any licence agreement in accordance with the advice of an ecologist.

Birds

- 2.46 Intentional harm to a wild bird, egg, or a nest that is in use or being built is an offence²⁵. Disturbance of certain wild birds that are building a nest, or are in, on or near a nest containing eggs or young, or disturbance of dependent young is also an offence²⁶.
- 2.47 All trees are a potential habitat for nesting birds so tree work should ideally, but not essentially, be undertaken outside the bird nesting season. Between March and August, a detailed inspection of each tree should be undertaken by a qualified ecologist to confirm the absence of nesting birds immediately prior to works.
- 2.48 Some birds nest outside the core nesting season. If an active nest is found at any time of year, work likely to affect the nest must be halted until the nest becomes inactive. This will vary depending on the species of bird but is typically up to six weeks. The advice of an ecologist regarding the duration and size of a protection buffer around the nest should be sought.

Bats

- 2.49 It is an offence to damage, destroy or obstruct access to any structure or place which is used for shelter or protection²⁷, or breeding or resting²⁸ by a bat. Mature trees often contain cavities, splits and ivy, which may be attractive to bats.
- 2.50 The Environmental Report (B2416603_BODEL_SUB_001) identified 3 trees with low bat roost suitability within the footprint of the proposed substation.
- 2.51 If the presence of a bat, or a roost or resting site is suspected whilst undertaking works on any trees, operations must be halted and the advice of appropriately licensed ecologist should be sought.

²⁵ Wildlife and Countryside Act 1981, 1 (1)

²⁶ Wildlife and Countryside Act 1981, 1 (5)

²⁷ Wildlife and Countryside Act 1981, 9 (4)

²⁸ The Conservation of Habitats and Species Regulations 2017, 43 (1)

3.0 Effects

- 3.1 In simple terms, the effects on arboriculture comprises an account of which existing trees, groups of trees, hedgerow and woodland would not be retained within the proposed development; what significance they have; and whether adverse effects would or can be mitigated or offset.

Proposed development

- 3.2 The proposed development comprises construction of an extension to the existing substation. The removal and replacement of associated overhead lines and towers will also be necessary but does not form part of the current application and are not assessed in this report.
- 3.3 The proposed layout is shown on Drawing 2 and Drawing 3 and is based on drawing PDD-32281-001-SBS-006 P01.1 provided by the client.
- 3.4 An external works plan showing the detail and arrangement of drainage, levels, retaining structures and utilities was not available to inform the production of this assessment.

Tree Removal and Pruning

- 3.5 This section details all tree removal which is proposed as part of the substation extension development only. All trees not identified for removal can be retained in accordance with BS 5837.
- 3.6 In total, 7 individual trees; 1 tree group equating to approximately 0.0123ha of canopy cover; and 89m of hedgerow would be removed to accommodate the proposed development.

Table 4 Reference number and location of features that would be removed

	Trees	Groups	Woodland	Hedgerow
Remove (on-site)	T21, T24, T25, T26, T28, T29, T31	G6	-	(H11)
Remove (off-site)	-	-	-	-

(Features in brackets are those of which a part would be removed and part retained)

- 3.7 If planning permission is granted with reference to this report, the removal of any feature not listed above and shown on Drawing 2 for removal would constitute a material amendment and may therefore require an application to vary the consent.
- 3.8 The following table provides an overview of the quantity and the percentage of trees that would be removed and a breakdown of the number of instances of removal by quality category. It uses canopy area to describe effects on Trees, Groups and Woodland. The reported areas may be higher than the absolute area of tree cover on the site due to overlap between adjacent features.

Table 5 Quantity and percentage of trees to be removed

Feature	Number of features affected				
	Category A	Category B	Category C	Category U	Hedges
Trees	2	3	1	1	1
Groups	-	-	1	-	
Woodland	-	-	-	-	
Total loss	0.0344ha	0.0244ha	0.0141ha	0.0065ha	89m
Proportion of existing	21.9%	13.4%	10%	12%	3.3%

3.9 Tree removal both numerically and by area is relatively minimal with only 7 trees; a single group; and part of 1 hedgerow requiring removal. However, the loss of 2 high quality (Category A) trees represents a fifth of all high quality trees recorded during the survey. This impact is unavoidable due to the proximity of the trees to the existing substation and the associated constraints to design resulting from the current substation arrangement.

3.10 Encroachment into the southern part of the RPA of T31 to deliver the earthworks would result in loss of approximately 18% of the tree's rooting area. This level of impact to the roots is likely to cause the decline of the tree and its retention cannot be assured. It will be counted as a removed tree but left in situ to retain its habitat value for as long as it is safe to do so.

Effects on designated or protected features

Veteran Trees

3.11 The proposed development would not result in loss or deterioration of veteran trees.

3.12 Veteran tree T44 is located well beyond any proposed works associated with this application and will not be impacted.

Habitats of Principal Importance

3.13 Loss of or harm to a Habitat of Principal Importance, without mitigation, constitutes an adverse effect that is likely to be regarded by the consenting authority as contrary to its duty to conserve biodiversity.

Broadleaved, Mixed and Yew Woodland

3.14 The proposed development would not result in loss or harm of Broadleaved, Mixed and Yew Woodland.

3.15 Broadleaved, Mixed and Yew woodland W1 is approximately 120m from the edge of the proposed development and would be unaffected by any works.

Hedgerow

- 3.16 The proposed development would result in loss of 83m of Hedgerow but would not result in harm to remaining Hedgerow.
- 3.17 A section of hedgerow H11 would be removed to facilitate the development. The remaining parts of this feature can be retained and protected throughout development.

Protected Species

- 3.18 The effects of the proposed development on protected species and significance thereof is considered by the relevant ecology reports including the Environmental Report.

4.0 Mitigation

- 4.1 This section describes opportunities to mitigate or offset adverse effects described by the previous section. It summarises measures that are part of the proposed development and which are relied upon by this report, and measures that are not proposed but could be secured by planning condition or agreement. Conclusions are drawn regarding overall effects, and the requirements that should be imposed in order to secure the outcomes described.
- 4.2 The table below provides an overview of effects on the receptors described in the preceding sections. Within it, Column (1) describes the outcome for each receptor without mitigation; Column (2) reflects whether any mitigation would be secured by the current application; Column (3) represents whether predicted effects are (or could be rendered) neutral or positive; and Column (4) defines the outcome in simple terms.

Table 6 Summary of effects and mitigation

Receptor	(1) Adverse effect*	(2) Mitigation proposed	(3) Mitigation possible	(4) Residual effect
Tree cover	Yes	No	Yes	Pending
Tree condition ²⁹	Yes	Yes	Yes	Neutral
Broadleaved, Mixed and Yew Woodland	No	No	No	Neutral
Hedgerow	Yes	No	Yes	Pending

**Without mitigation*

- 4.3 **Positive** residual effects represent benefits that would be delivered by the proposed development.
- 4.4 **Neutral**³⁰ residual effects are those that should have no weight in decision making.
- 4.5 **Negative** residual effects cannot be mitigated or offset and represent adverse effects of the proposed development. They may be acceptable in the planning balance on consideration of other benefits delivered by the proposed development.
- 4.6 **Pending** residual effects are those for which mitigation or offsetting can be secured after consent has been granted, typically by planning condition. It is assumed by this report that they would be.

²⁹ In this context, whether there would be a risk of harm to existing trees during development (without protection)

³⁰ Including negligible and non-material effects

Proposed measures

- 4.7 The following measures are proposed and would be secured by a planning permission referencing and requiring compliance with this report:

Layout

- 4.8 The retention of trees that has been assessed as possible within the proposed layout would be observed by the developer and all appointed contractors; tree removal would be limited to that illustrated on Drawing 2.

Tree Protection

- 4.9 A Tree Protection Plan is provided at Drawing 3. It shows the arrangement of temporary protection measures that would be installed prior to the commencement of any works, including ground investigation, setting out, compound establishment or delivery of any plant or materials.
- 4.10 It also shows areas where root pruning will take place and a specification for how this should be undertaken.
- 4.11 Tree protection measures will follow the specification provided at Drawings 4 and 5.
- 4.12 Temporary protection measures would be maintained as shown during the entire construction process and would not be removed or realigned until all buildings, structures, hard surfaces, utilities, drainage, demolition and the removal of scaffolding, plant, compounds and surplus material has been completed.

Recommended measures

- 4.13 The following measures should be secured by planning condition or other agreement:

Planting

- 4.14 A scheme of tree planting should be produced and implemented in order to provide mitigation for the loss of trees. Mature, well-established trees are difficult to replace in any meaningful timescale. Mitigation should seek to reinstate lost habitat whilst allowing adequate stand-off for new trees to reach their mature size.
- 4.15 There should be a predominance of native species that can achieve a large final size, particularly oak, as well as smaller species such as hawthorn, elder and elm species within hedgerows.
- 4.16 Provision should be made for the maintenance of new planting in accordance with British Standard 8545:2014 Trees: from nursery to independence in the landscape - Recommendations, and replacement of failures for a period of at least 5 years.

APPENDIX A: Arboricultural Survey Data



Surveyor Heather Eilbeck/Angus Blankenstein
Survey Date 27.06.2023
Site Bodelwyddan Substation
Drawing Ref D9037.01.001-003

Italicised Feature Ref: Inspection of this feature was restricted
Italicised Values: Feature value was estimated

APPENDIX A: Arboricultural Survey Data Sheets

Ref	Species	Height	Canopy Ground Clearance	Stem Diameter (or range)	No. of stems/ individuals	Crown Spread North	Crown Spread South	Crown Spread East	Crown Spread West	Lowest Branch Height	Lowest Branch Direction	Maturity	Condition	Comments on form, condition, health and significant defects	Management recommendations in current context	BS 5837 Quality Category	Estimated Remaining Contribution
		(m)	(m)	(mm)	arising below 1.5m	(m)	(m)	(m)	(m)	(m)	(N,S,E,W)	Young, Middle Age, Mature	Good, Fair, Poor, Veteran			A,B,C,U (1,2,3)	Long, Medium, Short, Very Short
Trees																	
T1	Pedunculate oak	7.0	2.0	550	1	5.5	3.5	3.5	7.0	3.0	S	Middle Age	Fair	Tree at edge of ditch and field and at end of boundary hedge. Growth bias to north with stem lean in this direction until it rights itself at c. 2.5m. Bifurcated at 2.5m with wide union and further bifurcation immediately above. Poor pruning cuts evident with some flush cuts and remnant stubs. Growing beneath powerlines with some limitations on future growth potential. Squat.		B ,1	Long
T2	Pedunculate oak	11.0	4.0	760	1	5.0	3.5	8.0	7.0	4.0	NE	Mature	Fair	Tree at edge of ditch and field. Growing adjacent to but not under powerlines. Slight lean to north-east. Canopy bias to south-east. Bifurcated at c. 4m. Large deadwood branches. Dieback of branches. Soil and bank erosion evident with gaps under tree and buttress roots evident. Previous branch failures.		B ,1, 3	Long
T3	Pedunculate oak	10.0	2.0	990	1	7.5	6.0	8.0	6.0	2.0	N	Mature	Fair	Large boundary tree with significant amount of dead wood in crown, some pieces over 200mm. Slight lean to east. Ditch <0.5m to east. Branch failures and stubs. Somewhat sparse stag-headed canopy. Cavities and decay pockets.		B ,1, 3	Long
T4	Pedunculate oak	13.0	1.0	1390	1	5.5	8.0	7.5	6.0	1.0	N	Mature	Fair	Large tree at edge of field and within pylon compound. Dense epicormic growth around base and located on slight slope with stem lean to north. Diameter measured at c. 1.5m at lowest ground point but at c. 1m at highest ground point due to large stem burr. Canopy bias to south. Dieback of upper branches forming stag heading and leaving remnant large dead branches. Previous branch failures. Some early veteran characteristics but tree condition but not considered to be a veteran at present.		A ,1, 2	Long
T5	Pedunculate oak	8.0	1.5	580	1	3.0	5.5	6.0	5.0	2.0	S	Mature	Good	Boundary tree next to ditch. Reduced crown to north with some large pruning wounds. Dead wood throughout, most pieces well decayed. Some early signs of stag-heading.		B ,1, 2	Long
T6	Pedunculate oak	11.0	3.0	798	4	7.5	6.0	10.0	5.0	2.5	W	Mature	Fair	Basally multi-stemmed tree at edge of ditch and field. Growing at edge of pylon compound. Canopy bias to east. Moderate deadwood branches. Previous branch failures and remnant pruning stubs.		B ,1	Long
T7	Pedunculate oak	8.0	2.0	800	1	5.5	6.0	6.0	5.0	2.5	W	Mature	Poor	Large moribund tree with small Lower crown still alive. Good habitat		C ,3	Short
T8	Pedunculate oak	8.0	2.5	850	1	5.0	7.5	6.0	4.0	2.5	SW	Mature	Dead	Large standing dead tree. Decay throughout. Pseudoinonotus dryadeus fruiting bodies at base.	Acceptable risk in current context	U	Very Short
T9	Pedunculate oak	8.0	3.5	573	2	5.0	5.0	5.5	5.0	4.0	W	Middle Age	Good	Open grown tree with upright form and high crown, raised. Twin stemmed with slightly tight union but no inclusion. Small ditch excavated 1m to north. Minor dead wood in crown. Some broken branches and small stubs.		B ,1	Long
T10	Pedunculate oak	15.0	2.0	1060	1	10.0	9.0	10.0	9.5	3.0	N	Mature	Good	Very large tree on edge of woodland. Tall and broad. Some large dead limbs. Occasional limb failures. Some small cavities. 3 large limbs removed to east. Good tree with no major defects		A ,1, 2	Long
T11	Pedunculate oak	3.0	2.5	80	1	1.0	1.0	1.5	1.0	2.5	E	Middle Age	Good	Small self-set tree at field edge.		C ,1	Medium
T12	Pedunculate oak	14.0	2.5	1020	1	9.0	7.5	7.5	8.0	3.0	SE	Mature	Poor	Large moribund tree at field edge in hedgerow gap. Poached ground around base. Some limited live foliage, but predominantly dead. Pseudoinonotus dryadeus fungal fruiting bodies evident between buttress roots on south-west and south-east sides at base. Habitat value.		U	Very Short
T13	Pedunculate oak	8.0	3.5	450	1	3.5	3.5	4.0	3.5	3.5	SW	Middle Age	Dead	Standing dead tree within field boundary hedge.		U	Very Short
T14	Pedunculate oak	9.0	2.5	700	1	2.5	6.0	7.5	3.5	3.0	E	Mature	Fair	Field boundary tree within hedgerow gap. Canopy heavily suppressed to north and west by proximity of adjacent tree; branch death; and large branch removal on west side. Pruning wounds with some occlusion but also decay. Moderate and large deadwood branches. Bifurcate at c. 3m. Squat.		B ,2, 3	Long
T15	Pedunculate oak	10.0	2.5	830	1	6.5	6.0	6.0	6.0	2.5	S	Mature	Fair	Field boundary tree within hedgerow gap. Suppressing adjacent oak. Moderate deadwood in canopy. Small previous branch failures. Squat.		B ,1, 2, 3	Long



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		(m)	(m)	(mm)	arising below 1.5m	(m)	(m)	(m)	(m)	(m)	(N,S,E,W)	Young, Middle Age, Mature	Good, Fair, Poor, Veteran			A,B,C,U (1,2,3)	Long, Medium, Short, Very Short
T16	Pedunculate oak	11.0	2.0	850	1	3.5	4.5	5.0	4.5	2.0	S	Middle Age	Good	Tree located within field boundary hedge in small gap. 2 pruned branches west side of lower canopy with remnant stubs evident. Canopy biased to east. Squat.		B ,1	Medium
T17	Pedunculate oak	9.0	2.0	620	1	7.5	5.5	6.5	6.5	2.0	NW	Middle Age	Good	Large boundary tree within hedge. Ditch to east. Leaning north-east. Small basal cavity to west with some minor decay. Historical hazard beam failure to south with dry decay. Minor dead wood throughout crown.		B ,1, 2, 3	Long
T18	Pedunculate oak	12.0	2.5	850	1	2.5	7.5	8.0	7.0	2.5	N	Mature	Fair	Tree located within gap in field boundary hedgerow. Canopy heavily suppressed to north by proximity of adjacent tree. Biased canopy growth to east. Failed moderate and major branches evident, also some pruning wounds and stubs. Crevice in western failure stub that may have some bat potential. Moderate deadwood. Tree tag on stem, number 0243.		B ,1, 2, 3	Long
T19	Pedunculate oak	12.0	2.5	860	1	6.5	7.5	8.0	5.5	2.5	N	Mature	Fair	Tree located within gap in field boundary hedgerow. Canopy suppressing adjacent tree to south. Biased canopy growth to east. Pruning wounds and stubs, some with bark tearing evident. Small amount of deadwood. Appears to be a small cavity at end of pruned branch in north-west side and an occluding cavity on west side of stem, both have bat potential. Tree tag on stem, number 0244.		B ,1, 2, 3	Long
T20	Pedunculate oak	11.0	2.5	890	1	7.0	7.0	8.0	3.0	3.5	E	Mature	Fair	Tree located within gap in field boundary hedgerow. Large branches previously removed leaving large wounds. Small amount of moderate deadwood. No major defects noted. Tree tag on stem, number 0245.		B ,1, 2	Long
T21	Pedunculate oak	10.0	2.5	1020	1	5.0	7.0	8.0	3.0	2.5	S	Mature	Fair	Tree located within gap in field boundary hedgerow. Large deadwood branches evident. Slight lean to east. Previous large branch failures evident. Dense retrenchment of canopy internally. Some upper canopy tip dieback.		B ,1, 2, 3	Long
T22	Pedunculate oak	7.0	2.0	370	1	5.5	3.5	5.0	4.0	3.0	N	Middle Age	Fair	Curved stem, likely regrowth after basal failure. Old decay to root buttresses. Crude pruning wounds and stubs. Minor dead wood in crown		B ,3	Long
T23	Pedunculate oak	10.0	2.0	780	1	6.5	10.0	6.5	7.5	2.5	S	Middle Age	Good	Large hedgerow tree. Broad spreading crown, biased to south. Some large pruning wounds, occluding well. Broken branches and stubs, some well decayed. Minor dead wood in canopy.		B ,1, 2, 3	Long
T24	Pedunculate oak	8.0	2.5	280	1	2.5	3.0	3.0	2.5	4.0	N	Middle Age	Good	Tree within hedgerow at corner of field. Reasonably rounded canopy. No major defects noted.		B ,1	Long
T25	Pedunculate oak	15.0	2.0	970	1	7.5	8.0	7.5	7.5	2.5	W	Mature	Fair	Large tree at field edge. Multi-stemmed between 3.5m and 5m. Small amount of moderate deadwood. 1 moderate branch in mid-southern canopy cracking. Occluding pruning wound on southern side of stem. Large occluding tearing wound on north-west side of stem from 1m up to c. 5m.		A ,2	Long
T26	Pedunculate oak	13.0	2.5	1030	1	7.5	8.0	8.0	7.5	3.0	NE	Mature	Fair	Large tree at field edge. Small amount of moderate and major deadwood. Large lower branches to south and east poorly pruned, leaving large wounds with bark tearing and long remnant stubs. Tree is otherwise in good health and condition.		A ,2	Long
T27	Pedunculate oak	8.0	2.5	950	1	6.0	6.0	7.5	5.0	4.0	E	Mature	Fair	Large hedgerow tree. Decay column to eastern side of main stem from ground level to 3m. Further stem cavities present. Large dead limb from 4m north. Other smaller dead limbs also present. Large cavity at 6m with decay extending into main stem. Good habitat		B ,3	Long
T28	Pedunculate oak	10.0	3.0	230	1	2.5	2.5	2.5	2.5	3.0	SW	Middle Age	Fair	Tree within linear boundary group. Leans to west due to proximity of adjacent and now dead ash tree. Lower branch pruned leaving remnant stub with epicormic growth. Upper and main canopy rounded.		C ,1	Long
T29	Common ash	7.0	3.5	474	10	4.5	4.0	5.0	5.5	1.0	E	Middle Age	Dead	Standing dead tree that is basally multi-stemmed.		U	Very Short
T30	Pedunculate oak	7.0	3.0	690	1	5.0	5.5	10.0	6.0	2.5	E	Middle Age	Good	Broad squat tree with canopy biased to east. Large western limb pruned half way back to stem. Minor dead wood in crown. Ivy obscures union.		B ,1, 2	Long



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		(m)	(m)	(mm)	arising below 1.5m	(m)	(m)	(m)	(m)	(m)	(N,S,E,W)	Young, Middle Age, Mature	Good, Fair, Poor, Veteran			A,B,C,U (1,2,3)	Long, Medium, Short, Very Short
T31	Pedunculate oak	12.0	2.0	940	1	6.0	6.0	9.5	5.0	4.0	E	Mature	Good	Large field boundary tree. Slightly sparse and with some early stag-heading. Pruning wounds and some large stubs. Minor dead wood throughout. Exposed roots and poached ground to east. Decay and small cavity on burred stem to east		B ,1, 2, 3	Long
T32	Pedunculate oak	11.0	2.0	820	1	7.0	8.0	8.5	7.0	2.5	N	Mature	Good	Field boundary tree at edge of hedge. Domed and reasonably rounded canopy, typical of species. Leans to south-east. Occasional minor and moderate branch failure. Multi-stemmed at 3.5m. Small deadwood. No major defects noted.		A ,1, 2	Long
T33	Pedunculate oak	8.0	2.0	610	1	5.0	5.5	5.5	4.5	2.5	NW	Middle Age	Good	Field boundary tree within hedge. Domed and reasonably rounded canopy, typical of species. Occasional minor and moderate branch failure. Bifurcate at 3.5m. Small deadwood. 1 occluding cavity with bat potential on east side. No major defects noted.		A ,1, 2	Long
T34	Pedunculate oak	12.0	2.0	730	1	7.5	5.0	6.0	6.5	2.5	SW	Mature	Fair	Field boundary tree within hedge. Bifurcate at c. 3m with wide union and further bifurcation above. Part of central stem is dying and decaying, leaving canopy gap in middle of crown. Pruned lower branches with remnant stubs. Moderate and major deadwood in canopy.		B ,1, 2	Long
T35	Pedunculate oak	10.0	2.0	940	1	7.0	8.5	6.0	6.0	2.5	W	Mature	Fair	Large boundary tree, part of linear group. Slightly sparse with some early stag-heading. Large pruning wound and stubs to south and south-east with splits to cut faces. We'll decayed torn stub in union. Large pieces of dead wood in crown		B ,1, 2, 3	Long
T36	Pedunculate oak	710.0	2.0	710	1	4.0	4.5	7.0	4.5	2.0	S	Mature	Fair	Field boundary tree located within hedge. Pruned lower branches. Stem leans, and canopy biased, to east. Foliage appears quite small and parts of canopy a little sparse which may be indicative of stress.		B ,1, 2	Long
T37	Pedunculate oak	8.0	2.0	1000	1	6.0	6.0	6.0	6.0	2.0	E	Mature	Fair	Squat tree within hedgerow, part of linear group. Heavily burred stem. Bifurcated at 2m. Large pieces of dead wood in crown. Lower canopy failed with split and torn branches. Some minor cavities. Pruning wounds and stubs		B ,1, 2, 3	Long
T38	Elm species	5.0	2.0	180	1	1.0	1.0	1.5	2.0	1.5	E	Middle Age	Dead	Standing dead tree at end of hedge.		U	Very Short
T39	Pedunculate oak	6.0	2.5	700	1	4.5	4.5	2.0	4.0	3.0	NW	Mature	Fair	Tree located within field boundary hedge. Top of crown has died back leaving canopy gap and dead upper stem. Canopy comprises foliage from side branches. Pruned branches evident.		C ,1, 3	Short
T40	Pedunculate oak	8.0	1.5	1390	1	5.0	6.0	8.0	6.5	2.0	W	Mature	Fair	Broad squat tree in hedgerow, part of linear group. Huge burred stem. Erosion around root buttresses. Somepruning wounds with retained stubs. Large dead limbs with some well decayed pieces. Some cavity formation		B ,1, 2, 3	Long
T41	Pedunculate oak	6.0	2.5	780	1	3.5	5.0	4.0	3.5	2.5	NE	Mature	Poor	Tree located within field boundary hedge. Largely moribund with live foliage comprising internal crown epicormic growth mostly. Bifurcate mid-stem. Heavily ivy clad stem.		U	Very Short
T42	Pedunculate oak	14.0	2.5	1030	1	5.0	5.0	7.5	6.0	3.5	NW	Mature	Fair	Large tree growing in field boundary hedge. Mid-stem is ivy clad. Slight stem kink to north-east in upper canopy. Bifurcate at c. 6m, union appears to be included from ground level inspection. Pruned branches and occasional failed limbs, leaving large deadwood stubs. Slight dieback of southern upper crown resulting in moderate deadwood.		B ,1, 2	Long
T43	Pedunculate oak	8.0	2.0	931	3	6.5	6.0	7.0	5.5	4.0	W	Mature	Fair	Broad squat tree, part of linear group. 3 main stems. Dead upright stem. Large pieces of dead wood throughout crown with some well decayed pieces. Numerous small cavities.		B ,1, 2, 3	Long
T44	Pedunculate oak	12.0	2.5	1470	1	8.5	6.5	7.5	7.0	2.5	NE	Mature	Veteran	Large veteran oak tree growing on field boundary that is partially suppressing adjacent oak's canopy to south. Large branch failures evident with some occlusion. Upper canopy retrenching with prominent stag heading. Secondary stem appears to have been cut/pollarded previously and is hollowing from cutting point. Fluting of lower stem. Multi-stemmed in upper canopy. Large deadwood over 150mm diameter present. Some small cavities on secondary stem.		A ,1, 2, 3	Long



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Italicised Values: Feature value was estimated

APPENDIX A: Arboricultural Survey Data Sheets

Ref	Species	Height	Canopy Ground Clearance	Stem Diameter (or range)	No. of stems/ individuals	Crown Spread North	Crown Spread South	Crown Spread East	Crown Spread West	Lowest Branch Height	Lowest Branch Direction	Maturity	Condition	Comments on form, condition, health and significant defects	Management recommendations in current context	BS 5837 Quality Category	Estimated Remaining Contribution
		(m)	(m)	(mm)	arising below 1.5m	(m)	(m)	(m)	(m)	(m)	(N,S,E,W)	Young, Middle Age, Mature	Good, Fair, Poor, Veteran			A,B,C,U (1,2,3)	Long, Medium, Short, Very Short
T45	Pedunculate oak	10.0	2.0	1010	1	3.5	7.0	7.5	6.5	2.0	SW	Mature	Fair	Large field boundary tree. Forms mutual canopy with adjacent huge tree. Stem angled 20 degrees to south. Decay pocket to main stem buttresses south. Burring on main stem with further epicormic growth. Large dead limbs in southern part of crown. Further dead wood throughout.		B ,1, 2, 3	Long
T46	Pedunculate oak	7.0	1.5	910	1	5.5	6.0	6.0	5.5	2.0	W	Mature	Fair	Broad squat tree, part of linear group. Burred stem. Rather sparse. Some large dead branches. Dense secondary crown that has been flailed. Various cavities and decay pockets		B ,2, 3	Long
T47	Pedunculate oak	7.0	2.0	800	1	6.5	4.5	3.0	10.0	2.0	W	Mature	Fair	Large roadside tree. Large amount of root damage to north side with torn and decayed roots. Leaning south over road. Canopy bias to east. Dead wood throughout including retrenchment and stag heading. Vertical cavity to western side of main stem. Remaining canopy has good vigour		B ,2, 3	Medium
<i>T48</i>	Pedunculate oak	10.0	2.5	986	2	4.5	4.5	4.5	5.0	2.5	W	Mature	Poor	Large, basally bifurcate tree located within roadside boundary hedge. Heavily ivy clad and located within hedge restricting inspection. Major dieback in canopy, leaving large remnant deadwood. Canopy is biased to south-west and is overhanging road, with branch socket cavities and moderate deadwood evident on this large branch.	Remove south-western branch overhanging road. Remove deadwood 100mm diameter and above where in reaching distance of road.	U	Very Short
T49	Pedunculate oak	11.0	1.0	1070	1	6.0	8.0	9.0	4.0	3.0	E	Mature	Fair	Large roadside tree growing in bank 2m above road. Retrenchment with significant stag-heading. Large dead stems with decay and hollowing. Numerous dead limbs with some well decayed. Ivy on main stem. Fungal fruiting body, possibly Ganoderma sp. Unable access base or south side due to very steep bank. Good habitat tree		B ,3	Medium
<i>T50</i>	Pedunculate oak	8.0	2.0	900	1	4.0	3.5	6.5	3.0	1.5	W	Middle Age	Fair	Roadside tree in hedge. Small dense crown. Some early stag-heading. Some longitudinal wounds to upper branches but occluding well. Minor dead wood throughout crown. Unable to access north side		B ,1, 2	Long
<i>T51</i>	Pedunculate oak	6.0	2.0	550	1	2.0	3.0	3.0	3.5	2.5	W	Middle Age	Poor	Retrenching and dying back tree overhanging road within field boundary hedge. Trifurcate mid-stem. Heavily ivy clad. Moderate deadwood. Previously failed branches. Canopy biased to south-west over road.	Remove south-western branch overhanging road.	U	Very Short
T52	Pedunculate oak	10.0	3.0	1110	1	6.5	9.0	12.0	5.0	3.5	SW	Mature	Good	Large mature oak tree growing immediately adjacent to road and field gate at end of hedge. Heavily ivy clad lower to mid-stem. Canopy heavily biased to south-east. Occasional moderate deadwood and branch failures. Multi-stemmed at c. 3m. Excellent tree in good health, condition and vigour.	Crown lift to 5m where canopy overhangs road.	A ,1, 2	Long
T53	Pedunculate oak	10.0	1.5	860	1	4.0	2.5	3.5	2.0	1.5	E	Mature	Fair	Roadside tree within hedge. Significantly retrenched with compact secondary crown. Large dead stems and limbs. Small wound with decay to southern side.		C ,1, 2, 3	Medium
T54	Pedunculate oak	13.0	2.0	870	1	5.0	3.0	3.5	3.0	2.5	N	Mature	Fair	Mature tree growing from within field boundary hedge adjacent to road. Lower to mid-canopy flailed resulting in dense epicormic growth on lower stem. Large branches in lower to mid-stem removed previously with poor pruning cuts evident, including some flush cuts. Stem leans to south. Tree in close proximity to overhead powerlines, although manageable due to previous pruning and age of tree. Moderate deadwood.		B ,2	Medium
T55	Pedunculate oak	11.0	2.0	810	1	6.0	5.5	6.5	4.5	4.0	E	Mature	Poor	Large roadside tree. Approximately 50% canopy dead with major dead limbs and stems. Large heavy limb with end weighting over road to east. Decay and cavities. Good habitat potential	Reduce end weighted limb to east	C ,2, 3	Medium
T56	Pedunculate oak	11.0	2.5	940	1	8.0	9.0	8.5	7.0	4.5	E	Mature	Fair	Large roadside tree. Some retrenchment and stag-heading. Other dead wood present throughout canopy. Old fungal fruiting bodies at base, possibly G lucidum. Large tearout wound with decay to south-west limb. Longitudinal cavity to western stem. Good habitat tree.		B ,1, 2, 3	Long



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		(m)	(m)	(mm)	arising below 1.5m	(m)	(m)	(m)	(m)	(m)	(N,S,E,W)	Young, Middle Age, Mature	Good, Fair, Poor, Veteran			A,B,C,U (1,2,3)	Long, Medium, Short, Very Short
T57	Pedunculate oak	11.0	2.5	765	2	5.0	7.0	7.5	6.0	3.0	W	Mature	Fair	Tree located in field boundary hedge adjacent to ditch. Bifurcate at 1.5m. Slight lean to south. Occluded and occluding pruning wounds. Flailed lower branches. Moderate deadwood. Remnant dead stub of previously failed branch at northern base that is decaying significantly.		B ,1, 2	Long
T58	Pedunculate oak	10.0	2.0	820	1	5.0	3.5	5.0	7.0	3.0	N	Mature	Good	Large roadside tree. Some early retrenchment and stag-heading but generally good vigour. Some dead wood and decay pockets. Large hazard beam failure to east hung up on BT cable.	Remove hung up limb	B ,1, 2, 3	Long
T59	Pedunculate oak	11.0	3.5	550	1	6.0	8.0	6.5	5.0	3.5	S	Middle Age	Fair	Tree within field boundary hedge. Minor ivy growth on stem. Small amount of moderate deadwood. Canopy biased to south. Close to overhead powerlines but can likely be managed with pruning in future. Some upper canopy dieback evident.		B ,1	Long
T60	Pedunculate oak	13.0	2.0	810	1	4.5	5.0	5.0	4.0	3.5	E	Mature	Fair	Large roadside tree. Suppressed to north by tree on other side of road. Very large dead stem , estimated 300mm, at 3.5m. Various other pieces of dead wood. Generally good vigour		B ,1, 2, 3	Long
T61	Common ash	7.0	2.5	323	2	2.0	5.5	4.0	4.0	2.5	N	Middle Age	Fair	Tree growing in corner of field at edge of boundary hedge. Growth biased heavily to south due to suppression from adjacent oak trees. No significant ash dieback symptoms present.		C ,1	Medium
T62	Pedunculate oak	9.0	2.0	570	1	4.5	4.0	2.5	5.5	2.5	E	Middle Age	Fair	Tree growing in corner of field within boundary hedge. Growth biased heavily to west due to suppression from adjacent oak tree. Previous failed branches evident. Minor to moderate deadwood.		B ,1	Medium
T63	Pedunculate oak	11.0	2.5	1020	1	8.0	5.0	10.0	5.5	3.5	E	Mature	Fair	Large mature tree growing in field boundary hedge adjacent to road. Multi-stemmed at c. 3.5m, unions and lower stem heavily ivy clad restricting inspection. Stag heading and significant dieback of upper canopy evident, leaving large deadwood branches. Some large branches pruned fieldside. Canopy biased to east and north. Some branch socket cavities with bat potential.		B ,1, 2, 3	Medium
T64	Pedunculate oak	13.0	2.0	940	1	6.0	9.5	11.0	8.5	2.0	W	Mature	Good	Large roadside tree with broad spreading crown. Some dead wood in crown. Some broken branches and stubs. Damage to surface roots and buttresses to north. Good vigour and no major defects noted		A ,1	Long
T65	Common hawthorn	4.0	3.0	250	1	2.0	1.5	2.0	1.0	2.0	E	Middle Age	Fair	Tree growing from within boundary hedge that is likely a lapsed tree from hedge. Leans to north. Heavily ivy clad. Suppressed by adjacent larger trees.		C ,1	Medium
T66	Pedunculate oak	10.0	3.0	800	1	5.5	7.0	3.5	7.0	2.5	W	Mature	Poor	Tree within field boundary hedge adjacent to road. Prolific stag heading and tip dieback evident. Multi-stemmed mid-canopy. Previous limb failures and moderate to major deadwood throughout. Live foliage appears healthy.	Remove deadwood 100mm diameter and above where it is within reaching distance of road.	C ,1, 3	Short



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		(m)	(m)	(mm)	arising below 1.5m	(m)	(m)	(m)	(m)	(m)	(N,S,E,W)	Young, Middle Age, Mature	Good, Fair, Poor, Veteran			A,B,C,U (1,2,3)	Long, Medium, Short, Very Short
Groups																	
G1	Common hawthorn, Blackthorn	2 to 4	0.5	75 to 200	20							Middle Age	Fair	Sections of former hedgerow that have now lapsed out of management.		C ,2	Long
G2	Silver birch, Common hawthorn, Common ash, Pedunculate oak, Goat willow, Wych elm	3 to 7	0.0	50 to 220	70							Middle Age	Mixed	Linear group of trees along boundary fence in pylon compound. Some trees on northern side and at western end planted. Parts densely overgrown by undergrowth. Mostly in good or fair condition, occasional ash tree with dieback in poor condition.		C ,2	Medium
G3	Common hawthorn, Common ash, Blackthorn, Pedunculate oak, Elm species	1.5 to 6	0.5	50 to 280	20							Middle Age	Fair	Outgrown hedgerow and larger trees forming linear group along ditch. Some multistemmed forms. Minor dead wood throughout		B ,2	Long
G4	Common hawthorn, Pedunculate oak	9 to 15	2.0	360 to 800	100							Middle Age to Mature	Good	Area of continuous tree cover with minimal understorey or ground cover. Signs of heavy grazing. Some standing dead trees. Aerial and terrestrial dead wood including old decayed stumps. Cavities and decay pockets. Bat/bird boxes throughout.		B ,1, 2, 3	Long
G5	Common hawthorn, Blackthorn, Elm species	1.5 to 5	0.0	50 to 190	30							Middle Age	Fair	Outgrown former hedgerow. Somewhat fragmentary. Cluster of larger stems between T17 and T22. Multistemmed forms. Minor or dead wood throughout		C ,2	Long
G6	Common hawthorn, Blackthorn, Pedunculate oak	2 to 5	0.0	40 to 170	40							Middle Age	Fair	Linear boundary group of predominantly thorn. Reasonably dense feature.		C ,2	Long
G7	Common hawthorn	3 to 5	1.0	75 to 130	6							Middle Age	Fair	Small sporadic hawthorn trees that were potentially part of now gone hedge.		C ,1	Medium
Woodlands																	
W1	Silver birch, Common hawthorn, Common ash, English holly, Norway spruce, Scots pine, Blackthorn, Pedunculate oak, Elder	3 to 15	1.0	50 to 760	500							Mixed Age	Good	Large area of mixed woodland. Younger plantation trees with some large mature oaks. Good age and size structure with regeneration throughout. Some failed trees. Aerial and terrestrial dead wood. Dense undergrowth in places		B ,1, 2, 3	Long



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		(m)	(m)	(mm)	arising below 1.5m	(m)	(m)	(m)	(m)	(m)	(N,S,E,W)	Young, Middle Age, Mature	Good, Fair, Poor, Veteran			A,B,C,U (1,2,3)	Long, Medium, Short, Very Short
Hedges																	
H1	Blackthorn, Elder, Elm species	1.5 to 1.5		<i>n/a</i>	<i>n/a</i>							Middle Age	Good	Maintained field boundary hedge.		<i>n/a</i>	<i>n/a</i>
H2	Common hazel, Common hawthorn, Common ash, Blackthorn, Goat willow, Wych elm	1.8 to 2	0.5	<i>n/a</i>	<i>n/a</i>							Mature	Fair	Established hedgerow. Gappy in places. Some large stems		<i>n/a</i>	<i>n/a</i>
H3	Common hawthorn, Common ash, Blackthorn, Goat willow	1.5 to 2		<i>n/a</i>	<i>n/a</i>							Middle Age	Fair	Irregularly managed boundary hedge. Outgrown in places. Some sparse areas and gaps		<i>n/a</i>	<i>n/a</i>
H4	Common hawthorn	3 to 3		<i>n/a</i>	<i>n/a</i>							Middle Age	Good	Maintained field boundary hedge around pylon compound.		<i>n/a</i>	<i>n/a</i>
H5	Common hawthorn, Blackthorn	1 to 1.5		<i>n/a</i>	<i>n/a</i>							Mature	Fair	Partially managed hedgerow along ditch. Spans ditch in places. Some large stems		<i>n/a</i>	<i>n/a</i>
H6	Sycamore, Common hawthorn, Blackthorn, Pedunculate oak, Dog rose, Wych elm	2 to 4		<i>n/a</i>	<i>n/a</i>							Middle Age	Fair	Lapsing hedgerow with some self-set trees within. Could be brought back into hedgerow management.		<i>n/a</i>	<i>n/a</i>
H7	Common hawthorn	1.5 to 1.5		<i>n/a</i>	<i>n/a</i>							Young to Middle Age	Good	Hedgerow that has been planted in recent years but foliage forming cohesive canopy. Some spiral guards still around tree bases.		<i>n/a</i>	<i>n/a</i>
H8	Sycamore, Common hawthorn, Common ash, Blackthorn	2 to 5		<i>n/a</i>	<i>n/a</i>							Middle Age	Fair	Lapsing hedgerow with some self-set trees within. Could be brought back into hedgerow management.		<i>n/a</i>	<i>n/a</i>
H9	Common hawthorn, Common ash, Blackthorn, Dog rose	2 to 2.5		<i>n/a</i>	<i>n/a</i>							Mature	Good	Maintained field boundary hedge.		<i>n/a</i>	<i>n/a</i>
H10	Common hawthorn, Blackthorn, Dog rose	1.5 to 2		<i>n/a</i>	<i>n/a</i>							Middle Age	Fair	Variably managed boundary hedge		<i>n/a</i>	<i>n/a</i>
H11	Common hawthorn, Blackthorn, Pedunculate oak, Dog rose	2 to 2.5		<i>n/a</i>	<i>n/a</i>							Mature	Good	Maintained field boundary hedge.		<i>n/a</i>	<i>n/a</i>
H12	Common hazel, Common hawthorn, English holly, Blackthorn	1.5 to 1.5		<i>n/a</i>	<i>n/a</i>							Middle Age	Fair	Irregularly managed boundary hedge. Some parts closely flailed, others outgrown		<i>n/a</i>	<i>n/a</i>
H13	Common hawthorn, Blackthorn	2 to 4		<i>n/a</i>	<i>n/a</i>							Middle Age	Fair	Partially managed boundary hedge. Quite outgrown between larger trees		<i>n/a</i>	<i>n/a</i>
H14	Common hawthorn, Common ash, Blackthorn, Pedunculate oak, Wych elm	1.5 to 2		<i>n/a</i>	<i>n/a</i>							Mature	Good	Maintained field boundary hedge.		<i>n/a</i>	<i>n/a</i>
H15	Sycamore, Common hawthorn, Common ash, Blackthorn, Wych elm	1.5 to 1.5		<i>n/a</i>	<i>n/a</i>							Middle Age	Fair	Managed boundary hedge. Ditch to west		<i>n/a</i>	<i>n/a</i>
H16	Common hawthorn, Blackthorn, Dog rose	2 to 3		<i>n/a</i>	<i>n/a</i>							Mature	Good	Maintained field boundary hedge. Some large dead remnant tree stumps in hedge, however these are low lying and do not form structural parts of hedge.		<i>n/a</i>	<i>n/a</i>
H17	Common hazel, Common hawthorn, Common ash, Blackthorn, Pedunculate oak, Dog rose	2 to 2.5		<i>n/a</i>	<i>n/a</i>							Mature	Good	Maintained field boundary hedge adjacent to road.		<i>n/a</i>	<i>n/a</i>
H18	Common hawthorn, English holly, Blackthorn, Pedunculate oak, Dog rose	2 to 2		<i>n/a</i>	<i>n/a</i>							Mature	Good	Maintained field boundary hedge adjacent to road.		<i>n/a</i>	<i>n/a</i>
H19	Common hawthorn, Blackthorn, Dog rose	2 to 2		<i>n/a</i>	<i>n/a</i>							Mature	Good	Maintained field boundary hedge. Some occasional large dead remnant tree stumps in hedge, however these are low lying and do not form structural parts of hedge.		<i>n/a</i>	<i>n/a</i>
H20	Sycamore, Common hazel, Common hawthorn, Blackthorn, Pedunculate oak, Dog rose, Elder	2 to 3		<i>n/a</i>	<i>n/a</i>							Mature	Good	Maintained field boundary hedge.		<i>n/a</i>	<i>n/a</i>
H21	Common hazel, Common hawthorn, Blackthorn	1 to 2		<i>n/a</i>	<i>n/a</i>							Middle Age	Fair	Partially managed roadside hedge on top of bank		<i>n/a</i>	<i>n/a</i>
H22	Common hazel, Common hawthorn, English holly, Blackthorn, Dog rose, Wych elm	0.5 to 1.5		<i>n/a</i>	<i>n/a</i>							Middle Age	Fair	Variably managed roadside hedge. Very short in sections. On top of bank		<i>n/a</i>	<i>n/a</i>
H23	Common hazel, Common hawthorn, English holly, Blackthorn, Dog rose	1 to 2		<i>n/a</i>	<i>n/a</i>							Middle Age	Fair	Irregularly managed roadside hedge. On bank		<i>n/a</i>	<i>n/a</i>

APPENDIX B: Survey Method

Limitation

Trees are dynamic living organisms with a constantly changing structure; even healthy trees can change or decline. Survey information is presented as being correct at the time of survey. Limitations to the reliability of the survey data are noted within Appendix A and the main report text.

Scope

All woody vegetation with a stem diameter exceeding 75mm is recorded. Below this threshold, vegetation may also be recorded at the discretion of the surveyor. The survey includes woody vegetation within a defined boundary, and on adjacent land where the characteristics, location or context of the tree mean that activity within the boundary could affect the tree, or be influenced by it. This is typically up to 15m outside the boundary.

Resolution

Vegetation is recorded as either an individual *Tree*, *Group* of trees, *Woodland*, or *Hedgerow*. This is done at the discretion of the surveyor to provide a useful resolution to the survey data, to differentiate between features with varying attributes and group those with common attributes, and collective value or function.

Typically, *Trees* are recorded where they are arranged separately; different from adjacent trees; or where the assessment would benefit from greater detail. *Groups* are coherent arboricultural features comprising trees with a collective form, function, history or management opportunities. *Woodland* is recorded where areas of tree cover have the qualities of a woodland habitat, including age and species structure, natural regeneration, and associated non-arboreal features. *Hedgerow* describes linear features largely comprising woody vegetation that are under, or could be returned to, regular hedgerow management. It should be noted that these terms are also used in other assessment types, sometimes with different definitions.

Tree locations

The location of trees is based on stem locations and canopy spreads taken from a topographical survey, where available. Where this information is not available, this is noted in Appendix A and locations should be regarded as approximate. Approximate locations are based on one or more of: GPS data captured during the survey; aerial photographs; and measurement from known points of reference. Approximate stem locations are typically accurate to within a few metres. Stem locations are shown for all *Trees*.

Groups, *Woodland* and *Hedges* are principally described in terms of their canopy outline, although stem locations may also be shown. Individual tree canopy outlines are projected on Drawings based on measurements taken as described below (see Crown Spread). *Groups*, *Woodland* and *Hedges* canopy outlines are projected based on the same hierarchy of source data as stem locations.

Tree survey

The survey is conducted from ground level by an arboriculturist, taking account of the tree, and its context. The nature of the soil is not assessed. Non-invasive assessment tools may be used as appropriate, including hypsometer, measuring tape, probe and nylon mallet.

The following attributes are recorded for each feature (see Arboricultural Survey Data Sheets at Appendix A):

Reference Number	A unique code per feature, typically but not necessarily a chronological sequence, in the form <i>Tn</i> for <i>Trees</i> ; <i>Gn</i> for <i>Groups</i> ; <i>Wn</i> for <i>Woodlands</i> ; and <i>Hn</i> for <i>Hedgerows</i>
Species	The common name is given. All species are listed for <i>Groups</i> , <i>Woodland</i> and <i>Hedgerows</i> . The Latin name may also be given if further clarification is required.
Height	Top height recorded in metres, or the range for <i>Groups</i> , <i>Woodland</i> and <i>Hedgerows</i>
Canopy Ground Clearance	The height of the canopy above ground level in metres
Stem Diameter	A measurement taken at 1.5 metres above ground level, or the nearest representative point below, in millimetres. For multi-stemmed trees a single figure is calculated according to BS5837 4.6. For <i>Groups</i> , <i>Woodland</i> and <i>Hedgerows</i> , the range of diameters

No. of Stems / Individuals	The number of stems arising below a height of 1.5 metres, or for <i>Groups</i> , <i>Woodland</i> and <i>Hedgerows</i> an estimate or count of the number of trees
Crown Spread	Radial branch spread in metres at cardinal points (N, S, E, W) from the location of the <i>Tree</i> stem at ground level (for <i>Groups</i> , <i>Woodland</i> and <i>Hedgerows</i> , see <i>Tree Locations</i>)
Lowest Branch Height	The height of the first significant branch at the point of attachment (<i>Trees</i> only)
Lowest Branch Direction	The direction of growth of the first significant branch from the point of attachment (<i>Trees</i> only)
Maturity	<p>Classification describing age relative to the species, and size and growth potential, in order to inform management decisions</p> <ul style="list-style-type: none"> • Young means small and/or recently planted and could be relocated, or replaced on a like for like basis • Middle Age means established and independent, within the growth stage of life, and with potential to continue increasing in height and/or spread • Mature means having reached ultimate height and/or spread, given the location and surroundings; further increases will be slow or limited • Mixed Age (<i>Groups</i>, <i>Woodland</i> and <i>Hedgerows</i> only) means comprising all three maturity classes
Condition	<p>An overall assessment of a feature's physiological and structural state, informing longevity and quality categorisation, and supported by <i>Comments</i></p> <ul style="list-style-type: none"> • Good condition means with vitality and resilience commensurate with species and age, and without significant defects or pathogens • Fair condition means with tolerable reduction of vitality and resilience, and/or remediable or tolerable defects and/or pathogens • Poor condition means with declining or significant loss of vitality and resilience, and/or significant and irreparable defects and/or pathogens • Dead condition means without photosynthetic or metabolic capacity, or moribund and in imminent terminal decline • Mixed (<i>Groups</i> and <i>Woodland</i>) means comprising more than one condition class • Veteran means trees of exceptional value, meeting recognised criteria including age, size and characteristics. Classification is partly informed by the sustained presence of structural defects, physiological decline, and pathogens, and their contribution to biodiversity. Undesirable characteristics in ordinary trees may be desirable in veteran trees, therefore <i>Veteran</i> can be understood as a superlative <i>Condition</i> that supersedes other categories (excluding <i>Dead</i>).
Comments	A description of all significant characteristics of the feature and its context that are not described by other attribute fields; including observations to support the classification of <i>Condition</i> , <i>Quality Category</i> and <i>Estimated Remaining Contribution</i> as appropriate
Management Recommendations	Recommendations for arboricultural works based on the current land use, in the interests of good arboricultural practice. These are incidental to the primary survey purpose, and not a comprehensive schedule in pursuit of any particular objective.
BS 5837 Quality Category	Tree quality assessment based on Table 1 of BS 5837:2012 (see below) comprising quality categories A , B , C and U and sub-categories 1 , 2 and 3
Estimated Remaining Contribution	<p>A forecast of the durability of the feature in its current form and context, and therefore the reliance that can be placed on any benefits or functions it provides. This is influenced by <i>Species</i> and <i>Condition</i>, and is not necessarily a forecast of life expectancy.</p> <ul style="list-style-type: none"> • Long means more than 40 years • Medium means 20 to 40 years • Short means 10 to 20 years • Very Short means less than 10 years

Table 1 Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	<ul style="list-style-type: none">Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning)Trees that are dead or are showing signs of significant, immediate, and irreversible overall declineTrees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality <p><i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.</i></p>			See Table 2
	1 Mainly arboricultural qualities	2 Mainly landscape qualities	3 Mainly cultural values, including conservation	
Trees to be considered for retention				
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	See Table 2
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	See Table 2
Category C Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	See Table 2

Table 1: Extract from **British Standards Institution (2012) BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations**, page 9

Note on Root Protection Areas:

Data is captured during the survey to inform the design of Root Protection Areas (RPA). These are a design tool, representing the area around a tree in which restrictions to some activities may be required to avoid significant harm, particularly to roots and soil. The RPA is a function of *Stem Diameter*, and additional considerations including management history, barriers to root growth, topography, ground conditions and tree characteristics. These factors are combined by an arboriculturist to produce a buffer zone for each feature from which the exclusion of construction activities would ensure the continued reliability of the survey data at Appendix A, including *Condition*, *BS 5837 Quality Category* and *Estimated Remaining Contribution*.

For *Trees*, RPA is defined as a circle with a radius 12 times the *Stem Diameter*, which may be modified to reflect the considerations above.

For *Groups* and *Woodland* RPA is based on the size and location of peripheral constituent trees, and presented as an offset from the canopy edge giving equivalent or greater protection to all trees of any size, or modified to reflect significant variation in constituent tree sizes and/or the considerations above.

For *Hedgerow*, no RPA is shown. Typically, hedgerow requires a smaller stand-off than trees due to reduced crown dimensions. Any stand-off should include sufficient space for access and ongoing management and should therefore normally be based on the canopy spread rather than root spread.

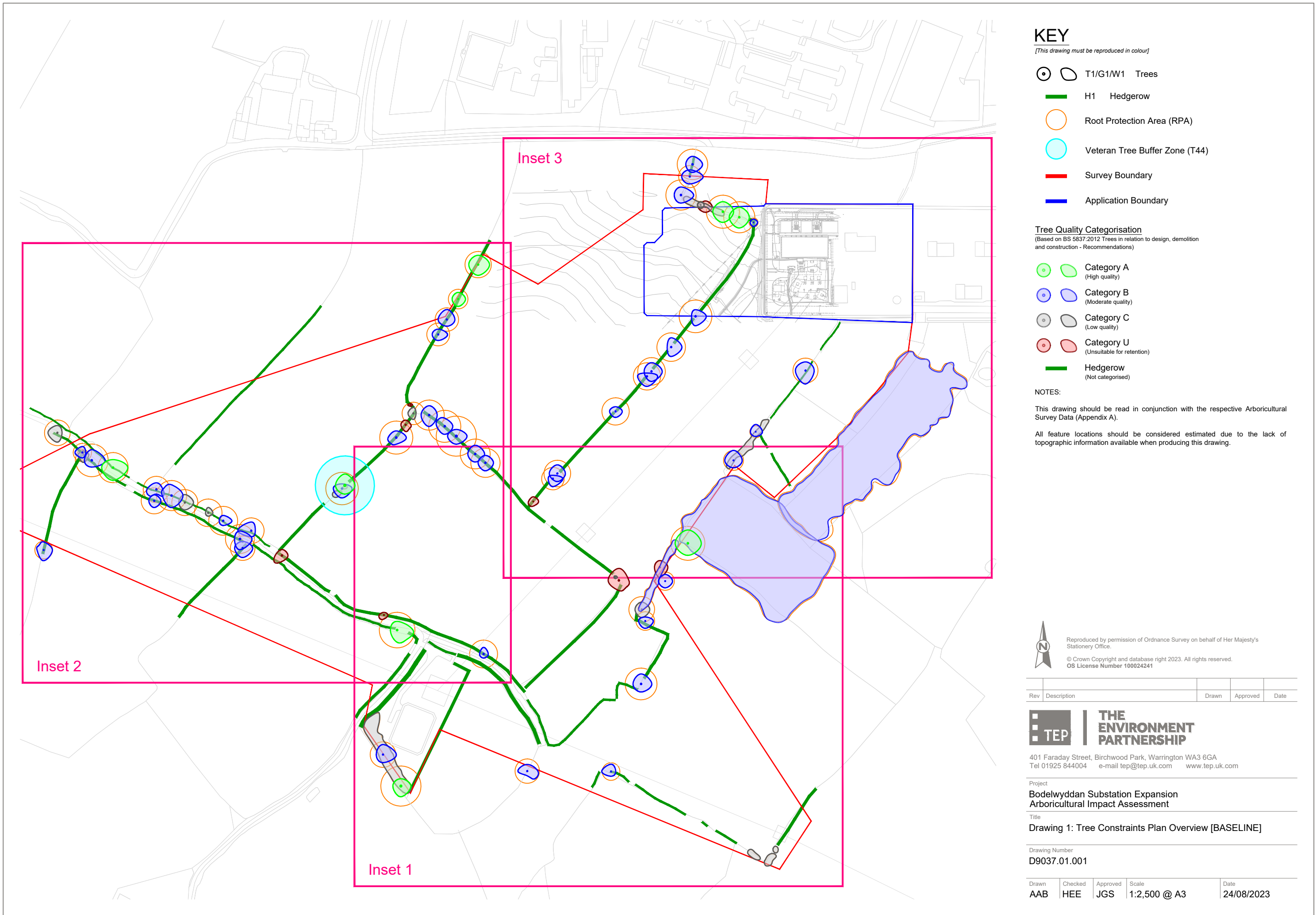
DRAWINGS

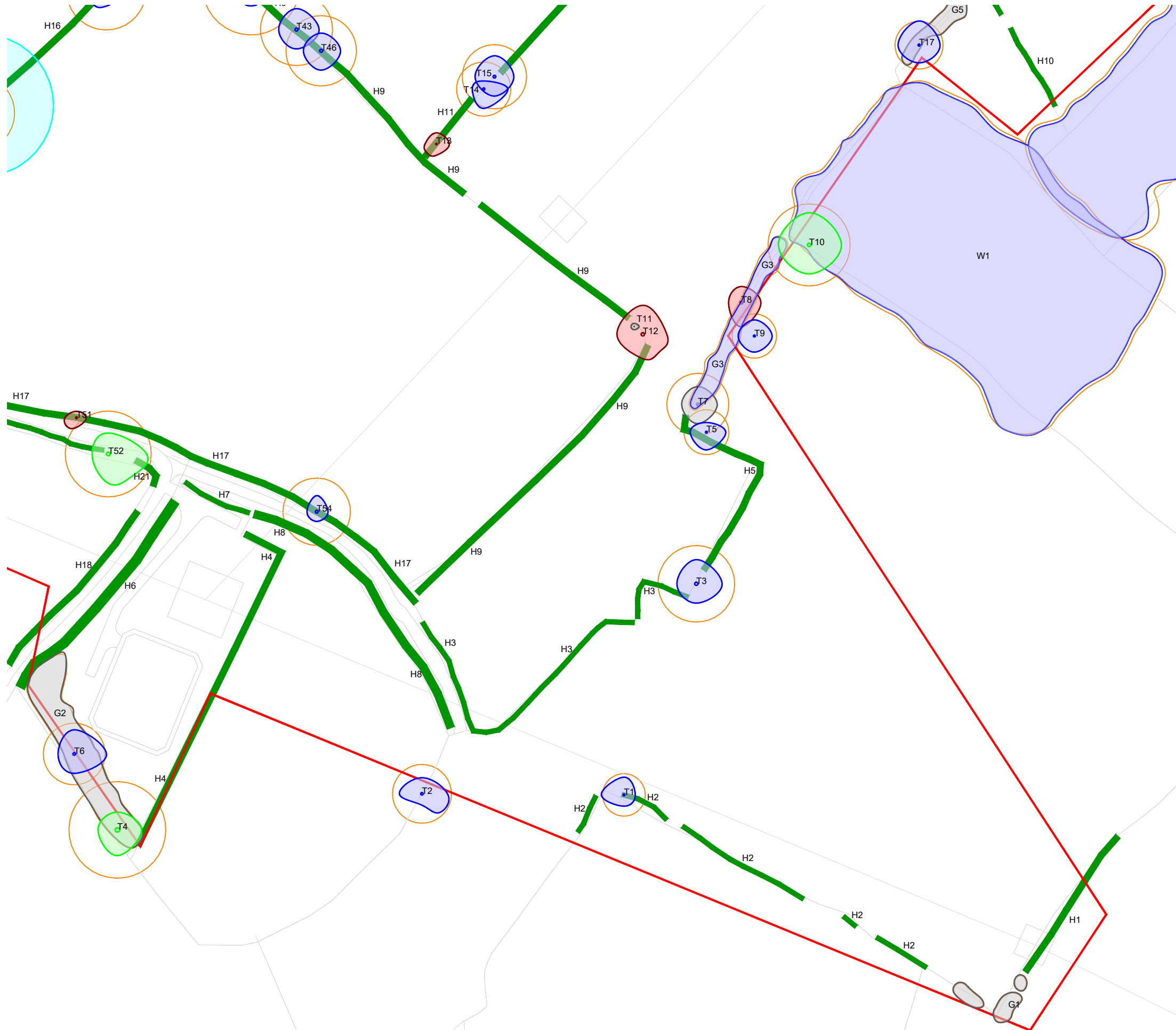
Drawing 1 - Tree Constraints Plan

Drawing 2 - Tree Works Plan

Drawing 3 - Tree Protection Plan







Drawing 4 - Tree Protection Fencing Specification





KEY

[This drawing must be reproduced in colour]

-  T1/G1/W1 Trees
-  H1 Hedgerow
-  Root Protection Area (RPA)
-  Veteran Tree Buffer Zone (T44)
-  Survey Boundary
-  Application Boundary

Tree Quality Categorisation

(Based on BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations)

-  Category A (High quality)
-  Category B (Moderate quality)
-  Category C (Low quality)
-  Category U (Unsuitable for retention)
-  Hedgerow (Not categorised)

NOTES:

This drawing should be read in conjunction with the respective Arboricultural Survey Data (Appendix A).

All feature locations should be considered estimated due to the lack of topographic information available when producing this drawing.



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Rev	Description	Drawn	Approved	Date



**THE
ENVIRONMENT
PARTNERSHIP**

401 Faraday Street, Birchwood Park, Warrington WA3 6GA
Tel 01925 844004 e-mail tep@tep.uk.com www.tep.uk.com

Project

**Bodelwyddan Substation Expansion
Arboricultural Impact Assessment**

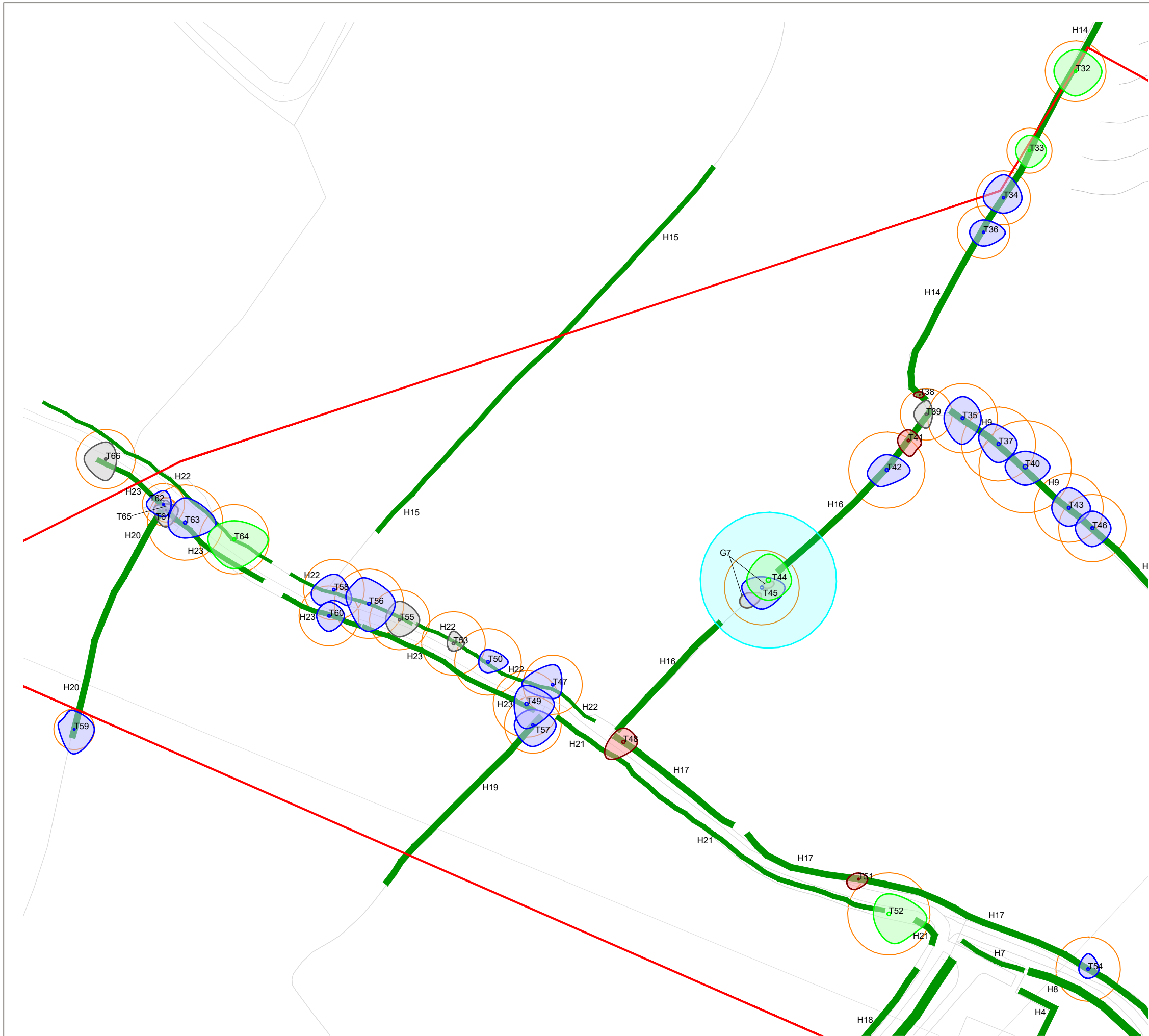
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Drawing 1: Tree Constraints Plan [BASELINE] Inset 1 of 3

Drawing Number

D9037.01.002

Drawn	Checked	Approved	Scale	Date
AAB	HEE	JGS	1:1,250 @ A3	24/08/2023



KEY

[This drawing must be reproduced in colour]

- T1/G1/W1 Trees
- H1 Hedgerow
- Root Protection Area (RPA)
- Veteran Tree Buffer Zone (T44)
- Survey Boundary
- Application Boundary

Tree Quality Categorisation
(Based on BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations)

- Category A (High quality)
- Category B (Moderate quality)
- Category C (Low quality)
- Category U (Unsuitable for retention)
- Hedgerow (Not categorised)

NOTES:

This drawing should be read in conjunction with the respective Arboricultural Survey Data (Appendix A).

All feature locations should be considered estimated due to the lack of topographic information available when producing this drawing.



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Rev	Description	Drawn	Approved	Date
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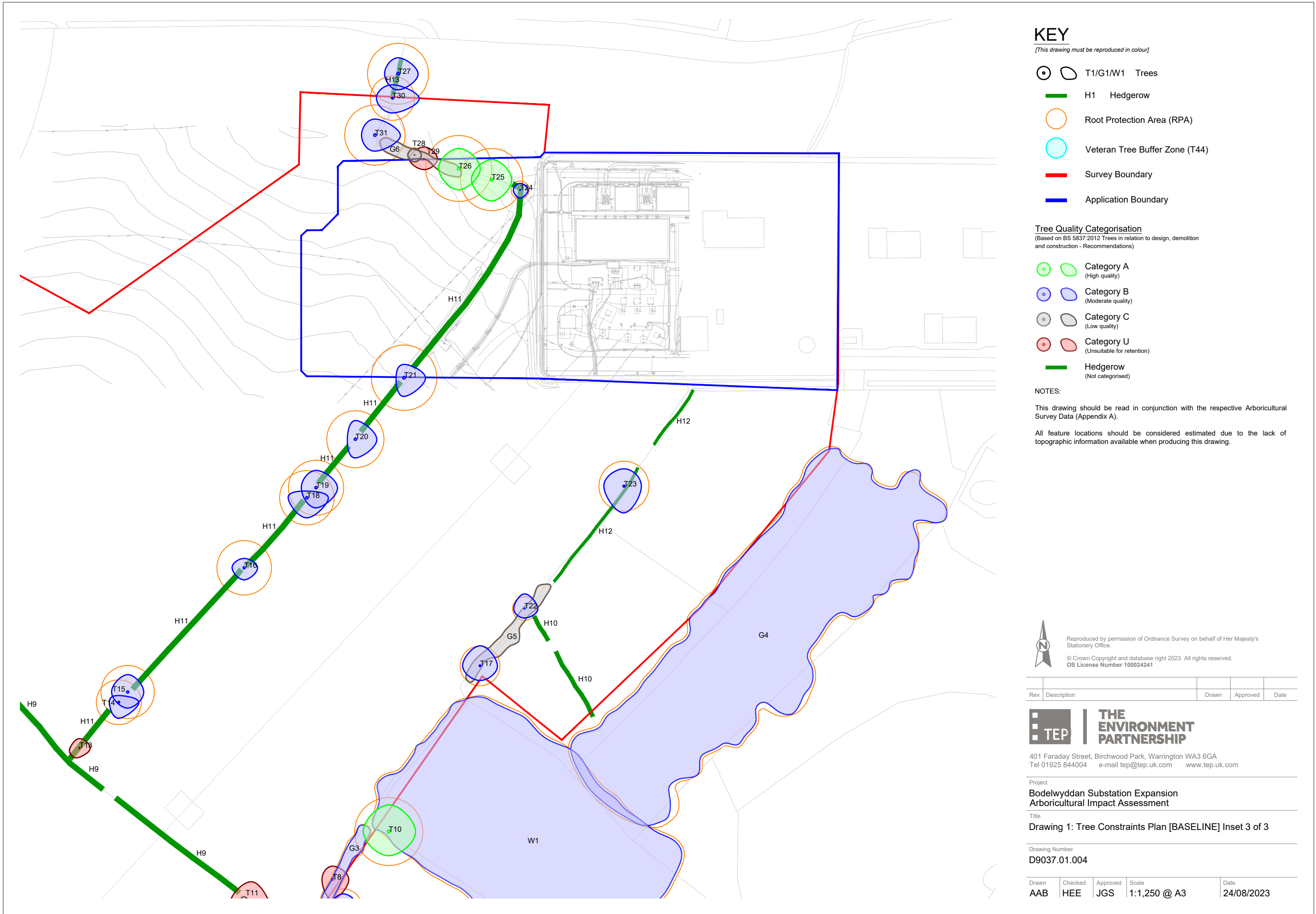


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Project
Bodelwyddan Substation Expansion
Arboricultural Impact Assessment
Title
Drawing 1: Tree Constraints Plan [BASELINE] Inset 2 of 3

Drawing Number
D9037.01.003

Drawn	Checked	Approved	Scale	Date
AAB	HEE	JGS	1:1,250 @ A3	24/08/2023



KEY

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- T1/G1/W1 Trees
- H1 Hedgerow
- Root Protection Area (RPA)
- Veteran Tree Buffer Zone (T44)
- Survey Boundary
- Application Boundary

Tree Quality Categorisation

(Based on BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations)

- Category A (High quality)
- Category B (Moderate quality)
- Category C (Low quality)
- Category U (Unsuitable for retention)
- Hedgerow (Not categorised)

NOTES:

This drawing should be read in conjunction with the respective Arboricultural Survey Data (Appendix A).

All feature locations should be considered estimated due to the lack of topographic information available when producing this drawing.



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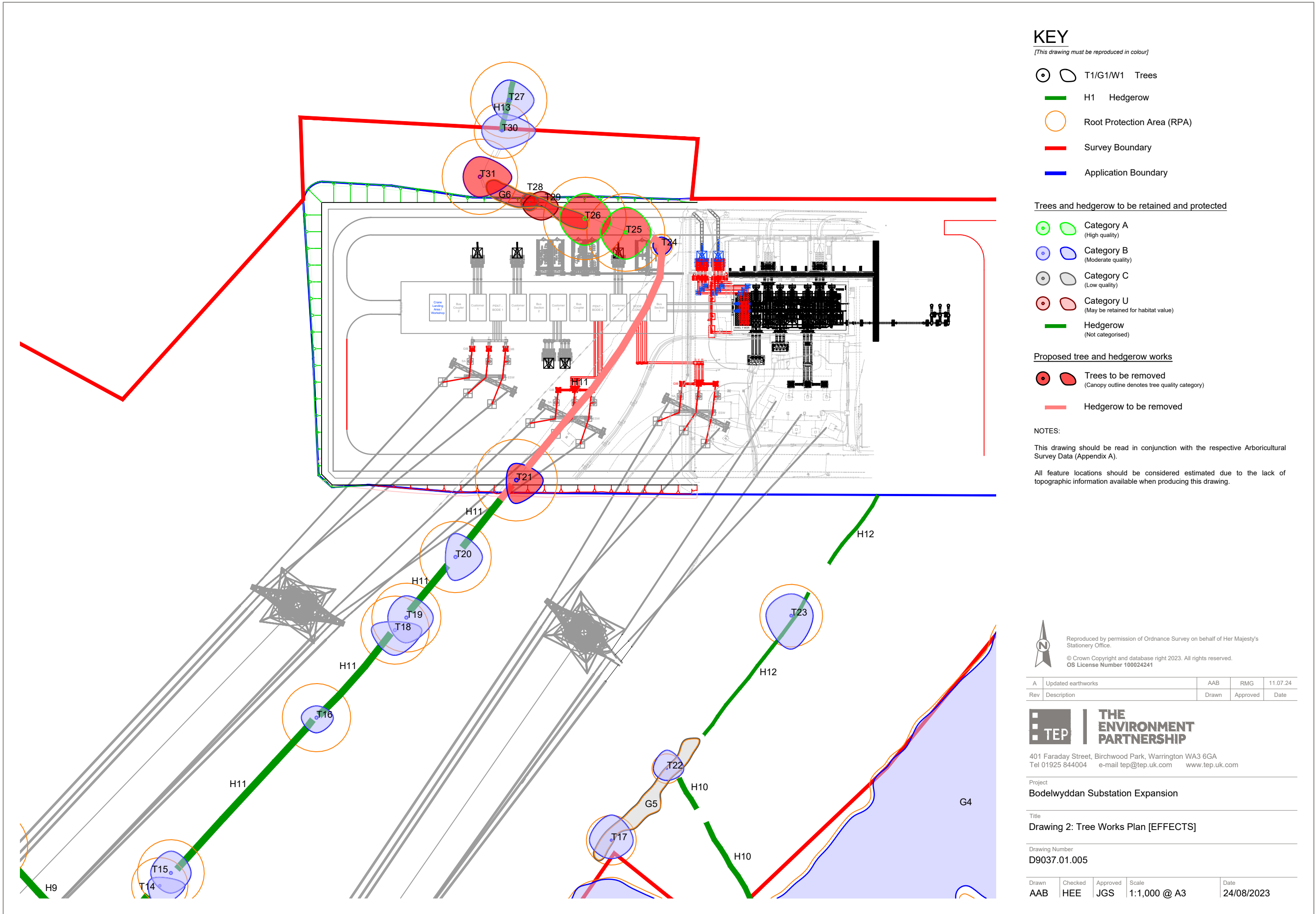
Rev	Description	Drawn	Approved	Date
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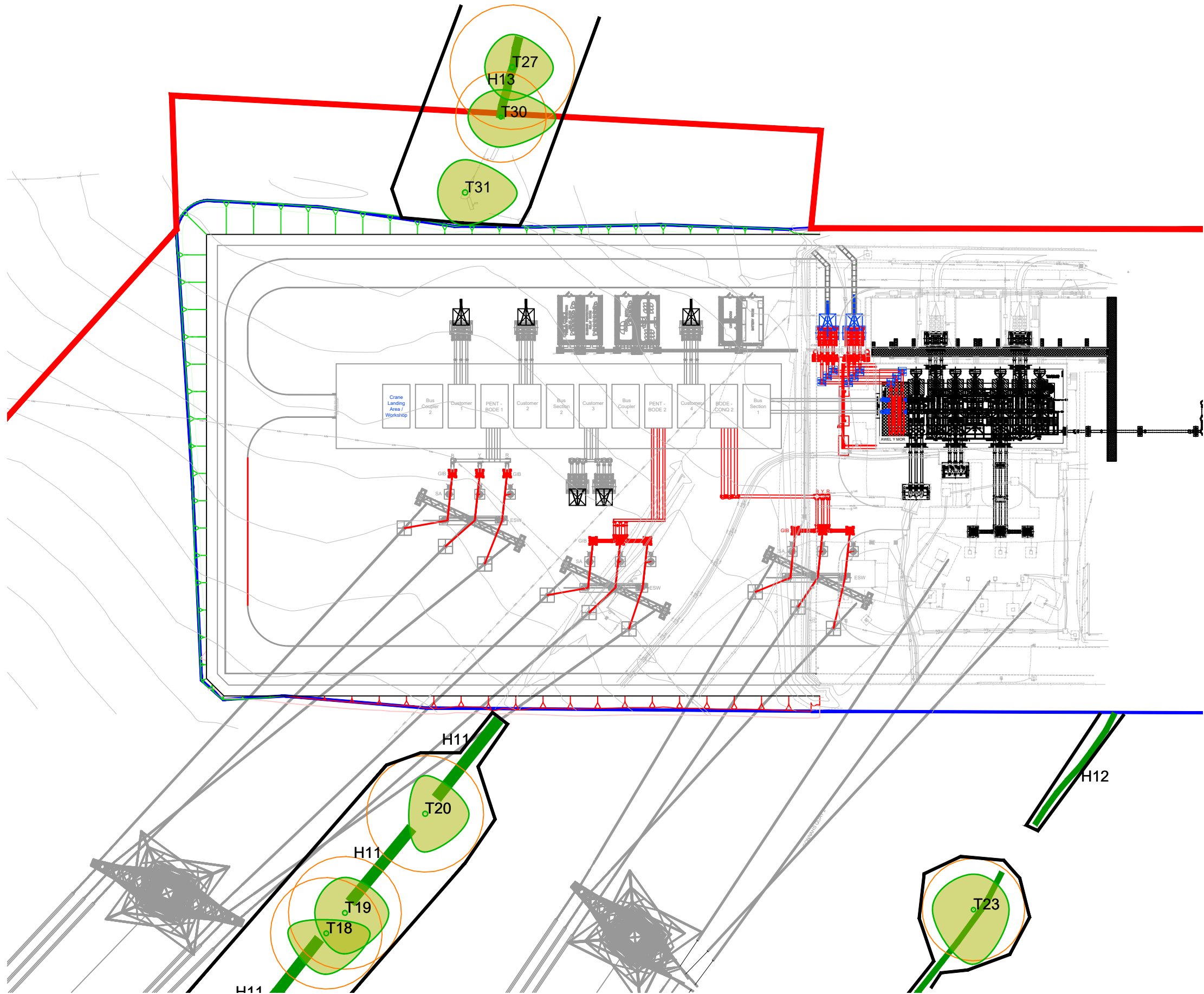


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Project
Bodelwyddan Substation Expansion
Arboricultural Impact Assessment
Title
Drawing 1: Tree Constraints Plan [BASELINE] Inset 3 of 3

Drawn	Checked	Approved	Scale	Date
AAB	HEE	JGS	1:1,250 @ A3	24/08/2023





KEY

[This drawing must be reproduced in colour]

- T1/G1/W1 Retained trees, groups and woodland
- H1 Retained hedgerow
- Root Protection Area (RPA)
- Survey Boundary
- Application Boundary
- Approximate location
(Feature not shown on supplied topographical survey)
- Tree Protection Fencing
(Must be installed prior to works commencement)



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A	Updated earthworks	AAB	RMG	11.07.24
Rev	Description	Drawn	Approved	Date



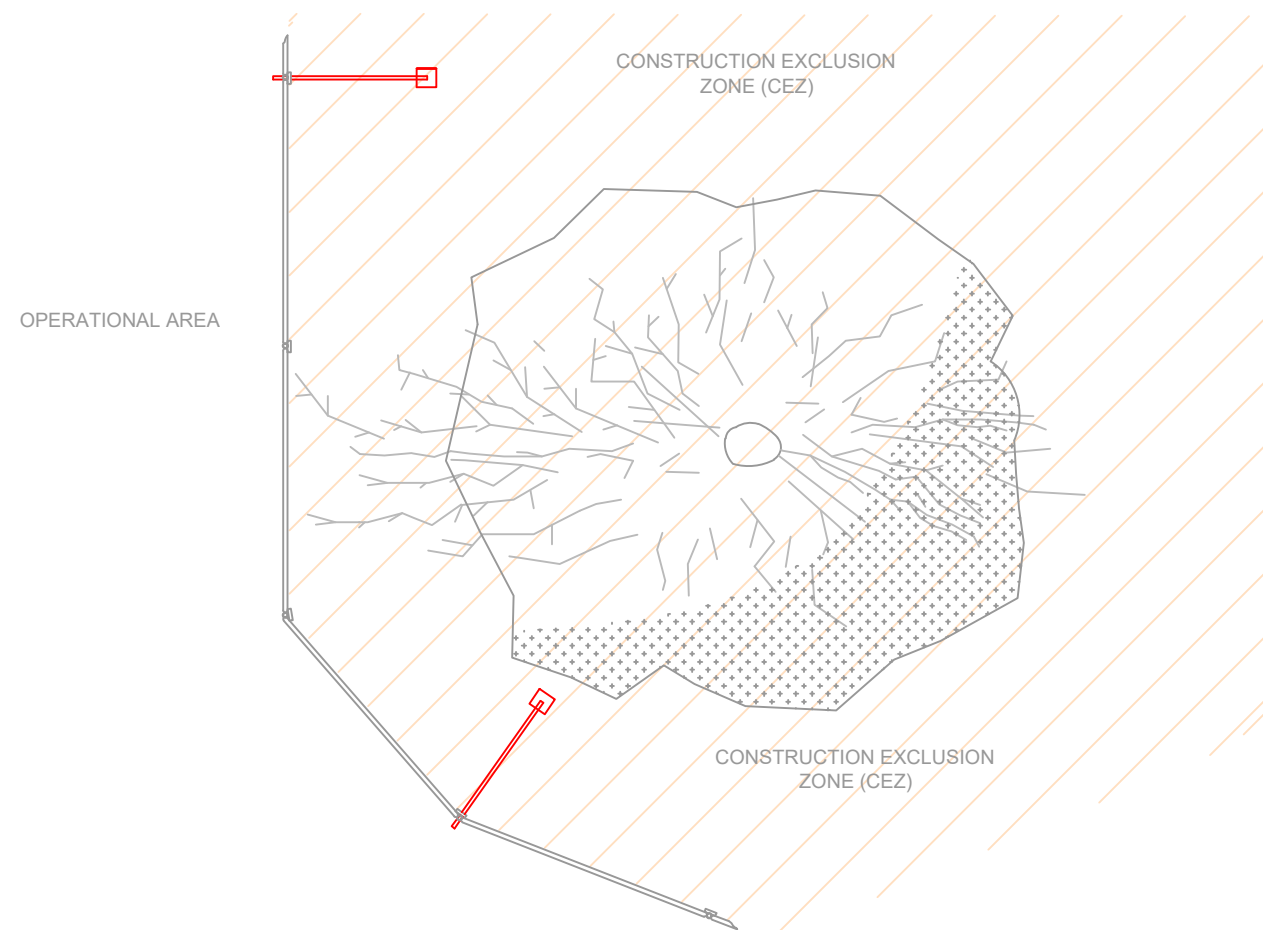
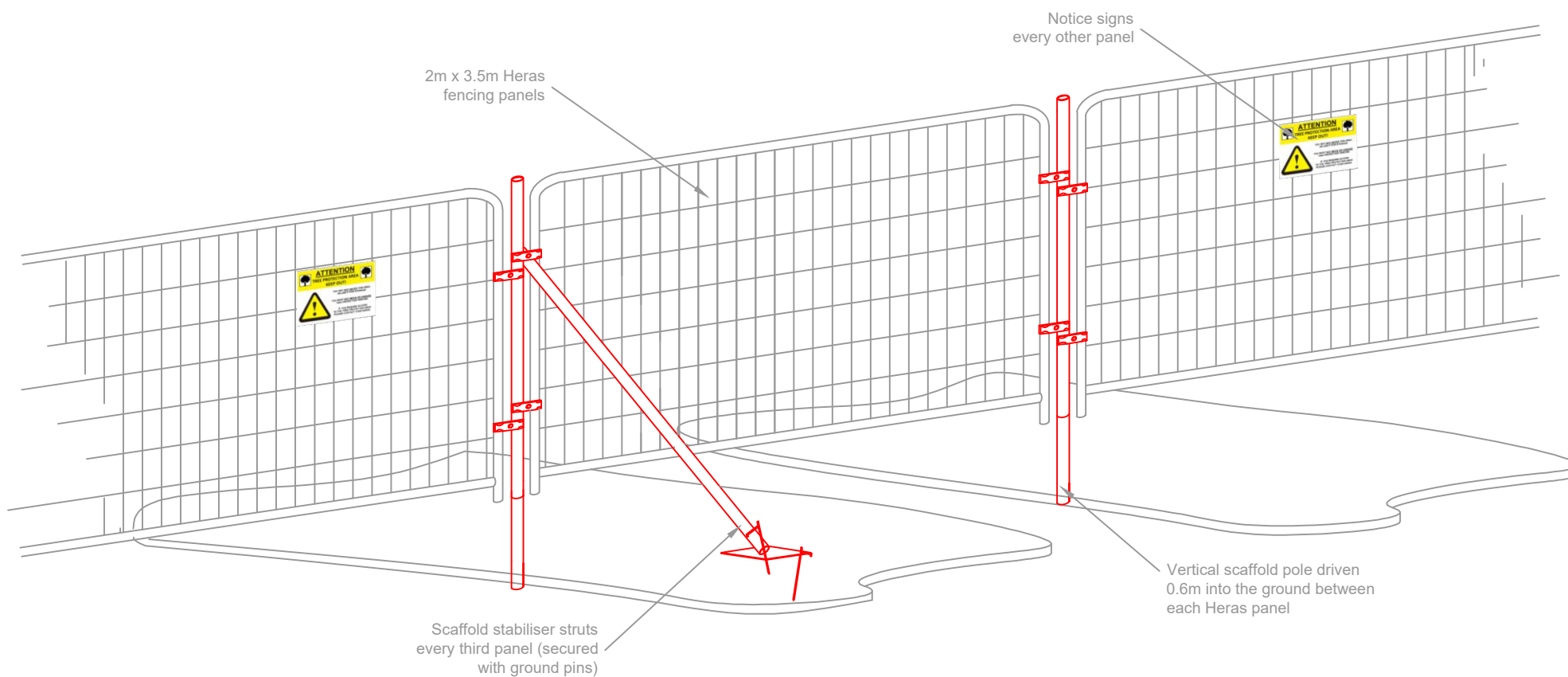
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Project
Bodelwyddan Substation Expansion

Title
Drawing 3: Tree Protection Plan [EFFECTS]

Drawing Number
D9037.01.006

Drawn	Checked	Approved	Scale	Date
AAB	HEE	JGS	1:750 @ A3	24/08/2023



Per 3No. Heras panels (10.5m)	
Component	Quantity
2m x 3.5m Standard Heras panels	3
3m Galvanised steel scaffold pole	3
Heras fecurity fence clip	12
Heras stabilising support bar	1
Stabilising pin	2
Tree protection notice	2

Notes:

Rev	Description	Drawn	Approved	Date
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TEP

THE ENVIRONMENT PARTNERSHIP

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Project

Title
Temporary tree protection fencing for use on soft surfaces

Drawing Number
TEP.ARB.FEN.001

Drawn	Checked	Approved	Scale	Date
TDP	RMG	JGS	(not to scale) @ A3	08/07/2019



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Appendix C. Consultation

C.1 Denbighshire County Council

C.1.1 Landscape and Visual Assessment Proposals

From: [REDACTED]
Sent: 23 June 2022 13:17
To: planning@denbighshire.gov.uk
Cc: [REDACTED]
Subject: Bodelwyddan Connections: Landscape Scope & Surveys

Good afternoon,

On behalf of National Grid, Jacobs have been instructed to provide environmental and planning services for the Bodelwyddan Connections project near St Asaph, Denbighshire in North Wales. We're therefore writing to you to seek comments on our initial landscape assessment proposals prior to our summer site surveys over the coming weeks, and I would be grateful if you could forward on this request to whom it may concern (e.g. Denbighshire County Council's Landscape Officer). In particular, we would welcome feedback on our overall approach to the landscape surveys, search/study area, methodology and identified visual and landscape receptors.

Project Description

The proposed works would create a new overhead line from Connah's Quay to Bodelwyddan and Bodelwyddan to Pentir. Each double circuit line would be approximately 400m in length, approaching the substation from the existing overhead line to the south-west.

The proposals would involve the following scheme components with consent sought under two separate planning routes:

1. Extension of the existing Bodelwyddan substation, which lies approximately 2 km west of St. Asaph in Denbighshire, and 1.3 km south of Junction 26 of the North Wales A55 Expressway. This would be sought under a Town & Country Planning Act application to Denbighshire County Council
2. The reconfiguration of the current double T arrangement between the 4ZB circuit and the Bodelwyddan substation, to a double turn-in configuration comprising two additional circuits between the T-point and the substation. This would be sought via a Section 37 Electricity Act application to the Secretary of State for Business, Energy and Industrial Strategy (BEIS).

It is anticipated that the proposals would also require the diversion of an existing gas pipeline and the removal of an existing cable sealing end compound, which connects the existing northern circuit to the substation by underground cables.

Search Area/Study Area

The overall approach to determining the search and study areas has been informed by *Using LANDMAP in Landscape and Visual Impact Assessments GN46*. The two tallest proposed structures are estimated to be 55m high and therefore it is proposed that a search area of 8km is used to help inform the extent of the study area for the assessment. It is anticipated that the study area will be approx. 5km, which will be confirmed after the production of Zone of Theoretical Visibility and site walkover. These distances have been based on the typical extent of search and study areas for tall structures (see below) and are towards the lower end of the scale due to the height of the proposed towers and the presence of existing electrical infrastructure at the site (e.g. substations, towers, overhead lines etc.). As such, there is a limited likelihood of a higher magnitude of effect being experienced by more distant receptors.

Height structure (metres)	<25	26 to 49	50 to 79	80 to 108	109 to 145	146 to 175	176 to 225	226+
Search area (km)	3	4 to 8	8 to 12	12 to 17	17 to 23	23 to 26	26 to 33	34+
Study area (km)	2	2 to 5	5 to 8	8 to 11	11 to 20	20 to 24	26 to 28	32+

General Approach/Methodology

A proposed Landscape and Visual Appraisal (LVA) or statutory Landscape and Visual Impact assessment (LVIA) methodology (incl. assessment criteria) will be presented to Denbighshire County Council following receipt of the screening opinion/decision. If the development is considered non-EIA, the submission of the Landscape and Visual Appraisal (LVA) would be based on a receptor-led assessment with accompanying representative

photographs illustrating the visual context and impacts on identified receptors. The approach to the assessment and mitigation would be based on the following guidance:

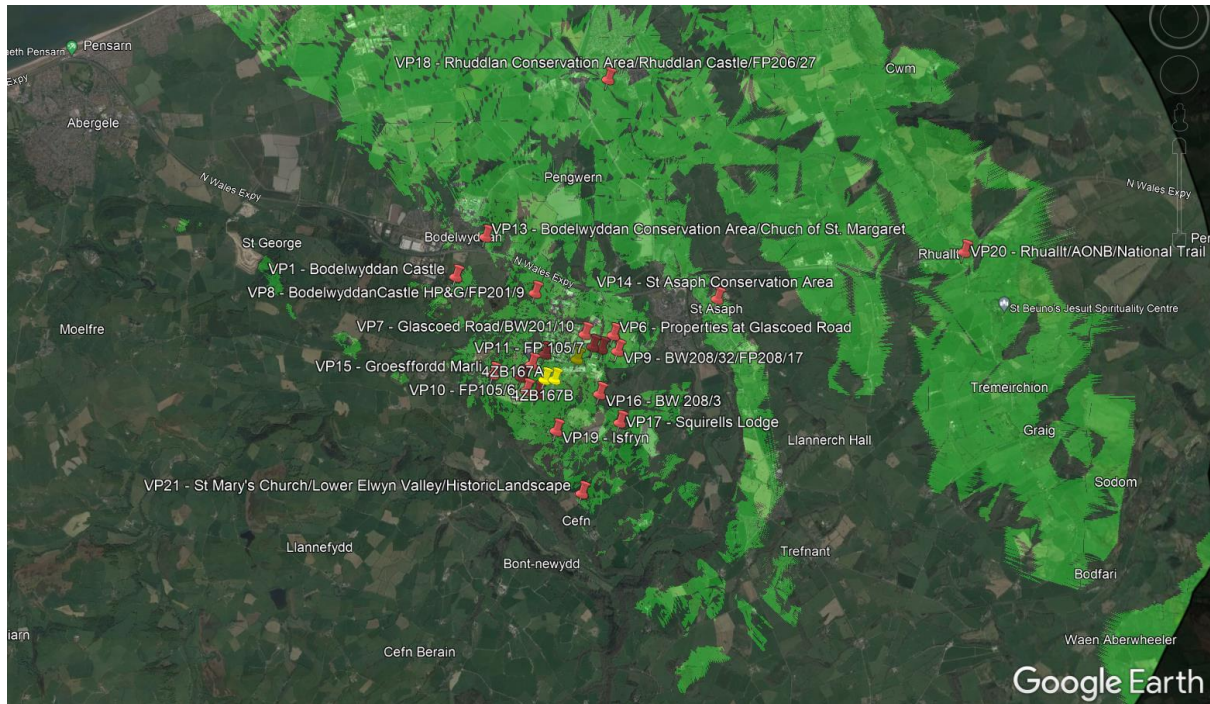
- *Guidelines for Landscape and Visual Impact Assessment 3*
- *Using LANDMAP in Landscape and Visual Impact Assessments (GN46)*
- *The Horlock Rules*
- *The Holford Rules.*

Accompanying photography would be for context purposes only and therefore not presented in accordance with *LI TGN 06/19*. All photography would be undertaken in the summer period and assumptions would be made on the winter impact based on professional judgement and past project experience. Photomontages would not be included as part of the submission.

Visual Receptors

Only visual receptors likely to experience significant visual effects during construction or operation would be included within the assessment of visual effects. The identification and selection of visual receptors would be based on site survey knowledge and a desk-top study. For the purposes of the site walkovers, the receptors/locations listed below would be visited to determine the likelihood of significant effects. The locations and an initial viewshed (based on a 55m high transmission tower) are shown on Figure 1 and 2 below.

- Recreational users of the nearby local PRow network (BW201/10, FP208/16, BW208/12, BW208/32, FP208/17, BW208/3, FP105/6, FP105/7)
- Visitors to Bodelwyddan Castle and Bodelwyddan Castle Historic Park and Garden
- Residents at nearby properties (Grade II Listed Pentre Meredydd, Waen Meredydd, Pentre-Mawr, Glascoed Road, Isfryn, Squirrels Lodge)
- Residents and visitors of surrounding Conservation Areas (Rhuddlan, Bodelwyddan, St. Asaph)
- Transient users of Glascoed Road and the surrounding local road network
- Settlement views from the wider settlements of Groesffordd Marli, Rhuddlan, Bodelwyddan, St Asaph and Rhualt
- Recreational users of the Bryniau Clwyd A Dyffryn Dyfrdwy/Clwydian Range And Dee Valley AONB and Offas Dyke National Trail
- Visitors to the Lower Elwyn Valley Historic Landscape.



Figures 1 & 2: Proposed survey locations and initial viewshed

Landscape Receptors

A review of published national and local landscape character assessments would be undertaken and, where appropriate, included within the assessment to determine the extent of landscape effects. Relevant landscape units from the following sources would be considered as landscape receptors:

- *National Landscape Character Areas*
- *LANDMAP*

- *Conwy and Denbighshire Landscape Sensitivity and Capacity Assessment for Wind Energy Development 2013*

Townscapes are unlikely to experience significant effects and these would therefore be omitted from the assessment.

As per *GLVIA3* and *LI TGN 01/20* , it is generally considered best practice to agree the scope and methodology with the determining authority before the assessment work is undertaken. Therefore, I would be grateful if you could provide us with feedback on the initial proposals before our summer site surveys are due to begin (w/c 04/07/2022). I appreciate that this is a limited timeframe; however, due to the tight project programme and access requirements, we must commence the surveys at the earliest opportunity. Unless we hear to the contrary, we'll assume that this approach is acceptable to the Council. I am of course happy to discuss and queries that you may have in the meantime.

Kind regards,

A large black rectangular redaction box covering the signature and name of the sender.

From: [REDACTED]
Sent: 22 July 2022 13:39
To: [REDACTED]
Subject: [EXTERNAL] RE: Bodelwyddan Connections: Landscape Scope & Surveys

Dear [REDACTED],

I write in response to your enquiry regarding the Bodelwyddan Connections Landscape Surveys.

I would have to advise that the Council cannot provide much input into this project at this stage as the Council does not employ a Landscape Officer, and we have limited capacity to provide pre-application advice outside of a formal pre-application enquiry.

In general terms it is noted that the application would be supported by a Landscape and Visual Impact Assessment (LVIA). The LVIA should be carried out by a Chartered Landscape Architect in accordance with the Guidelines for Landscape and Visual Assessment (Third Edition). It is also noted that you intend to draw upon Welsh Government LANDMAP data. This is an important tool in assessment of the landscape and which sets out the regional landscape context, and therefore its use is supported.

Whilst not of direct relevance to electricity transmission infrastructure, the Council has published the 'Conwy and Denbighshire Landscape Sensitivity and Capacity Assessment For Wind Energy Development' which may provide useful information for the baseline landscape assessment. A copy of this assessment can be found here:

<https://www.denbighshire.gov.uk/en/planning-and-building-regulations/local-development-plan/evidence-monitoring-and-information.aspx>

In terms of receptors, standard advice is that receptors should be selected to represent a range of sensitive receptors from within the study area, and should also include view points from within the Clwydian Range and Dee Valley AONB.

It is noted that photography would be taken during the summer months, and therefore would not illustrate the worse case scenario. The proposal to undertake photographic surveys in the summer months whilst trees are in full leaf would need to be fully justified to demonstrate the assessment is robust.

The LVIA should also include a cumulative assessment to assess the impact of the proposal in combination with existing and planned energy and electrical infrastructure in the vicinity of the site.

Existing energy infrastructure in the vicinity of the site includes high voltage overhead lines; existing substations to south of Glascoed Road (National Grid Bodelwyddan substation, Gwynt y Mor offshore windfarm substation and Burbo Bank Extension offshore windfarm substation respectively); the Scottish Power Distribution Network substation on land to the east of St. Asaph Business Park; and the flexible gas fired power station at TRB Drive on the St. Asaph business park.

Proposed major energy developments in the planning system include the Elwy solar farm at Gwernigron Farm which is currently subject of a DNS application before Welsh Ministers (PEDW Ref: DNS/3247619); and the proposed Awel y Mor Offshore windfarm Nationally Significant Infrastructure Project which is proposing a new substation on land to the west of St. Asaph business park approximately 1.3km to the north-west of the site and which is currently subject of a DCO application which has been submitted to the Planning Inspectorate (PINS National Infrastructure Planning ref: EN010112).

There is a further solar farm development proposed in St. Asaph on land close to the National Grid Bodelwyddan substation which is in the pre-application stage. Please See the EIA screening opinion request submitted to PEDW for further information (PEDW ref: CAS-01392-D2TSF3

There are also further proposed offshore windfarm developments which are likely to have onshore works in Denbighshire. These are the Mona and Morgan offshore windfarms which are both in the early pre-application planning stages and which have been offered grid connection points at the National Grid Bodelwyddan Substation, and will likely include new substation development on a site close to the national grid substation.

The Mona offshore windfarm is at the EIA Scoping Stage and an EIA Scoping Opinion was submitted to PINS in May 2022, and PINS issues a scoping opinion response on 15 June 2022. The EIA Scoping Report confirms the grid connection point that has been offered to serve the windfarm is at the Bodelwyddan National Grid Substation, and the area of search for the substation includes land around St Asaph / Bodelwyddan (PINS National Infrastructure Planning ref: EN010137).

Please note, this response is made at Officer level and is given without prejudice; it is not to be held as binding on the Local Planning Authority or any of its elected members, and the Council reserves the right to make comment on the proposal at a later stage.

Should you wish to obtain further, detailed site specific advice, I must advise that the Local Planning Authority operates a formal enquiry system, and as such we are not able to provide site specific advice outside of a formal pre-application enquiry. Further information can be found on the following webpage:

<https://www.denbighshire.gov.uk/en/resident/planning-and-building-regulations/planning/planning-advice.aspx>

Please be advised that a statutory fee will apply to obtain pre-application planning advice from the Council.

Kind Regards

[REDACTED]

Gwasanaethau Cynllunio, Gwarchod y Cyhoedd a Chefn Gwlad

Cyngor Sir Ddinbych

Caledfryn, Ffordd y Ffair, Dinbych LL16 3RJ

Ffôn : 01824 706727 Ffacs : 01824 706709

E-bost: cynllunio@sirddinbych.gov.uk

Gwefan: www.sirddinbych.gov.uk

Rydym yn croesawu gohebiaeth yn Gymraeg a ni fydd unrhyw oedi wrth ymateb i ohebiaeth a dderbyniwyd yn Gymraeg.

We welcome correspondence in Welsh and there will be no delay in responding to correspondence received in Welsh.

Planning, Public Protection and Countryside Services

Denbighshire County Council

Caledfryn, Smithfield Road, Denbigh, LL16 3RJ

Phone : 01824 706727 Fax : 01824 706709

E-mail planning@denbighshire.gov.uk

Web Site: www.denbighshire.gov.uk

Rydym yn croesawu gohebiaeth yn Gymraeg a ni fydd unrhyw oedi wrth ymateb i ohebiaeth a dderbyniwyd yn Gymraeg.

We welcome correspondence in Welsh and there will be no delay in responding to correspondence received in Welsh.

From: [REDACTED]

Sent: 27 July 2022 12:51

To: planning@denbighshire.gov.uk

Cc: [REDACTED]

Subject: RE: [EXTERNAL] RE: Bodelwyddan Connections: Landscape Scope & Surveys

Dear [REDACTED],

Thank you for your email. We will review and get back to you with any queries or in relation to pre-application advice.

Best regards,

[REDACTED]

[REDACTED]

Jacobs Challenging today.
Reinventing tomorrow.

*Due to my flexible working pattern, I may send emails outside of normal working hours.
Please don't reply outside your working day. Be safe and healthy.*

C.1.2 Permitted Development Letter

22nd February 2023

Our Ref: 9037.007



**THE
ENVIRONMENT
PARTNERSHIP**

██████████ is dealing with this matter
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Ruthin
LL15 1YN

PLANNING | DESIGN | ENVIRONMENT

Dear Sir or Madam

**NATIONAL GRID PERMITTED DEVELOPMENT AT BODELWYDDAN SUBSTATION,
GLASCOED RD, SAINT ASAPH LL17 0LJ**

I am writing on behalf of National Grid Electricity Transmission (NGET) to confirm that it intends to undertake works at its Bodelwyddan Substation at the address shown above.

The works comprise a single bay extension to the existing National Grid substation to accommodate a new connection from the proposed Awel-y-Môr offshore wind farm.

The works are shown on the attached drawings:

- Drawing B31000G6-JAC-ZZ-XX-DR-E-0022_01
- Drawing B31000G6-JAC-ZZ-XX-DR-E-0023_02

The works comprise an extension to the existing substation building and fitting of new equipment. The works will take place entirely within the existing substation operational area enclosed by security fencing and gates.

The building extension will match the profile of the existing substation main building (see elevation C-C at Drawing B31000G6-JAC-ZZ-XX-DR-E-0023). Its maximum height will be 11.9m falling to a height of 10.73m. The extension will be the same width as the existing substation main building at 15.5m. The extension will be 6.225m long whereas the existing substation main building is 35m long.

The extension will enclose a volume of 1,092m³ and the new floorspace will be 96.5m². The existing substation main building encloses a volume of 6,139m³ and has a footprint of 542.5m².

The extension will be clad in similar material and finish to the existing substation main building.

There will be outdoor equipment comprising gas insulated bars and disconnectors as shown on the drawings with a height of 7.85m. These comprise similar equipment to that already at the substation.



**INVESTORS
IN PEOPLE** | Gold

The General Permitted Development Order (GPDO) 1995 sets out activities that comprise permitted development in Wales. The part relevant to National Grid's activities is in Schedule 2 Part 17 Class G Electricity undertakings.

Section G sets out activities which comprise permitted development and includes G(d) the extension or alteration of buildings on operational land.

The existing substation at Bodelwyddan comprises operational land because in accordance with 263(1) of the Planning Act 1990 it comprises land which is used for the purpose of carrying on their undertaking and land in which an interest is held for that purpose. It does not fall in the exclusion from operational land otherwise applied by 264(1)(a) as having been acquired on or after 6th December 1968 because, consistent with 264(3)(a) and (b), it comprises land where *'there is, or at some time has been, in force with respect to it a specific planning permission for its development;...and that development, if carried out, would involve or have involved its use for the purpose of the carrying on of the statutory undertakers' undertaking'*.

The land is held on the balance of a 99 years' lease and has the benefit of planning permission 31/2008/1123/PF for the existing National Grid Bodelwyddan substation.

GPDO 1995 Schedule 2 Part 17 G(1) sets out restrictions that apply to development permitted under G(d). These include that development is not permitted where the height of the original building would be exceeded; the cubic content of the original building would be exceeded by more than 25%; and where the floor space of the original building would be exceeded by more than 1,000 square metres. (Greater restrictions apply in National Parks, Areas of Outstanding Natural Beauty and other designations but these do not apply at the Bodelwyddan substation site.)

The dimensions of the proposed substation building extension do not exceed these parameters.

GPDO 1995 Schedule 2 Part 17 G(1) (f) states that permitted development includes *any other development carried out in, on, over or under the operational land of the undertaking*.

There are restrictions on the application of this clause and GPDO 1995 Schedule 2 Part 17 G(1) (e) (ii) states that development is not permitted if it would consist of or include *'the installation or erection by way of addition or replacement of any plant or machinery exceeding 15 metres in height or the height of any plant or machinery replaced, whichever is the greater'*.

The above confirms that the proposed works shown on the attached drawings comprise permitted development under the GPDO 1995.

Work is anticipated to commence during autumn 2023.

Due to other projects requiring connection at the Bodelwyddan substation, NGET is investigating further works that will be required in the locale. These works would be outside the existing substation's operational land and so would require planning permission.

NGET will contact you separately about these other works in due course.

Yours sincerely

[Redacted Signature]

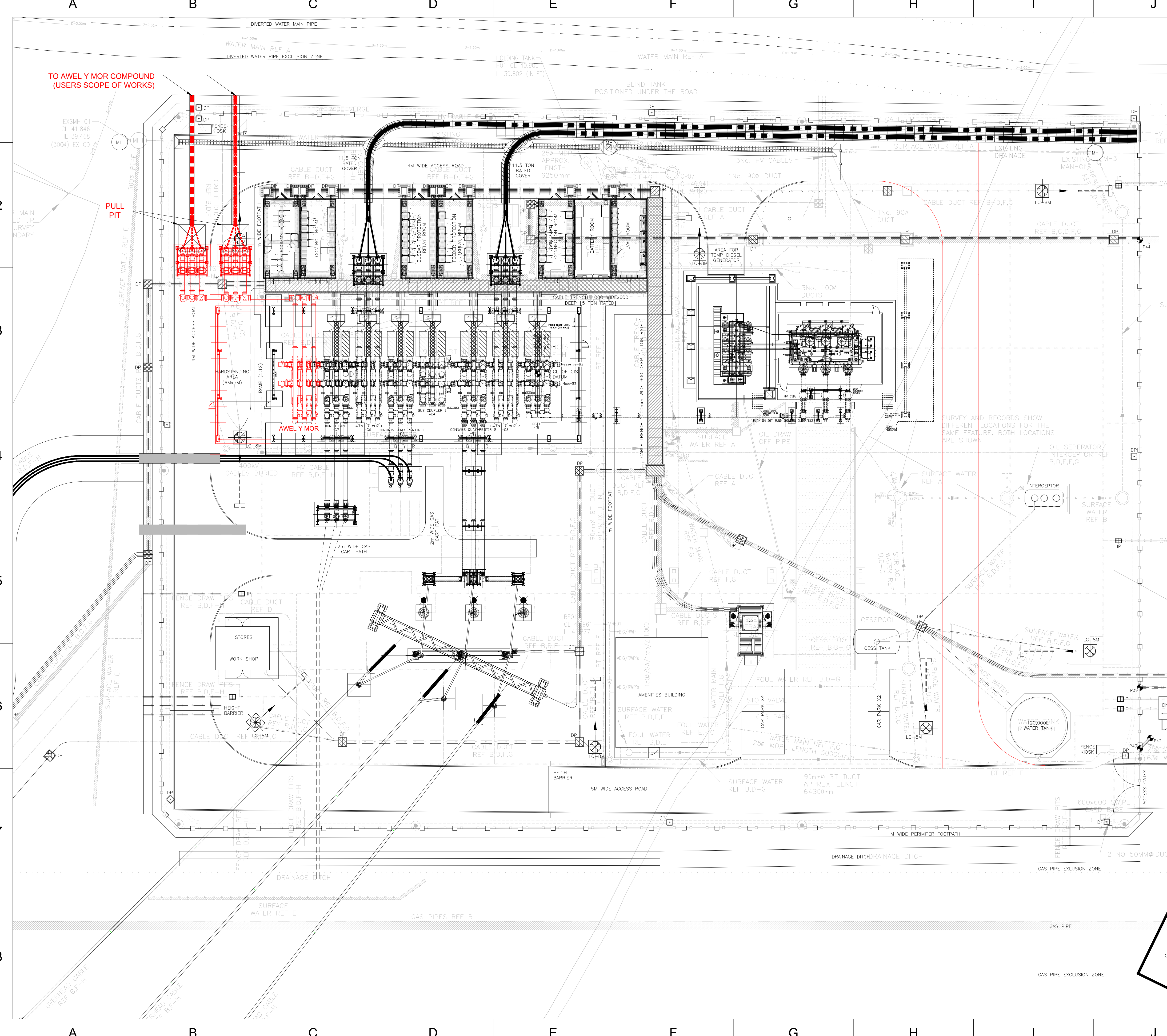
[Redacted Name]

Consultant Consents Officer

Encs

Drawing B31000G6-JAC-ZZ-XX-DR-E-0022_01

Drawing B31000G6-JAC-ZZ-XX-DR-E-0023_02



NOTES

- 1. THIS IS A 4.2/4.3 DRAWING AND IS FOR DEVELOPMENT PURPOSES ONLY
- 2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
- 3. EXISTING BACKGROUND TAKEN FROM DRG 21/CEA/0217.
- 4. ALL NEW WORKS AND EXTENSION TO BUILDING TO MATCH EXISTING AESTHETICAL APPEARANCE AND FINISH.

LEGEND

- EXISTING EQUIPMENT
- NEW NATIONAL GRID EQUIPMENT (LICENSED WORKS)

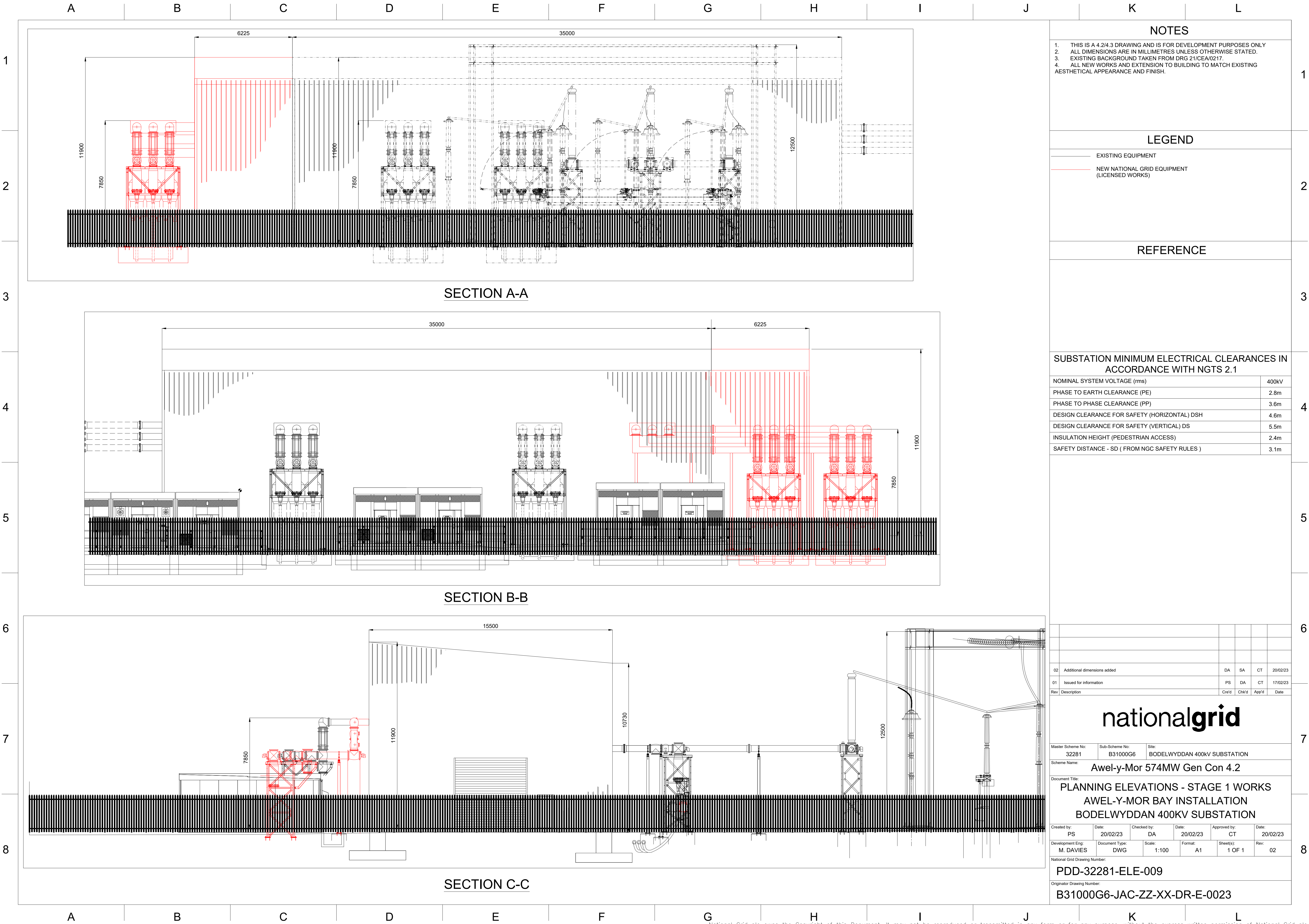
REFERENCE

SUBSTATION MINIMUM ELECTRICAL CLEARANCES IN ACCORDANCE WITH NGTS 2.1

NOMINAL SYSTEM VOLTAGE (rms)	400kV
PHASE TO EARTH CLEARANCE (PE)	2.8m
PHASE TO PHASE CLEARANCE (PP)	3.6m
DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH	4.6m
DESIGN CLEARANCE FOR SAFETY (VERTICAL) DS	5.5m
INSULATION HEIGHT (PEDESTRIAN ACCESS)	2.4m
SAFETY DISTANCE - SD (FROM NGC SAFETY RULES)	3.1m

nationalgrid

Master Scheme No:	32281	Sub-Scheme No:	B31000G6	Site:	BODELWYDDAN 400kV SUBSTATION
Scheme Name: Awel-y-Mor 574MW Gen Con 4.2					
Document Title: PLANNING LAYOUT - STAGE 1 WORKS AWEL-Y-MOR BAY INSTALLATION BODELWYDDAN 400kV SUBSTATION					
Created by:	PS	Date:	17/02/23	Checked by:	DA
Development Eng:	M.DAVIES	Document Type:	DWG	Scale:	1:200
National Grid Drawing Number:	PDD-32281-LAY-010				
Originator Drawing Number:	B31000G6-JAC-ZZ-XX-DR-E-0022				
Approved by:	CT	Date:	17/02/23	Rev:	01
Format:	A1	Sheet(s):	1 OF 1		



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- EXISTING BACKGROUND TAKEN FROM DRG 21/CEA/0217.
- ALL NEW WORKS AND EXTENSION TO BUILDING TO MATCH EXISTING AESTHETICAL APPEARANCE AND FINISH.

LEGEND

- EXISTING EQUIPMENT
- NEW NATIONAL GRID EQUIPMENT (LICENSED WORKS)

REFERENCE

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02	Additional dimensions added	DA	SA	CT	20/02/23
01	Issued for information	PS	DA	CT	17/02/23
Rev	Description	Cre'd	Chk'd	App'd	Date

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
32281	B31000G6	BODELWYDDAN 400kV SUBSTATION
Scheme Name:		
Awel-y-Mor 574MW Gen Con 4.2		
Document Title:		
PLANNING ELEVATIONS - STAGE 1 WORKS AWEL-Y-MOR BAY INSTALLATION BODELWYDDAN 400KV SUBSTATION		
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PS	20/02/23	DA
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M. DAVIES	DWG	1:100
Approved by:	Date:	Sheet(s):
CT	20/02/23	1 OF 1
Rev:	02	
National Grid Drawing Number:		
PDD-32281-ELE-009		
Originator Drawing Number:		
B31000G6-JAC-ZZ-XX-DR-E-0023		

Appendix D. Biodiversity Baseline

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

Document no: B2416603/BODEL/ECO/003
Revision no: P03

National Grid
B2416603

Bodelwyddan Substation Extension
27 February 2025

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

Client name:

National Grid

Project name:

Bodelwyddan Substation

Document no:

B2416603/BODEL/ECO/003

Revision no:

P03

Date:

27 February 2025

Project no:

B2416603

Project manager:

KW

Prepared by:

MF

File name:

Bodelwyddan substation_Appendix E Biodiversity Baseline

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
P01	15 July 2023	Initial Draft	RW	LG	LG	KW
P02	5 August 2024	Updated report to reflect UKHabs review	KR	LG	LG	KW
P03	28 February 2025	Updated to reflect design change	MF	LG	LG	KW

Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments

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Contents

1.	Introduction	1
1.1	Background.....	1
1.2	Site description.....	1
1.3	Description of proposal	1
2.	Methodology	2
2.1	Desk Study	2
2.2	UK Habitat Classification Survey.....	2
2.3	Great crested newt	2
2.4	Bats.....	4
2.5	Other species.....	7
2.6	Survey Limitations	7
3.	Results	8
3.1	Statutory Designated Sites	8
3.2	Non-Statutory Designated Sites	8
3.4	UK Habitat Classification Survey.....	10
3.5	Great crested newt	15
3.6	Bats.....	18
3.7	Invasive species	29
3.8	Other species.....	29
4.	References.....	31
5.	Figures	32

Appendices

Annex A. Habitat Survey Photographs	37
Annex B. Bat Survey Weather Data	40
Annex C. Confirmed Bat Roost Features	42

1. Introduction

1.1 Background

Jacobs UK Ltd has been commissioned by National Grid to undertake a programme of ecological desk study and field survey to support the proposed extension of the 400kV Bodelwyddan Substation and a new overhead line circuit. The existing substation is located south of Glascoed Rd, Saint Asaph (centred on OS Grid Ref. SJ 01738 73567) with the proposed development extending to the land to the south and the west of the substation.

The permanent and temporary working areas for the proposed substation and overhead line developments are referred to as 'the site' within this report. Where specific information applies to only one aspect of the works, this is clarified in the text. All figures show the boundaries of the two separate aspects.

The spatial scope of the 'study area' takes account of all areas where significant effects to ecological features could occur throughout the lifetime of the proposed development including the construction footprint and potential locations of any ancillary works, compounds and varying Zones of Influence for the ecological receptors present. The field based 'survey area' is specific to each biodiversity feature and discussed further in Section 2.

The site boundary as shown on the figures includes the existing access road to the substation from Glascoed Road. This was not included in the scope of ecological survey as the access road is in existence and no works are proposed.

1.2 Site description

The substation is set within a predominantly rural landscape, comprising agricultural fields, hedgerows, woodland and ditches. A business park is located approximately 25m north of the substation, and a wind farm borders the substation 150m to the east.

1.3 Description of proposal

National Grid proposes to extend the existing Bodelwyddan substation, which lies approximately 2km west of St. Asaph in Denbighshire, and 1.3km south of Junction 26 of the North Wales A55 Expressway. The existing substation occupies an enclosed site approximately 2.5ha in area, with a private access 375m in length from a junction off Glascoed Road. In addition to extending the existing substation site, National Grid proposes to replace the turn-in of the existing Connah's Quay to Pentir overhead line with two double circuit overhead lines.

The proposed works would create a new overhead line from Connah's Quay to Bodelwyddan and Bodelwyddan to Pentir. Each double circuit line would be approximately 400m in length, approaching the substation from the existing overhead line to the south-west. The proposals would also involve the removal of an existing cable sealing end compound, which connects the existing northern circuit to the substation by underground cables.

The substation extension would include provision of the following: telecoms room; control room; Busbar protection relay room; feeder protection relay room; battery room; LVAC room; overhead line connection infrastructure; couplers; and infrastructure to support contracted user assets.

2. Methodology

2.1 Desk Study

An ecological desk study was completed in December 2022 to obtain ecological information relevant to inform and collate current baseline data held by statutory and non-statutory consultees in line with standard guidelines and current best practice (CIEEM, 2017).

Ecological records were requested from Cofnod (North Wales Environmental Information Service) in December 2022. Additionally, the Multi Agency Geographic Information for the Countryside (MAGIC) and DataMapWales websites were searched for any supplementary information. The desk study records include only those from the last 10 years to reflect the current ecological context of the site.

A search was conducted for Special Areas of Conservation (SAC) within 30km of the site for which bats are a qualifying feature.

The following baseline data were gathered for a 2km radius around the site:

- Statutory sites designated for nature conservation comprising all SACs, Special Protection Areas (SPAs), Ramsar sites, Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR) and Local Nature Reserves (LNR);
- Non-statutory sites designated for nature conservation, e.g., Local Wildlife Sites (LWS);
- Ancient Woodland Inventory sites and Priority Habitats (listed in accordance with Section 7 of the Environment (Wales) Act 2016);
- Records of legally protected species and notable species, including Priority species (listed in accordance with Section 7 of the Environment (Wales) Act 2016); and
- Invasive non-native species (INNS).

2.2 UK Habitat Classification Survey

A UK Habitat Classification (UK Hab) survey was first carried out on the 8th July 2022 within the site defined at that time plus an approximate 100m area or full extent of field where boundaries were located beyond this. An updated survey was carried out on the 12th and 13th July 2024. Both surveys were in accordance with the methodology outlined in the UK Habitat Classification User manual (Butcher *et al.*, 2021). This involved mapping and describing the broad habitats and compiling a general plant species list (all plant species nomenclature follows New Flora of the British Isles (Stace, 2019)), to reflect the floristic assemblage of each habitat type. The condition of all habitats (Good, Moderate, Poor and N/A with reference to Natural England, 2021) were also recorded.

Target notes were made for any features which were too small to map or were of particular ecological interest. Photographs were also taken.

2.3 Great crested newt

A review of Ordnance Survey mapping from MAGIC and ESRI aerial photography was undertaken to identify ponds within a 250m survey area based on the extents of the site. Subsequent Habitat Suitability Index (HSI) assessment and environmental DNA (eDNA) surveys for great crested were then undertaken.

2.3.1 Habitat Suitability Index Assessment

An HSI assessment of ponds was carried out on 30th June 2022. The HSI is a measure of habitat suitability for GCN and is a standardised assessment of the potential of a pond to support the species. A HSI assessment cannot be used as a substitute for presence / absence surveys. However, it can be useful for evaluating the general suitability of waterbodies for GCN.

The assessment and attribution of the HSI followed standard methodology of Oldham *et. al.* (2000). Ten suitability indices (SI) are evaluated for each waterbody. These are:

- SI₁ Geographic location: Sites are scored according to the geographical zone in which they occur. All ponds are located within the optimal range for great crested newt.
- SI₂ Pond area: The surface area of the pond when water is at its highest level (excluding flooding). Measuring by pacing the perimeter in the field or, where this was not possible, by desk study.
- SI₃ Permanence: An estimate on how often a pond dries up. Usually based on the size and depth of the pond.
- SI₄ Water quality: Determined through the apparent invertebrate diversity in the pond, the presence of submerged plants, and knowledge of water sources or possible pollutants/run-off.
- SI₅ Shade: The percentage of perimeter that is shaded to at least 1m from the shore, excluding emergent vegetation.
- SI₆ Waterfowl: The perceived presence and/or impact of waterfowl populations in the pond.
- SI₇ Fish: The perceived presence of fish populations in the pond, including knowledge of presence by the landowner or connectivity to watercourses.
- SI₈ Pond count: The number of ponds within 1km of the survey pond not disconnected by major barriers to movement, such as rivers or main roads.
- SI₉ Terrestrial habitat: The potential value of habitats up to 250m from the pond for GCN foraging, movement, and refuge.
- SI₁₀ Macrophytes: The percentage of plant cover of the pond surface including emergent and submerged plants.

From the ten suitability indices, a geometric mean was calculated using the following equation:

$$HSI = (SI_1 \times SI_2 \times SI_3 \times SI_4 \times SI_5 \times SI_6 \times SI_7 \times SI_8 \times SI_9 \times SI_{10})^{1/10}$$

This gave a HSI score between 0 and 1, where waterbodies with a higher HSI score are considered more suitable for GCN than those with a low score. The scores are given suitability categories as detailed in Table 2.1.

Table 2.1: HSI Score and suitability categories (from Oldham *et. al.* (2000))

HSI Score	Suitability Category
<0.5	Poor
0.5-0.59	Below average
0.6-0.69	Average
0.7-0.79	Good
>0.8	Excellent

2.3.2 Environmental DNA

Environmental DNA (eDNA) is nuclear or mitochondrial DNA that is released from an organism into the environment. Sources of eDNA include secreted faeces, mucous, shed skin and hair, and carcasses. In aquatic environments eDNA is diluted and distributed in the water where it can persist for 7–21 days. Environmental

DNA from a range of aquatic organisms can be detected in water samples at very low concentrations using quantitative Polymerase Chain Reaction (qPCR) methods. eDNA tests for GCN, as evidence of presence or likely absence of GCN within a pond, was undertaken as per the standardised methodology set out in a technical advice note by the Freshwater Habitats Trust (Biggs *et al.*, 2014).

An eDNA survey involves the collection of 20 water samples taken around the perimeter of a pond, which must be collected between April 15th and June 30th. The 20 samples are combined into a single container, mixed well, and six sub-samples are then removed and placed into tubes with a DNA preservative (Biggs *et al.*, 2014). The preserved samples are then couriered to a laboratory for analysis.

The eDNA surveys of ponds identified were conducted on the 30th June 2022 by a GCN licenced surveyor and an assistant (details can be provided on request). Samples were sent to NatureMetrics for analysis.

2.4 Bats

The Preliminary Ecological Appraisal (Jacobs, 2021) did not identify any buildings or structures that provided potential for roosting bats and therefore this survey effort focused on trees. Trees within the site and its immediate surroundings were inspected for their potential to support bat roosts.

2.4.1 Ground based assessment of trees for roosting bats

Trees within the survey area were assessed by two surveyors for their suitability to support roosting bats on 30th August 2022. These surveys were undertaken in accordance with good practice guidelines (Collins, 2016 and Andrews, 2013). A suitably experienced team of ecologists assessed each tree from the ground with the use of torches and close-focusing binoculars. All evidence of the presence of bats or features that had or may have potential as roost sites were recorded and the location mapped.

A category was assigned to each tree based on its single highest Potential Roost Feature (PRF). The locations of all trees with PRFs rated as 'high', 'moderate' or 'low' potential (based on Collins (2016) were recorded. Trees considered to have negligible suitability to support roosting bats were also recorded but not comprehensively. The description of each roosting potential category are summarised in Table 2.2. Typically, PRFs are categorised as decay or damage features in trees. These are summarised in Table 2.3.

The following information for each tree was then recorded to determine the most appropriate options for further survey and to facilitate locating the tree and the PRFs for further survey:

- Location;
- Species;
- Age; and
- Diameter at breast height (DBH).

Table 2.2: Bat roost potential categories (adapted from Collins, 2016)

Bat Roosting Potential Category	Description
Confirmed roost	Evidence of a confirmed roost within a tree or structure would include observations (visual and aural) of bats within or emerging from a roost as well as the presence of fresh or old bat droppings within or below the roost entrances. Other evidence of a confirmed roost (particularly in trees) includes smoothing and /or staining around a roost entrance point.
High	A tree or structure with one or more potential roost sites that are suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.
Moderate	A tree or structure with one or more potential roost sites that could be used by bats due to their size, shelter, protection conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).
Low	A tree of sufficient size and age to contain potential roost features, but with none seen from the ground or features seen with only very limited roosting potential. A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and / or suitable surrounding habitat to be used on a regular basis or by large numbers of bats.
Negligible	Negligible features likely to be used by roosting bats.

Table 2.3: Potential Roost Features typically recorded in trees (adapted from Collins, 2016)

Potential Roost Feature Type	
<u>Decay and Disease</u>	<u>Damage</u>
Woodpecker-holes	Lightning-strikes
Squirrel-holes	Hazard-beams
Knotholes	Subsidence-cracks
Tear-outs	Pruning cuts
Wounds	Shearing-cracks
Cankers	Transverse-snaps
Compression-forks	Lifting bark
Butt-rots	Welds
	Frost-cracks
	Ram's horns

2.4.2 Dusk emergence and re-entry

All trees categorised as having 'moderate' to 'high' potential for roosting bats following the ground-based roost assessment had subsequent dusk emergence/ dawn re-entry surveys or tree climb surveys (where possible), if it was considered likely that they may be impacted by proposed works. The approach to survey effort followed Collins (2016) which is summarised in Table 2.4.

Table 2.4: Bat survey effort

Bat Roosting Potential Category	Survey Effort
High	Three dusk emergence or dawn re-entry surveys
Moderate	Two dusk emergence or dawn re-entry surveys
Low	No further survey required
Negligible	No further survey required

Eighteen trees (T4, T6, T7, T7a, T9, T11, T12, T13, T15, T16, T17, T18, T19, T20, T21, T22, T25 and T26) all illustrated in Figure 5, received a level of survey. Surveys were completed between 30th August 2022 and 22nd of June 2023 by appropriately experienced ecologists, following best practice guidelines. A number of trees (T4, T7, T9, T12, T15, T16, T17, T18, T19, T20, T21, T22, T25) were unsafe to climb due to several factors such as trees being dead, tree being under overhead wires or overhanging a road. Trees that were not climbed were instead subject to dusk and or dawn surveys.

Surveys were carried out over two seasons due to project programme. Dusk emergence surveys commenced 15 minutes before sunset and finished 120 minutes after sunset; dawn re-entry surveys commenced 120 minutes before sunrise and finished 15 minutes after sunrise (Collins, 2016). Sufficient surveyor coverage of each tree was ensured throughout, with either one or two surveyors per tree dependent upon the number of PRFs. Potential roosting features were visually observed throughout the survey and each surveyor used a bat detector to assist in the identification of bats. Each surveyor was equipped with either an Echo Meter (EM) Touch Pro 2 connected to an iPad to record bat calls for identification in the field and assist with any subsequent sonogram data analysis required. Additionally, each surveyor was equipped with an infrared (IR) video camera that was used to capture emergence/re-entries of bats from specific features that may otherwise be missed by the human eye.

Surveyors recorded environmental variables including temperature, wind speed and precipitation on each survey. The local weather was checked prior to the start of each survey, and conditions assessed to ensure they were suitable for recording bats (sunset/sunrise temperature 10 degrees Celsius or above, no strong wind, no heavy precipitation), as per Collins (2016).

2.4.3 Tree climbing inspection

Four trees (T6, T7a, T11 and T13) were subject to tree climb surveys in addition to dusk/dawn surveys by two qualified tree climbing ecologists (with Natural England Class two bat survey licences), following best practice guidelines. The surveys were undertaken from 25th of April to 31st of May 2023 during the daytime (when bats would be present within features). The surveys included using ropes and climbing equipment to climb the trees to reach features, using an endoscope camera to search for bats within features.

2.4.4 Sound analysis

Sound analysis was mainly completed in real time whilst surveying, with the aid of Kaleidoscope built in classifiers feature on EM Touch Pro 2 detectors. Pipistrelle calls with a peak frequency of above 50kHz were labelled as soprano pipistrelle. Pipistrelle calls between 50 and 41kHz were labelled as common pipistrelle.

Identification of *Myotis* spp. bats were made to species level where possible. However, due to a degree of overlap in the call characteristics of the associated species, some calls were identified to genus level only.

2.5 Other species

A desk study and habitat suitability approach was used for assessing the likely presence / absence of other ecological features on site.

2.6 Survey Limitations

Data supplied by records centres provide useful baseline information on the species that have been recorded within a local area and details of sites with nature conservation designations. This data often includes surveys undertaken by third parties on an 'ad hoc' basis so may be incomplete. Absence of species records may not therefore indicate absence of that species from an area.

The woodland areas to the north and south of the substation were fenced and direct access was not possible for some portions of these habitats. However, the scope of the survey was to classify the habitats present and their condition, which was possible, so it is not seen as a significant limitation.

Heavy precipitation that occurred on the 22nd September 2022 from around 19:45 onwards meant the bat dusk emergence surveys on T7 and T7a had to be terminated prematurely, as conditions had become unfavourable for bat activity. No emergences had been observed prior to the onset of the rain. This limitation is not thought to significantly impact upon results as further surveys were completed successfully including a climbing survey where full inspection of the PRF of T7a was possible.

Access to T25 and T26 were restricted and have only had a single bat survey undertaken. However, the trees are outside of the anticipated construction boundary and will not be impacted.

3. Results

3.1 Statutory Designated Sites

One SAC where bats are a qualifying feature is located approximately 25km southeast of the site: Mwyngloddiau Fforest Gwydir/ Gwydyr Forest Mines SAC. The SAC comprises a collection of multiple smaller sites of which the lesser horseshoe bat (*Rhinolophus hipposideros*) is listed as an Annex II species present as a qualifying feature, but not a primary reason for site selection.

Two statutory designated sites were identified within 2km of the site, as detailed in Table 3.1. These two concurrent designated sites are located approximately southeast 1.3km of the site (see Figure 1).

No NNR or LNR were identified within 2km of the site.

Table 3.1: Statutory Designated Sites within 2km

Site Name	Approximate Distance and direction from the site	Designation
Coedwigoedd Dyffryn Elwy/ Elwy Valley Woods SAC	1.3km southeast	Annex I habitats that are a primary reason for selection of this site: <ul style="list-style-type: none"> 9180 Tilio-Acerion forests of slopes, scree and ravines * Priority feature.
Coedydd ac Ogofâu Elwy a Meirchion SSSI	1.3km southeast	SSSI features: <ul style="list-style-type: none"> Semi-natural broadleaved woodland; Calcareous grassland; Assemblage of rare vascular plants; Spiked speedwell (<i>Veronica spicata</i>); Lesser horseshoe bat; Mixed bat assemblage; and Cave interest (Countryside Council for Wales, 2012).

3.2 Non-Statutory Designated Sites

The desk study search identified 13 non-statutory designated sites, all Local Wildlife Sites (LWS) or candidate LWS, within 2km of the site as shown in Table 3.2. The closest LWS to the site is Coed Cord and Coed y Saeson LWS comprised of three areas of ancient woodland where the boundary of the Coed Cord area of woodland is approximately 100m southeast of the site at its closest point.

Although not strictly designated sites, 18 areas of ancient woodland (as per the Ancient Woodland Inventory) were identified within 2km of the site (see Figure 2). This includes the Coed Cord and Coed y Saeson LWS. The ancient woodland habitats are categorised as a mix of ancient semi-natural woodland, restored ancient woodland and plantation on ancient woodland site.

An un-named woodland of restored ancient woodland is present within 20m of the proposed development footprint (see Figure 2, also named as Hendy Gorse in Figures 4 and 5).

Table 3.2: Non-Statutory Designated Sites within 2km

Site Name	Approximate Distance from Site	Citation (Cofnod, 2022)
Coed Cord, block to NW and Coed y Saeson (three areas)	150m	Flat, low lying, ancient woodland including alder (<i>Alnus glutinosa</i>), ash (<i>Fraxinus excelsior</i>), oak (<i>Quercus</i> spp.) and birch (<i>Betula</i> spp.) communities. Hazel (<i>Corylus avellana</i>) forms an extensive herb layer with hawthorn (<i>Crataegus monogyna</i>) and ash and elm (<i>Ulmus</i> spp.) saplings. The herb-layer is varied with dog's mercury (<i>Mercurialis perennis</i>), sanicle (<i>Sanicula europaea</i>), giant fescue (<i>Festuca gigantea</i>), false brome (<i>Brachypodium sylvaticum</i>) and early dog-violet (<i>Viola reichenbachiana</i>).
Bryn Meiriadog	0.7km	Ancient woodland with calcareous grassland and rocky outcrops. Part of the Cefn Estate.
Glascoed (2 areas)	1.14km	Lowland, ancient broadleaved woodland.
Ty'n-y-Coed Rough (2 areas)	1.27km	Flat, lowland broadleaved woodland.
Coed yr Accar (2 areas)	1.35km	Ancient broadleaved woodland.
Plas Newydd/Coed Carreg Dafydd	1.38km	A flat, ancient woodland site with ash and beech woodland communities.
Coed y Ddol/Coed y Fadir	1.39km	A south facing lowland ancient woodland on the valley side of the River Elwy. Wet, alder woodland occurs on lower slopes, ash woodland where it is drier, and silver birch (<i>Betula pendula</i>) woodland where soils are more acid.
Coed Fron and Eryl Hall Wood	1.6km	Ancient woodland with alder, ash, oak and birch communities.
Coed Wig [Candidate]	1.8km	Broadleaved woodland (conifer blocks omitted).
Pwllau Graig [Candidate]	1.84km	Standing water – appear to have been infilled.
Coed Kendrick	1.87km	Ancient broadleaved woodland on a gentle, south facing slope.
Coed Nant-y-graig [Candidate]	1.93km	Broadleaved woodland.
Coed Bont Newydd [Candidate]	1.97km	Broadleaved woodland.

3.4 UK Habitat Classification Survey

Habitats present within the site comprised (see Figure 3):

- modified grassland of poor condition;
- cereal crops;
- species poor, managed hedgerows with trees (a priority habitat) and scattered trees, of moderate condition. These habitats are considered to be of local importance for biodiversity;
- dense scrub (of less than local importance); and
- the existing substation which comprised areas of hardstanding with electrical infrastructure and buildings as well as small areas of modified grassland. These habitats have little to no ecological value and are considered to be of negligible importance.

Figure 3 shows the full UK Habitat Classification survey results over the wider survey area. The habitats recorded are described in Table 3.3. Photographs are provided in Annex A and locations in Figure 3.

Table 3.3: UK Habitat Classification Survey Results

UKHab Primary Habitat	Habitat Condition	Description
g3c - Other neutral grassland: Tall ruderal (1) (Annex A; Table A.2, Photograph 1)	Moderate	Area of grassland left to grow unmanaged. Located near northern boundary of substation adjacent to urban area and woodland. Grass species included Yorkshire fog (<i>Holcus lanatus</i>), red fescue (<i>Festuca rubra</i>), common bent (<i>Agrostis capillaris</i>). Frequent herb species included Tufted vetch (<i>Vicia cracca</i>), field horsetail (<i>Equisetum arvense</i>), broad-leaved willowherb (<i>Epilobium montanum</i>), great willowherb (<i>Epilobium hirsutum</i>), broadleaf dock (<i>Rumex obtusifolius</i>), creeping thistle (<i>Cirsium arvense</i>), meadow buttercup (<i>Ranunculus acris</i>) and perforate St. John's wort (<i>Hypericum perforatum</i>). Occasional species included rush species (<i>Juncaceae</i> spp.), sedge species (<i>Cyperaceae</i> spp.), hop trefoil (<i>Trifolium campestre</i>), scarlet pimpernel (<i>Anagallis arvensis</i>), meadowsweet (<i>Filipendula ulmaria</i>), cut leaf geranium (<i>Geranium dissectum</i>), weld (<i>Reseda luteola</i>) and prickly sow thistle (<i>Sonchus asper</i>).
g3c - Other neutral grassland: Tall ruderal (2) (Annex A; Table A.2, Photograph 2)	Moderate	Area of grassland featuring tall ruderal, north of the substation along the access track. Grass species included cock's-foot (<i>Dactylis glomerata</i>), false oatgrass (<i>Arrhenatherum elatius</i>), brome species (<i>Cytisus</i> spp.) and fescue species (<i>Festuca</i> spp.). Frequent herb species included common hogweed (<i>Heracleum sphondylium</i>), meadowsweet, great willowherb, creeping thistle, meadow vetchling (<i>Lathyrus pratensis</i>), cleavers (<i>Galium aparine</i>) and meadow buttercup. Occasional herb species included red clover (<i>Galium aparine</i>), and scarlet pimpernel.
g3c - Other neutral grassland (Annex A; Table A.2, Photograph 3)	Poor	The access track to the northwest of the existing substation featured an area of species poor grass along its centre. Species included cock's-foot, Yorkshire fog, and perennial rye grass (<i>Lolium perenne</i>). White clover (<i>Trifolium repens</i>) was also frequent.

UKHab Primary Habitat	Habitat Condition	Description
g4 - Modified grassland (Annex A; Table A.2, Photographs 4, 5)	Poor	Two areas of grassland separated by species poor hedgerow and fencing were identified north of the substation. Grazing and management looked to take place, with perennial rye grass and couch grass (<i>Elymus repens</i>) being the only grass species of note. No tall herbs were present.
g4 - Modified grassland (Annex A; Table A.2, Photograph 6)	Poor	Areas of well-maintained species poor modified grassland were located adjacent to buildings and sealed surfaces to the north of the site. Yorkshire fog was the dominant species.
h2a - Hedgerow (1) (Annex A; Table A.2, Photograph 7, 8, 9,)	Moderate	Species rich hedgerow was present to the north of the substation, travelling east to west along the south side of the access track, located northwest of the existing substation. The west side of the hedgerow then extended south along the border of the cropland. The hedgerow was well managed at approximately 2.5m high and 1m wide, with no gaps present. Species included dominant blackthorn (<i>Prunus spinosa</i>) to the west, abundant hawthorn to the east and frequent Dogrose (<i>Rosa canina</i>), hazel, oak, and nettle (<i>Urtica dioica</i>) along the entire length of the hedgerow. Occasional Ash and gorse (<i>Ulex europaeus</i>) were also present along sections of the hedgerow.
h2a - Hedgerow (2) (Annex A; Table A.2, Photograph 10)	Moderate	Hedgerow habitats were present within the carpark of the ambulance service building, to the north of the site. These were approximately 3m tall and 1.5m wide, with no gaps present at the base or along the length of the habitat. No invasive plant species present. The hedgerow was dominated by hawthorn, with frequent hazel, dogwood (<i>Cornus sanguinea</i>), and occasional birch species.
h3 - Dense scrub (Annex A; Table A.2, Photograph 11)	N/A	An area of dense scrub was identified north of the existing substation. Hawthorn was dominant, and blackthorn and nettle were abundant. Frequent species included ivy (<i>Hedera spp.</i>) and hogweed, as well as occasional ash and elder (<i>Sambucus nigra</i>).
w1f - Lowland mixed deciduous woodland (Annex A; Table A.2, Photograph 12)	Moderate	A small area of lowland mixed deciduous woodland was identified to the north of the site, adjacent to the ambulance centre car park. Trees were of varied ages, but no saplings were present. No invasive species were present. More than half of the canopy and understory species were native, with no damage, and less than 20% of the woodland had open space. Tree canopy species included frequent common oak (<i>Quercus robur</i>), and ash, with occasional birch species. The understory featured occasional dogwood.

UKHab Primary Habitat	Habitat Condition	Description
w1h - Other woodland – mixed (Annex A; Table A.2, Photograph 13, 14)	Moderate	An area of plantation woodland was present to the north of the existing substation and to the south of the retail park. Over 50% of the canopy species were native, and no damage was evident. Young and mature trees were present within the woodland. No invasive plant species were identified. The canopy included abundant silver birch, frequent alder, and occasional Acer species. The understorey featured frequent blackthorn and occasional dogwood, young ash, hazel, and elder. The ground layer featured frequent bramble (<i>Rubus fruticosus</i> agg.), ivy, occasional herb-robert (<i>Geranium robertianum</i>), rose sp. (<i>Rosa</i> spp.) and hogweed.
Scattered trees (Annex A; Table A.2, Photograph 15)		Instances of scattered trees were identified in areas of grassland, examples of the species present were common oak, whitebeam (<i>Sorbus aria</i>), and silver birch.
r1a - Eutrophic standing waters (Annex A; Table A.2, Photograph 16)	Moderate	A pond was present within the industrial estate to the north of the substation, . The pond was large, approximately 20m x 25m, and surrounded by woodland planting consisting of oak, birch and dogwood with a scrub understorey.
u1b5 -Buildings	N/A	A business park was identified to the north of the substation. Buildings present included offices and warehouses. The substation also featured a building. Multiple buildings were present within the farm area to the south of the overhead line works, including residential buildings and buildings for agricultural use.
u1b - Developed land; sealed surface (Annex A; Table A.2, Photograph 17)	N/A	The business park and substation featured sealed surfaces in the form of roads, car parks and areas with industrial/electrical equipment use.
u1 - Built up areas and gardens (Annex A; Table A.2, Photograph 18)	N/A	Gardens with modified grassland featuring introduced non-native shrubs were identified in areas around the business park, adjacent to buildings and entrance roads.
c - Cropland (Annex A; Table A.2, Photograph 19, 31 & 35)	N/A	Large crop fields were present to the west and southwest of the substation.

UKHab Primary Habitat	Habitat Condition	Description
g4 - Modified grassland (Annex A; Table A.2, Photograph 20)	Poor	Areas of modified grassland were identified to the south of the substation. Grassland was well managed and possibly grazed by cattle. Perennial rye grass and couch were the dominant species.
g4 - Modified grassland (Annex A; Table A.2, Photograph 21)	Poor	Many areas of managed modified grassland were identified within the south area of the site separated by species poor hedgerows.
h2a - Hedgerows (1) (Annex A; Table A.2, Photographs 22, 23)	Moderate	Many instances of species poor hedgerows were recorded along field boundaries and roads in the area to the south of the substation. These hedgerows were dominated by hawthorn and blackthorn, with rare holly (<i>Ilex</i> spp.). Some instances hedgerows south of the substation also featured occasional tree species such as oak. All the hedgerows were relatively well managed, approximately 1.5m tall and 1m wide, with no invasive species present, and no gaps at the base or along the lengths.
H2a - Hedgerows (2) (Annex A; Table A.2, Photograph 24)	Good	Two hedgerows were present near the south-western boundary of the survey area. These hedgerows were on opposite sides of the road adjacent to the farm. The hedgerows were approximately 3-4m tall, and 1-2m wide, with no gaps at the base or along the length, and no damage. The dominant species was hawthorn with frequent bindweed (<i>Calystegia sepium</i>) and rare sycamore (<i>Acer pseudoplatanus</i>).
h3 - Dense scrub (Annex A; Table A.2, Photograph 25)	N/A	A small area of dense scrub was present in a field of modified grassland to near the south boundary of the site.
w1f - Lowland mixed deciduous woodland (Annex A; Table A.2, Photographs 26-28)	Moderate	An area of lowland mixed deciduous woodland was identified approximately 10 m south of the existing access track to the substation. The north area of the woodland consisted of only oak species of the same age, with bat boxes present in the trees, and grazing looked to take place with more than 50% of this area consisting of open space. The south area of the woodland had 50% of the canopy consisting of native species, and no damage was evident. Young and mature trees were present within the woodland, and no invasive plant species were identified. Canopy species included abundant ash, frequent common oak, and rare pine species (<i>Pinus</i> spp.). The understory featured abundant hawthorn and frequent bindweed.
r2b - Other rivers and streams – Dry ditch	Poor	Several dry ditches were present in areas adjacent to hedgerows located to the south of the substation. Some dry ditches featured piles of rubble that had good potential for reptiles, these are detailed in Appendix A, Table A.1 and shown in Figure 3. The ditches were dry at the time of

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

UKHab Primary Habitat	Habitat Condition	Description
(Annex A; Table A.2, Photograph 29)		survey and featured frequent perennial rye grass and couch grass as well as occasional nettle.
u1b - Developed land; sealed surface (Annex A; Table A.2, Photograph 30)	N/A	Roads and concrete areas were located within the survey area and a farm yard to the west consisted of sealed ground..
g4 - Modified grassland (Annex A; Table A.2, Photograph 32)	Poor	The survey area was dominated by modified grassland, that was used for hay production at the time of the survey. The grassland is generally species-poor (and does not satisfy condition A of the BNG metric condition assessments). The sward has a consistent height throughout and is composed of Perennial Rye-grass (A), Annual Meadow Grass (A), Rough Meadow Grass (A), Creeping Buttercup (F), Daisy (O), Meadow Foxtail (O), Red Fescue (R), False-oat Grass (O), Cock's-foot (F), Dandelion (O), Cow Parsley (R), Creeping Bent (O), Yorkshire Fog (A), Common Mouse ear (O), Creeping Cinquefoil (O), Smooth meadow Grass (A), Blackthorn saplings (R), Common Chickweed (R), Crested Dog's-tail (O), Lesser trefoil (R), Timothy (O), Meadow Buttercup (O), Broadleaved Dock (O), Curled Dock (O), White Clover (A), Spear thistle (R), Creeping Thistle (R), Common Hogweed (O).
g4 - Modified grassland (Annex A; Table A.2, Photograph 33)	Poor	Other fields of modified grassland were grazed predominantly by sheep and cattle. The grassland sward is species-poor and has been grazed to a short height (the grassland does not support enough species diversity to satisfy criteria A or have the structural diversity to stratify criteria B of the BNG metric condition assessments). Species composition includes Yorkshire fog (A), perennial rye-grass (A), red fescue (<i>Festuca rubra</i>) (A), annual meadow grass (F), creeping bent (O), crested dog's tail (R), Creeping Buttercup (O) and common mouse-ear (O).
W1g- Other Woodland Broad-leaved (Annex A; Table A.2, Photograph 34)	Moderate	An area of broad-leaved woodland was located within the Overhead Line Works and Access Boundary. However, this is avoided by the existing overhead line infrastructure and no impact would occur through the project. This plantation woodland was dominated by English oak (D - composing of about 90% of the tree species), hawthorn, ash, willow also occur. The ground flora was composed a low growing scrub and ruderal species including bramble, common nettle, false-oat grass, cock's-foot, greater willowherb, cleavers and meadow sweet. The woodland was fenced off from the surrounding agricultural land and a dry ditch ran along the northern boundary.
H2a - Hedgerows (species-poor) (Annex A; Table A.2, Photograph 36)	Moderate	Several hedgerows existed within the survey area on field margins. The hedgerows appeared to have been subject to frequent management keeping them at an approximate height of between 2m and 4m in height and average width of 2m (none of the hedgerows were less than 1.5m wide at any point). The hedgerows were not found to support gaps at the bases, or along the length except at the site access points. The hedgerows were not found to support a band of perennial herbaceous vegetation of at least 1m from one edge. There were no species indicative of nutrient enrichment, no invasive non-native species were present and there were no signs of damage due to human activities.
H2a - Hedgerows (Species-rich)	Moderate	





UKHab Primary Habitat	Habitat Condition	Description
(Annex A; Table A.2, Photograph 37)		<p>Some of the hedgerows supported mature trees which satisfy the additional criteria of having trees in a healthy condition but not supporting more than one age class.</p> <p>The typical species composition for the species-poor hedgerows was blackthorn (A), hawthorn (A), elder (O), holly (R) and elm (R).</p> <p>The typical species composition for the species-rich hedgerows was blackthorn (A), hawthorn (A), elder (O), holly (O) and elm (O), hazel (F), dog rose (O), honeysuckle (F), gorse (O), white bryony (R), ash (R), sycamore (R) and ivy (F).</p>
<p>R1g – Other standing water (Wet Ditch)</p> <p>(Annex A; Table A.2, Photograph 38)</p>	Poor	There was a wet ditch that flows through the site, to the east, which was shaded by hawthorn and blackthorn scrub. The ditch had a shallow water level and was poached in places (minor). There was no aquatic or marginal vegetation associated with the ditch and it is possible that it dried out at times.
<p>Pond</p> <p>(Annex A; Table A.2, Photograph 39)</p>	Moderate	A pond to the east of the site, north of the overhead line works, was assessed as having a moderate condition due to the presence and coverage of duckweed (<i>Lemna</i> sp.) and the lack of other aquatic vegetation
<p>u1b - Developed land; sealed surface</p> <p>(Annex A; Table A.2, Photograph 40)</p>	N/A	Roads, access tracks and areas of hardstanding/buildings were present within the survey area and immediately adjacent to it.

3.5 Great crested newt

Several records of GCN were returned from Cofnod between 1993 and 2022. The nearest record was located approximately 0.3km north-east of the site. Records of common toad (*Bufo bufo*), common frog (*Rana temporaria*), smooth newt (*Lissotriton vulgaris*) and palmate newt (*Lissotriton helveticus*) were also returned.

Ten ponds were identified as requiring further survey for GCN (see Figure 4). However, during the field survey, five of the ten ponds were dry or no longer existed: ponds 2, 4, 6, 7 and 8. These ponds were not subject to further survey. Ponds 1, 3, 5, 9 and 10 were subject to HSI and eDNA assessments with full bank-side access possible. A description and photographs of these ponds are provided in Table 3.4.

Table 3.4: Pond description

Pond ID (see Figure 4)	Description	Photograph
Pond 1	Pond in corner of grazed field, fenced off from livestock poaching with tall ruderal vegetation on the bankside. Iris and some pondweed present. Pond shallow at time of survey with 2-3cm of water present.	
Pond 3	Pond present within centre of cropland field. The pond was surrounded by willow and mixed scrub. Heavy layer of duckweed on surface.	<i>No photograph</i>
Pond 5	Pond was present within a field boundary and comprised a shallow depression filled with grass from surrounding arable/graed grassland.	
Pond 9	Large pond, approximately 20m x 25m located within an industrial estate. Surrounded by woodland planting consisting of oak, birch and dogwood with a scrub understory.	
Pond 10	Large lake approx. 35m x 100m within an industrial estate. Moderate levels of algae and duckweed present with ducks and likely fish. Plantation woodland bordered well vegetated banks.	

3.5.1 Habitat Suitability Index Assessment

The output of the HSI assessment determined all surveyed ponds to have below average suitability to support GCN, see Table 3.5. Ponds 1, 3 9 and 10 are also considered to be suitable to support populations of common toad.

Table 3.5: HSI Assessment score and suitability categories

Habitat Suitability Index		Pond 1	Pond 3	Pond 5	Pond 9	Pond 10
SI ₁	Location	A	A	A	A	A
SI ₂	Pond area	81m ²	160m ²	10m ²	563m ²	1826m ²
SI ₃	Pond drying	Sometimes	Rarely	Annually	Never	Never
SI ₄	Water quality	Moderate	Poor	Poor	Moderate	Moderate
SI ₅	Shade	10%	90%	10%	40%	10%
SI ₆	Waterfowl	Minor	Minor	Absent	Minor	Minor
SI ₇	Fish	Minor	Minor	Absent	Major	Major
SI ₈	Pond count	14	14	14	14	14
SI ₉	Terrestrial habitat	Good	Moderate	Moderate	Good	Good
SI ₁₀	Macrophytes	20%	100%	40%	75%	45%
HSI Score		0.58	0.59	0.59	0.55	0.54
Suitability		Below Average	Below Average	Below Average	Below Average	Below Average

3.5.2 Environmental DNA

Three ponds returned positive eDNA results for GCN. The eDNA results for surveyed ponds is summarised in Table 3.6. A negative result means that no GCN DNA has been detected in the sample and therefore the likely absence of GCN can be concluded. A positive result indicates the presence of GCN within the ponds.

Pond 5 is located within the Overhead Line Works and Access Boundary (see Figure 4) and has been identified as positive result indicating the presence of GCN, the pond.

Table 3.6: eDNA results

Pond ID (see Figure 4)	GCN eDNA Presence
Pond 1	Present
Pond 3	Absent

Pond ID (see Figure 4)	GCN eDNA Presence
Pond 5	Present
Pond 9	Present
Pond 10	Absent

3.6 Bats

The data search identified records of the following bat species within 2km of the site:

- Daubenton's bat (*Myotis daubentonii*);
- Whiskered bat (*Myotis mystacinus*);
- Natterer's bat (*Myotis nattereri*);
- Noctule bat;
- Common pipistrelle;
- Soprano pipistrelle;
- Brown long-eared bat;
- Lesser horseshoe bat; and
- Brandt's bat (*Myotis brandti*).

3.6.1 Ground based assessment of trees for roosting bats

The ground based assessment of trees for bat roost potential identified twenty-seven trees within the survey area. Two trees were assessed as negligible bat roosting potential, seven trees with low bat roosting potential, nine trees with moderate bat roosting potential and nine trees with high bat roosting potential (See Table 3.7 and Figure 5).

All trees assessed as moderate and high bat roosting potential (eighteen of the twenty-seven trees) assessed were then subject to further surveys which included dusk emergence, dawn re-entry and aerial inspection (endoscope) surveys.

Table 3.7: Ground based assessment of trees for roosting bats

Tree ref.	Distance to Proposed works	Tree Species	Tree age	Diameter at Breast Height (m)	Location	Potential Roost Features	Bat Roost Potential
T1	Within Substation Extension Boundary	Oak	Mature	0.8m	SJ 01552 73604 Field boundary	Split up main stem. However, no suitable features with any suitable crevices exposed to elements	Low

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

Tree ref.	Distance to Proposed works	Tree Species	Tree age	Diameter at Breast Height (m)	Location	Potential Roost Features	Bat Roost Potential
T2	Within Substation Extension Boundary	Oak	Mature	0.8	SJ 01509 73616 Field boundary	Tree tag 0250. Dead limbs with splits, however, these are exposed to elements	Low
T3	On Substation Extension Boundary	Oak	Mature	0.8	SJ 01519 73628 Field boundary	Very thin ivy cover. No other features	Negligible
T4	10m north of Substation Extension Boundary	Oak	Mature	0.6	SJ 01518 73643 Field boundary	Rotted limbs with loose bark and exposed cavities. Large fissure in main trunk leading to suitable cavities.	High
T5	50 m north of Substation Extension Boundary	Oak	Mature	-	SJ 01531 73663 Edge of woodland strip	Superficial damage	Negligible
T6	40m north of Substation Extension Boundary	Oak	Mature	1	SJ 01471 73658 Field boundary next to access track	Large rotten limb with split stem leading to raised bark and cavity.	Moderate
T7	Within Overhead line Boundary	Dead	Mature	0.5	SJ 01398 73387 Field boundary	Loose bark and multiple stem cavities	High
T7A	Within Overhead Line Boundary	Oak	Mature	0.7	SJ 01415 73409 Field boundary	Woodpecker hole leading to cavity on limb	High – later confirmed as a roost (see Section 3.5.3)

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

Tree ref.	Distance to Proposed works	Tree Species	Tree age	Diameter at Breast Height (m)	Location	Potential Roost Features	Bat Roost Potential
T8	Within Substation Extension Boundary	Oak	Mature	-	SJ 01522 73527 Field boundary	Superficial damage	Low
T9	Within Overhead Line Boundary	Oak	Mature	0.7	SJ 01502 73502 Field boundary	Split limb leading to cavity	Moderate, Later downgraded to Negligible (see Section 3.5.3)
T10	Within Overhead Line Boundary	Oak	Mature	-	SJ 01485 73484 Field boundary	Superficial area of raised bark	Low
T11	Within Overhead Line Boundary	Oak	Mature	0.8	SJ 01462 73336 Field boundary	Dead branch coming off main limb on southwest aspect. Raised bark around limb leading to potential cavity	High
T12	Within Overhead Line Boundary	Oak	Mature	1.1	SJ 01478 73257 Field boundary	Multiple split limbs leading to raised bark and cavity in the crown of the tree.	Moderate
T13	Within Overhead Line Boundary	Oak	Mature	0.8	SJ 01394 73191 Field boundary / hedgerow	Split/dead limbs leading to raised bark and cavity. Rot hole from tear off. All on southern aspect.	Moderate
T14	Within Overhead Line Boundary	Oak	Mature	1	SJ 01380 73177 Field boundary / hedgerow	No visible features from the ground however potential for the tree to have suitable PRF.	Low

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

Tree ref.	Distance to Proposed works	Tree Species	Tree age	Diameter at Breast Height (m)	Location	Potential Roost Features	Bat Roost Potential
T15	Within Overhead Line Boundary	Oak	Mature	1.1	SJ 01359 73280 Field boundary / road edge	Single hole into main stem and crack within pruned limb above.	High Later confirmed roost (see Section 3.5.2)
T16	Within Overhead Line Boundary	Oak	Mature	1.2	SJ 01213 73350 Corner of field, north of road	Dying crown, lots of loose bark with multiple PRF throughout the tree	High
T17	Within Overhead Line Boundary	Oak	Mature	0.9	SJ 01189 73364 Field boundary, north of road	Split limb leading to potential cavity on main stem.	Moderate
T18	Within Overhead Line Boundary	Oak	Mature	1.1	SJ 01181 73355 Field boundary, south of road, raised.	Rotting limb leads to multiple features in crown	Moderate
T19	Within Overhead Line Boundary	Oak	Mature	0.9	SJ 01162 73377 Field boundary, north of road	Broken branch leading to lifted bark	Moderate
T20	Within Overhead Line Boundary	Oak	Mature	0.7	SJ 01141 73387 Field boundary, north of road	Rot hole / woodpecker hole in broken limb.	High

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

Tree ref.	Distance to Proposed works	Tree Species	Tree age	Diameter at Breast Height (m)	Location	Potential Roost Features	Bat Roost Potential
T21	Within Overhead Line Boundary	Oak	Mature	1	SJ 01129 73393 Field boundary, north of road	Knot hole in main stem on eastern face of main trunk approx. 20m high	High
T22	5m west of Overhead Line Boundary	Oak	Mature	0.7	SJ 01117 73397 Field boundary, north of road	Twisted dead limbs lead to multiple cracks and crevices	Moderate
T23	Within Overhead Line Boundary	Oak	Mature	0.8	SJ 01115 73394 Field boundary south of road	No visible features but state of tree suggests potential for PRF.	Low
T24	20m north of Overhead Line Boundary	Oak	Mature	0.6	SJ 01082 73414 Field boundary north of road	No suitable features visible for state of tree suggests PRF.	Low
T25	25m north of Overhead Line Boundary	Oak	Mature	1.2	SJ 01059 73420 Field boundary south of road	Lifted bark on dead limb	Moderate
T26	Immediately north of the Overhead Line Boundary	Oak	Mature	1.5	SJ 00990 73419 Field boundary west of road.	A lifted bark leading to suitable PRF throughout crown of tree	High

3.6.2 Dusk emergence and dawn re-entry

Table 3.8 summarises the programme of dusk emergence and dawn re-entry bat surveys. Weather conditions for all surveys are detailed in Annex B. Bat emergence/re-entry was recorded on T15 (OS Grid reference SJ 01359 73280) from two separate features on its southern aspect. Two soprano pipistrelle bats emerged from PRF 2 on 30th August 2022; one at 20:13 and the second at 20:25. A single soprano pipistrelle re-entered PRF 1 on 23rd September at 06:33. Two soprano pipistrelle bats emerged on 29th September; the first at 19:11 from PRF 2, and the second at 19:13 from PRF 1. IR camera footage confirmed the emergence from PRF 1 on 29th September 2022 at 19:13. No other bat roosts were observed during the 2022 surveys. Photographs in Annex C show the roosting features.

General bat activity was recorded during the surveys including foraging, commuting, or social call behaviour was noted from the below eight species:

- Common pipistrelle;
- Noctule;
- Soprano pipistrelle;
- Natterer's bat*;
- Daubenton's bat*;
- Lesser horseshoe bat;
- Brown long-eared bat; and
- Brandt's bat*.

**Probable species identification*

No bat emergence or re-entry was recorded during any of the surveys undertaken in 2023. Low levels of bat activity were recorded for most of the surveys, similar to those recorded during the 2022 surveys. Common and soprano pipistrelle was the most common species recorded either foraging, commuting with low levels of social calls observed. Noctule was also recorded during majority of the surveys but were often distant calls. Other low-level activity was recorded and included brown long eared bat and myotis sp., (likely Brandt's bat and Daubenton's bat).

Table 3.8: Summary of bat emergence / re-entry surveys

Tree ref.	Tree Species	Date of survey	Temp at start of survey (°C)	Survey notes	Survey type	Start/finish time	Roost present	Roost Details
T4	Oak	06/09/22	16	Foraging activity throughout survey	Emergence	19:37 / 21:52	No	N/A
		29/05/2023	16	General foraging and commuting activity observed throughout, mainly soprano and common pipistrelle with the occasional myotis and noctule calls observed.	Emergence	21:14 / 23:29	No	N/A
		20/06/2023	14	Low activity of individual soprano and common pipistrelle heard and seen foraging along tree line of T4.	Re-entry	03:19 / 05:01	No	N/A
T6	Oak	07/09/22	13	Minimal activity during survey, one soprano pipistrelle seen commuting along road	Re-entry	04:29 / 06:47	No	N/A
T7	Dead	31/08/22	19	Foraging and commuting activity recorded of pipistrelle sp. and natterers bat.	Emergence	19:50 / 22:05	No	N/A
		22/09/22	15	Suspected emergence observed at 19:30 of a soprano pip, however, this was not supported by IR camera footage and is thought the bat flew around tree. Noctule seen commuting west at 19:28.	Emergence	18:58 / 21:13	No	N/A
		31/05/2023	9	Low levels of commuting activity, mostly distant common pipistrelle, myotis and brown long eared bat call observed.	Re-entry	02:54 / 05:09	No	N/A
T7A	Oak	31/08/22	21	Common and soprano pipistrelle foraging throughout survey	Emergence	19:50 / 22:05	No	N/A
		22/09/22	15	Noctule seen commuting south, soprano pip foraging throughout. Survey called off at 20:15 due to heavy rainfall.	Emergence	18:58 / 21:13	No	N/A
T9	Oak	07/09/22	17	No emergences, foraging throughout survey from soprano pip and noctules	Emergence	19:35 / 21:50	No	N/A

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

Tree ref.	Tree Species	Date of survey	Temp at start of survey (°C)	Survey notes	Survey type	Start/finish time	Roost present	Roost Details
T11	Oak	08/09/22	13	Minimal activity throughout survey, one soprano pip seen commuting into woodland	Re-entry	04:35 / 06:50	No	N/A
		01/06/2023	9	Low levels of soprano pipistrelle, myotis and noctule calls heard and one soprano pipistrelle observed foraging along hedge.	Re-entry	02:54 / 04:54	No	N/A
		19/06/2023	16	Low activity of noctule, soprano and common pipistrelle heard. Only noctule was observed commuting west to east.	Emergence	21:30 / 23:05	No	N/A
T12	Oak	21/09/22	16	Common and soprano pipistrelle along with brown long-eared bat recorded. Frequent Noctule calls recorded between 19:51-20:05	Emergence	19:00 / 21:15	No	N/A
		30/09/22	10	Distant calls recorded from brown long-eared, noctule, and soprano pip	Re-entry	05:15 / 07:27	No	N/A
T13	Oak	22/09/22	14	Minimal activity throughout survey, distant lesser horseshoe call picked up at 05:47 (confirmed from sound analysis)	Re-entry	05:00 / 07:15	No	N/A
T15	Oak	30/08/22	19	One emergence of a single soprano pipistrelle from hole on main stem at 20:13. One emergence of a single soprano pipistrelle from crack within pollarded limb at approximately 20:25.	Emergence	05:00 / 07:15	Yes	One soprano pipistrelle emergence from hole in main stem at 20:13 and one soprano pipistrelle emergence from crack within pruned limb at 20:25. Ivy cover blocked IR camera from capturing footage. Both observations were confirmed from sound analysis.
		23/09/22	13	One re-entry of a single soprano pipistrelle at 06:33. Minimal activity throughout rest of the survey with only a few foraging calls recorded.	Re-entry	05:00 / 07:15	Yes	One re-entry into cavity on main stem at 06:33, bat flew from west and entered the cavity within the main stem of the tree.
		29/09/22	12	One emergence of a single soprano pipistrelle at 19:11, and then one further emergence of a single soprano pipistrelle 1 at 19:13. Foraging activity up and down hedgerow throughout rest of survey.	Emergence	05:00 / 07:15	Yes	One emergence from PRF 1 at 19:11 and one emergence from PRF 2 at 19:13. This second emergence was captured on IR camera footage.

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

Tree ref.	Tree Species	Date of survey	Temp at start of survey (°C)	Survey notes	Survey type	Start/finish time	Roost present	Roost Details
T16	Oak	31/08/22	11	Brown long-eared bat recorded foraging, natterers bat and common/soprano pipistrelle also recorded throughout survey.	Re-entry	04:21 / 07:15	No	N/A
		30/05/2023	10	Moderate levels of activity recorded for common & soprano pipistrelle and single call observed of	Emergence	21:13 / 23:28	No	N/A
		21/06/2023	15	Continuous soprano pipistrelle foraging activity observed along hedge of T16 with calls heard sporadically for noctule and common pipistrelle.	Re-entry	03:19 / 05:01	No	N/A
T17	Oak	01/09/22	12	Foraging up and down hedgerow recorded throughout survey.	Re-entry	04:50 / 06:38	No	N/A
		28/09/22	12	Frequent soprano pip calls throughout. Some common pip, brown long-eared and noctule calls recorded	Emergence	18:43 / 20:58	No	N/A
T18	Oak	01/09/22	12	Soprano pip activity throughout survey	Re-entry	04:50 / 06:38	No	N/A
		28/09/22	12	Foraging activity throughout survey, soprano/common pip as well as a brown long-eared bat recorded at 19:47. All bats heard not seen	Emergence	18:43 / 20:58	No	N/A
T19	Oak	02/09/22	14	Mainly soprano pipistrelles recorded throughout, foraging a commuting activity	Re-entry	04:50 / 06:40	No	N/A
		29/09/22	12	Frequent common and soprano pip activity throughout.	Re-entry	05:10 / 7:25	No	N/A
T20	Oak	01/09/22	21	Frequent common and soprano pip activity throughout.	Emergence	19:48 / 22:02	No	N/A
		29/09/22	12	Generally quiet survey with some soprano foraging throughout	Re-entry	05:10 / 07:25	No	N/A
		01/06/2023	15	Low levels of activity recorded for common and soprano pipistrelle displaying foraging and	Emergence	21:16 / 23:31	No	N/A

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

Tree ref.	Tree Species	Date of survey	Temp at start of survey (°C)	Survey notes	Survey type	Start/finish time	Roost present	Roost Details
				commuting behaviour. Noctule was observed foraging west to east above the tree canopy. Two passes of brown long eared was observed and myotis was recorded commuting.				
T21	Oak	01/09/22	21	Foraging activity recorded throughout survey	Emergence	19:48 / 22:02	No	N/A
		01/06/2023	15	Low levels of activity recorded for common and soprano pipistrelle displaying foraging and commuting behaviour. Brown long eared bat and noctule was heard foraging occasionally.	Emergence	21:16 / 23:31	No	N/A
		20/06/2023	15	Low levels recorded of common pipistrelle foraging and commuting of three individuals along hedge of T21 and T22. Noctule bat heard in the distance. Low levels of brown long eared bats heard.	Emergence	21:30 / 23:05	No	N/A
T22	Oak	02/09/22	14.5	Soprano pipistrelle, brown long-eared bat and noctule all recorded	Re-entry	04:55 / 06:55	No	N/A
		21/06/2023	16	Low levels of foraging and commuting soprano and common pipistrelle along hedge and commuting east. Noctule observed foraging in adjacent field to the north. Brown long eared calls recorded in the distance.	Emergence	21:30 / 23:05	No	N/A
T25	Oak	20/09/22	16	General foraging and commuting activity observed throughout, mainly soprano and common pipistrelle	Emergence	19:03 / 21:18	No	N/A
T26	Oak	21/09/22	10	Generally quiet survey with little activity recorded, soprano pipistrelle and myotis calls observed	Re-entry	04:58 / 07:13	No	N/A

3.6.3 Tree climbing inspection

Table 3.8 summarises the results of the tree climbing inspection surveys. The surveys identified and confirmed a bat roost present within T7a on the 25th of March 2023. The roost was identified within a pruning cut on the west side of the tree at approximately 1.7m high (PRF-b). A single pipistrelle sp. bat was identified via the endoscope viewer but the identification on species level was not possible due to the angle the bat was situated. Photographs in Annex C show the roosting features. No bat roost or evidence of bats were recorded within T6, T9 and T13.

Table 3.8: Summary of tree climbing inspections for bats

Tree ref.	Tree Species	Survey Visit No.	Survey Notes	Roost Present	Roost Details
T6	Oak	V2	<p>PRF-a: Lifting bark - crevice between the bark and the heartwood. Inactive birds' nest on top of exposed heartwood at top of the same limb. Cavity entrance 20cm high / 2.5cm wide / 6cm deep. DPH 25cm. Doesn't extend down - flat base. Extends up 7cm with domed apex. Internal up dimensions 3x4cm. Debris, bumpy, no smell, dry. No bats or evidence of bats.</p> <p>PRF-b: Newly described sub-feature (unable to see from ground). Tear out on upper side of northern facing limb at height of 6m. DPH 30cm. Entrance 3cm high and 2cm wide. Extends up 4cm with a width of 3cm and depth of 4cm. Dome apex. Doesn't extend down. Some bird droppings at base. Debris, rough, no smell, dry. No bats or evidence of bats.</p>	No	N/A
T7a	Oak	V3	<p>1 x Pipistrellus sp. in PRF-b found within a pruning cut on west side at 1.7m high (feature not mentioned in ground-based notes). Unable to identify whether common or soprano due to angle the bat was sitting / quality of images from endoscope. Located above the entrance approximately 10cm, bat was awake.</p> <p>PRF-a: knothole northeast facing. Extends up and down at least 1m - unable to fully inspect, high potential.</p>	Yes	Single pipistrelle bat recorded within feature b of a pruning cut.
T9	Oak	V2	Feature too exposed with bird droppings. Downgraded to negligible.	No	N/A
T13	Oak	V2	The split/dead limbs and raised bark and rot hole cavity inspected but no evidence of bats found.	No	N/A

3.6.4 Bat survey results evaluation

One soprano pipistrelle bat roost was confirmed in T15. The roost features of T15 are considered to be actively used as a regular roost for individuals/small groups of male or non-breeding female bats.

A single pipistrelle bat (undefined species) roost was confirmed in T7a during the tree climb survey in March 2023. The roost feature of T7a is considered likely to be used by male or non-breeding female bats, sporadically as a transitional/occasional roost to shelter during the prolonged cold spells of the winter. T7a and T15 are both located within the Overhead Line Works and Access Boundary. However these trees will be retained.

A single lesser horseshoe bat was heard and recorded, at distance, during the 2022 dawn re-entry survey of T13. Lesser horseshoe bat was not recorded during any other surveys of 2022 and 2023. Lesser horseshoe bat is listed as an Annex II species and a qualifying feature of Mwyngloddiau Fforest Gwydir/ Gwydyr Forest Mines SAC which is located approximately 25km from the site and a feature of the Coedydd ac Ogofâu Elwy a Meirchion SSSI which is located approximately 1.3km south-east of site.



3.7 Invasive species

Four records of Himalayan balsam (*Impatiens glandulifera*), two records of Japanese knotweed (*Fallopia japonica*) and one record of Montbretia (*Crocasmia x crocosmiiflora*) were returned by the desk study. The closest is a record of Himalayan balsam approximately 1.78km north of the site, which was recorded as a small area of growth alongside a stream in 2021. No INNS were identified during field survey.

3.8 Other species

The desk study returned nine records of grass snake (*Natrix helvetica*) within 2km of the site. Suitable refugia (see Table 3.9 and Figure 3) and foraging habitat for reptiles, including grass snake, were recorded within the site comprising hedgerows, tall ruderal vegetation and dry ditches. TN1 and TN3 are not anticipated to be impacted by the proposed work and TN2 is not within the proposed working area for either substation extension or Overhead Lines. The cropland and grassland habitats on-site provided sub-optimal potential as reptile habitat due to their short sward and heavily managed nature. A small population of reptiles are assumed to be present.

Table 3.9: Habitat suitable for reptiles

Description	Photograph	Description	Photograph
<p>TN1 (Figure 3)</p> <p>Pile of rocks good for reptiles</p> <p>r2b – dry ditch</p>		<p>TN3</p> <p>Pile of rocks good for reptiles</p> <p>G4</p>	

Description	Photograph	Description	Photograph
<p>TN2</p> <p>Pile of rocks good for reptiles</p> <p>G4</p>		-	-

The desk study returned three records of hazel dormouse (*Muscardinus avellanarius*) within 2km of the site. The closest record was approximately 1.2km southwest within Coed Plas Newydd woodland in 2013. Dormouse are considered rare in this part of Wales. The ancient woodland (Coed Cord and Coed y Saeson LWS), approximately 100m south-east of the site provided potential habitat for dormouse, with connectivity to the site via the surrounding hedgerows. However, the hedgerows present were heavily managed by farming practices reducing suitability for dormouse.

Scrub, hedgerow, and scattered trees across the site had potential to support tree and shrub nesting birds. Grassland field margins and arable habitats had the potential to support ground-nesting birds. The site also had potential to be used by foraging barn owl (*Tyto alba*) but there was negligible potential for roosting/nesting barn owl within buildings or trees within the site. Equipment surrounding the transformer within the existing substation, such as surge arresters, provided suitable areas for nesting birds. However, no evidence of Schedule 11 listed bird species was recorded during the field surveys.

A single disused badger sett (a single hole) was recorded in 2021, as part of the Preliminary Ecological Appraisal (Jacobs, 2021). However, no evidence of this sett was recorded during the subsequent surveys in 2022 and 2023. A live badger was observed during a dusk emergence bat survey foraging along the road to the north of the site.

Small mammals including hedgehog (*Erinaceus europaeus*) are likely to be active across the site particularly in hedgerows and scrub.

No suitable habitat for otter (*Lutra lutra*), water vole (*Arvicola amphibius*) or white-clawed crayfish (*Austropotamobius pallipes*) were recorded within the site. The habitats present and desk study do not indicate the presence of important invertebrate assemblages.

¹ Wildlife and Countryside Act 10981 (as amended)

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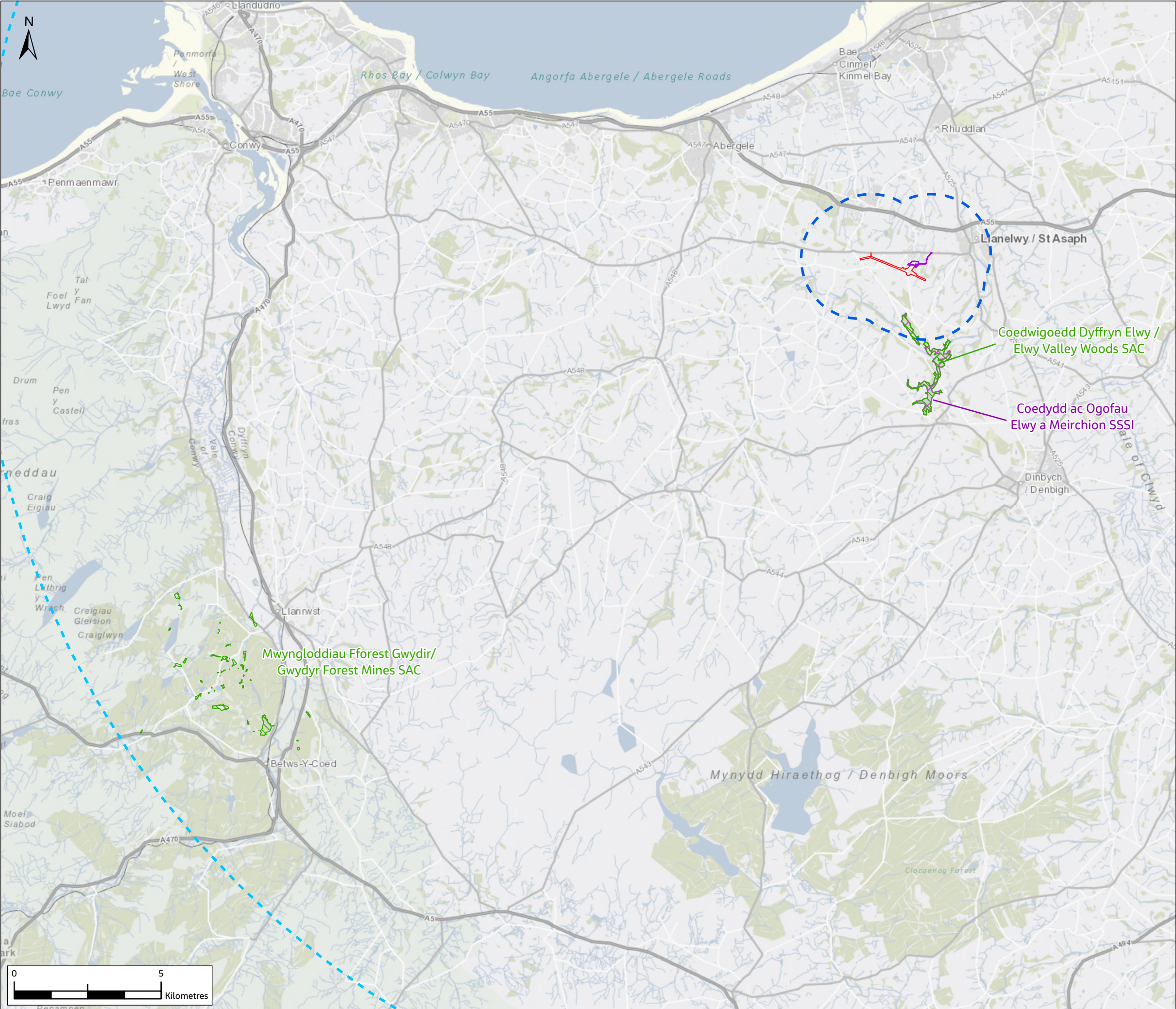
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5. Figures

Figure 1. Statutory Designated Sites



Legend

- Overhead Line Works and Access Boundary
- Substation Extension Application Boundary (includes access road and existing substation)
- 2km Buffer
- 30km Buffer
- Special Areas of Conservation (SAC)
- Sites of Special Scientific Interest (SSSI)

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Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

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Client

Project

BODELWYDDAN SUBSTATION

Drawing Title

STATUTORY DESIGNATED SITES PLAN

Drawing No.

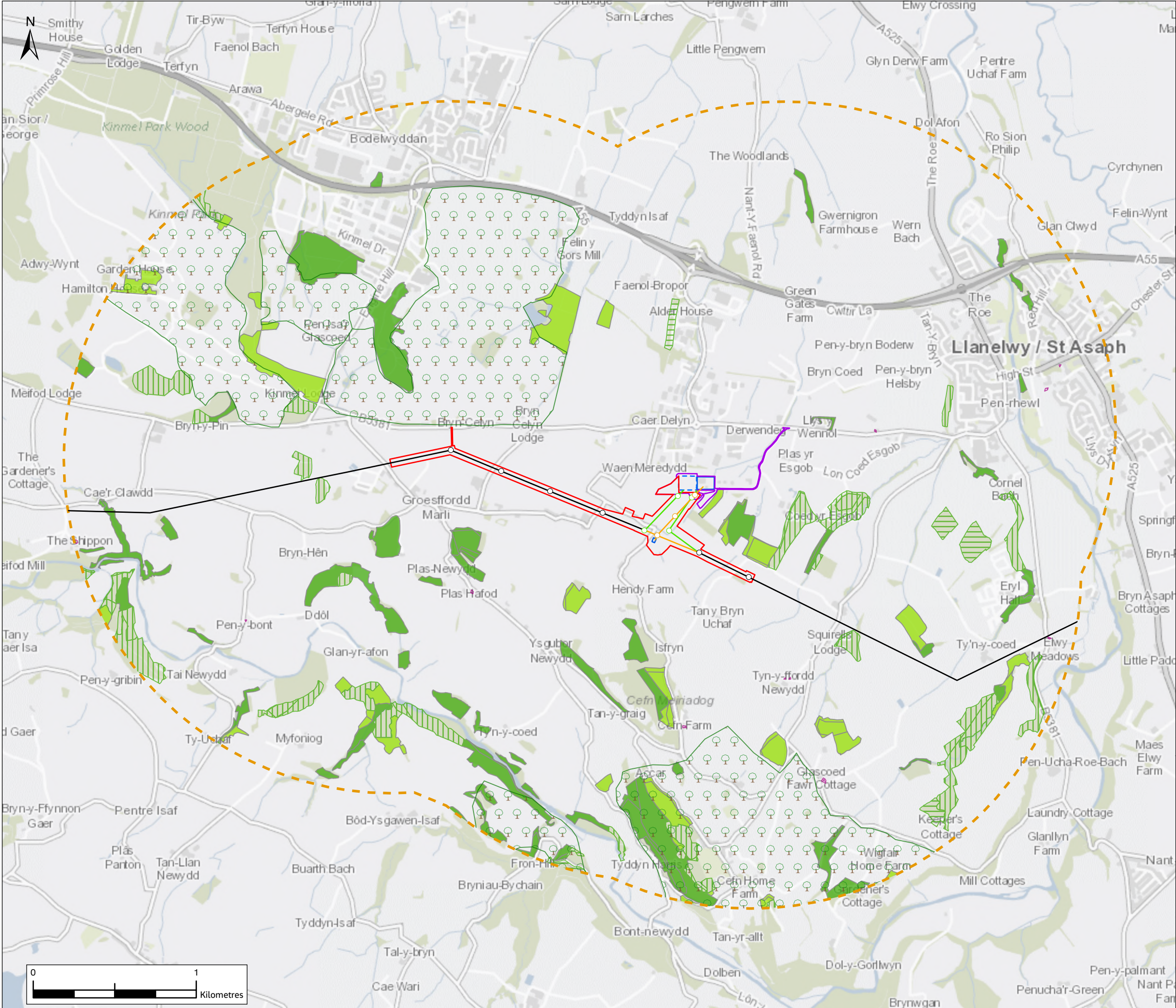
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Drawing Status

FINAL

FIGURE 1

Figure 2. Ancient Woodland and Priority Habitats



Legend

- Overhead Line Works and Access Boundary
- Substation Extension Application Boundary (includes access road and existing substation)
- Substation Extension Boundary
- Existing Substation Boundary
- Existing Overhead Line and Towers - Retained
- New Overhead Lines and Towers
- Existing Overhead Lines and Towers - Removed
- 2km Buffer

Priority Habitats

- Parkland
- Traditional Orchards

Ancient Woodland Inventory

- Ancient Semi Natural Woodland
- Restored Ancient Woodland Site
- Plantation on Ancient Woodland Site
- Ancient Woodland Site of Unknown Category

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BODELWYDDAN OVERHEAD LINES

Drawing Title

ANCIENT WOODLAND AND PRIORITY HABITATS AREAS

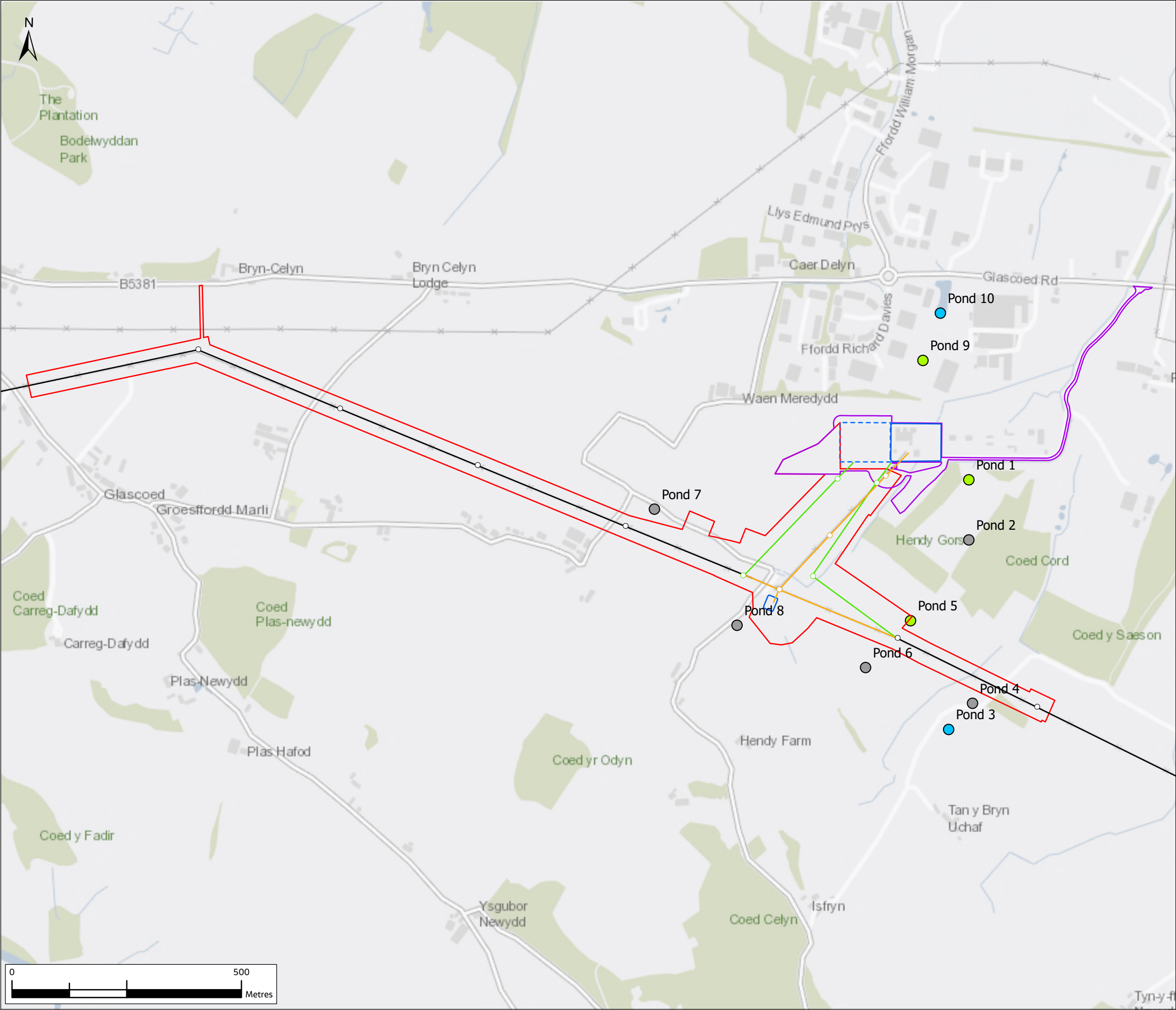
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FIGURE 2

Figure 3. UK Habitats Classification



Figure 4. Great Crested Newt eDNA



Legend

- Overhead Line Works and Access Boundary
- Proposed Substation Extension Works Boundary
- Existing Substation
- Substation Extension
- Existing Overhead Line and Towers - Retained
- Existing Overhead Lines and Towers - Removed
- New Overhead Lines and Towers

Great Crested Newt eDNA Survey Result

- dry
- negative
- positive



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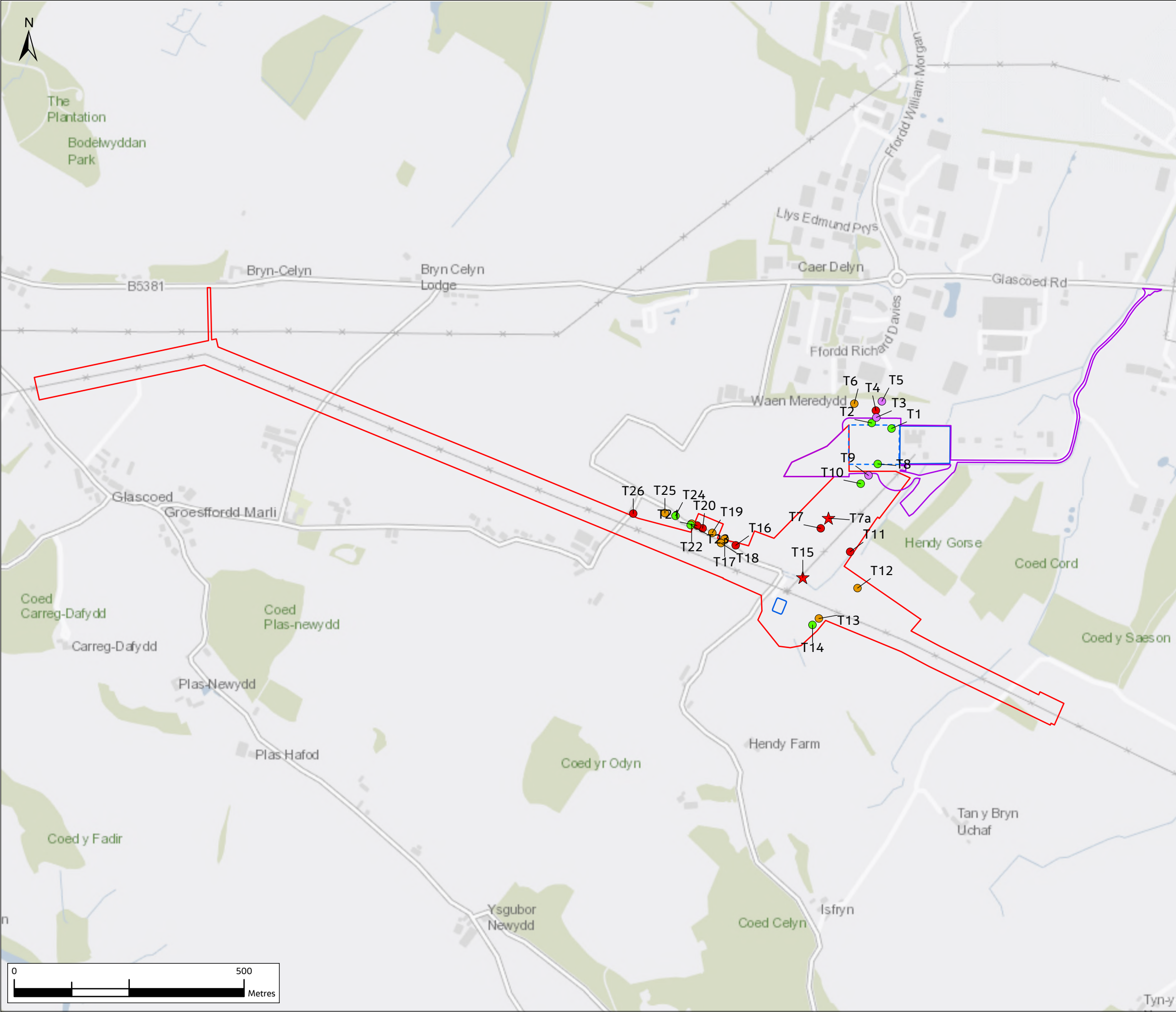
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FIGURE 4

Figure 5. Bat Survey



Legend

Overhead Line Works and Access Boundary

Proposed Substation Extension Works Boundary

Substation Extension Boundary

Existing Substation Boundary

Existing Overhead Lines and Towers - Removed

New Overhead Lines and Towers

Existing Overhead Line and Towers - Retained

Tree - bat roosting potential

★

Confirmed Bat Roost

●

High - Confirmed

●

Moderate

●

Negligible

●

Low

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02	6/16/2025	FINAL	WW	RW	LG	TW
Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

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Scale: 1:8,000

DO NOT SCALE

Jacobs No. B2416603

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Project

BODELWYDDAN SUBSTATION

Drawing Title

BAT SURVEY

Drawing No.













B2416603/BODEL/BS/001

Drawing Status





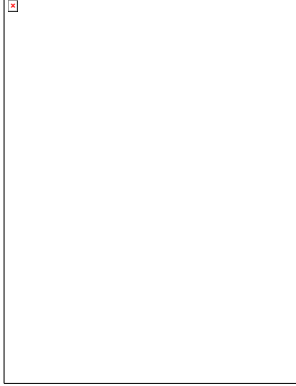







FINAL

FIGURE 5

Annex A. Habitat Survey Photographs

			
Photograph 1 Other neutral grassland: Tall ruderal, identified on site.	Photograph 2: Other neutral grassland: Tall ruderal, identified on site.	Photograph 3: other neutral grassland identified along road on site.	Photograph 4: Well managed other neutral grassland: semi improved, identified north of substation.
			
Photograph 5: Well managed other neutral grassland: semi improved, identified north of substation.	Photograph 6: well managed modified grassland identified north of the site, adjacent to buildings and sealed surfaces.	Photograph 7: Species rich hedgerow identified to the west of the crop field in the north area of the site.	Photograph 8: Species rich hedgerow identified north of the substation between semi improved neutral grassland and the road.
			
Photograph 9: Species rich hedgerow identified north of the substation between semi improved neutral grassland and the road.	Photograph 10: hawthorn dominated hedgerow identified near northern boundary of site.	Photograph 11: dense scrub near northern boundary of site.	Photograph 12: lowland mixed deciduous woodland identified at the northern boundary of the site.

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

			
Photograph 13: other woodland mixed, identified along to the north of the substation.	Photograph 14: other woodland mixed, identified along to the north of the substation.	Photograph 15: An example of scattered trees within the grassland areas north of the substation.	Photograph 16: Pond located on the northern boundary of the site.
			
Photograph 17: Substation with buildings and sealed surface.	Photograph 18: An example of Introduced shrubs within gardens identified to the north of the site.	Photograph 19: Crop fields identified to the north of the site, west of the substation.	Photograph 20: An example of semi improved neutral grassland identified to the south of the substation.
			
Photograph 21: An example of well managed modified grassland identified to the south of the substation.	Photograph 22: An example of species poor hedgerow separating grassland habitat south of the substation.	Photograph 23: An example of species poor hedgerow containing oak tree species south of the substation.	Photograph 24: Hedgerow in good condition to the southwest of the site, near the western boundary.

			
Photograph 25: Dense scrub within modified grassland near the south site boundary.	Photograph 26: north area of lowland mixed deciduous woodland featuring bat boxes in oak trees	Photograph 27: north area of lowland mixed deciduous woodland featuring bat boxes in oak trees	Photograph 28 south area of lowland mixed deciduous woodland.
			
Photograph 29: an example of the several dry ditches identified within the south area of the site, along borders of grass fields.	Photograph 30: an example of the sealed surface habitat identified on site in the form of country roads.	Photograph 31: Crop fields identified to the south of the site, adjacent to the southern site boundary.	Photograph 32: showing the modified grassland cut for hay.
			
Photograph 33: showing the modified grassland grazed by cattle.	Photograph 34: showing the plantation oak woodland (other broad-leaved woodland).	Photograph 35: showing the unsown arable field	Photograph 36: showing a species-poor hedgerow
			
Photograph 37: showing a species-rich hedgerow	Photograph 38: showing the wet ditch	Photograph 39: showing the pond on site	Photograph 40: showing the urban; developed land sealed surface habitat on site

Annex B. Bat Survey Weather Data

Tree ref.	Date of survey	Survey type	Sunrise/sunset times	Start/finish time	Temp at start of survey (°C)	Cloud cover (%)	Precipitation	Windspeed
T4	06/09/22	Emergence	19.52	19:37 / 21:52	16	100	0	calm
	29/05/2023	Emergence	21.29	21:14 / 23:29	16	0	0	calm
	20/06/2023	Re-entry	04.46	03:19 / 05:01	14	85	0	calm
T6	07/09/22	Re-entry	06.32	04:29 / 06:47	13	85	0	calm
T7	31/08/22	Emergence	20.05	19:50 / 22:05	19	10	0	calm
	22/09/22	Emergence	19.13	18:58 / 21:13	15	70	light	calm
	31/05/2023	Re-entry	04.54	02:54 / 05:09	9	20	0	calm
T7A	31/08/22	Emergence	20.05	19:50 / 22:05	21	0	0	calm
	22/09/22	Emergence	19.13	18:58 / 21:13	15	100	0	calm
T9	07/09/22	Emergence	19.49	19:35 / 21:50	17	60	light	calm
T11	08/09/22	Re-entry	06.35	04:35 / 06:50	13	20	0	calm
	01/06/2023	Re-entry	04.54	02:54 / 04:54	9	90	0	calm
	19/06/2023	Emergence	21.45	21:30 / 23:05	16	5	0	calm
T12	21/09/22	Emergence	19.17	19:00 / 21:15	16	30	0	calm
	30/09/22	Re-entry	07.12	05:15 / 07:27	10	20	0	calm
T13	22/09/22	Re-entry	07.00	05:00 / 07:15	14	60	0	breezy
T15	30/08/22	Emergence	20.08	19:53 / 22:08	19	35	0	calm
	23/09/22	Re-entry	07.00	05:00 / 07:15	11	55	0	calm
	29/09/22	Emergence	18.58	18.43 / 20.58	13	0	0	calm
T16	31/08/22	Re-entry	06.21	04:21 / 07:15	11	35	0	calm

Bodelwyddan Substation Extension and Overhead Line route: Biodiversity Baseline

Tree ref.	Date of survey	Survey type	Sunrise/sunset times	Start/finish time	Temp at start of survey (°C)	Cloud cover (%)	Precipitation	Windspeed
	30/05/2023	Emergence	21.28	21:13 / 23:28	10	0	0	calm
	21/06/2023	Re-entry	0.46	03:19 / 05:01	15	50	0	calm
T17	01/09/22	Re-entry	06.23	04:50 / 06:38	12	0	0	calm
	28/09/22	Emergence	18.58	18:43 / 20:58	12	30	0	calm
T18	01/09/22	Re-entry	06.3	04:50 / 06:38	12	0	0	calm
	28/09/22	Emergence	18.53	18:43 / 20:58	12	90	0	breezy
T19	02/09/22	Re-entry	06.25	04:50 / 06:40	14	40	0	calm
	29/09/22	Re-entry	07.10	05:10 / 7:25	12	45	light	breezy
T20	01/09/22	Emergence	20.02	19:48 / 22:02	21	0	0	calm
	29/09/22	Re-entry	07.10	05:10 / 07:25	12	80	0	slight gusts
	01/06/2023	Emergence	21.31	21:16 / 23:31	15	0	0	light
T21	01/09/22	Emergence	20.02	19:48 / 22:02	21	0	0	calm
	01/06/2023	Emergence	21.31	21:16 / 23:31	15	0	0	light
	20/06/2023	Emergence	21.45	21:30 / 23:05	15	35	0	calm
T22	02/09/22	Re-entry	06.25	04:55 / 06:55	14.5	100	0	calm
	21/06/2023	Emergence	21.45	21:30 / 23:05	16	20	0	calm
T25	20/09/22	Emergence	19.18	19:03 / 21:18	16	10	0	calm
T26	21/09/22	Re-entry	06.58	04:58 / 07:13	10	90	0	calm

Annex C. Confirmed Bat Roost Features

Tree 7a	Tree 15
 <p>T7a - confirmed Pip sp. Roost</p>	 <p>PREF 1</p> <p>PREF 2</p>

Appendix E. Habitats Regulations Assessment Screening

Bodelwyddan Substation Extension and Overhead Line Route: Habitats Regulations Assessment Stage 1 Screening Report

Document no: B2416603/BODEL/ECO/004
Version: 04

National Grid
B2416603

Bodelwyddan Substation Extension and Overhead Line Route
28 February 2025

Bodelwyddan Substation Extension and Overhead Line Route: Habitats Regulations Assessment Stage 1 Screening Report

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Executive summary

National Grid proposes to extend the existing Bodelwyddan substation, which lies approximately 2km west of St. Asaph in Denbighshire, and 1.3km south of Junction 26 of the North Wales A55 Expressway. The existing substation occupies an enclosed site approximately 2.5ha in area, with a private access 375m in length from a junction off Glascoed Road. In addition to extending the existing substation site, National Grid proposes to replace the turn-in of the existing Connah's Quay to Pentir overhead line with two double circuit overhead lines.

This report has been prepared in accordance with the requirements of National Grid, as the Competent Authority, to undertake a Habitats Regulations Assessment as set out in the Conservation of Habitats and Species Regulations 2017 (as amended). It considers the potential for the proposed project to result in significant effects to European sites either alone or in combination with other plans or projects. This report covers Stage 1 Screening only.

Two European sites have been considered during the Screening Assessment:

- Coedwigoedd Dyffryn Elwy / Elwy Valley Woods Special Area for Conservation (SAC); and
- Mwyngloddiau Fforest Gwydir / Gwydyr Forest Mines SAC.

The results of the Stage 1 Screening Assessment show that the proposed project alone and in-combination with other plans and developments will have **no** Likely Significant Effects on the qualifying features of the two SACs. Consequently, the subsequent stages of HRA, including Stage 2: Appropriate Assessment, will not be required for this project.

Contents

Executive summary	i
Acronyms and Abbreviations	iii
1. Introduction.....	1
1.1 Habitats Regulations Assessment	1
1.2 Purpose and Structure of this Report.....	1
2. The Project.....	2
2.1 Project Proposal.....	2
2.2 Site Description.....	2
2.3 Project Delivery.....	2
2.4 Construction Methods and Techniques.....	3
2.5 Ecological Survey Work.....	3
2.5.1 Bat Survey Work (2022-2023)	4
3. Methodology.....	5
3.1 Background Information	5
3.2 Identifying Impact Pathways.....	5
3.3 Identification of Proposed Project Activities with the Potential to Generate LSEs.....	6
3.4 Assessment of Likely Significant Effects	7
3.5 Mitigation Measures	8
3.6 In-combination Assessment	8
4. Screening Results.....	10
5. In-Combination Assessment	18
6. Stage 1 Screening Assessment Conclusions	19
7. References	20

Acronyms and Abbreviations

CO	Conservation Objectives
CSZ	Core Sustainance Zone (bats)
CTMP	Construction Traffic Management Plan
DCO	Development Consent Order
DPF	Diesel Particulate Filters
EU	European Union
GCN	Great Crested Newt (<i>Triturus cristatus</i>)
GIB	Gas Insulated Busbars
GIS	Gas Insulated Substation
ha	Hectares
HGV	Heavy Goods Vehicle
HRA	Habitats Regulations Assessment
INNS	Invasive Non-Native Species
LGV	Light Goods Vehicle
LSE	Likely Significant Effects
QI	Qualifying Interest
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
ZoI	Zone of Influence

1. Introduction

1.1 Habitats Regulations Assessment

Habitats Regulations Assessment (HRA) assesses the potential for plans or projects to significantly affect European designated sites. In accordance with National Planning Policy and best practice guidelines, potential and candidate European sites, as well as Ramsar sites, are subject to HRA. Section 63(1) of the Conservation of Habitats and Species Regulations 2017 (as amended) requires that:

'A competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which—

(a) is likely to have a significant effect on a European Site or a European offshore marine site (either alone or in combination with other plans or projects), and

(b) is not directly connected with or necessary to the management of that site,

must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives.'

1.2 Purpose and Structure of this Report

This report has been prepared in accordance with the requirements of National Grid, as the Competent Authority, to undertake an HRA as set out in the Conservation of Habitats and Species Regulations 2017 (as amended). The report is also available to inform decisions made by other Competent Authorities that are relevant to the proposed project e.g. Local Planning Authorities and Natural Resources Wales. It considers the potential for the proposed project to result in significant effects to European sites either alone or in combination with other plans or projects.

Planning Inspectorate Advice Note 10 (2022) outlines a three-stage process for HRA which has been followed as part of the assessment. Not all three stages of the process are required. This report concludes at Stage 1 – Screening and is structured as follows:

- Section 2 – provides a description of the project, including construction programme and methods;
- Section 3 – describes the methodology followed in this study to inform this HRA;
- Section 4 – presents the results of the Stage 1 Screening Assessment;
- Section 5 – presents the results of the in-combination assessment; and
- Section 6 – concludes the results of the Stage 1 Screening Assessment.

2. The Project

2.1 Project Proposal

National Grid proposes to extend the existing Bodelwyddan substation, which lies approximately 2km west of St. Asaph in Denbighshire, and 1.3km south of Junction 26 of the North Wales A55 Expressway. The existing substation occupies an enclosed site approximately 2.5 hectares (ha) in area, with a private access 375 metres (m) in length from a junction off Glascoed Road. The substation extension would include provision of the following: telecoms room; control room; Busbar protection relay room; feeder protection relay room; battery room; LVAC room; overhead line connection infrastructure; couplers; and infrastructure to support contracted user assets. Demolition and removal of some existing assets would also be required as part of the proposed development.

In addition to extending the existing substation site, National Grid proposes to replace the turn-in of the existing Connah's Quay to Pentir overhead line with two double circuit overhead lines. The proposed works would create a new overhead line from Connah's Quay to Bodelwyddan and Bodelwyddan to Pentir. Each double circuit line would be approximately 400m in length, approaching the substation from the existing overhead line to the south-west.

The proposals would also involve the removal of an existing cable sealing end compound, which connects the existing northern circuit to the substation by underground cables. Temporary working areas and access routes will be required to enable reconductoring or replacing conductors and wires, which will be between approximate OS Grid Reference SJ 01578 73153 and SJ 01885 73010, and SJ 00989 73380 and SH 99726 73686. See Figure 1 for site location and proposed red line boundary.

2.2 Site Description

The substation is set within a predominantly rural landscape, comprising agricultural fields, hedgerows, woodland and ditches. The substation is located to the south of Glascoed Road, St. Asaph (central Ordnance Survey (OS) grid reference: SJ 01738 73567) with the proposed development extending to the land to the south and the west of the substation. A business park is located approximately 25m north of the substation, and a wind farm borders the substation 150m to the east.

2.3 Project Delivery

It is important that the substation extension and connection of the proposed double circuit overhead lines are delivered as early as feasible to accommodate the anticipated new connections. These are required due to increasing energy demand and the need to mitigate the causes of climate change by achieving a carbon-neutral economy. The Welsh Government targets to generate 70% of electricity needs from renewable energy sources by 2030 and to reach net-zero by 2050.

Subject to planning permission, work is anticipated to commence on the Bodelwyddan substation extension during 2025 to deliver the wider project in time to accommodate the proposed new connections and additional load. The substation extension will take approximately 24 to 28 months to construct. The overhead line works will take longer due to required outages (period of time when at least one circuit or one 'side' of the overhead line is not live, allowing works to take place). The availability of outages can vary dependent on system conditions, but the current sequence of work is outlined in the stage-by-stage drawings, and as follows;

- Stage 1: Pre-outage assumes works commence 2026 with completion in April 2027;;
- Stage 2: Pentir - Deeside - Bodelwyddan 2 circuit outage assumed 5 weeks;
- Stage 3: Pentir - Deeside - Bodelwyddan 1 circuit outage assumed 3 weeks;

- Stage 4: Pentir - Deeside - Bodelwyddan 2 circuit outage assumed 6 weeks subject to confirmation of remote end works;
- Stage 5: Pentir - Deeside - Bodelwyddan 1 circuit outage assumed 4 weeks subject to confirmation of remote end works; and
- Stage 6: Post outage and final arrangement.

The programme anticipates delivery of the overhead line works in late 2028 or early 2029, which would allow the new connections into the substation (subject to the connecting projects securing required consents) and accommodation of the additional load on the revised overhead lines arrangements following completion of the substation extension.

2.4 Construction Methods and Techniques

The total area of the proposed substation extension comprising the permanent development of the substation extension, temporary working areas and compound and temporary car parking is approximately 3ha (29,510 m²). The substation extension permanent works comprise approximately 0.9ha (9,420m²).

The working methods are as follows:

- The majority of the Gas Insulated Substation (GIS) will be constructed within the main building and will not be visible during installation. The visible items will consist of Gas Insulated Busbars (GIB) and GIB enclosed cable sealing ends;
- Relay Rooms will be installed outside adjacent to the main building and the associated GIB. These are approximately 9m long by 4m wide and 4m high. The finish of these will be similar to the existing external relay rooms and to planning consent requirements;
- For the GIS/GIB it will require approximately 50 articulated low load lorries to the requirements in line with the Government Guidelines for *"Maximum length of vehicles used in the UK"* and *"Road Vehicles (Construction and Use) Regulations 1986 (as amended)"*; and
- External GIB are normally painted white. This helps to reduce any solar gain on the GIB and as a consequence keeps the gas pressure within the GIB within acceptable levels.

Construction working hours will typically be from 07:30 – 17:30 and may occasionally require weekend working between 08:00 – 17:00. Working during daylight hours will generally not require lighting, although lighting may be required in winter or if needed in work-specific areas, compounds and for security.

2.5 Ecological Survey Work

Jacobs UK Ltd was commissioned by National Grid to undertake a programme of ecological field survey and desk study to support the proposed project. The study area accounted for all areas where significant effects to ecological features could occur throughout the lifetime of the proposed project including the construction footprint, potential locations of any ancillary works, compounds and varying Zones of Influence (Zoi) for the ecological receptors present. The field survey area comprised the permanent and temporary working areas for the proposed project (combined substation extension and overhead line works) and is referred to as 'the site'. Surveys conducted comprised UK Habitat Classification and Condition Assessment, bat emergence and re-entry surveys, climbing assessments of trees for bats and great crested newt (GCN; *Triturus cristatus*) environmental DNA (eDNA) surveys.

The existing access road to the substation from Glascoed Road was not included in the scope of the ecological survey as the access road is in existence and no works are proposed. The development also includes a temporary construction compound to the north of Glascoed Road, opposite the substation access road. This

was not included in the scope of this report as it is an existing area of hardstanding used previously as a construction compound for a separate development.

Full results of the desk study and ecological field surveys undertaken are provided in a separate report: Bodelwyddan Substation Extension and Overhead Line Route: Appendix E Biodiversity Baseline. A summary of the bat survey results is provided below.

2.5.1 Bat Survey Work (2022-2023)

The ground-based assessment of trees for bat roost potential identified 27 trees within the survey area. Two trees were assessed as having 'negligible' potential to support roosting bats, seven trees with 'low' bat roosting potential, nine trees with 'moderate' bat roosting potential and nine trees with 'high' bat roosting potential. No buildings were identified to have any potential to support roosting bats.

Of the original 27 trees identified, 18 were then subject to further survey (dependent on potential impacts) between 2022 and 2023 which included dusk emergence surveys, dawn re-entry surveys and climb and inspect surveys.

A soprano pipistrelle (*Pipistrellus pygmaeus*) bat roost was confirmed in tree T15 (see Biodiversity Baseline, B2416603/BODEL/ECO/003, for further details on bat survey work). The roost features of T15 are likely to be actively used as a regular roost for individuals/small groups of male or non-breeding female bats.

A single pipistrelle bat (undefined species) roost was confirmed in T7a during the tree climb survey in March 2023. The roost feature of T7a is likely to be sporadically used by male or non-breeding female bats, as a transitional/occasional roost to shelter during the prolonged cold spells of the winter.

A single lesser horseshoe bat (*Rhinolophus hipposideros*) was heard and recorded, at distance, during the 2022 dawn re-entry survey of T13. Lesser horseshoe bat was not recorded during any other surveys of 2022 and 2023. Lesser horseshoe bat is listed as an Annex II species and a qualifying feature of Mwyngloddiau Fforest Gwydir/ Gwydyr Forest Mines Special Area for Conservation (SAC) which is located approximately 25km south west of the site and a feature of the Coedydd ac Ogofâu Elwy a Meirchion Site of Special Scientific Interest (SSSI) which is located approximately 1.3km south of the site.

An update to the UK Habitat Classification survey was undertaken in July 2024. No change in supporting habitat or potential bat roosting features were found.

3. Methodology

3.1 Background Information

This HRA Report follows guidance provided by the European Commission in 2001. It also follows guidance set out within the Planning Inspectorate's Advice Note Ten: Habitats Regulations Assessment (Planning Inspectorate, 2022) which provides a framework for the assessment of implications for European sites of Nationally Significant Infrastructure Projects (NSIP). The proposed project is not classed an NSIP, however the guidance for assessment is still relevant to this report. The latter outlines a three stage process for HRA, which comprises:

- Stage 1: Screening – the purpose of this Stage is to screen the project to see if it will have a significant effect on the European site's conservation objectives (alone or in combination with other projects or plans). If one or more likely significant effects were likely to occur, it would then be necessary to proceed to HRA Stage 2;
- Stage 2: Appropriate Assessment – assess the implications of the proposal for the qualifying features of the European site, in view of the site's conservation objectives, and identify ways to avoid or minimise any effects; and
- Stage 3: Derogation – consider if proposals that would have adverse effects on the integrity of a European site qualify for an exemption. There are three tests to this stage to be followed in order: consider alternative solutions; consider Imperative Reasons of Overriding Public Interest (IROPI); and secure compensatory measures. Each test must be passed in sequence for a derogation to be granted.

This HRA Report covers HRA Stage 1: Screening. Stage 2 is only triggered where one or more likely significant effects have been identified at Stage 1 (in the absence of mitigation).

3.2 Identifying Impact Pathways

The aim of Stage 1 Screening is to identify any Likely Significant Effects originating from the proposed project on qualifying interest features of European site. This assessment has used the 'impact pathway' approach to identify the mechanisms by which the proposed project might have likely significant effects on the qualifying interest features of European sites. The approach starts by identifying potential sources of effects and then mapping the progression of the effect along potential pathways. The geographical location and nature of the receiving environment are fundamental to the approach to determine the likely risk of exposure for a given receptor. An understanding of the receptor, its behavioural traits and specific vulnerability to the anticipated level and nature of the effect is similarly important. The approach is consistent with the iterative steps that European Commission guidance prescribes for the appraisal of potential receptors, effects and pathways that lead to the identification of European sites to be considered in Screening (European Commission, 2001).

Consideration is also given to the potential for more complex pathways that might link a receptor to an impact source, including indirect linkages. This includes consideration of effects to qualifying features of European sites that are located outside European sites but still fall within the proposed Project's Zone of Influence i.e. mobile species such as birds or bats.

The Stage 1 Screening Assessment considers all relevant European sites identified using the following criteria where the project:

1. is within 2km of a European site or functionally linked land;
2. is within 30km of a SAC, where bats are noted as one of the qualifying interest features;

3. crosses or lies adjacent to, upstream of, or downstream of, a watercourse which is designated in part or wholly as a European site;
4. has a potential hydrological or hydrogeological linkage to a European site containing a groundwater dependent terrestrial ecosystem (GWDTE) which triggers the assessment of European sites;
5. has an affected road network within 200m of European sites;
6. located within relevant Sites of Special Scientific Interest (SSSI) Impact Risk Zones (IRZ); and/or
7. there is existence of ecological connectivity with European sites in addition to those above.

3.3 Identification of Proposed Project Activities with the Potential to Generate LSEs

All proposed project activities with the potential to generate effects on European sites were identified, see Table 3.1. The following criteria were considered when reviewing the proposed activities:

- the size, scale and area of the works as they relate to land take;
- the extent of physical changes that would emanate from proposed activities;
- emissions and waste (disposal to land, water or air); and
- transportation requirements.

Best practice guidance, literature, and professional judgement were used to gauge the Zone of Influence of potential effects, e.g. the effects associated with dust emissions were considered over a distance of 50m in line with the Institute of Air Quality Management (IAQM) (2014) guidance. Based on this, a study area was identified reflecting the geographical area over which relevant significant effects may potentially arise. An assessment of the presence of European sites within this zone was then undertaken with respect to their Conservation Objectives.

Table 3.1: Potential Effect pathways from development on European sites

Broad categories of potential impacts	Potential impact pathways
Physical disturbance e.g. loss of habitats / supporting habitat / habitat fragmentation / habitat erosion	Physical loss of habitat is only likely to be significant if it is within the boundary of a European site, or within an area of supporting habitat outside of the European site (for example, off-site area of known foraging, roosting, breeding habitat for a qualifying interest (QI) for which a European site is designated – functionally linked land).
Habitat degradation e.g. changes in water quality (pollution) through ground contamination (toxic)	Water quality can be affected by spills of fuels, oil and chemicals from site vehicles. Changes in water quality could directly affect QI species or habitats or affect them indirectly through loss of aquatic prey species, or through changes in their habitat.
Mortality	Mortality of species could occur through direct impact (e.g. destruction of a bat roosting site) or indirectly (e.g. as a result of pollution events or in response to high noise/vibration stress).
Air quality changes e.g. dust emissions	Air emissions associated with vehicular traffic during construction of the proposed project and the release of dust following excavations and tracking of machinery.
Non-physical disturbance e.g. noise / vibration / machinery movements /	Disturbance may include, but not be limited to, noise, vibration, movement (of people and/ or vehicles) and lighting.

Broad categories of potential impacts	Potential impact pathways
human presence / light pollution	There is no current authoritative guidance on how far a noise study area should extend from construction activities due to the variability of the potential noise generating activities and plant used. However, the effects of noise (as well as visual/human presence) are only likely to be significant where the boundary of the proposed project extends within or is directly adjacent to the boundary of the European site, or within/adjacent to an offsite area of known foraging, roosting, breeding habitat (that supports species for which a European site is designated).
Introduction or spread of invasive non-native species (INNS)	Introduction or spread of INNS e.g. due to plant movements or ground disturbance. Only likely to be experienced within the immediate vicinity of areas where machinery movements etc. would be undertaken. Potential for wider effects to occur where works are within the vicinity of flowing watercourses.

3.4 Assessment of Likely Significant Effects

In the assessment of likely significant effects, consideration is given to what proposed project outcomes would constitute a significant effect in terms of loss, fragmentation, disruption, disturbance and changes to key elements that may compromise the Conservation Objectives of the European site.

The HRA Screening process is underpinned by an interpretation of likely significant effects. The terms 'likely' and 'significance' have been defined variously by governments and through the courts. The following sections seek to provide clarification on the current interpretation of these terms as determined by recent guidance and case law.

An interpretation of 'Likely'

The two defining cases on the meaning of an LSE are provided in *Bagmoor Wind Ltd v The Scottish Ministers* (2012) and *Feeney v Secretary of State for Transport* (2013). The cases establish that the term 'likely' should not be regarded as a measure of probability in the context of a HRA but instead infers the presence of a risk. An LSE finding is, therefore, an acknowledgment that the risk of a significant effect occurring exists.

The above rulings are consistent with the Advocate General's opinion in *Sweetman v An Bord Pleanála* (2013) and with the findings in the *Waddenzee* judgement. The former of these judgments found that "...there is no need to establish such an effect; it is merely necessary to determine that there may be such an effect".

The *Waddenzee* judgment clarifies the benchmark for a determination of an LSE and that "...if it cannot be excluded, on the basis of objective information, that [the works under consideration] would have a significant effect on that site..." then an LSE finding is appropriate. There must remain "no reasonable scientific doubt as to the absence of such effects."

Planning Inspectorate guidance also advises that if a large amount of evidence and data gathering is necessary to determine LSE, it is assumed that LSEs likely exist and an Appropriate Assessment is likely required (Planning Inspectorate, 2016).

An interpretation of 'Significant' under the Habitats Directive

It was clarified in the *Waddenzee* judgment that the measure of significance should be made against the Conservation Objectives for which the site was designated: "*where a plan or project [...] is likely to undermine the site's conservation objectives, it must be considered likely to have a significant effect on that site*"¹.

3.5 Mitigation Measures

Mitigation refers to measures proposed to avoid or reduce adverse environmental effects. Previously, mitigation aimed at avoiding or reducing significant effects to European sites was considered to be appropriate 'objective information' about a plan or project and was considered at the Screening stage, in accordance with the *Waddenzee* ruling. Moreover, in *R (Hart D C) v SSCLG and others* (EWHC 1204 (Admin)) the judgement was that:

'... there is no legal requirement that a screening assessment ... must be carried out in the absence of any mitigation measures that form part of a plan or project. On the contrary, the competent authority is required to consider whether the project, as a whole, including such measures, if they are part of the project, is likely to have a significant effect...'

However, in April 2018 a converse decision was reached by the Court of Justice of the European Union (CJEU) in *People Over Wind and Sweetman v Coillte Teoranta* (C323/17) which stated that:

'... Article 6(3) of the Habitats Directive must be interpreted as meaning that, in order to determine whether it is necessary to carry out, subsequently, an Appropriate Assessment of the implications, for a site concerned, of a plan or project, it is not appropriate, at the screening stage, to take account of the measures intended to avoid or reduce the harmful effects of the plan or project on that site.'

As such, good practice or mitigation measures (other than embedded measures) specifically intended to reduce the adverse effects of a plan or project on a European site have not been taken into account during the Stage 1 Screening.

3.6 In-combination Assessment

The Habitats Directive requires that a HRA must assess whether a project or plan would be likely to have a significant effect on a European site "*either individually or in combination with other plans or projects*". The Directive recognises that in some cases, the effects of a project or plan on its own would be either unlikely or insignificant. Nevertheless, the Directive also recognises that those plans and projects which are unlikely to have a likely significant effect alone may have a likely significant effect in combination with other plans and projects.

The in-combination component of the likely significant effect test needs to focus only on those plans or projects that potentially could interact with the project under consideration. In this respect the in-combination assessment must consider whether:

- The effects of the plans and projects, in combination, would make effects more likely to occur, or more likely to occur at significant levels, that alone would be unlikely to either occur or be significant.
- The effects of the plans and projects, in combination, would make insignificant effects significant.
- The effects of the plans and projects, in combination, would generate new or different effects that would not occur if the plans and projects proceeded alone.

¹ Case C-127/02 *Waddenzee*, para 49.

The in-combination assessment was restricted to an area within 200m of the proposed project, as this is the anticipated maximum extent of the proposed project's zone of influence. Plans or projects located beyond 200m are not considered likely to act in-combination with any potential effects from the proposed project.

4. Screening Results

Two sites have been identified during the Screening Assessment (see Figure 2):

- Coedwigoedd Dyffryn Elwy / Elwy Valley Woods SAC is located within 2km of the proposed project; and
- Mwyngloddiau Fforest Gwydir / Gwydir Forest Mines SAC is located within 30km of the proposed project and is designated on behalf of the bat interest present.

Each designated site is taken in turn and screened in Table 4.1 and Table 4.2, respectively.

Table 4.1: Coedwigoedd Dyffryn Elwy / Elwy Valley Woods SAC, Stage 1 Screening Assessment

Project Name	Bodelwyddan Substation Expansion and Overhead Line Route
European Site	Coedwigoedd Dyffryn Elwy / Elwy Valley Woods SAC
Characteristics of European Site	
Location and distance of European site from the proposed works	Central OS Grid Reference: SJ 020691 1.3 km to the south of the existing National Grid sub-station at its closest point
European site size	81.44 ha
Key features of European site including the primary reasons for selection and any other qualifying interests.	<u>Annex I habitats that are a primary reason for selection of the SAC:</u> <ul style="list-style-type: none"> • 9180 <i>Tilio-Acerion</i> forests of slopes and screes and ravines • Elwy Valley Woods is one of three sites selected to represent <i>Tilio-Acerion</i> forest across its geographic range on the Carboniferous limestone of north Wales, and is an example of the habitat with an outstanding lower-plant flora. The canopy is quite varied: ash (<i>Fraxinus excelsior</i>) is the commonest tree, but there is also occasional small-leaved lime (<i>Tilia cordata</i>) and wild service-tree (<i>Sorbus torminalis</i>). There is a rich, calcicolous understorey and ground flora, and rare bryophytes include <i>Bryum canariense</i>, <i>Cololejeunea rossettiana</i>, <i>Plagiochila britannica</i>, <i>Platydictya confervoides</i> and <i>Isothecium striatulum</i>. The woods have developed along steep valley-sides and ravines that are also important for their cave systems and Pleistocene fossil mammal assemblages.
Vulnerability of European site - any information available from the standard data forms on potential effect pathways	Pressures considered to have an impact on the SAC are (JNCC, 2015a): <ul style="list-style-type: none"> • Air pollution and air-borne pollutants • Grazing in forests/ woodland • Invasive non-native species • Forest and Plantation management and use • Pollution to groundwater (point sources and diffuse sources) • Interspecific floral relations
Conservation Objectives of the European Site	The vision for the SAC is for it to be in favourable conservation status, where all of the following are satisfied (Countryside Council for Wales, 2008a): <ul style="list-style-type: none"> • The area of <i>Tilio-acerion</i> woodland is stable or increasing, at the expense of areas of non-native trees, including beech (<i>Fagus sylvatica</i>). • The woodland is maintained as far as possible by natural processes.

	<ul style="list-style-type: none"> • The following canopy species ash, field maple, rowan, Wych elm and small leaved lime should be present throughout. • The remainder of the site will be other semi-natural habitat. • Trees and shrubs are mainly locally native broadleaved species. • The abundance and density of individual native species varies across the site. • Trees and shrubs of a wide range of ages and sizes are present. • Tree seedlings are plentiful throughout the site. • Other canopy forming species including conifers (except yew (<i>Taxus baccata</i>) which is native), beech, hornbeam (<i>Carpinus betulus</i>) and sycamore (<i>Acer pseudoplatanus</i>) will be discouraged. • Deadwood, standing or fallen, will be retained to provide habitat for invertebrates, fungi and other woodland species. • Field and ground layers are well developed with a patchwork of vegetation communities characteristic of local soil and humidity conditions. • All factors affecting the achievement of these conditions are under control.
Description of the Project	
Size and scale	The total area of the proposed substation extension comprising the permanent development of the substation extension, temporary working areas and compound and temporary car parking is approximately 3ha. The substation extension permanent works comprise approximately 0.9ha.
Land-take	Loss of approximately 0.78ha of agricultural land (modified grassland and cropland) and 89m of hedgerow would be required. However, this is at distance from the SAC which is located approximately 1.3km from the site.
Resource requirements	There will be no resource requirements from the SAC or from any land which is considered to be functionally linked to the SAC.
Emissions (e.g. polluted surface water runoff - both soluble and insoluble pollutants, atmospheric pollution).	<p>Construction works will unavoidably result in some noise, vibration, dust emissions and light emissions, although the extent of which will be limited to the proposed project boundary and immediate surrounds. Due to the distance the proposed project is located from the SAC, it is considered that the change in air, noise and light quality will be negligible and inconsequential in comparison to those generated by the existing sub-station.</p> <p>There is no affected road network that would trigger an assessment of possible vehicle emissions on sensitive receptors and the SAC is beyond the 50m distance where dust could potentially cause an impact and the 200m where nitrogen deposition could cause an impact on sensitive receptors.</p> <p>There will be no discharge to surface or ground water during works and no pathway to any accidental discharge as there are no hydrological connections between the project and the SAC.</p> <p>Outside of non-routine maintenance requests and security events, the site would not be lit at night. It is not anticipated that there would be additional noise, emissions or discharges during operation.</p>

Excavation requirements (e.g. impacts of local hydrogeology)	The proposed project will not require any excavation works within the SAC or within any land which could be considered as hydrologically linked to the SAC.
Transportation requirements	<p>During the peak of construction for the substation extension, it is anticipated that the site will generate 19 HGV trips two-way and 50 LGV/ cars trips two way per day. There will be a maximum of 25 staff present on site daily.</p> <p>During the peak of construction for the overhead lines, it is anticipated that the site will generate 36 HGV trips two-way and 34 LGV/ cars trips two way per day. There will be a maximum of 17 staff present on site daily.</p> <p>During operation the substation extension would be subject to routine maintenance checks but will not lead to any increase in the number of personnel working at the substation. Consequently, there will be no change in operational traffic and no new permanent access routes.</p> <p>This does not meet the criteria to be considered an affected road network.</p>
Duration of construction, operation etc.	Construction of the substation is scheduled to commence in 2024 and will take between 24 and 28 months to complete. The overhead lines work will commence in 2026 and will be complete by 2027.
<p>Initial Assessment: The key characteristics of the site and the details of the European site should be considered in identifying potential impacts.</p> <p>Describe any likely changes to the site arising as a result of the following:</p>	
Reduction of habitat area	There will be no reduction in habitat area of the SAC as a result of the proposed project. No vegetation clearance is required within the SAC. Approximately 0.78ha of agricultural land (modified grassland and cropland) and 89m of hedgerow would be permanently lost. However, this would be at over 1.3km from the SAC.
Disturbance to key species / habitats	<p>There will be no disturbance to the qualifying habitats located within the SAC, as a result of the proposed project. Works are located approximately 1.3km from the SAC and are relatively small scale.</p> <p>There will be no discharge to ground water during works and no pathway linking the SAC and the project should there be any accidental discharge.</p>
Habitat or species fragmentation	There will be no fragmentation of the woodland habitat that comprises the SAC designation.
Reduction in species / habitat density	There will be no reduction of the woodland habitat that comprises the SAC designation. Minor habitat loss would be required for the project but this would be of agricultural land only and be at distance from the SAC.
Changes in key indicators of conservation value (water quality, etc)	Direct or indirect impacts upon the key indicators of conservation value in the SAC will not occur as there are no pathways to effect: there are no hydro or hydrogeological connections between the project and the SAC and the SAC is further than the 200m where potential air quality changes could cause an effect.
Climate Change	Works will produce some small-scale carbon dioxide emissions and, on this basis, contribute to the global production of carbon dioxide emissions from human activities. However, given the localised scope and preference for

	modern machinery and/or machinery with diesel particulate filters (DPFs) to limit pollutants, a negligible impact is anticipated.
Describe any likely impacts on the European site as a whole in terms of:	
Interference with key relationships that define the structure of the site	There are no pathways to effects that could interfere with the key relationships that define the structure of the site (i.e. habitat distribution and extent within the SAC) given that there is no vegetation clearance required and no pathway to effect that would change the habitat structure of the SAC.
Interference with key relationships that define the function of the site	There are no pathways to effects that could result in interfere of the key relationships that define the function of the site.
Indicate the significance as a result of the identification of impacts set out above in terms of:	
Reduction of habitat area	No likely significant effect
Disturbance to key species	No likely significant effect
Habitat or species fragmentation	No likely significant effect
Loss	No likely significant effect
Fragmentation	No likely significant effect
Disruption	No likely significant effect
Change to key elements of the site (e.g. water quality, hydrological regime etc)	No likely significant effect
Describe those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known:	
Outcome of screening stage	No Likely Significant Effect
Are the appropriate statutory environmental bodies in agreement with this conclusion	This report is for consultation purposes.

Table 4.2: Mwyngloddiau Fforest Gwydir / Gwydyr Forest Mines SAC Stage 1 Screening Assessment

Project Name	Bodelwyddan Substation Expansion and Overhead Line Route
European Site	Mwyngloddiau Fforest Gwydir / Gwydyr Forest Mines SAC
Characteristics of European Site	
Location and distance of European site from the proposed works	Central OS Grid reference: SH 795 578 Approximately 25km to the south-west of the existing National grid sub-station
European site size	39.13ha
Key features of European site including the primary reasons for selection and any other qualifying interests.	<u>Annex I habitats that are a primary reason for selection of the SAC:</u> <ul style="list-style-type: none"> 6130 Calaminarian grasslands of the <i>Violetalia calaminariae</i> <u>Annex II species present as a qualifying feature but not as a primary reason for site selection:</u> <ul style="list-style-type: none"> 1303 Lesser horseshoe bat (significant presence) As only the lesser horseshoe bat feature of the SAC that meets the criteria for inclusion the screening assessment, this feature shall be assessed only.
Vulnerability of European site - any information available from the standard data forms on potential effect pathways	Pressures considered to have an impact on the SAC are (JNCC, 2015b): <ul style="list-style-type: none"> Forest and Plantation management and use Air pollution and air-borne pollutants Invasive non-native species Biocenotic evolution, succession Outdoor sports and leisure activities, recreational activities Other ecosystem modifications Mining and quarrying Other urbanisation, industrial and similar activities
Designated Site Conservation Objectives	The vision for the SAC is for it to be in favourable conservation status, where all of the following are satisfied (lesser horseshoe bat objectives only (Countryside Council for Wales, 2008b): <ul style="list-style-type: none"> The remainder of the management units not highlighted for calaminarian grassland will be maintained in a favourable condition for lesser horseshoe bat.
Description of the Project	
Size and scale	The total area of the proposed substation extension comprising the permanent development of the substation extension, temporary working areas and compound and temporary car parking is approximately 3ha. The substation extension permanent works comprise approximately 0.9ha.
Land-take	Loss of approximately 0.78ha of agricultural land (modified grassland and cropland) and 89m of hedgerow would be required. However, this is at distance from the SAC which is located approximately 25km from the site.
Resource requirements	There will be no resource requirements from the SAC.
Emissions (e.g. polluted surface water runoff - both soluble and insoluble pollutants, atmospheric pollution).	Construction works will unavoidably result in some noise, vibration, dust emissions and light emissions, although the extent of which will be limited to the proposed project boundary and immediate surrounds. Due to the

	<p>distance the proposed project is located from the SAC, it is considered that the change in air, noise and light quality will be negligible and inconsequential in comparison to those generated by the existing sub-station.</p> <p>There is no affected road network that would trigger an assessment of possible vehicle emissions on sensitive receptors and the SAC is beyond the 50m distance where dust could potentially cause an impact and the 200m where nitrogen deposition could cause an impact on sensitive receptors.</p> <p>There would be no discharge to surface or ground water during works and no pathway to any accidental discharge as there are no hydrological connections between the project and the SAC.</p> <p>Outside of non-routine maintenance requests and security events, the site would not be lit at night. It is not anticipated that there would be additional noise, emissions or discharges during operation.</p>
Excavation requirements (<i>e.g. impacts of local hydrogeology</i>)	The proposed project will not require any excavation works within the SAC or within any land which could be considered as hydrologically linked to the SAC.
Transportation requirements	<p>During the peak of construction for the substation extension, it is anticipated that the site will generate 19 HGV trips two-way and 50 LGV/ cars trips two way per day. There will be a maximum of 25 staff present on site daily.</p> <p>During the peak of construction for the overhead lines, it is anticipated that the site will generate 36 HGV trips two-way and 34 LGV/ cars trips two way per day. There will be a maximum of 17 staff present on site daily.</p> <p>During operation the substation extension would be subject to routine maintenance checks but will not lead to any increase in the number of personnel working at the substation. Consequently, there will be no change in operational traffic and no new permanent access routes.</p> <p>This does not meet the criteria to be considered an affected road network.</p>
Duration of construction, operation etc.	Construction of the substation is scheduled to commence in 2024 and will take between 24 and 28 months to complete. The overhead lines work will commence in 2026 and will be complete by 2027.
<p>Initial Assessment: The key characteristics of the site and the details of the European site should be considered in identifying potential impacts.</p> <p>Describe any likely changes to the site arising as a result of the following:</p>	
Reduction of habitat area	<p>The project will not require any land-take or habitat loss from the SAC.</p> <p>Approximately 0.9ha of agricultural land would be lost, though this is not considered important foraging habitat for bats. The permanent loss of 110m of hedgerow is unlikely to affect lesser horseshoe bats as although hedgerows provide important commuting routes, at the distance from the SAC (i.e. 25km) the effected hedgerow is highly unlikely to provide an important habitat link between important feeding or roosting resources for the SAC bats which have a core sustenance zone² of 2km.</p>

² The area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost

Disturbance to key species	Bats are sensitive to changes in noise, vibration and lighting. However, the SAC is located approximately 25km to the south west of the project so disturbance to bats inhabiting roosts of the SAC is considered highly unlikely. Impacts to lesser horseshoe bats are also considered unlikely as the on-site habitats do not contribute to the functional habitat for the local lesser horseshoe bat population. This is because the CSZ for the species will normally be within 2km of an individual's roosting site (Collins, 2016) and the site is located approximately 25km from the proposed project. Amongst a programme of bat survey over two year, lesser horseshoe bat activity was identified just once.
Habitat or species fragmentation	The proposed project is not considered to be functionally linked land to the SAC. No vegetation clearance is required within the SAC and no vegetation which constitutes a foraging or commuting pathway for lesser horseshoe bats will be cleared as a result of the proposed project.
Reduction in species / habitat density	There will be no reduction in habitat density located within the SAC or functionally linked land. The project will not result in a reduction of species density i.e. injury or mortality of individual bat species of the SAC population. A programme of bat survey over two years did not identify any roosting lesser horseshoe bats in the survey area.
Changes in key indicators of conservation value (water quality, etc)	Direct or indirect impacts upon the key indicators of conservation value in the SAC will not occur as there are no pathways to effect: there are no hydro or hydrogeological connections between the project and the SAC and the SAC is further than the 200m where potential air quality changes could cause an effect.
Climate Change	Works will produce some small-scale carbon dioxide emissions and, on this basis, contribute to the global production of carbon dioxide emissions from human activities. However, given the localised scope and preference for modern machinery and/or machinery with DPFs to limit pollutants, a negligible impact is anticipated.
Describe any likely impacts on the European site as a whole in terms of:	
Interference with key relationships that define the structure of the site	There are no pathways to effects that could interfere with the key relationships that define the structure of the site (i.e. bat roosting or feeding habitat abundance within the SAC).
Interference with key relationships that define the function of the site	There are no pathways to effects that could result in interfere of the key relationships that define the function of the site.
Indicate the significance as a result of the identification of impacts set out above in terms of:	
Reduction of habitat area	There will be no reduction of habitat area within the SAC. Approximately 0.9ha of agricultural land and 110m of hedgerow would be permanently lost but this would be at 25km from the SAC and therefore beyond the 2km CSZ where habitats are important feeding and roosting resources.
Disturbance to key species	There will be no disturbance to lesser horseshoe bats within the SAC due to the 25km distance between the project and the SAC. The project site does not constitute functionally linked land for the mobile lesser horseshoe bats of the

	SAC with a single recording of the species made in two years of field survey indicating that the project site is not an important resource.
Habitat or species fragmentation	Although there would be a permanent loss of 89m of hedgerow, this would be at 25km from the SAC and in a location that does not provide an important habitat connection for individuals of the SAC between important feeding and roosting resources outside of the SAC.
Loss	There will be no loss of any species, habitats or connectivity that could compromise the lesser horseshoe bat population.
Fragmentation	There will be no fragmentation of habitats as no vegetation clearance within the SAC is required.
Disruption	The project will not significantly disrupt the structure or function of the SAC.
Change to key elements of the site (e.g. water quality, hydrological regime etc)	N/A – No pathway to effect
Describe those elements of the project, or combination of elements, where the above impacts are likely to be significant or where the scale or magnitude of impacts is not known:	
Outcome of screening stage	No Likely Significant Effect
Are the appropriate statutory environmental bodies in agreement with this conclusion	This report is for consultation purposes.

5. In-Combination Assessment

In order to take account of in-combination effects, plans and projects that are completed, approved but uncompleted, or proposed (but not yet approved) should be considered in this context (European Commission, 2002).

The in-combination assessment was restricted to an area within 200m of the proposed project, as this is the anticipated maximum extent of the proposed project's ZOI. Plans or projects located beyond 200m are not considered likely to act in-combination with any potential effects from the proposed project.

A search for planning applications and local plans located within 200m of the proposed works was conducted using the following sources:

- Denbighshire County Council (Denbighshire County Council, 2025);
- Denbighshire County Council Adopted Local Plan Interactive Map (Denbighshire County Council, 2025 (a)); and
- The Planning Inspectorate website (<https://national-infrastructure-consenting.planninginspectorate.gov.uk/project-search>)

For the purposes of this HRA Stage 1 Screening exercise, individual residential planning applications and other small construction projects including school renovations and upgrades have not been considered as part of the in-combination assessment. This is because small residential upgrades for example will not have an impact on SAC qualifying interest habitats or species (lesser horseshoe bats).

An assessment of the Denbighshire County Council Local Plan and Planning Portal found no development proposals or ongoing development which would act in-combination with the Bodelywyddan Substation Extension and Overhead Powerlines Project to have a likely significant effect on the Coedwigoedd Dyffryn Elwy/Elwy Valley Woods SAC or Mwyngloddiau Fforest Gwydir / Gwydyr Forest Mines SAC.

Developments of potential in-combination interest identified comprised:

- Awel-y-Môr Offshore Wind Farm (substation to the northwest with underground cables) (The Planning Inspectorate National Infrastructure Planning Ref: EN010112);
- Mona Offshore Wind Farm (DCO Examination closed January 2025) (The Planning Inspectorate National Infrastructure Planning Ref: EN010136 and EN010137); and
- IGP Solar EIA Scoping Opinion Request of January 2025 (Denbighshire County Council Application 40/2024/1575/EIA-SCO).

In-combination effects on European sites are highly unlikely to occur. The scale of habitat affected (and therefore also any dependent species) by the proposed substation and overhead line works is relatively small and much of it temporary. While the two offshore wind farm projects considered include an underground cable and new substation to the south of the existing Bodelywyddan substation, the nature and scale of the Bodelywyddan works are so minor in comparison that no in-combination effect is anticipated, even if construction works were to overlap. It is highly unlikely that there would be any overlap in construction between the Bodelywyddan substation and overhead line works and the IGP Solar project,

In light of the above information, there is no potential for in-combination effects to undermine the conservation objectives of any European sites from the proposed substation extension and overhead power lines and other plans or projects.

6. Stage 1 Screening Assessment Conclusions

This Stage 1 Screening Assessment report presents the objective scientific information required to inform a robust and complete examination of the potential impacts of the proposed works on European sites. The conclusion of the Screening Assessment is that there is no potential for Likely Significant Effects, alone or in combination, on the conservation objectives of European sites listed in this report. Therefore, further assessment, including Stage 2 Appropriate Assessment of the proposed works, is not required.

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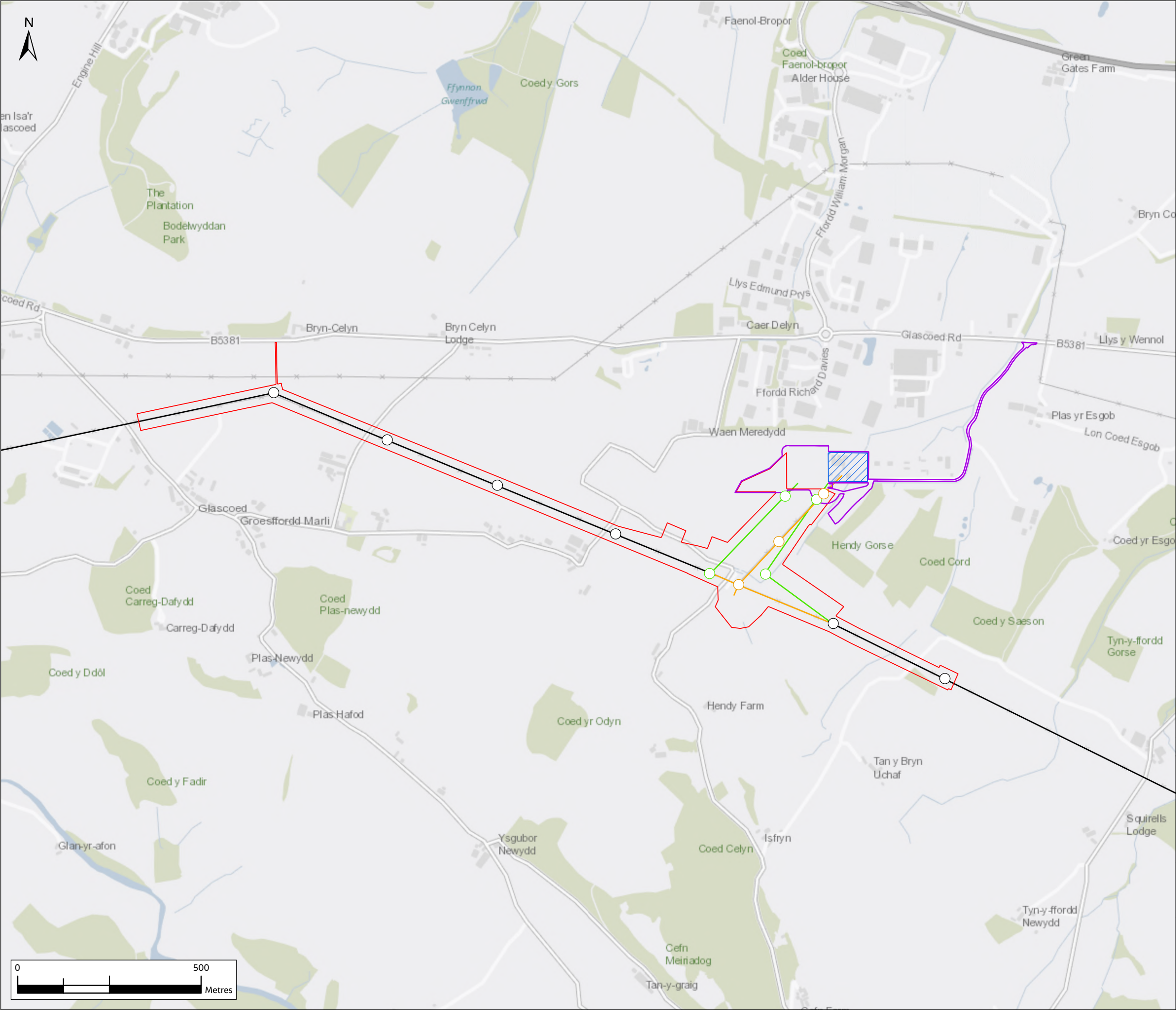
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Sweetman v Coillte Teoranta (2018) C-323/17.

Figures

Figure 1. Works Site Plan



- Legend**
- Overhead Line Works and Access Boundary
 - Substation Extension Application Boundary (includes access road and existing substation)
 - Existing Substation Boundary
 - Existing Overhead Line and Towers - Retained
 - Existing Overhead Lines and Towers - Removed
 - New Overhead Lines and Towers



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Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

Scale @ A3: Scale: 1:10,000 DO NOT SCALE

Jacobs No. B2416603

Client

Project

BODELWYDDAN OVERHEAD LINES

Drawing Title

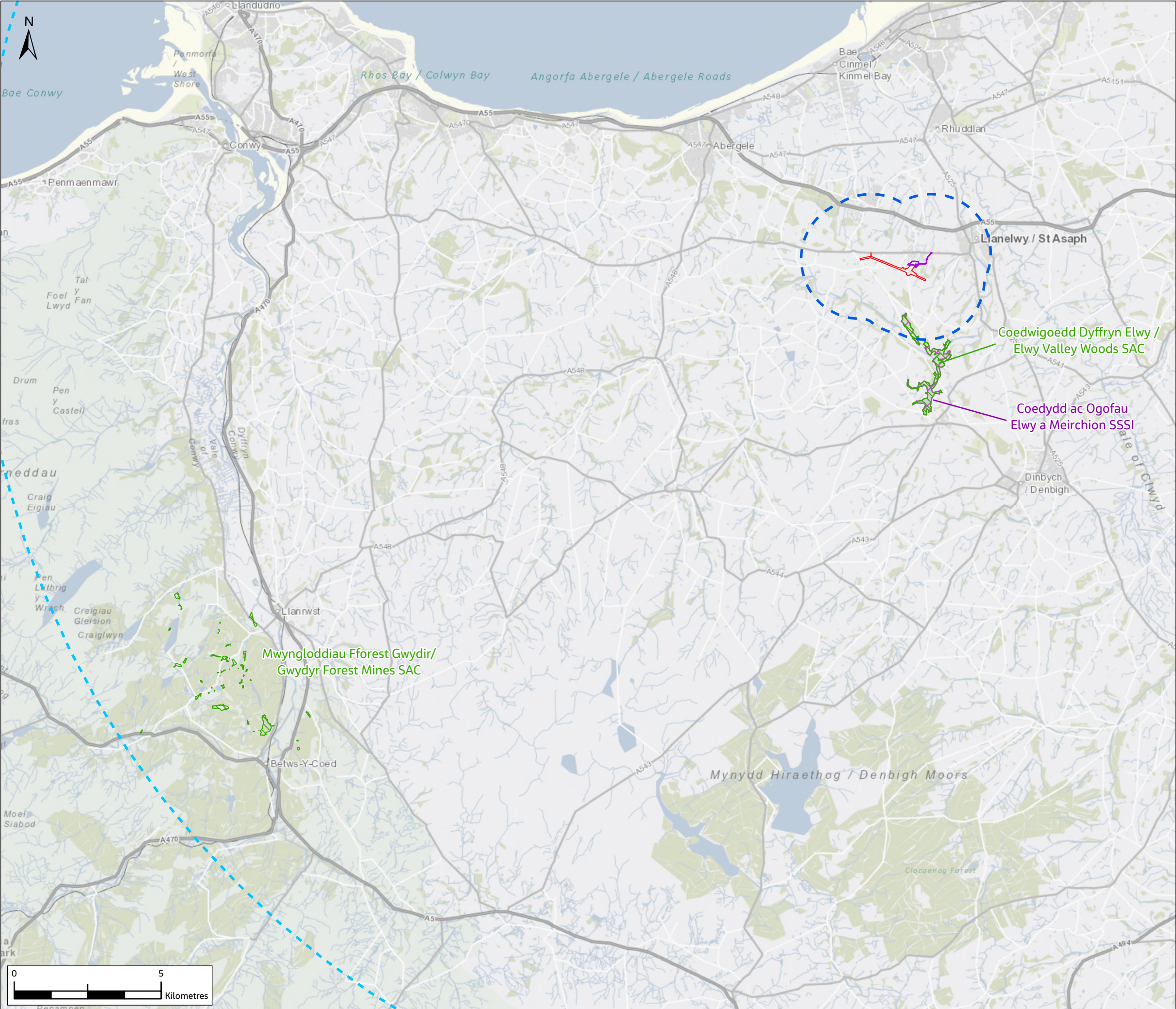
WORKS SITE LOCATION PLAN

Drawing No. B2416603/BODEL/SLP/001	Drawing Status FINAL
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FIGURE 1

Figure 2. Designated Sites Plan





Legend

- Overhead Line Works and Access Boundary
- Proposed Substation Extension Works Boundary
- 2km Buffer
- 30km Buffer
- Special Areas of Conservation (SAC)
- Sites of Special Scientific Interest (SSSI)

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Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

Scale @ A3

Scale: 1:125,000

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Jacobs No. B2416603

Jacobs

nationalgrid

Client

Project

BODELWYDDAN OVERHEAD LINES

Drawing Title

STATUTORY DESIGNATED SITES PLAN

Drawing No.

B2416603/BODEL/SS/001

Drawing Status

FINAL

FIGURE 2

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Appendix F. Landscape and Visual Methodology

F.1 LVA Assessment Criteria

The criteria for assessing the sensitivity of receptors, magnitude of effects and level of effects is presented below.

The nature of landscape and visual effects may be beneficial or adverse. Beneficial effects are those that enhance and/or reinforce characteristics that are valued. Adverse effects are those that remove and/or undermine characteristics that are valued.

F.1.1 Evaluation of Sensitivity

Sensitivity is defined by GLVIA3 as, '*the nature of the receptor likely to be affected*'. In accordance with GLVIA3, the assessment of landscape and visual sensitivity combines judgements on the value attached to that receptor and the susceptibility of the receptor to the specific type of development proposed.

Sensitivity has been assessed on a three-point scale of High, Medium or Low. The application of these criteria is not formulaic, and the tables below only indicate general categories of sensitivity.

F.1.1.1 Landscape Sensitivity

For the purpose of this assessment, landscape sensitivity to change is defined as the ability of the landscape receptor to accommodate the overhead line works without undue, negative consequences.

Sensitivity of landscape receptors to change will be assessed using the criteria detailed in **Appendix Table 1** below.

Appendix Table 1: Landscape Sensitivity Criteria

Sensitivity	Criteria
High	Landscape of particular distinctive character, which is highly valued and considered susceptible to relatively small changes.
Medium	Landscape of moderately valued characteristics considered reasonably tolerant of change. Some ability to accommodate the overhead line works without undue harm.
Low	Landscape of generally low valued characteristics considered potentially tolerant of substantial change.

The sensitivity of visual receptors to changes in their views have been evaluated in accordance with the criteria provided in **Appendix Table 2**, based on the receptor susceptibility to change and the value of views.

Appendix Table 2: Visual Sensitivity Criteria

Sensitivity	Criteria
High	Receptors where the changed view is of high value and importance and/or where the receptor will notice any change to visual amenity by reason of the nature of use and their expectations. Receptors where the view is important to users will be considered to be of high sensitivity such as residential properties with views from principal rooms or outdoor spaces or PRoW/long distance routes.
Medium	Receptors where the changed view is incidental, but not critical to amenity and/or the nature of the view, is not a primary consideration of the users. Such as residential properties with restricted views or views from non-principal rooms where the focus is not on the landscape or view and receptors where users are travelling through or engaged in outdoor recreation where the view is incidental or transient and sporadic.
Low	Receptors where the changed view is unimportant and/or users are not sensitive to change. People at their place of work, industrial facilities or people traveling through the landscape in cars, trains or other transport such that the speed and nature of the views involved area short lived and have no special significance

F.1.2 Evaluation of Magnitude of Effect

The magnitude of effect is defined by GLVIA3 as, '*the nature of the effect likely to occur*'. It combines judgements on the size and scale of the effect; the geographical extent of the area over which it occurs; whether the effect is reversible or irreversible; and the duration of the effect.

The overall magnitude of effect is judged on individual merit rather than by a formulaic process, guided by the criteria set out below.

F.1.2.1 Magnitude of Landscape Effects

The magnitude of landscape effect has been assessed in terms of its size or scale of the development, the geographical extent of the area that would be influenced, its duration and reversibility. This judgement takes into consideration the following factors:

Size / Scale

- The extent/proportion of landscape elements lost or added;
- The contribution of that element to landscape character and the degree to which aesthetic/ perceptual aspects are altered; and
- Whether the change is likely to alter the key characteristics of the landscape, which are critical to its distinctive character.

Geographical Extent

The geographical extent of landscape changes has considered how far reaching the changes would be at the following scales:

- Within the immediate setting;
- Landscape character areas/types; and
- At a larger scale, influencing several landscape character areas.

Duration and Reversibility

Duration and reversibility of the changes has been categorised as follows:

- Short-term/reversible – change that is reversible and would last up to five years;
- Medium-term/reversible – change that is theoretically reversible but would last for between five years and 10 years;
- Long-term/reversible – change that is theoretically reversible but would last for between 10 and 25 years; and
- Permanent/irreversible – change that would last for 25 years or more, which are deemed as permanent or irreversible.

The criteria used to assess the size, scale and geographic extents of landscape effects has been based upon the amount of change that would occur as a result of the overhead line works, as described in **Appendix Table 3** below.

Appendix Table 3: Magnitude of Landscape Effects Criteria

Magnitude of effect	Criteria
Major	<p>Size/Scale: substantial change to the key characteristics of the landscape; and/or total loss or substantial change to the existing landscape elements; and/or the addition of major new and uncharacteristic features or components.</p> <p>Geographical Extent: effects on a large part of the landscape character area/types; and/or a large proportion of landscape elements/features.</p> <p>Duration and Reversibility: introduction of permanent/irreversible change.</p>
Moderate	<p>Size/Scale: noticeable change to the key characteristics of the landscape; and/or partial loss or noticeable change to existing landscape elements; and/or the introduction of moderate new and uncharacteristic features or components.</p> <p>Geographical Extent: effects on a moderate part of the landscape character area/types; and/or a notable proportion of landscape elements/features.</p> <p>Duration and Reversibility: introduction of long-term/reversible change.</p>
Minor	<p>Size/Scale: minor change to the key characteristics of the landscape; and/or minor loss or slight change to existing landscape elements; and/or the introduction of minor new and uncharacteristic features or components.</p> <p>Geographical Extent: effects on a small part of the landscape character area/types; and/or a small proportion of landscape elements/features.</p> <p>Duration and Reversibility: introduction of medium-term/reversible change.</p>
Negligible	<p>Size/Scale: barely perceptible change to the key characteristics of the landscape; and/or minimal loss or barely perceptible change to existing landscape elements; and/or the introduction of barely perceptible new and uncharacteristic features or components.</p> <p>Geographical Extent: effects on a negligible part of the landscape character area/types; and/or a very small proportion of landscape elements/features.</p> <p>Duration and Reversibility: introduction of a short-term/reversible change.</p>

F.1.2.2 Magnitude of Visual Effects

Evaluation of the magnitude of effect on visual receptors has been carried out by considering the following factors:

Size and Scale

- The scale of the change in the view with respect to the loss or addition of features and changes in its composition, including the proportion of the receptor's available view affected by the development;
- The degree of contrast or integration of any new features or changes in the landscape with the existing landscape elements and characteristics; and
- The nature of the view, in terms of the relative amount of time over which it will be experienced and whether views will be full, partial or glimpsed.

Geographical extent

The angle of view relative to the main activity of the receptor and the distance of the viewpoint from the overhead line works.

- Short distance – up to 250m from the overhead line works;

- Middle distance – between 250m and 500m from the overhead line works; and
- Long distance/background – beyond 500m of the overhead line works.

Duration and Reversibility

Duration and reversibility of the changes has been categorised as follows:

- Short-term/reversible – change that is reversible and would last up to five years;
- Medium-term/reversible – change that is theoretically reversible but would last for between five years and 10 years;
- Long-term/reversible – change that is theoretically reversible but would last for between 10 and 25 years; and
- Permanent/irreversible – change that would last for 25 years or more, which are deemed as permanent or irreversible.

The criteria used to help determine the magnitude of visual effects are shown in **Appendix Table 4** below.

Appendix Table 4: Magnitude of Visual Effects Criteria

Magnitude	Criteria
Major	<p>Size/Scale: the project, or a part of it, would become the dominant feature or focal point of the view; and/or total loss or substantial alteration to key characteristics of the view (e.g., the proposals dominate the view and fundamentally change its character and components); and/or introduction of uncharacteristic features across a large proportion of the view.</p> <p>Geographical Extent: the view is available from all or most parts of a specific location; or from the majority of a linear route; and/or is within the direct frame of view; and/or experienced at close proximity from the receptor that the project would form part of the foreground of the view.</p> <p>Duration and Reversibility: introduction of permanent/irreversible change.</p>
Moderate	<p>Size/Scale: the project, or a part of it, would form a noticeable feature or element of the view which is readily apparent to the receptor (e.g., the proposals are noticeable in the view), affecting its character and altering some of its components and features; and/or partial loss or noticeable alteration to key characteristics of the view; and/or introduction of uncharacteristic features across part of the view.</p> <p>Geographical Extent: the view is available from a moderate proportion of a specific location; or from the moderate part of a linear route; and/or is at a slightly oblique angle; and/or experienced at a distance from the receptor that the project would form part of the middle ground of the view.</p> <p>Duration and Reversibility: introduction of long-term/reversible change.</p>
Minor	<p>Size/Scale: the project, or a part of it, would be perceptible but not alter the overall balance of features and elements that comprise the existing view; and/or slight loss or alteration to key characteristics of the view; and/or the introduction of uncharacteristic features across a small part of the view.</p> <p>Geographical Extent: the view is available from a small proportion of a specific location; or from limited sections of a linear route; and/or is at an oblique angle; and/or experienced at a relatively long distance from the receptor that the project would form part of the background of the view.</p> <p>Duration and Reversibility: introduction of medium-term/reversible change.</p>
Negligible	<p>Size/Scale: only a very small part of the project would be discernible; and/or the introduction of features largely characteristic of the view.</p>

Magnitude	Criteria
	Geographical Extent: the view is available from hardly any part of a specific location; or from a very limited part of a linear route; and/or is at a very oblique angle; and/or experienced at such a distance from the receptor that the project would form a barely noticeable feature or element of the view.
	Duration and Reversibility: introduction of a short-term/reversible change.

Mitigation measures and standard construction and operational management practices has been incorporated into the design and have been considered in the determination of the magnitude of effect.

F.1.3 Evaluation of Level of Effect

The resulting sensitivity and magnitude assessments has been applied together to determine the level of effect on each landscape or visual receptor, as shown in the matrix in **Appendix Table 5** below.

This matrix forms only a guide (i.e., an aide memoir) to the way that sensitivity and magnitude of effect give rise to a prediction of effects. The assessment of level of effect relies upon common sense, experience and professional judgement, supported by substantiated reasoning. The predicted effect therefore may not always fit with the matrix. For example, in assessing the level of an effect, an assessor may consider changes of a relatively low magnitude to be of a high level of effect if they relate to a highly sensitive (or 'important' or 'vulnerable') landscape or visual resource, whilst a high magnitude of effect on a less sensitive receptor may be deemed to be a relatively low level of effect. The relationship between sensitivity and magnitude of effect is therefore not always linear.

Appendix Table 5: Level of Effect Matrix

		Magnitude			
		Negligible	Minor	Moderate	Major
Sensitivity	Low	Negligible	Negligible/Slight	Moderate	Moderate
	Medium	Negligible/Slight	Slight	Moderate	Moderate/Major
	High	Slight	Slight/Moderate	Moderate/Major	Major

Effects have been qualified as either 'adverse' or 'beneficial'. The level of landscape and visual effects has been assessed on a four-point scale of 'major', 'moderate', 'slight' and 'negligible', which are based on professional judgement and informed by GLVIA3.

Appendix Table 6: Landscape / Visual Level of Effect Criteria

Category	Landscape	Visual
Major Beneficial Effect	The project would fit well with the scale, landform and pattern and enhance the character (including quality and value) of the landscape; enable the restoration of characteristic features and elements lost as a result of changes from inappropriate management or development; enable a sense of place to be enhanced.	The project would create a new feature that would greatly enhance the view. For example, new feature or landmark of local importance.
Moderate Beneficial Effect	The project would improve the character (including quality and value) of the landscape; enable the restoration of characteristic features and elements partially lost or diminished as a result of changes	The proposals would cause obvious improvement to a view from a receptor of lower sensitivity or a perceptible improvement to a view from a more sensitive receptor.

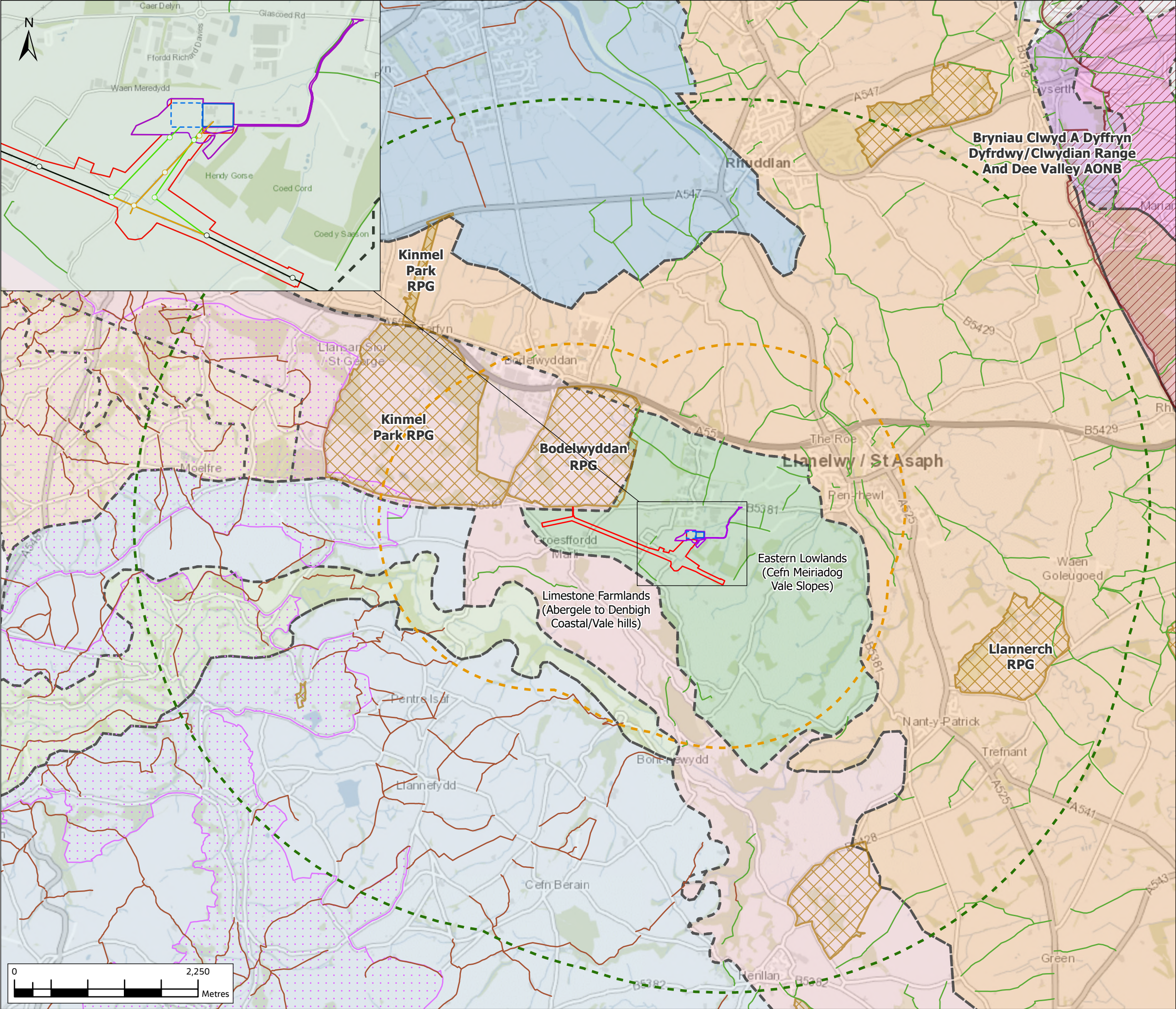
Category	Landscape	Visual
	from inappropriate management or development; enable a sense of place to be restored.	
Slight Beneficial Effect	The project would complement the character (including quality and value) of the landscape; maintain or enhance characteristic features and elements; enable some sense of place to be restored.	The project would cause limited improvement to a view from a receptor of higher sensitivity or would cause greater improvement to a view from a receptor of lower sensitivity.
Negligible Effect	The project would be compatible with the existing character (including quality and value) of the landscape; blend in with characteristic features and elements; enable a sense of place to be retained.	No perceptible deterioration or improvement in the existing view
Slight Adverse Effect	The project would not quite fit the character (including quality and value) of the landscape; be at variance with characteristic features and elements; detract from a sense of place.	The project would cause limited deterioration to a view from a receptor of higher sensitivity or cause greater deterioration to a view from a receptor of lower sensitivity.
Moderate Adverse Effect	The project would conflict with the character (including quality and value) of the landscape; have an adverse impact on characteristic features or elements; diminish a sense of place	The project would cause obvious deterioration to a view from a receptor of lower sensitivity or perceptible damage to a view from a more sensitive receptor.
Major Adverse Effect	The project would be at complete variance with the character (including quality and value) of the landscape; cause the integrity of characteristic features, elements and sense of place to be lost.	The project would cause major deterioration or loss of a view from a highly sensitive receptor and would constitute a major discordant element in the view.

F.1.4 Cumulative Assessment Methodology

F.1.4.1 Inter-Project Effects (Local)

- 1) Inter-project cumulative effects assessment considered relevant other proposed developments as listed by Denbighshire County Council within 5km of the overhead line works.
- 2) The council provided a list of planned energy and electrical infrastructure in the vicinity of the site (email 22/07/2022) which formed a 'long list' of potential other developments for further consideration by the Landscape Architect. This list was then assessed and shortened on 13/07/2023 to those applications that were still awaiting decisions, others that had been rejected were removed from the list and entered the cumulative assessment process.
- 3) The short list was then used by the Landscape Architect who then exercised professional judgement in determining which proposed other local developments might reasonably and foreseeably act cumulatively with their respective areas of interest. In all cases only likely significant cumulative effects were considered. Non-significant potential cumulative effects were taken no further.
- 4) For each other development consideration was given to the anticipated programme, scale and location and professional judgement was applied to determine landscape and visual effects.

Appendix G. Landscape Character and Constraints



Legend

Overhead Line Works and Access Boundary

Application Boundary (includes access road and existing substation)

Substation Extension Boundary

Existing Substation Boundary

2km Study Area

5km Search Area

Existing Overhead Line and Towers - Retained

Existing Overhead Lines and Towers - Removed

New Overhead Lines and Towers

Denbighshire Public Rights of Way (PRoW)

Conwy Public Rights of Way (PRoW)

Special Landscape Areas (SLAs)

Area of Outstanding Natural Beauty (AONB)

Registered Park and Garden (RPG)

Landscape Character Areas (LCA)

Aled Hireathog Hills (West)

Coastal and Estuarine Flats (Prestatyn to Abergele)

Deep Valleys (Aled and Elwy)

Eastern Lowlands (Cefn Meiriadog Vale Slopes)

Limestone Farmlands (Abergele to Denbigh Coastal/Vale hills)

Limestone Farmlands (North Clywdian Range)

Lowland Hills

Vale Farmlands (Vale of Clywd)

Limestone Escarpment and Hills (Prestatyn – Dyserth Hillside)

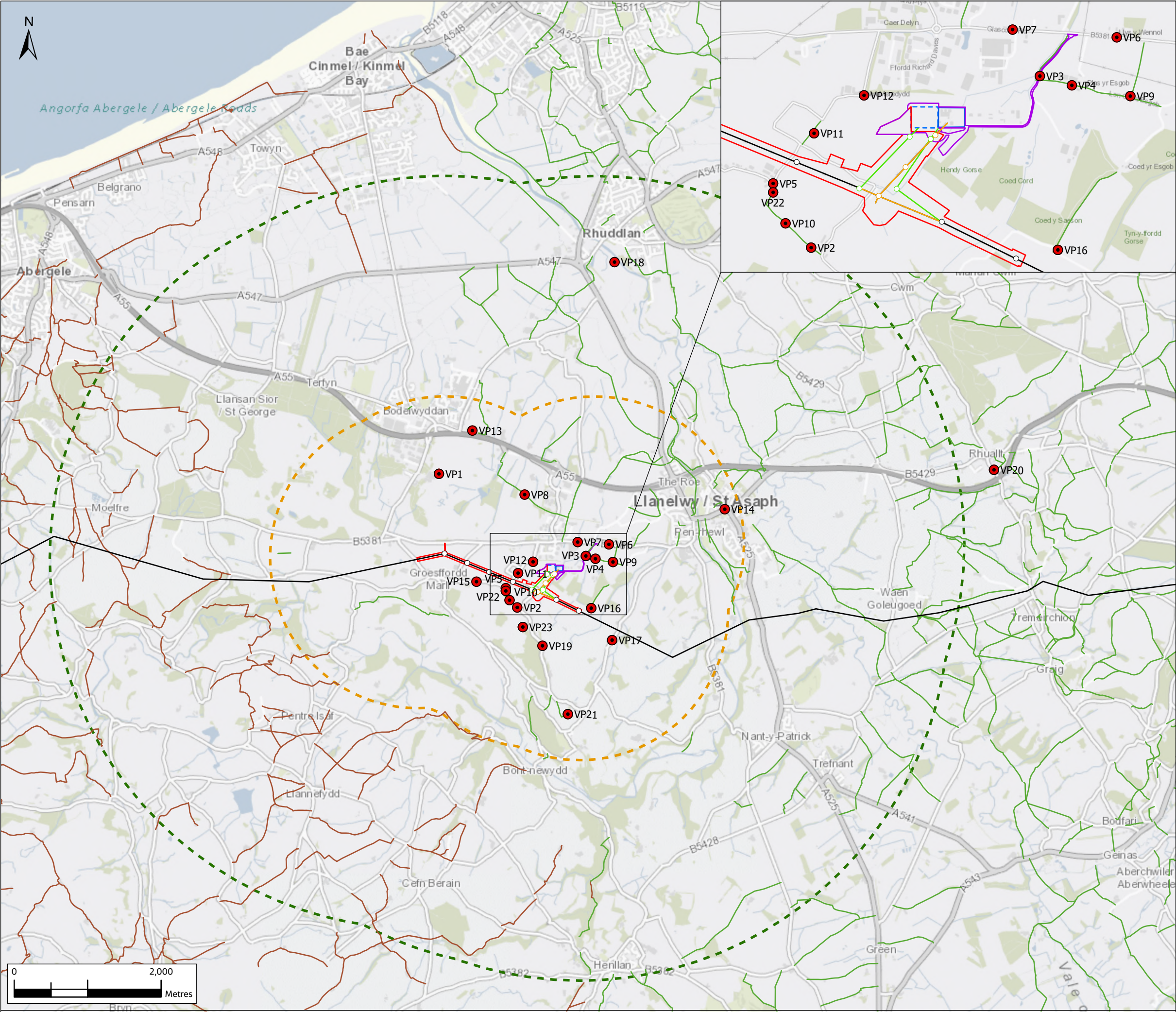
Trelawnyd Plateau



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03	6/16/2025	FINAL	WW	JE	TW	KW
Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
Scale @ A3		Scale: 1:45,000			DO NOT SCALE	
Jacobs No. B2416603						
Client <div>Jacobs</div> <div>nationalgrid</div>						
Project <div>BODELWYDDAN SUBSTATION</div>						
Drawing Title <div>LANDSCAPE CHARACTER AND CONSTRAINTS</div>						
Drawing No. B2416603/BODEL/LCC/001			Drawing Status FINAL			

Appendix H. Viewpoint Plan



Legend

- Overhead Line Works and Access Boundary
- Substation Extension Application Boundary (includes access road and existing substation)
- Existing Substation Boundary
- Substation Extension Boundary
- 2km Study Area
- 5km Search Area
- Existing Overhead Lines and Towers - Removed
- Proposed New Overhead Lines and Replacement Towers (Pylons)
- Existing Overhead Line and Towers - Retained
- Viewpoints
- Denbighshire Public Rights of Way (PRoW)
- Conwy Public Rights of Way (PRoW)



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Jacobs

nationalgrid

Project: BODELWYDDAN SUBSTATION

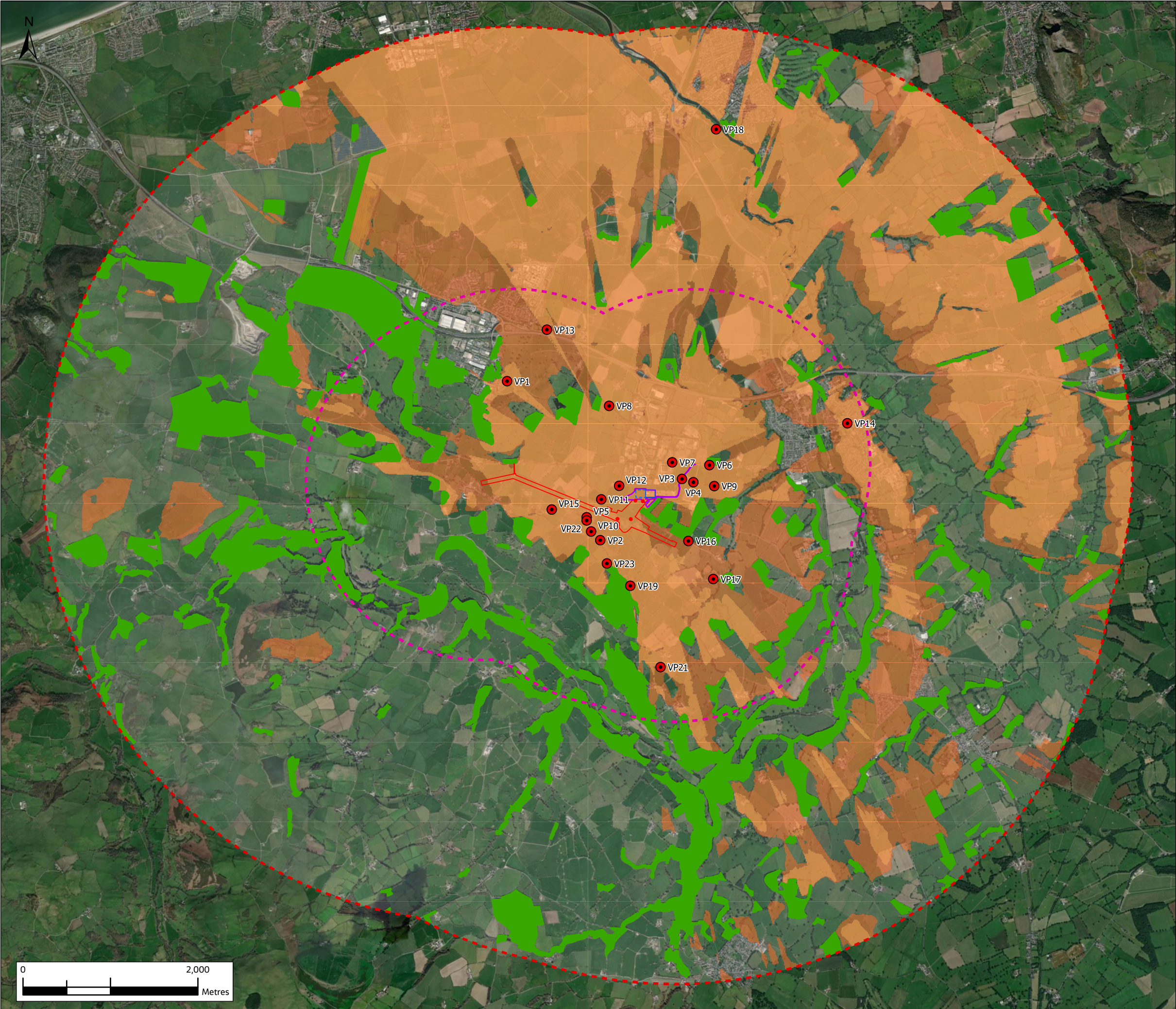
Drawing Title: VIEWPOINT PLAN

Drawing No. B2416603/BODEL/VP/001 Drawing Status: FINAL

APPENDIX H

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Appendix I. Zone of Theoretical Visibility



Legend

Overhead Line Works and Access Boundary

Substation Extension Application Boundary
(includes access road and existing substation)

Proposed New Replacement Towers (Pylons)

Viewpoints

Existing Substation Boundary

Substation Extension Boundary

2km Study Area

5 km Search Area

National Forest Inventory Woodland

Zone of Theoretical Visibility for the Proposed Pylons

No Theoretical Visibility

Theoretical Visibility of any of the Proposed Pylons

Zone of Theoretical Visibility for the Proposed Substation

No Theoretical Visibility

Theoretical Visibility of the Substation and Pylons

NOTES

1. The Zone of Theoretical Visibility (ZTV) is generated using computer program ArcGIS Pro 2.9.6 and is based on a OS Terrain 10 DTM generated from the contour data.

2. The ZTV is based upon a bare earth ground model combined with National Forest Inventory (NFI) Woodland data, with the assumption that all trees are 10 m height. The ZTV does not take account of surface features, such as buildings, which could also provide screening.

3. The ZTV has been modelled with a viewing height of 1.7m.



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Jacobs

Client

nationalgrid

Project

BODELWYDDAN SUBSTATION

Drawing Title

REV02 ZONE OF THEORETICAL VISIBILITY

Drawing No.	Drawing Status
B2416603/BODEL/ZTV/001	FINAL

APPENDIX I

Appendix J. Zone of Theoretical Visibility Methodology

J.1 Introduction

Zone of Theoretical Visibility (ZTV) mapping has been generated in ArcGIS software using the 'Viewshed' tool under the 'Surface' section of the Spatial Analyst software extension. Viewsheds are used to display where there is theoretical intervisibility between a designated target point, to reflect the location and height of the proposed substation and pylons and the surrounding topography. The ZTV has been modelled assuming a person's viewing height of 1.7m above the surrounding topography.

The ZTV illustrates the theoretical maximum extents to which the proposals may be visible from within an area. It is the starting point for defining the area from which the substation and pylons could potentially be seen. The actual extent of visibility is likely to be less due to intervening features that are not incorporated into the ZTV modelling (e.g., buildings outside of the site boundary, other pylons and other screening vegetation that is not included in the National Forest Inventory (NFI)).

J.2 Topography layer

The ZTV mapping has been generated based on a digital terrain model (DTM) OS5.

A topography layer in raster format has been used to generate the viewshed.

A point dataset of target points representing points along the overhead line works has been taken from a 3d model. The 3d model has been provided by Jacobs Front-End Engineering Design team.

Blocks of trees and woodlands identified in the NFI Woodland Map have been incorporated, based upon the assumption that all trees are 10m high, with the following exception: trees within the extent of the site boundary have been omitted to represent a worst-case scenario where all existing vegetation within would be removed. The NFI data does not include all trees but is focused on woodland of at least 0.5ha and minimum 20m width. While the NFI data includes blocks of deciduous woodland, the blocks are considered to generally provide an effective screen even during winter, due to the width of the blocks.

J.3 Point database/target points

The ZTVs have been generated using target points at each of the four corners of all buildings at roof height and the highest points on each end of all the gantries for the substation extension. Points have been taken from the top of each of the four proposed pylons.

J.4 Theoretical range of visibility

The final output of the ZTV mapping is a raster image. The raster image contains value columns, where 0 is not visible and numbers 1 and above are visible. A symbology has been automatically applied to the raster dataset as it is loaded into ArcGIS. The ZTVs show a multiple point analysis approach to identify how much of the overhead line works would be theoretically visible from a point in the study area.

Appendix K. Photomontages

A wide panoramic photograph of a rural landscape under a blue sky with scattered clouds. In the foreground, a lush green field is separated from a white house with two red brick chimneys by a stone wall and a wire fence. A large electricity pylon stands prominently in the middle ground. The background features rolling green hills and distant towns.

PHOTOMONTAGE - WINTER YEAR 1 OF OPERATION

A wide panoramic view of a rural landscape. In the foreground, a lush green field is bordered by a stone wall and a wire fence. To the right, a white house with a dark roof and two chimneys is visible. In the middle ground, a large industrial facility, likely a power plant, is situated among trees. Several high-voltage electricity pylons are scattered across the landscape. The background features rolling hills under a blue sky with light clouds.

VIEWPOINT 02: View looking north east from footpath towards Substation				NOTES: This photomontage is for illustrative purposes only and has been prepared in accordance with the methodology set out in Appendix M. 2) If using this photomontage illustration to judge scale, view at A1 sheet size. The A1 sheet should be viewed centrally at a comfortable arm's length. 3) If using this photomontage illustration for landscape context, the figure may be viewed at A3 sheet size. 4) For larger plans showing all viewpoint locations, refer to Appendix L.		<table border="1"> <tr> <td colspan="2">Project</td> <td colspan="2">BODELWYDDAN SUBSTATION</td> <td colspan="2"> <table border="1"> <tr> <td>Rev.</td> <td>Rev. date</td> <td>Purpose of revision</td> <td>Drawn</td> <td>Check'd</td> <td>Rev'd</td> <td>Appr'd</td> </tr> <tr> <td>P02</td> <td>AUG 24</td> <td>For Planning</td> <td>RL</td> <td>JP</td> <td>JE</td> <td>DB</td> </tr> <tr> <td>Rev.</td> <td>Rev. date</td> <td>Purpose of revision</td> <td>Drawn</td> <td>Check'd</td> <td>Rev'd</td> <td>Appr'd</td> </tr> <tr> <td>P01</td> <td>JUL 22</td> <td>For Planning</td> <td>RL</td> <td>EC</td> <td>JP</td> <td>DB</td> </tr> </table> </td> </tr> <tr> <td colspan="2">Drawing Title</td> <td colspan="2">APPENDIX K PHOTOMONTAGE VIEWPOINT 02 WINTER YEAR 1</td> <td colspan="2">Drawing Status FOR PLANNING</td> </tr> <tr> <td colspan="2">Jacobs No B2416603</td> <td colspan="2"></td> <td colspan="2">Scale SCALE @ A1</td> </tr> <tr> <td colspan="2">Drawing Number B2416603/BODEL/PHOTO/001</td> <td colspan="2">Rev P02</td> <td colspan="2"> </td> </tr> </table>		Project		BODELWYDDAN SUBSTATION		<table border="1"> <tr> <td>Rev.</td> <td>Rev. date</td> <td>Purpose of revision</td> <td>Drawn</td> <td>Check'd</td> <td>Rev'd</td> <td>Appr'd</td> </tr> <tr> <td>P02</td> <td>AUG 24</td> <td>For Planning</td> <td>RL</td> <td>JP</td> <td>JE</td> <td>DB</td> </tr> <tr> <td>Rev.</td> <td>Rev. date</td> <td>Purpose of revision</td> <td>Drawn</td> <td>Check'd</td> <td>Rev'd</td> <td>Appr'd</td> </tr> <tr> <td>P01</td> <td>JUL 22</td> <td>For Planning</td> <td>RL</td> <td>EC</td> <td>JP</td> <td>DB</td> </tr> </table>		Rev.	Rev. date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd	P02	AUG 24	For Planning	RL	JP	JE	DB	Rev.	Rev. date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd	P01	JUL 22	For Planning	RL	EC	JP	DB	Drawing Title		APPENDIX K PHOTOMONTAGE VIEWPOINT 02 WINTER YEAR 1		Drawing Status FOR PLANNING		Jacobs No B2416603				Scale SCALE @ A1		Drawing Number B2416603/BODEL/PHOTO/001		Rev P02			
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Visualisation type: Type 3 (in accordance with Landscape Institute Visual Representation of Development Proposals Technical Guidance Note 06/19) Date and time of photograph: 22/03/22 at 12.05 Lighting conditions: Bright OS grid reference: 301046, 373049 Viewpoint ground elevation: 86 m Projection: Cylindrical Sheet size: A1		Enlargement factor: 96% @ A1 Camera type: Canon EOS 5D MARK III Camera lens size: 50 mm Camera height above ground level: 1.6 m Aperture: F/7.1 ISO: 200 Shutter speed: 1/640 Horizontal field of view: 90° Vertical field of view: 27° Bearing to centre of panoramic: 50°		LOCATION PLAN <small> OS licence: This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Ordnance Survey licence number: 100009084 ©Copyright 2023 Jacobs U.K. Limited. The contents and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright. Location: This drawing has been prepared on behalf of, and for the exclusive use of Jacobs Clients, and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the client. Jacobs accepts no liability or responsibility elsewhere for, or in respect of, any use of or reliance upon this drawing by any third party. </small>																																																							

EXISTING - WINTER BASELINE



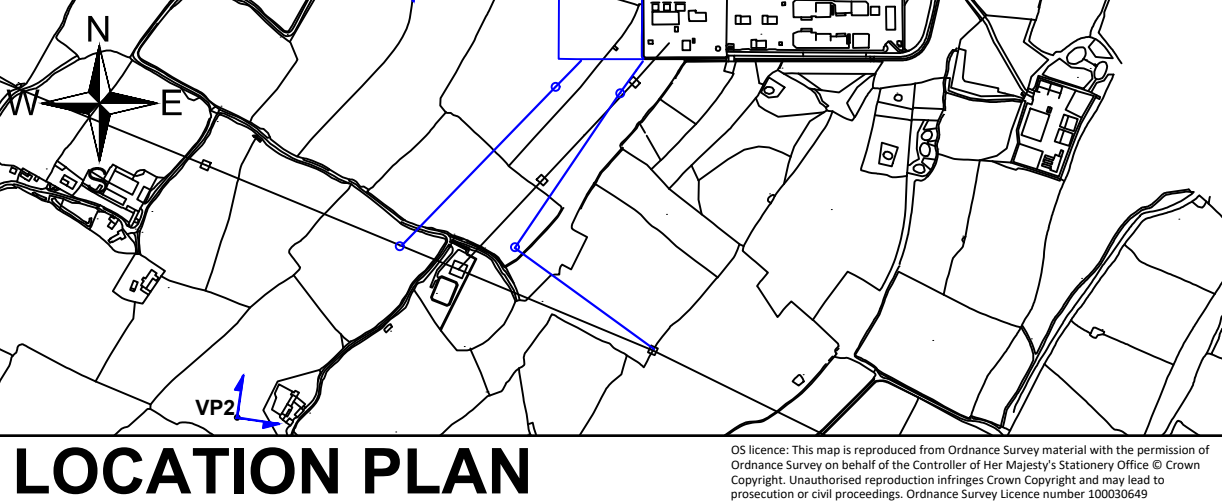
PHOTOMONTAGE - WINTER YEAR 15 OF OPERATION



VIEWPOINT 02: View looking north east from footpath towards Substation

Visualisation type: Type 3 (in accordance with Landscape Institute Visual Representation of Development Proposals Technical Guidance Note 06/19)
Date and time of photograph: 22/03/22 at 12.05
Lighting conditions: Bright
OS grid reference: 301046, 373049
Viewpoint ground elevation: 86 m
Projection: Cylindrical
Sheet size: A1

Enlargement factor: 96% @ A1
Camera type: Canon EOS 5D MARK III
Camera lens size: 50 mm
Camera height above ground level: 1.6 m
Aperture: F/7.1
ISO: 200
Shutter speed: 1/640
Horizontal field of view: 90°
Vertical field of view: 27°
Bearing to centre of panoramic: 50°



NOTES:
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3) If using this photomontage illustration for landscape context, the figure may be viewed at A3 sheet size.
4) For larger plans showing all viewpoint locations, refer to Appendix L.

Project	BODELWYDDAN SUBSTATION		Rev. P02	Rev. date AUG 24	Purpose of revision For Planning	Drawn RL	Check'd JP	Rev'd JE	Appr'd DB
			Rev. P01	Rev. date JUL 22	Purpose of revision For Planning	Drawn RL	Check'd EC	Rev'd JP	Appr'd DB
Drawing Title APPENDIX K PHOTOMONTAGE VIEWPOINT 02 WINTER YEAR 15			Drawing Status FOR PLANNING						
Jacobs No	B2416603		Scale SCALE @ A1						
Drawing Number B2416603/BODEL/PHOTO/002			Rev P02	Client nationalgrid					

EXISTING - WINTER BASELINE



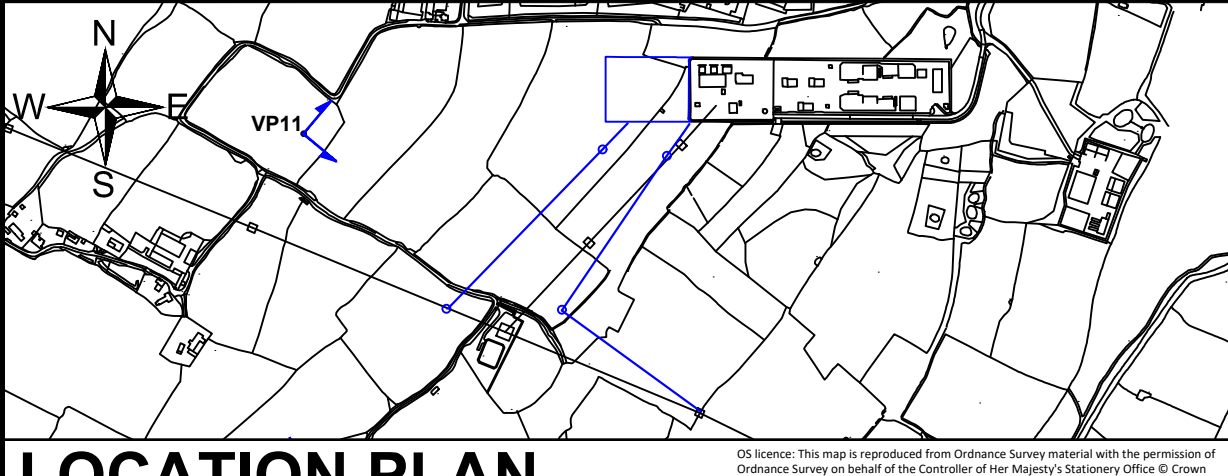
PHOTOMONTAGE - WINTER YEAR 1 OF OPERATION



VIEWPOINT 11: View looking east from footpath towards Substation

Visualisation type: Type 3 (in accordance with Landscape Institute Visual Representation of Development Proposals Technical Guidance Note 06/19)
Date and time of photograph: 22/03/22 at 11.15
Lighting conditions: Bright
OS grid reference: 301059, 373508
Viewpoint ground elevation: 60 m
Projection: Cylindrical
Sheet size: A1

Enlargement factor: 96% @ A1
Camera type: Canon EOS 5D MARK III
Camera lens size: 50 mm
Camera height above ground level: 1.6 m
Aperture: F/7.1
ISO: 200
Shutter speed: 1/800
Horizontal field of view: 90°
Vertical field of view: 27°
Bearing to centre of panoramic: 80°



NOTES:
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Project		BODELWYDDAN SUBSTATION		Rev. P02	Rev. date AUG 24	Purpose of revision For Planning	Drawn RL	Check'd JP	Rev'd JE	Appr'd DB
Drawing Title		APPENDIX K PHOTOMONTAGE VIEWPOINT 11 WINTER YEAR 1		Rev. P01	Rev. date JUL 22	Purpose of revision For Planning	Drawn RL	Check'd EC	Rev'd JP	Appr'd DB
Drawing Number		B2416603/BODEL/PHOTO/003		Rev. P02		Client nationalgrid				
Drawing Status		FOR PLANNING		Scale SCALE @ A1						

EXISTING - WINTER BASELINE



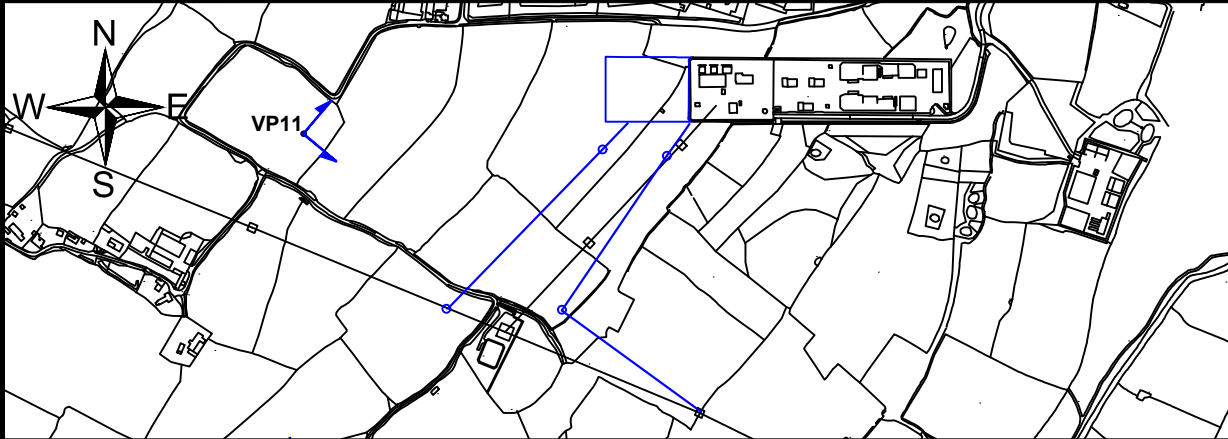
PHOTOMONTAGE - WINTER YEAR 15 OF OPERATION



VIEWPOINT 11: View looking east from footpath towards Substation

Visualisation type: Type 3 (in accordance with Landscape Institute Visual Representation of Development Proposals Technical Guidance Note 06/19)
Date and time of photograph: 22/03/22 at 11.15
Lighting conditions: Bright
OS grid reference: 301059, 373508
Viewpoint ground elevation: 60 m
Projection: Cylindrical
Sheet size: A1

Enlargement factor: 96% @ A1
Camera type: Canon EOS 5D MARK III
Camera lens size: 50 mm
Camera height above ground level: 1.6 m
Aperture: F/7.1
ISO: 200
Shutter speed: 1/800
Horizontal field of view: 90°
Vertical field of view: 27°
Bearing to centre of panoramic: 80°



LOCATION PLAN

NOTES:
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3) If using this photomontage illustration for landscape context, the figure may be viewed at A3 sheet size.
4) For larger plans showing all viewpoint locations, refer to Appendix L.

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ProjectBODELWYDDAN SUBSTATION			Rev. P02	Rev. date AUG 24	Purpose of revision For Planning	Drawn RL	Check'd JP	Rev'd JE	Appr'd DB
			Rev. P01	Rev. date JUL 22	Purpose of revision For Planning	Drawn RL	Check'd EC	Rev'd JP	Appr'd DB
Drawing TitleAPPENDIX K PHOTOMONTAGE VIEWPOINT 11 WINTER YEAR 15			Drawing StatusFOR PLANNING						
Jacobs NoB2416603			ScaleSCALE @ A1						
Drawing NumberB2416603/BODEL/PHOTO/004			Clientnationalgrid						
			RevP02						

EXISTING - WINTER BASELINE

A wide panoramic photograph showing a rural landscape. In the foreground, a dirt road with a small puddle leads towards a green field. A metal gate is partially open, flanked by a dense, dark hedge. In the background, several large electricity pylons and power lines stretch across the sky. A large industrial building is visible on the left side of the background. The sky is blue with some clouds.

VIEWPOINT 12: View looking south east from Waen Mereydd towards Substation		<p>LOCATION PLAN</p> <p><small>© Source: This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. Crown Copyright. Unauthorised reproduction infringes Crown Copyright and may lead to prosecution or civil proceedings. Ordnance Survey licence number: 100069837.</small></p> <p><small>©Copyright 2022 Jacobs U.K. Limited. The concepts and information contained in this document are the property of Jacobs. Use or copying of this document in whole or in part without the written permission of Jacobs constitutes an infringement of copyright. Location: This drawing has been prepared and issued by Jacobs as part of the project described above and it shall remain the property of Jacobs. It is loaned to you for your reference only and is not to be used for any other purpose without the prior written consent of Jacobs. It is not to be distributed outside your organisation and the client. Jacobs accepts no liability, responsibility or warranty for, or in respect of, any use of, or reliance upon, this drawing by any third party.</small></p>																																	
Visualisation type: Type 3 (in accordance with Landscape Institute Visual Representation of Development Proposals Technical Guidance Note 06/19)	Enlargement factor: 96% @ A1 Camera type: Canon EOS 5D MARK III Camera lens size: 50 mm Camera height above ground level: 1.6 m Aperture: F/7.1 ISO: 200 Shutter speed: 1/320 Horizontal field of view: 90° Vertical field of view: 27° Bearing to centre of panoramic: 130°																																		
Date and time of photograph: 22/03/22 at 10.55																																			
Lighting conditions: Bright																																			
OS grid reference: 301257, 373658																																			
Viewpoint ground elevation: 46 m																																			
Projection: Cylindrical		<p>NOTES:</p> <p>This photomontage is for illustrative purposes only and has been prepared in accordance with the methodology set out in Appendix M.</p> <p>2) If using this photomontage illustration to judge scale, view at A1 sheet size. The A1 sheet should be viewed centrally at a comfortable arm's length.</p> <p>3) If using this photomontage illustration for landscape context, the figure may be viewed at A3 sheet size.</p> <p>4) For larger plans showing all viewpoint locations, refer to Appendix L.</p>																																	
Sheet size: A1		<table border="1"> <thead> <tr> <th colspan="2">Project</th> <th colspan="2">Rev'd</th> <th>Check'd</th> <th>Rev'd</th> <th>Appr'd</th> </tr> </thead> <tbody> <tr> <td colspan="2">BODELYWDYDDAN SUBSTATION</td> <td>P02</td> <td>AUG 24</td> <td>For Planning</td> <td>RL</td> <td>JP JE DB</td> </tr> <tr> <td colspan="2"></td> <td>P01</td> <td>JUL 22</td> <td>For Planning</td> <td>RL</td> <td>EC JP DB</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Drawing Title</th> <th>Drawing Status</th> </tr> </thead> <tbody> <tr> <td>APPENDIX K PHOTOMONTAGE VIEWPOINT 12 WINTER YEAR 1</td> <td>FOR PLANNING</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Jacobs No</th> <th>Scale</th> </tr> </thead> <tbody> <tr> <td>B2416603</td> <td>SCALE @ A1</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Drawing Number</th> <th>Rev</th> </tr> </thead> <tbody> <tr> <td>B2416603/BODEL/PHOTO/005</td> <td>P02</td> </tr> </tbody> </table> <div style="text-align: right;"> </div>	Project		Rev'd		Check'd	Rev'd	Appr'd	BODELYWDYDDAN SUBSTATION		P02	AUG 24	For Planning	RL	JP JE DB			P01	JUL 22	For Planning	RL	EC JP DB	Drawing Title	Drawing Status	APPENDIX K PHOTOMONTAGE VIEWPOINT 12 WINTER YEAR 1	FOR PLANNING	Jacobs No	Scale	B2416603	SCALE @ A1	Drawing Number	Rev	B2416603/BODEL/PHOTO/005	P02
Project		Rev'd		Check'd	Rev'd	Appr'd																													
BODELYWDYDDAN SUBSTATION		P02	AUG 24	For Planning	RL	JP JE DB																													
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Jacobs No	Scale																																		
B2416603	SCALE @ A1																																		
Drawing Number	Rev																																		
B2416603/BODEL/PHOTO/005	P02																																		

EXISTING - WINTER BASELINE



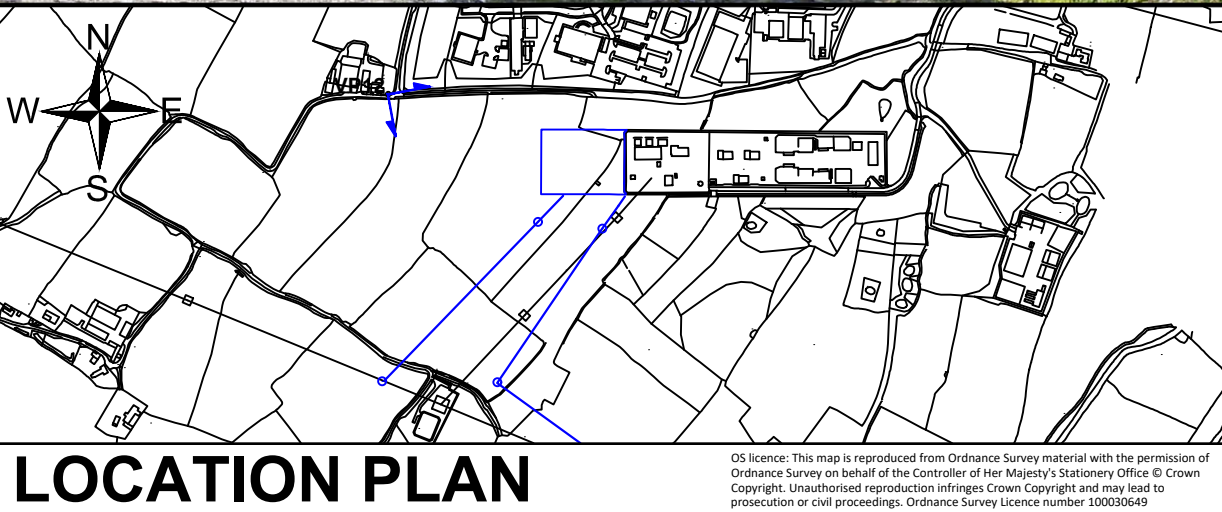
PHOTOMONTAGE - WINTER YEAR 15 OF OPERATION



VIEWPOINT 12: View looking south east from Waen Mereydd towards Substation

Visualisation type: Type 3 (in accordance with Landscape Institute Visual Representation of Development Proposals Technical Guidance Note 06/19)
Date and time of photograph: 22/03/22 at 10.55
Lighting conditions: Bright
OS grid reference: 301257, 373658
Viewpoint ground elevation: 46 m
Projection: Cylindrical
Sheet size: A1

Enlargement factor: 96% @ A1
Camera type: Canon EOS 5D MARK III
Camera lens size: 50 mm
Camera height above ground level: 1.6 m
Aperture: F/7.1
ISO: 200
Shutter speed: 1/320
Horizontal field of view: 90°
Vertical field of view: 27°
Bearing to centre of panoramic: 130°



NOTES:
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Project		BODELWYDDAN SUBSTATION		Rev.	Rev. date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
				P02	AUG 24	For Planning	RL	JP	JE	DB
Drawing Title		APPENDIX K PHOTOMONTAGE VIEWPOINT 12 WINTER YEAR 15		Rev.	Rev. date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
				P01	JUL 22	For Planning	RL	EC	JP	DB
Drawing Status		FOR PLANNING								
Drawing Number		B2416603		Scale		SCALE @ A1				
		B2416603/BODEL/PHOTO/006		Client		nationalgrid				
				Rev		P02				

EXISTING - WINTER BASELINE

A wide-angle landscape photograph showing a green field in the foreground, a large electricity pylon on the left, and rolling hills in the background under a blue sky with clouds. A wooden fence and trees are visible in the immediate foreground.

PHOTOMONTAGE - WINTER YEAR 1 OF OPERATION

VIEWPOINT 22: View looking north east from footpath towards Substation			NOTES: This photomontage is for illustrative purposes only and has been prepared in accordance with the methodology set out in Appendix M. 2) If using this photomontage illustration to judge scale, view at A1 sheet size. The A1 sheet should be viewed centrally at a comfortable arm's length. 3) If using this photomontage illustration for landscape context, the figure may be viewed at A3 sheet size. 4) For larger plans showing all viewpoint locations, refer to Appendix L.		Project BODELWYDDAN SUBSTATION		Rev. P02	Rev. date AUG 24	Purpose of revision For Planning	Drawn RL	Check'd JP	Rev'd JE	Appr'd DB			
Visualisation type: Type 3 (in accordance with Landscape Institute Visual Representation of Development Proposals Technical Guidance Note 06/19) Date and time of photograph: 22/03/22 at 11.45 Lighting conditions: Bright OS grid reference: 300894, 373265 Viewpoint ground elevation: 81 m Projection: Cylindrical Sheet size: A1			Enlargement factor: 96% @ A1 Camera type: Canon EOS 5D MARK III Camera lens size: 50 mm Camera height above ground level: 1.6 m Aperture: F/7.1 ISO: 200 Shutter speed: 1/800 Horizontal field of view: 90° Vertical field of view: 27° Bearing to centre of panoramic: 60°		Drawing Title APPENDIX K PHOTOMONTAGE VIEWPOINT 22 WINTER YEAR 1		Drawing Status FOR PLANNING		Rev. P01		Rev. date JUL 22	Purpose of revision For Planning	Drawn RL	Check'd EC	Rev'd JP	Appr'd DB
					Jacobs No B2416603		Scale SCALE @ A1									
							Client nationalgrid									
					Drawing Number B2416603/BODEL/PHOTO/007		Rev P02									

EXISTING - WINTER BASELINE



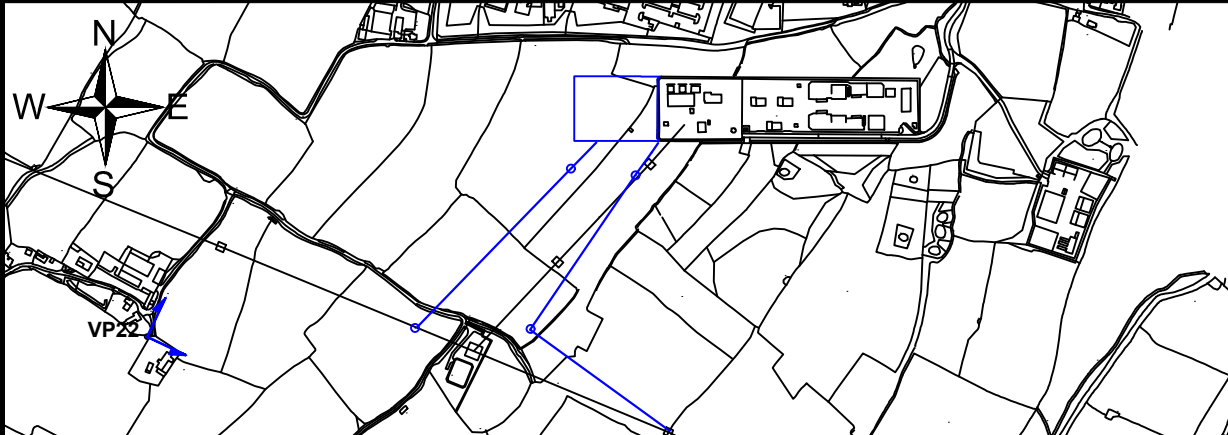
PHOTOMONTAGE - WINTER YEAR 15 OF OPERATION



VIEWPOINT 22: View looking north east from footpath towards Substation

Visualisation type: Type 3 (in accordance with Landscape Institute Visual Representation of Development Proposals Technical Guidance Note 06/19)
Date and time of photograph: 22/03/22 at 11.45
Lighting conditions: Bright
OS grid reference: 300894, 373265
Viewpoint ground elevation: 81 m
Projection: Cylindrical
Sheet size: A1

Enlargement factor: 96% @ A1
Camera type: Canon EOS 5D MARK III
Camera lens size: 50 mm
Camera height above ground level: 1.6 m
Aperture: F/7.1
ISO: 200
Shutter speed: 1/800
Horizontal field of view: 90°
Vertical field of view: 27°
Bearing to centre of panoramic: 60°



LOCATION PLAN

NOTES:
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Project		BODELWYDDAN SUBSTATION		Rev. P02	Rev. date AUG 24	Purpose of revision For Planning	Drawn RL	Check'd JP	Rev'd JE	Appr'd DB
				Rev. P01	Rev. date JUL 22	Purpose of revision For Planning	Drawn RL	Check'd EC	Rev'd JP	Appr'd DB
Drawing Title		APPENDIX K PHOTOMONTAGE VIEWPOINT 22 WINTER YEAR 15		Drawing Status FOR PLANNING						
Jacobs No		B2416603		Scale SCALE @ A1						
Drawing Number		B2416603/BODEL/PHOTO/008		Client nationalgrid						
		Rev P01								

Appendix L. Photomontage Methodology

L.1 Introduction

The text below outlines the methodology used to provide the photomontage representations to inform the extension to Bodelwyddan Substation and the overhead line works.

This methodology document has been undertaken in accordance with the following core guidance documents:

- Landscape Institute Technical Guidance Note 06-19 Visual Representation of Development Proposals (LI TGN 06/19) (Landscape Institute, 2019), herein referred to as LI TGN06/19; and
- Guidelines for Landscape and Visual Impact Assessment, Third Edition (Landscape Institute and Institute of Environmental Management and Assessment, 2013), herein referred to as GLVIA3.

L.1.1 Viewpoint Locations

The final locations of viewpoints to be presented as Photomontages, are as follows:

- Viewpoint 02: View looking north-east from footpath towards Substation;
- Viewpoint 11: View looking east from footpath towards Substation;
- Viewpoint 12: View looking south-east from Waen Mereydd towards Substation; and
- Viewpoint 22: View looking north-east from footpath towards Substation.

L.1.2 Visualisation Determination

LI TGN 06/19 identifies a process of determining the Visualisation Type by way of a proportionate appraisal of project type/scale, likely audience, visualisation purpose and anticipated level of visual effect. This has been undertaken by a suitably qualified Landscape Architect based on the available site and design data at this time, and in accordance with GLVIA3.

The purpose of the visualisations is to illustrate the likely change in view from a proportionate selection of representative viewpoints that may occur as a result of the proposed substation extension being introduced into that view.

Type 3 Visualisations - Photomontages/Photowires as defined within LI TGN 06/19 have been produced for this project. The objective of a Type 3 visualisation is to present a printed image which gives a realistic impression of appearance, context, form and extent of the proposed development. Type 3 is summarised in TGN06/19 Section 4 – Type 3 Summary as "... appropriate for many planning applications, LVAs and LVIA's, where photomontage is required but a verifiable process and printed scale representation are not needed."

The recommendations from this summary that have been adhered to are as follows:

"Use a Full Frame Sensor camera with 50mm lens or cropped frame sensor camera with 35mm or 28mm fixed lens...."

...The enlargement factor should be stated on each page, together with the label 'Visualisation Type: 3'...."

...For very wide linear infrastructure, cylindrical panoramas up to 90° at A1 width, with multiple sheets for very wide panoramas will be produced.

Accompany visualisations with a Technical Methodology. Images will typically be presented with a 100% enlargement (27°@ A3, or 90°@ A1) "

L.1.3 Assumptions and Limitations

Every effort has been made to ensure a reasonable level of accuracy was maintained throughout the production of the visualisations and that the scheme is represented accurately. The following assumptions and limitations have been identified below.

- The baseline photographs that form the basis of the photomontage are a flattened 2D representation of what the eye would see (planar projection);
- Accuracy tolerances for survey and data can be determined based on key data (e.g. OS data and handheld GPS units) used to provide references for fixing camera perspectives; and
- Photomontages are assumed to be required to reflect the worst-case effects of the proposed development in operation winter year 1, and the function of mitigation planting in operation winter year 15. For the year 15 photomontages, plant growth will be assumed to reflect a total height of proposed mitigation planting as described in section L.7.3 below.

L.2 Type 3 Visualisation Process Methodology

L.2.1 Photography and Survey Data

At each viewpoint location, the following survey data was collected:

- Ordnance Survey Grid coordinates of the camera location;
- date and time photograph;
- the height of the camera above ground level (1.6m); and
- weather conditions at the time of photography.

Photographs were taken 22nd March 2023. Camera locations were recorded using a hand-held SatMap Active 20 GPS unit or iPhone smart phone with Coordinates App.

The baseline photographs were taken using Canon EOS 6D Mark II Digital Single Lens Reflex (DSLR) cameras, both with a fixed 50mm lens. All photographs were taken on a tripod levelled to the vertical and horizontal axes.

Camera settings were standardised for the correct exposure, shutter speed and resolution to enable clean production of panoramic images and high-resolution output.

The panoramic photography was undertaken using a series of photographs taken with a panoramic tripod head set to provide a 60% overlap (15° increments) between frames to reduce barrel distortion. The photographs were taken in a portrait orientation.

L.3 Panoramic Baseline Images

Photographs were stitched together using PTGui software using cylindrical projection to produce a single panoramic image that was exported to Photoshop at 90° horizontal x 27° vertical.

During this process, only minor improvements, for example, to balance brightness and contrast, were made where necessary due to variable light conditions on site.

Images were then cropped to an 86.5° horizontal and 27° field of view to reflect 96% extent of the 90° horizontal field of view, in accordance with LTGN 06/19, used for the photography. Images were then resized to fit to the

final A1 page plates (820 x 250mm) to enable a comfortable viewing distance is maintained for viewing the figures.

L.4 Camera Matching Process

To assist the process of matching the baseline photograph with the 3D digital model of the scheme, reference points were identified at each viewpoint location. Reference points are features that could be identified from a topographical survey, Ordnance Survey data or aerial photography that are then imported and modelled into 3D within the existing 3D model. Examples include retained lighting columns, structural steel posts, road restraint barriers etc.

The baseline panoramic images were imported into the 3D modelling software (Autodesk 3DS Max) and used in the camera matching process as backdrops when rendering, using the V-Ray Next 3.70 engine. As part of this process, the 'warped old style camera' settings were used match the cylindrical projection of the baseline panoramic image and allow accurate matching of reference points.

A local grid with a common global shift from OS National Grid was identified to enable the 3D modelling software to operate efficiently and all modelling data was moved using this information.

The base 3D model (existing environment and site context) was produced using information from topographical surveys and 3D information to vertically place reference objects.

In the 3D modelling software, the locations of the viewpoints were added to the model using the survey data. The viewpoints were then used as a starting point for fixing the location of the 3D camera by matching terrain, reference points and other information in the model to the corresponding features in the background image (the 3D camera backdrop).

Once the correct aspect, orientation and any camera roll (potential minor rotation of the camera when photograph taken) were confirmed and checked, the locations were locked for use in rendering.

L.5 3D Design Modelling

L.5.1 Existing Site 3D Model

The baseline model was created using the existing 3D lidar and converted to a terrain in 3DS Max.

L.5.2 Proposed layout design 3D Model

The core design 3D model was provided in a Navisworks file and was exported into Autodesk 3DS Max via .fbx file type transfer. This created large files that needed further work to locate to a local grid. This was necessary for the software to work correctly.

Materials were confirmed with the designers and applied accordingly to the visible elements of the scheme.

Environmental lighting in the combined model was configured to match the date, time and lighting conditions as surveyed on site at the time of the photography.

L.5.3 Planting Mitigation Details

Operation Year 1

- Hedgerows: a double staggered row of 450 mm tall x 40 mm diameter shelters at 300 mm centres; and

Operation Year 15

- Reinstated hedgerows: as per existing;

L.6 Compilation of Type 3 Visualisations: Photomontages

Baseline panoramic images were adjusted in Adobe Photoshop to reflect any elements and/or vegetation lost to facilitate the scheme and any retained foreground elements were layered over the top of the rendered layers showing the scheme.

Rendered images were generated from Autodesk 3DS Max Design software for the final production stage in Adobe Photoshop where they were stitched back together across the panoramic base image.

Once all layering and final adjustment to brightness and contrast levels were completed, all panoramic photographs and visualisations were resized to 820 mm x 250 mm at 300 pixels per cm to reflect a 96% enlargement of 90o horizontal x 27o vertical field of view.

All final images were then framed in AutoCAD with accompanying information as detailed below:

- Visualisation type;
- Date and time of photograph;
- Viewpoint ground elevation;
- OS National Grid Reference and elevation;
- Season within which the photography was taken;
- Site lighting conditions when the photography was taken;
- Camera height above ground;
- Camera lens size;
- Aperture, ISO and shutter speed details;
- Bearing to centre of the panoramic;
- Sheet size;
- Enlargement factor;
- Camera specification;
- Field of view information;
- Direction of view;
- Key notes on use such as details on a comfortable viewing distance from the eye; and
- Inset plans showing the location and orientation of the viewpoints.

Once each viewpoint sheet set was complete, all images were printed to a single pdf document set at high resolution and to 1:1 scale to ensure no loss of image size.

L.7 Final Output

- PHOTOMONTAGE VIEWPOINT 02 – EXISTING & WINTER YEAR 1 OF OPERATION;

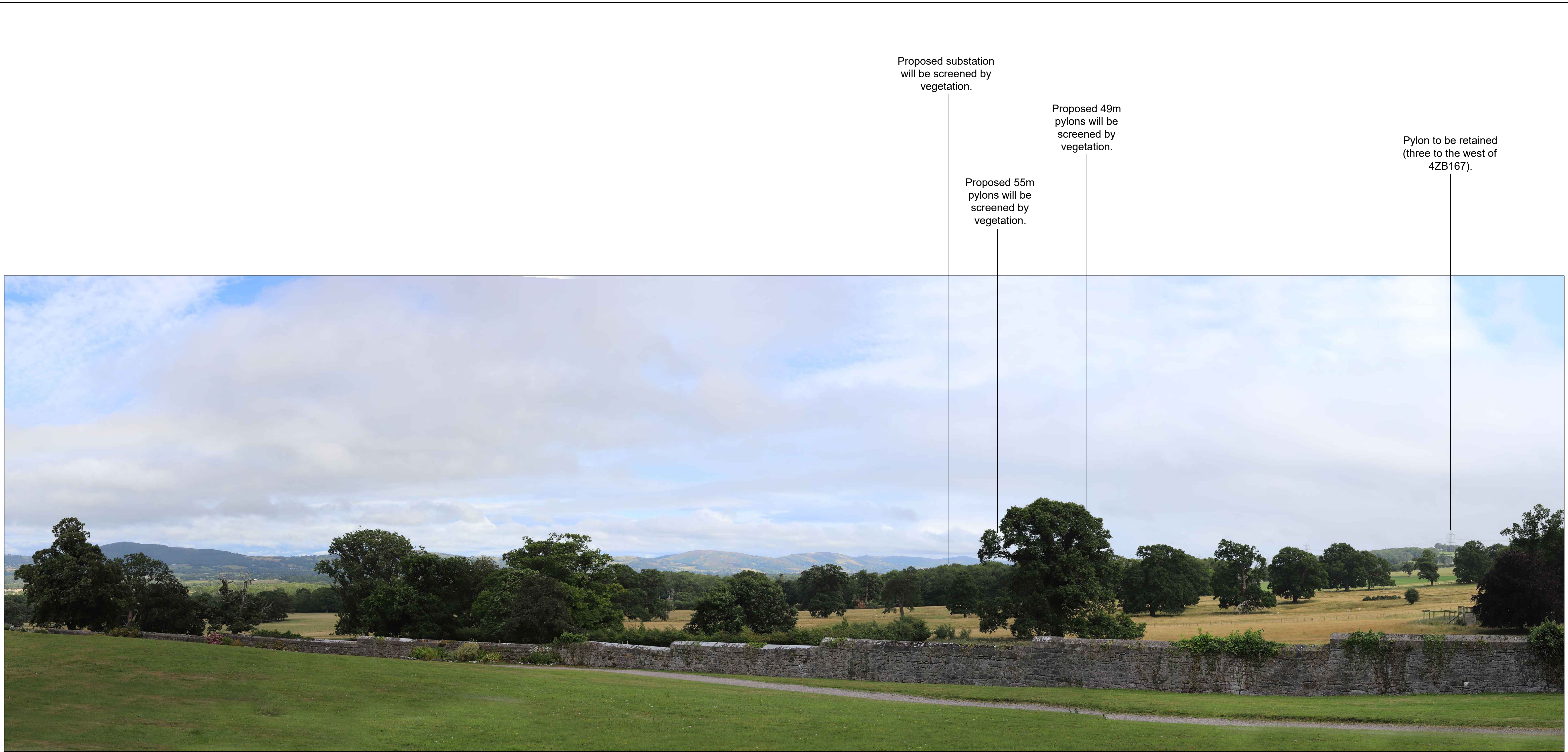
- PHOTOMONTAGE VIEWPOINT 02 – EXISTING & WINTER YEAR 15 OF OPERATION;
- PHOTOMONTAGE VIEWPOINT 11 – EXISTING & WINTER YEAR 1 OF OPERATION;
- PHOTOMONTAGE VIEWPOINT 11 – EXISTING & WINTER YEAR 15 OF OPERATION;
- PHOTOMONTAGE VIEWPOINT 12 – EXISTING & WINTER YEAR 1 OF OPERATION;
- PHOTOMONTAGE VIEWPOINT 12 – EXISTING & WINTER YEAR 15 OF OPERATION;
- PHOTOMONTAGE VIEWPOINT 22 – EXISTING & WINTER YEAR 1 OF OPERATION; and
- PHOTOMONTAGE VIEWPOINT 22 – EXISTING & WINTER YEAR 15 OF OPERATION.

L.8 References

Landscape Institute (2019), *Landscape Institute Technical Guidance Note 06-19 Visual Representation of Development Proposals (LI TGN 06/19)* – Landscape Institute. Available online https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/09/LI_TGN-06-19_Visual_Representation.pdf [accessed August 2024]

Landscape Institute and Institute of Environmental Management and Assessment (2013), *Guidelines for Landscape and Visual Impact Assessment, Third Edition* – Routledge

Appendix M. Representative Viewpoints



Proposed substation
will be screened by
vegetation.

Proposed 55m
pylons will be
screened by
vegetation.

Proposed 49m
pylons will be
screened by
vegetation.


Pylon to be retained
(three to the west of
4ZB167).

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NOTES:

Visualisation type: Type 1
Season: Summer
Date and time: 2nd/3rd August 2022
Projection: Cylindrical
Sheet size: A1

Camera type: Canon EOS 5D MARK II
Horizontal field of view (HFOV): 90°
Direction of view: Looking south east
To be viewed at comfortable arm's length



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Client	nationalgrid
Project	BODELWYDDAN SUBSTATION

VIEWPOINT 1: View south east from Bodelwyddan Castle and Park		
Scale	NTS	DO NOT SCALE
Jacobs No.	B2416603	
Drawing number	B2416603/BODEL/RV/001	




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NOTES:

Visualisation type: Type 1
Season: Summer
Date and time: 2nd/3rd August 2022
Projection: Cylindrical
Sheet size: A1

Camera type: Canon EOS 5D MARK II
Horizontal field of view (HFOV): 90°
Direction of view: Looking south
To be viewed at comfortable arm's length



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Client

Project

BODELWYDDAN SUBSTATION

VIEWPOINT 3: Public right of way and access road looking south		
Scale	NTS	DO NOT SCALE
Jacobs No.	B2416603	
Drawing number	B2416603/BODEL/RV/001	


Proposed new
55m pylon GM1.

Existing substation.

Proposed 55m pylon GMA1 and proposed substation extension.



								NOTES: Visualisation type: Type 1 Season: Summer Date and time: 2nd/3rd August 2022 Projection: Cylindrical Sheet size: A1								Camera type: Canon EOS 5D MARK II Horizontal field of view (HFOV): 90° Direction of view: Looking south west To be viewed at comfortable arm's length							
0	JUL 2023	FOR PLANNING			RL	EC	DB	KW															
Rev	Rev. Date	Purpose of revision			Drawn	Checked	Rev'd	Apprv'd															
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		Scale	NTS
Jacobs No.		B2416603	
Client		nationalgrid	
Project		BODELYDDAN SUBSTATION	
Drawing number		B2416603/BODEL/RV/001	



Temporary works to overhead lines during construction



Existing pylon to be retained two pylons
to the east of the existing pylon 4ZB167.



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NOTES:
Visualisation type: Type 1
Season: Summer
Date and time: 2nd/3rd August 2022
Projection: Cylindrical
Sheet size: A1

Camera type: Canon EOS 5D MARK II
Horizontal field of view (HFOV): 90°
Direction of view: Looking south
To be viewed at comfortable arm's length

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Client	nationalgrid
Project	BODELWYDDAN SUBSTATION

VIEWPOINT 7: View south from St Asaph Business Park on Glascoed Road		
Scale	NTS	DO NOT SCALE
Jacobs No.	B2416603	
Drawing number	B2416603/BODEL/RV/001	




FOR PLANNING						
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NOTES:

Visualisation type: Type 1
Season: Summer
Date and time: 2nd/3rd August 2022
Projection: Cylindrical
Sheet size: A1

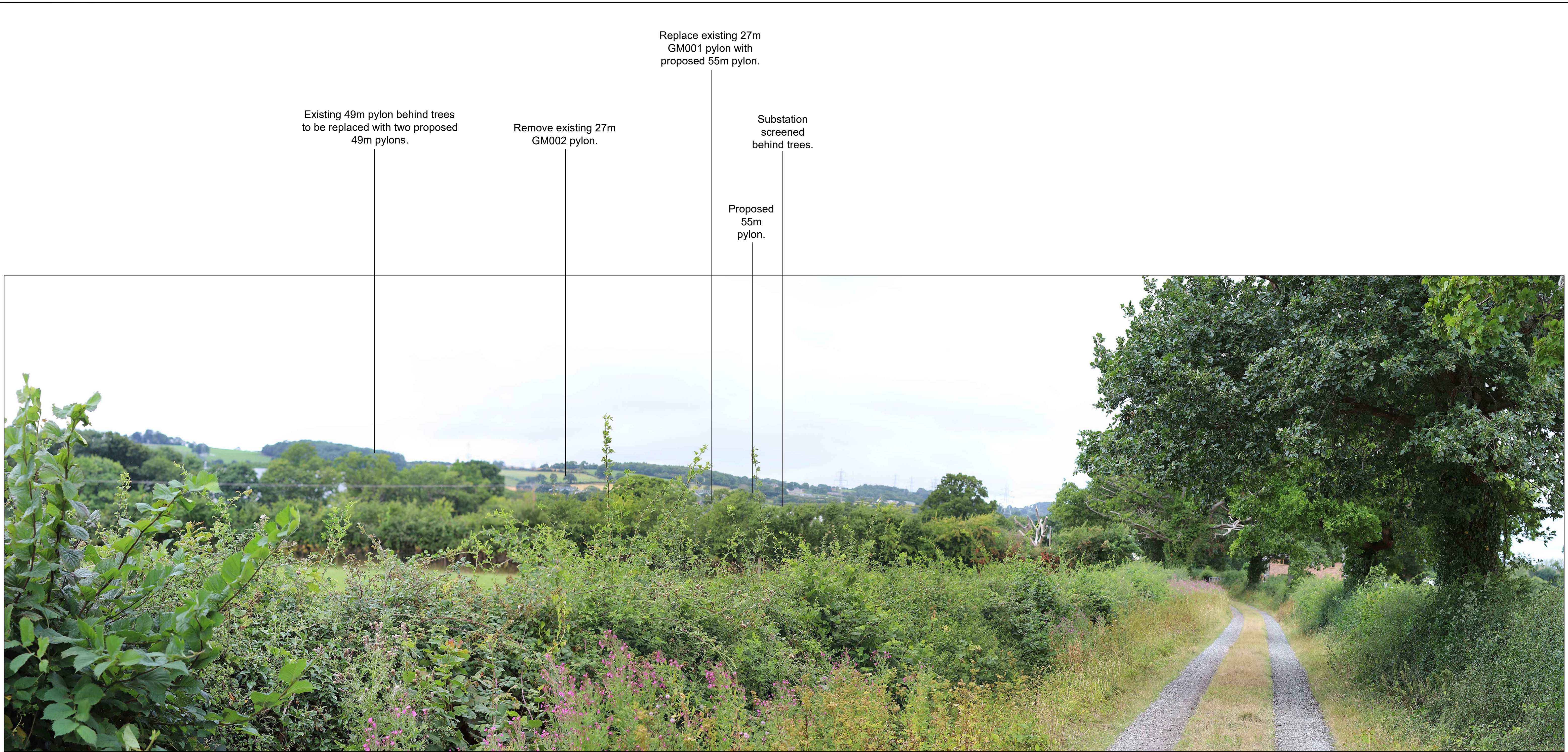
Camera type: Canon EOS 5D MARK II
Horizontal field of view (HFOV): 90°
Direction of view: Looking south
To be viewed at comfortable arm's length



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Client	nationalgrid
Project	BODELWYDDAN SUBSTATION

VIEWPOINT 8: View south from Public Right of Way at Faelnol Broper		
Scale	NTS	DO NOT SCALE
Jacobs No.	B2416603	
Drawing number	B2416603/BODEL/RV/001	



FOR PLANNING						
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NOTES:

Visualisation type: Type 1

Season: Summer

Date and time: 2nd/3rd August 2022

Projection: Cylindrical

Sheet size: A1

Camera type: Canon EOS 5D MARK II

Horizontal field of view (HFOV): 90°

Direction of view: Looking south west

To be viewed at comfortable arm's length

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Client	nationalgrid
Project	BODELWYDDAN SUBSTATION

VIEWPOINT 9: View south west from public right of way, Lon Coed Esgob.

Scale	NTS	DO NOT SCALE
Jacobs No.	B2416603	
Drawing number	B2416603/BODEL/RV/001	



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NOTES:

Visualisation type: Type 1
Season: Summer
Date and time: 2nd/3rd August 2022
Projection: Cylindrical
Sheet size: A1

Camera type: Canon EOS 5D MARK II
Horizontal field of view (HFOV): 90°
Direction of view: Looking north east
To be viewed at comfortable arm's length

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Client

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Project

BODELWYDDAN SUBSTATION

VIEWPOINT 10: View north east from public right of way, Hillside		
Scale	NTS	DO NOT SCALE
Jacobs No.	B2416603	
Drawing number	B2416603/BODEL/RV/001	



FOR PLANNING						
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Rev	Rev. Date	Purpose of revision	Drawn	Checked	Rev'd	Appr'd
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NOTES:
Visualisation type: Type 1
Season: Summer
Date and time: 2nd/3rd August 2022
Projection: Cylindrical
Sheet size: A1

Camera type: Canon EOS 5D MARK II
Horizontal field of view (HFoV): 90°
Direction of view: Looking south
To be viewed at comfortable arm's length

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Client	nationalgrid
Project	BODELWYDDAN SUBSTATION

VIEWPOINT 13: Marble Church South

Scale	NTS	DO NOT SCALE
Jacobs No.	B2416603	
Drawing number	B2416603/BODEL/RV/001	




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Rev	Rev. Date	Purpose of revision			Drawn	Checked	Rev'd	Apprv'd
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NOTES:

Visualisation type: Type 1
Season: Summer
Date and time: 2nd/3rd August 2022
Projection: Cylindrical
Sheet size: A1

Camera type: Canon EOS 5D MARK II
Horizontal field of view (HFOV): 90°
Direction of view: Looking west
To be viewed at comfortable arm's length



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Project

BODELWYDDAN SUBSTATION

VIEWPOINT 14: View west from St Asaph Cathedral		
Scale	NTS	DO NOT SCALE
Jacobs No.	B2416603	
Drawing number	B2416603/BODEL/RV/001	

4ZB167 49m pylon to be replaced in view with proposed 4ZB167B 49m pylon.

Proposed 4ZB167A pylon.

Public right of way west.



NOTES:

Visualisation type: Type 1
Season: Summer
Date and time: 2nd/3rd August 2022
Projection: Cylindrical
Sheet size: A1

Camera type: Canon EOS 5D MARK II
Horizontal field of view (HFOV): 90°
Direction of view: Looking west
To be viewed at comfortable arm's length

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VIEWPOINT 16: View west from public right of way

Scale	NTS	DO NOT SCALE
Jacobs No.	B2416603	
Drawing number	B2416603/BODEL/RV/001	

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Existing pylons to be retained
(pylon to the east of 4ZB167),
proposed development not visible.





St Asaph Cathedral Tower.

Existing 49m pylon 4ZB167 to be replaced by proposed 49m pylons 4ZB167A and 4ZB167B and 55m pylons GM1 and GMA1.

FOR PLANNING						
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NOTES:
Visualisation type: Type 1
Season: Summer
Date and time: 2nd/3rd August 2022
Projection: Cylindrical
Sheet size: A1

Camera type: Canon EOS 5D MARK II
Horizontal field of view (HFOV): 90°
Direction of view: Looking south west
To be viewed at comfortable arm's length

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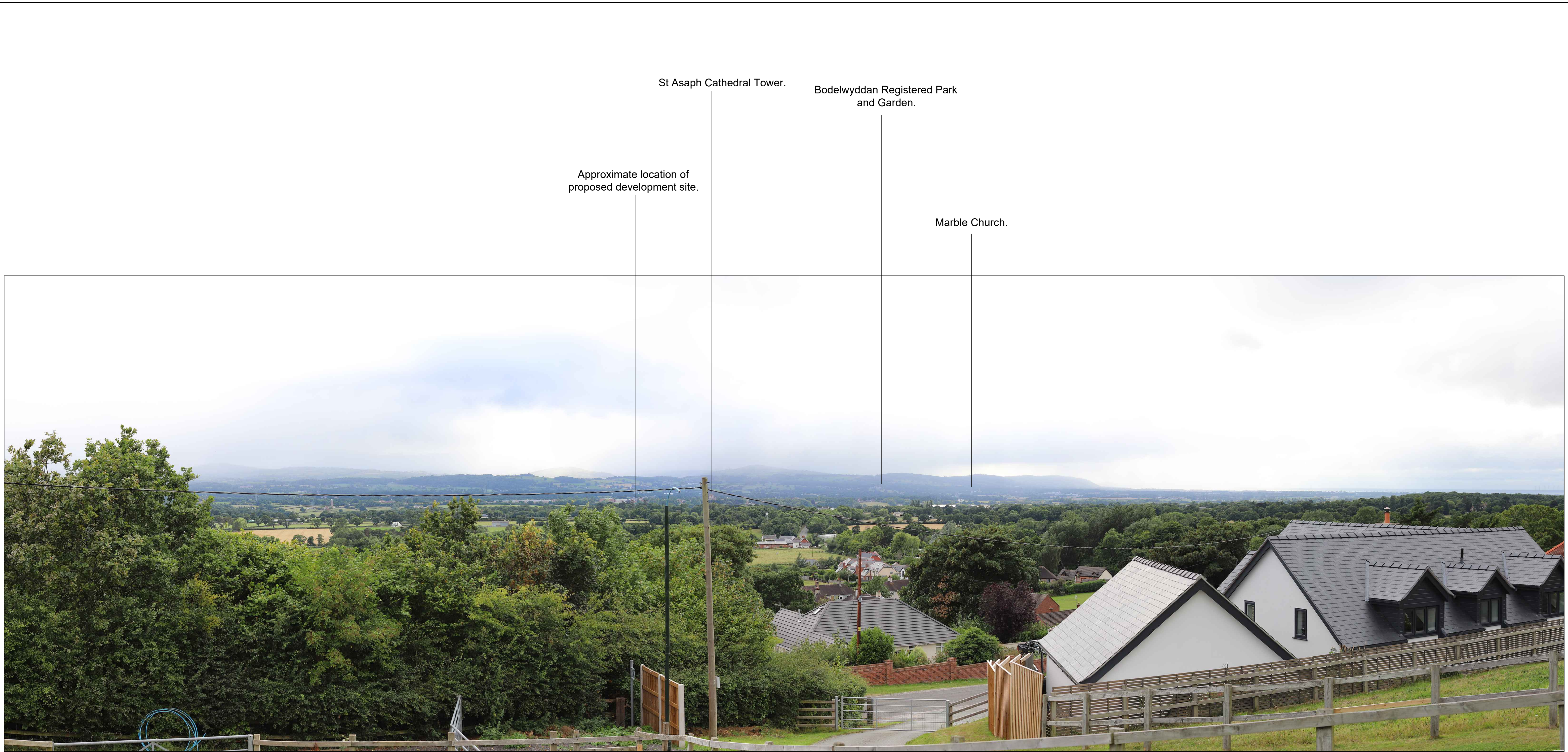
Client	
Project	BODELWYDDAN SUBSTATION

VIEWPOINT 18: View south west from Rhuddlan Castle		
Scale	NTS	DO NOT SCALE
Jacobs No.	B2416603	
Drawing number	B2416603/BODEL/RV/001	

Existing pylon to be retained
(pylon east of 4ZB167).



										NOTES: Visualisation type: Type 1 Season: Summer Date and time: 2nd/3rd August 2022 Projection: Cylindrical Sheet size: A1 Camera type: Canon EOS 5D MARK II Horizontal field of view (HFOv): 90° Direction of view: Looking north To be viewed at comfortable arm's length										<div><div><div><div><div><div>Jacobs.</div></div></div><div><div><div>1 City Walk, Leeds, LS11 9DX</div><div>Tel: +44(0)113 242 0771</div><div>Fax: +44(0)113 389 1389</div><div>www.jacobs.com</div></div></div></div><div>VIEWPOINT 19: View north from Isfryn Farm</div></div></div>									
0		JUL 2023		FOR PLANNING				RL	EC											DB	KW	Scale		NTS		DO NOT SCALE			
Rev		Rev. Date		Purpose of revision				Drawn	Checked											Rev'd	Apprv'd	Jacobs No.		B2416603					
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														Project		BODELWYDDAN SUBSTATION													





							<div>NOTES:</div> <div>Visualisation type: Type 1</div> <div>Season: Summer</div> <div>Date and time: 2nd/3rd August 2022</div> <div>Projection: Cylindrical</div> <div>Sheet size: A1</div>										<div>Camera type: Canon EOS 5D MARK II</div> <div>Horizontal field of view (HFOv): 90°</div> <div>Direction of view: Looking north</div> <div>To be viewed at comfortable arm's length</div>										<div><div><div><div>Jacobs.</div><div>1 City Walk, Leeds, LS11 8DQ</div><div>Tel: +44(0)113 242 8771 Fax: +44(0)113 389 1389</div><div>www.jacobs.com</div></div></div><div><div>VIEWPOINT 21: View north from St Mary's Church</div><table><tr><td>Scale</td><td>NTS</td><td>DO NOT SCALE</td></tr><tr><td>Jacobs No.</td><td colspan="2">B2416603</td></tr><tr><td>Drawing number</td><td colspan="2">B2416603/BODEL/RV/001</td></tr></table></div></div>										Scale	NTS	DO NOT SCALE	Jacobs No.	B2416603		Drawing number	B2416603/BODEL/RV/001	
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This drawing is not to be used in whole or part other than for the intended purpose and project as defined on this drawing. Refer to the contract for full terms and conditions.																																													

Appendix N. Landscape and Visual Effects Table

Appendix Table 7: Landscape Effects Table

Character Area	Sensitivity	Key Characteristics	Assessment Timescale	Description of the change	Magnitude of Change	Level of effect
Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA	Medium	<p>Gently undulating pastoral lowland of medium scale with cultural heritage interest. Mosaic of irregular and semi-regular medium sized pastures with frequent small broadleaved woodlands and vegetated river valley. Pastoral fields are bound by mature hedgerows that are themselves a characteristic feature that contribute to the short range and contained views that are typical of the locality. Man-made influence is evident in the managed landscape and frequency of dispersed farmsteads and rural properties. Modern development is most notable along the A55, at St. Asaph Business Park and where pylon lines cross the landscape unit.</p> <p>Distinctive skylines of the Clwydian Range lie to the east, but otherwise skylines are not prominent in this landscape unit. Skylines are occasionally punctuated by pylons and other built development. There is frequent road traffic along the Glascoed Road in the north of the character area. Views are typically enclosed and filtered by landform and vegetation (woodland blocks and hedgerow). There are few outward views, other than eastwards</p>	Construction	Eastern Lowlands (Cefn Meiriadog Vale Slopes) LCA would be directly impacted (albeit locally) by the construction activity for the proposed substation extension. There would be some localised disturbance from construction plant and machinery, which would slightly alter the relative tranquillity experienced in the vicinity of the works. There would also be the very localised removal of existing hedgerows and trees to accommodate the proposed substation extension. However, construction works would be relatively short term and temporary in duration, with the impacts restricted to a localised section of the landscape.	Minor adverse	Slight adverse
			Operation - year 1	At operation year 1, construction activity associated with the proposed substation extension would cease, improving the level of tranquillity in the landscape. The LCA would continue to be directly affected by the substation buildings and equipment; however, these would not be considered incongruous given the type of energy infrastructure features already present. A very minor loss of hedgerows and field boundary fragmentation would remain, due to the localised vegetation clearance at construction. There would be a barely perceptible change within the landscape.	Negligible adverse	Negligible adverse
			Operation - year 15	As per operation year 1.	Negligible adverse	Negligible adverse

Character Area	Sensitivity	Key Characteristics	Assessment Timescale	Description of the change	Magnitude of Change	Level of effect
		towards the Clwydian Range from the higher parts of the character area. There are views to and from important landscapes and cultural heritage features including The Bryniau Clwyd A Dyffryn Dyfrdwy (Clwydian Range and Dee Valley) National Landscape and Bodelwyddan Registered Park and Garden.				

Appendix Table 8: Visual Effects Table

Viewpoint Location	Sensitivity	View Description	Assessment Timescale	Description of the change	Magnitude of Change	Level of effect
VP2 – PRoW behind Residential receptor at Tyddyn Meredydd Approx. dist. from site boundary: 530m	High	Open panoramic views north to coast and Clwydian Range across open fields with hedges and mature boundary trees in middle distance. 4ZB167 pylon is a noticeable feature in the view in the middle distance, a third of which protrudes above the skyline of the hills. The existing GM001 and GM002 pylons are visible in the background of the view, as is the substation which is partially screened by field boundary trees. There are views towards the existing substation, which would be further screened in summer when intervening vegetation is in leaf.	Construction	The construction of the substation extension, including the proposed earthworks, buildings and gantries, would be largely visible from this location in long-distance views for the duration of the programmed works.	Minor adverse	Slight adverse
			Operation - year 1	At operation year 1, the proposed substation extension would be a permanent change in the long distance. It would blend in with the height and colouring of the existing substation, but it would be an increase in scale in contrasting energy infrastructure features with the rural scenery in the view from the footpath. There would also be a slight detectable loss of vegetation in the middle distance. The proposed substation extension would be a noticeable feature for a short section of the linear route.	Minor adverse	Slight adverse
			Operation - year 15	As per operation year 1.	Minor adverse	Slight adverse
VP2 – Residential receptor at Tyddyn Meredydd Approx. dist. from site boundary: 460m	High	The principal views from Tyddyn Meredydd are towards the south-east and north-west. There is also a view north-east from a conservatory extension on the east side of the house, which has a narrow view down into the valley across open fields. It is likely that the top of 4ZB167 pylon is visible above the hedgerows at middle distance. It is also likely the GM001 and GM002 pylons, and the existing substation, are partially visible behind	Construction	The construction of the substation extension including earthworks, buildings and gantries would be largely visible from this location in long-distance views for the duration of the works. The works would be seen in much of the narrow view.	Minor adverse	Slight adverse
			Operation - year 1	At operation year 1 the proposed new substation extension would be a permanent change in the long distance. There are no mature trees in the foreground to provide any screening. The proposed substation extension would be a perceptible feature and would increase the balance of energy infrastructure features	Minor adverse	Slight adverse

Viewpoint Location	Sensitivity	View Description	Assessment Timescale	Description of the change	Magnitude of Change	Level of effect
		intervening field boundary trees and hedges that offer some screening, although the majority of features would be present in the background. Commercial development and energy infrastructure features are a key characteristic of the views.		in a small part of the view. Localised tree and hedgerow loss would be visible in the middle distance.		
			Operation - year 15	As per operation year 1.	Minor adverse	Slight adverse
VP3 – Entrance to PRow off access road to existing Bodelwyddan and Gwynt-y-Môr Offshore Wind Farm substation Approx. dist. from site boundary: 0m	High	Short-distance views across the access road to the large mature trees on the west side of the access road, which screen views of the existing substation and nearby pylons. In summer, there would be more screening when the intervening vegetation is in leaf.	Construction	The construction of the substation extension, including buildings and gantries, would be glimpsed from this location through the mature trees. However, there would be short distance views of the access road and construction traffic would be visible for the duration of the works.	Negligible adverse	Slight adverse
			Operation - year 1	At operation year 1, the proposed substation extension would be glimpsed in the short distance from this location in winter through the intervening trees to the south. In summer, there would be more screening effects from the vegetation in leaf. The loss of vegetation near the substation extension would be barely perceptible due to the intervening vegetation.	Negligible adverse	Slight adverse
			Operation - year 15	As per operation year 1.	Negligible adverse	Slight adverse
VP4 – From PRow including residence south of Lon Coed Esgob	High	Partially open views south-west above the high hedges from the PRow with distant top of the 4ZB167 pylon visible. The principal views from the residence are south facing. There are large mature screening trees on the western boundary of the property,	Construction	Oblique glimpses of construction traffic on the access road from the upper storey of residence (no views from the PRow). The construction of the substation itself would not be visible.	Negligible adverse	Slight adverse
			Operation - year 1	At operation year 1, the proposed substation extension would not be visible from this location.	N/A	N/A

Viewpoint Location	Sensitivity	View Description	Assessment Timescale	Description of the change	Magnitude of Change	Level of effect
Approx. dist. from site boundary: 130m		which would likely filter views south-west to the corner of existing substation and access road from the property's upper storey windows. There are likely to be open views from upper and lower storey south to Burbo bank substation (150m from property), woodland blocks and hills to the south. There are also likely to be views to the existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines and associated pylons above the existing woodland block and against backdrop of hills.	Operation - year 15	As per operation year 1.	N/A	N/A
VP5 – Group of residential receptors at Pentre Mawr Approx. dist. from site boundary: 460m	High	From the ground floor of the properties, the views north-east include the road and a tall hedge in the short distance, which screens the easterly views. Views become more open as the ground drops away to the north, revealing mature trees, 4ZB166 pylon and existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines in the middle distance. Views from the upper floor of the properties are likely to be open to the east and north-east with partial distant glimpsed views of the existing substation, through the mature hedgerow trees. There are likely to be full upper-storey views of the existing pylons associated with the Deeside –	Construction	The principal view from the residences is filtered by intervening hedgerows and mature trees. There would be some glimpsed views towards the distant construction activities, including earthworks and the construction of the gantries and buildings.	Negligible adverse	Slight Adverse
			Operation - year 1	At operation year 1, the principal view from the residences would be filtered by intervening hedgerows and mature trees. However, there would be some glimpsed views towards the new substation extension and the loss of tree and hedgerow vegetation in the middle distance. Screening from intervening vegetation would be more notable in the summer.	Negligible adverse	Slight Adverse
			Operation - year 15	As per operation year 1.	Negligible adverse	Slight Adverse

Viewpoint Location	Sensitivity	View Description	Assessment Timescale	Description of the change	Magnitude of Change	Level of effect
		Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines in the middle distance.				
VP7 – Representative view from St. Asaph Business Park (Qioptic Ltd) at Glascoed Road Approx. dist. from site boundary: 200m	Low	Enclosed views south across Glascoed Road to Qioptic Ltd three storey building and small car park in the short distance. In summer, intervening mature trees and vegetation would wholly screen existing substation, which is located immediately to the south. However, there may be glimpsed views through to existing substation in winter when trees are not in leaf. Top of 4ZB167 pylon is visible above the trees. There are likely distant views from third floor to hills to the south, including partial views of existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines and the other associated pylons.	Construction	Views from most business receptors bordering the southern edge of the business park towards the construction activities associated with substation extension, such as earthworks and erection of buildings and gantries, would be mostly screened from view due to the dense screening vegetation in winter. In summer, the construction activities would not be visible due to the screening effect of the vegetation in leaf.	Negligible adverse	Negligible adverse
			Operation - year 1	At operation year 1, views towards the proposed substation extension would be mostly screened due to the presence of dense intervening vegetation in the winter. In summer, the proposed substation extension would not be visible due to the screening effect of the intervening vegetation in leaf. Vegetation loss would be barely perceptible.	Negligible adverse	Negligible adverse
			Operation - year 15	As per operation year 1.	Negligible adverse	Negligible adverse
VP10 – PProW Hillside Approx. dist. from site boundary: 520m	High	Open panoramic views north-east to distant coast and the hills of the Clwydian Range. Views to the hills and coast are partially screened in the short distance by field boundary trees. Views across arable and grazing fields are often broken up by hedges and mature trees with occasional woodland blocks and settlement. Commercial buildings,	Construction	There would be middle to long-distance views of construction activities associated with substation works, such as earthworks and construction of buildings and gantries. However, views would be partially visible in winter as they would be screened by mature boundary trees in the near distance. Construction activities would not likely be visible in summer due to the screening effect of the leaves on the trees.	Negligible adverse	Slight adverse

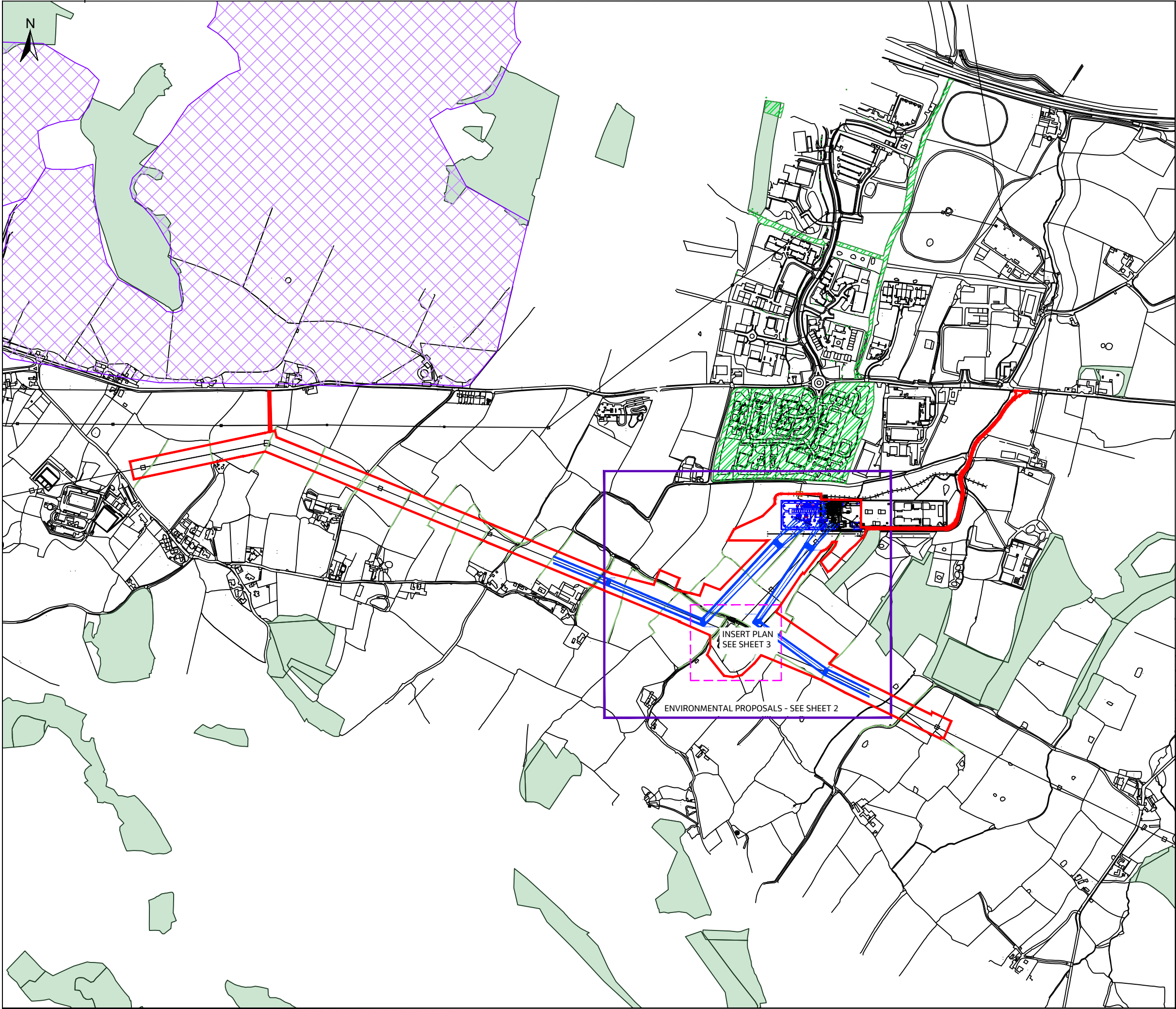
Viewpoint Location	Sensitivity	View Description	Assessment Timescale	Description of the change	Magnitude of Change	Level of effect
		substation development and pylons are present in the middle distance. 4ZB166 and 4ZB167 pylons protrude above the skyline of hills and coast. There are long-distance views of pylon GM001, with the existing substation partially visible.	Operation - year 1	At operation year 1, there would be middle to long-distance views of the new buildings and gantries, which would be partially screened by intervening trees in the winter and wholly screened by intervening trees in summer. The visible development would form a small part of whole view. There would be a barely perceptible loss of vegetation in the distant middle ground of views.	Negligible adverse	Slight adverse
			Operation - year 15	At operation year 15, At operation year 15, views would be as per operation year 1, except that hedgerows would have established sufficiently to reestablish the impacted field boundary network. Middle to long distance views towards the proposed substation extension and vegetation loss would remain.	Negligible adverse	Slight adverse
VP11 – PRow Valley Approx. dist. from site boundary: 250m	High	Open panoramic views. Hedges and fields in the short distance with occasional mature trees. Middle-distance views across mainly woodland blocks with occasional low pylons (backgrounded by woods) and energy infrastructure buildings (end of existing substation building and gantries visible). The existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines, along with several pylons, are visible to the south-east in the middle to long distance. 4ZB167 pylon in the middle distance is backgrounded mostly by sky. There are long-distance	Construction	There would be partial views of the construction activities associated with substation extension such as earthworks and erection of buildings and gantries and fences. Construction works would be partially visible in the middle distance for the duration of the programmed activity and for most of the route.	Minor adverse	Slight adverse
			Operation - year 1	At operation year 1, the new building, gantries and fences associated with the substation would be partially visible in the middle distance, although there would be some screening by four existing field boundary trees in the middle distance. The buildings would be at the same height and in the same colour as the existing substation. The development would make up a small part of the whole view and the increase in scale would be small. The screening would be more effective in the summer with the trees in leaf.	Minor adverse	Slight adverse

Viewpoint Location	Sensitivity	View Description	Assessment Timescale	Description of the change	Magnitude of Change	Level of effect
		panoramic views of the Clwydian Range.		Vegetation loss would be perceptible in the middle distance.		
			Operation - year 15	As per operation year 1.	Minor adverse	Slight adverse
VP12 – Residential receptor at Waen Meredydd Approx. dist. from site boundary: 150m	High	Open principal views south-east to woodland and across fields delineated with hedges, occasional mature trees and farm gates in the short distance. In the middle distance, the existing substation can be seen and the existing GM001 and GM002 pylons protrude slightly above distant woodland block skyline. There are open oblique views south across nearby fields to wooded hills where the 4ZB167 pylon is a dominant feature.	Construction	Predominantly open, slightly oblique views of the construction activities associated with substation extension such as removal of seven individual trees and a small tree group trees, new earthworks, and the erection of buildings and gantries and fences. Construction activity would be visible at a short distance for the duration of the programmed works. Views towards the works at the substation extension would be partially filtered by intervening hedgerow vegetation associated with the field network to the south-east.	Minor adverse	Moderate adverse
			Operation - year 1	At operation year 1, the new building, gantries and fences associated with the substation would be mostly visible in the short distance from the principal view from this receptor. However, these operational changes would be characteristic of the baseline, with the new substation extension being of the similar height and colour as the existing substation. The new development would represent a slight increase the visual prominence of the substation development to the south-east, although this new development would take up a small part of the view. A slight perceptible loss of tree cover would remain in the middle ground, resulting from the vegetation clearance works undertaken during construction.	Minor adverse	Slight adverse

Viewpoint Location	Sensitivity	View Description	Assessment Timescale	Description of the change	Magnitude of Change	Level of effect
			Operation - year 15	As per operation year 1.	Minor adverse	Slight adverse
VP22 – PRow near Pentre Mawr residences Approx. dist. from site boundary: 480m	High	Open view north-east to the hills of the Clwydian Range. Short-distance views of fields and hedges with mature field boundary trees. 4ZB166 pylon is a dominant feature in the foreground with the existing Deeside – Pentir Teed Bodelwyddan 1 and Deeside – Pentir Teed Bodelwyddan 2 overhead lines visible across much of the view. GM001 and GM002 pylons can be seen in the middle distance between a break in the mature trees. During winter, there are glimpsed views of the existing substation, although views would be mostly screened from in summer. There is a partial view of the 4ZB167 pylon, which can be glimpsed through some intervening scrub in the foreground. Commercial development and energy infrastructure are a key characteristic of the view.	Construction	Construction activities associated with substation extension such as removal of trees, earthworks and erection of buildings and gantries and fences would be glimpsed in the middle to long distance for the duration of the programmed works. Views would be filtered through intervening field boundary trees in winter. In summer, visibility would be reduced with leaf cover on the trees.	Negligible adverse	Slight adverse
			Operation - year 1	At operation year 1, filtered views of the new substation extension would be experienced in the long distance from this location. The buildings would be at the same height and in the same colour as the existing substation, and views would be filtered by field boundary trees. In summer, the screening would be greater with leaf cover on the trees. Only a very small part of the development would be discernible, and this would not alter the balance of elements characteristic of the view.	Negligible adverse	Slight adverse
			Operation - year 15	As per operation year 1.	Negligible adverse	Slight adverse
VP23 – Residential Properties at Hendy's Farm	Medium	Access was not sought to residences on private land much higher up the hill, but from desk top studies of aerial photography the principal views from the two residences are to the north-west-south east and the east-west,	Construction	Likely filtered views towards the construction activity from a non-principal view from a single residence.	Negligible adverse	Slight adverse
			Operation - year 1	At operation year 1, there would be likely filtered views towards the substation extension from a single residence. Screening would be greater in the summer	Negligible adverse	Slight adverse

Viewpoint Location	Sensitivity	View Description	Assessment Timescale	Description of the change	Magnitude of Change	Level of effect
Approx. dist. from site boundary: 750m		which are not in the direction of the development. A woodland block, several individual trees and a hedge are also present to the north and north-east of the properties, providing screening for any non-principal or oblique views.		when vegetation is in leaf. Vegetation loss would be barely perceptible in middle to long distance.		
			Operation - year 15	As per operation year 1.	Negligible adverse	Slight adverse

Appendix O. Environmental Masterplan

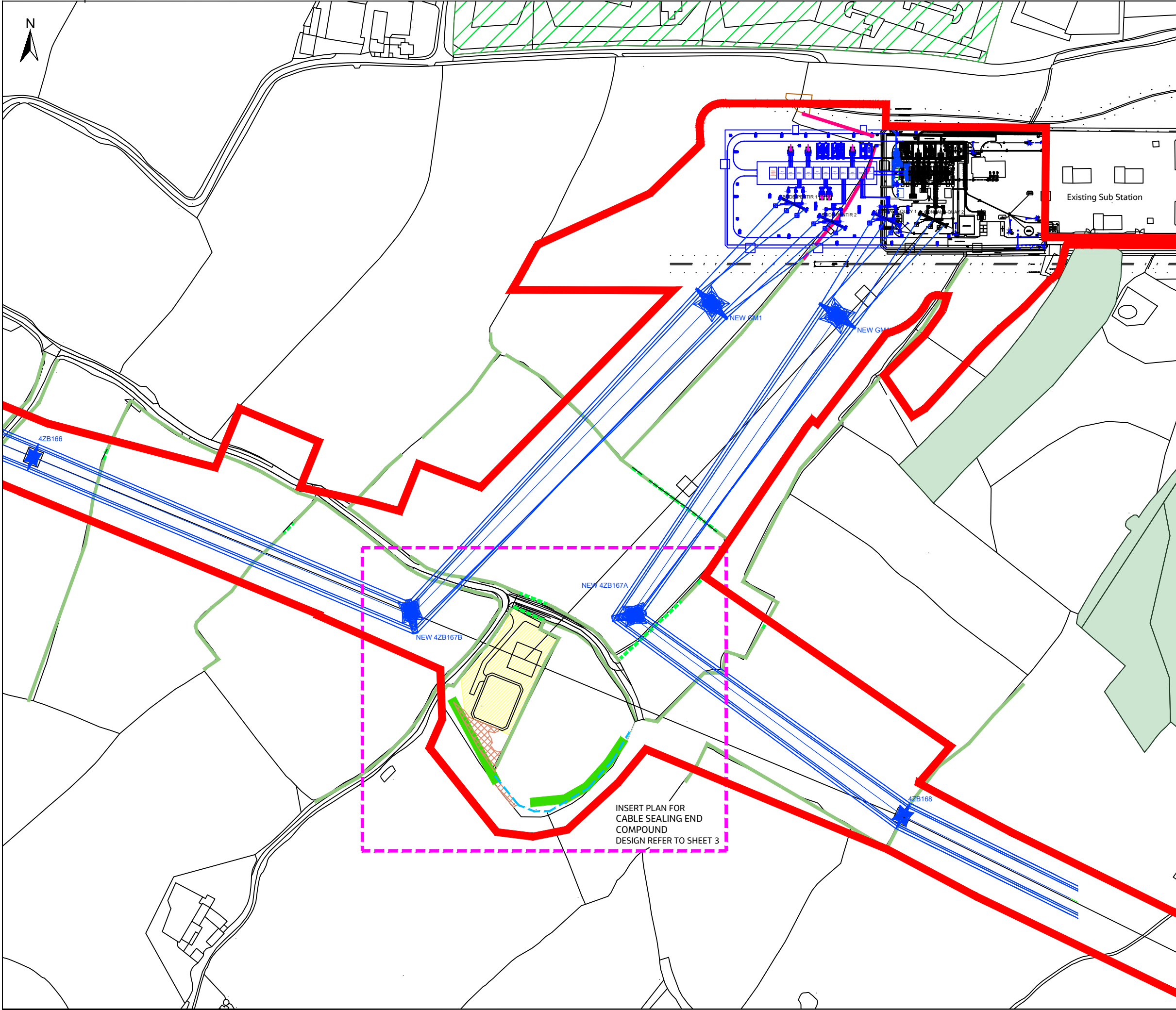


Legend

- Works Boundary
- Priority Habitat - Parkland
- Ancient Woodland
- Tree Preservation Order (TPO)
- Existing retained hedgerows

P03	17/06/2025	WORKS BOUNDARY CHANGE	JP	JE	TW	KW
P02	18/02/2025	SCOPE CHANGE - CSEC UPDATE	JP	JE	TW	KW
P01	14/08/2024	FINAL	JP	RL	JE	KW
Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
Scale @ A3		Scale: 1:10,000	DO NOT SCALE			
Jacobs No. B2416603						
<div><div>Jacobs</div><div>Client</div></div> <div><div>nationalgrid</div><div>Project</div></div> <div><div>BODLEWYDDAN SUBSTATION</div><div>Drawing Title</div></div> <div><div>ENVIRONMENTAL MASTERPLAN LAYOUT PLAN SHEET 1 OF 3</div><div>Drawing No. B2416603_BODEL_MAS_002</div></div> <div><div>FINAL</div><div>Drawing Status</div></div>						

Appendix O



Legend

- Works Boundary
- Ancient Woodland
- Tree Preservation Order (TPO)
- Existing retained hedgerows
- Existing Lines of Trees retained
- Existing mixed scrub retained
- Existing ditch retained
- Existing Substation
- Proposed Substation Extension
- Proposed Overhead Line improvements
- Hedgerows to be removed
- Hedgerow replacement planting
- Proposed return to pasture land

P03	17/06/2025	WORKS BOUNDARY CHANGE	JP	JE	TW	KW
P02	18/02/2025	SCOPE CHANGE - CSEC UPDATE	JP	JE	TW	KW
P01	14/08/2024	FINAL	JP	RL	JE	KW
Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

Scale @ A3

Scale: 1:2,500

DO NOT SCALE

Jacobs No. B2416603

Jacobs

nationalgrid

Client

Project

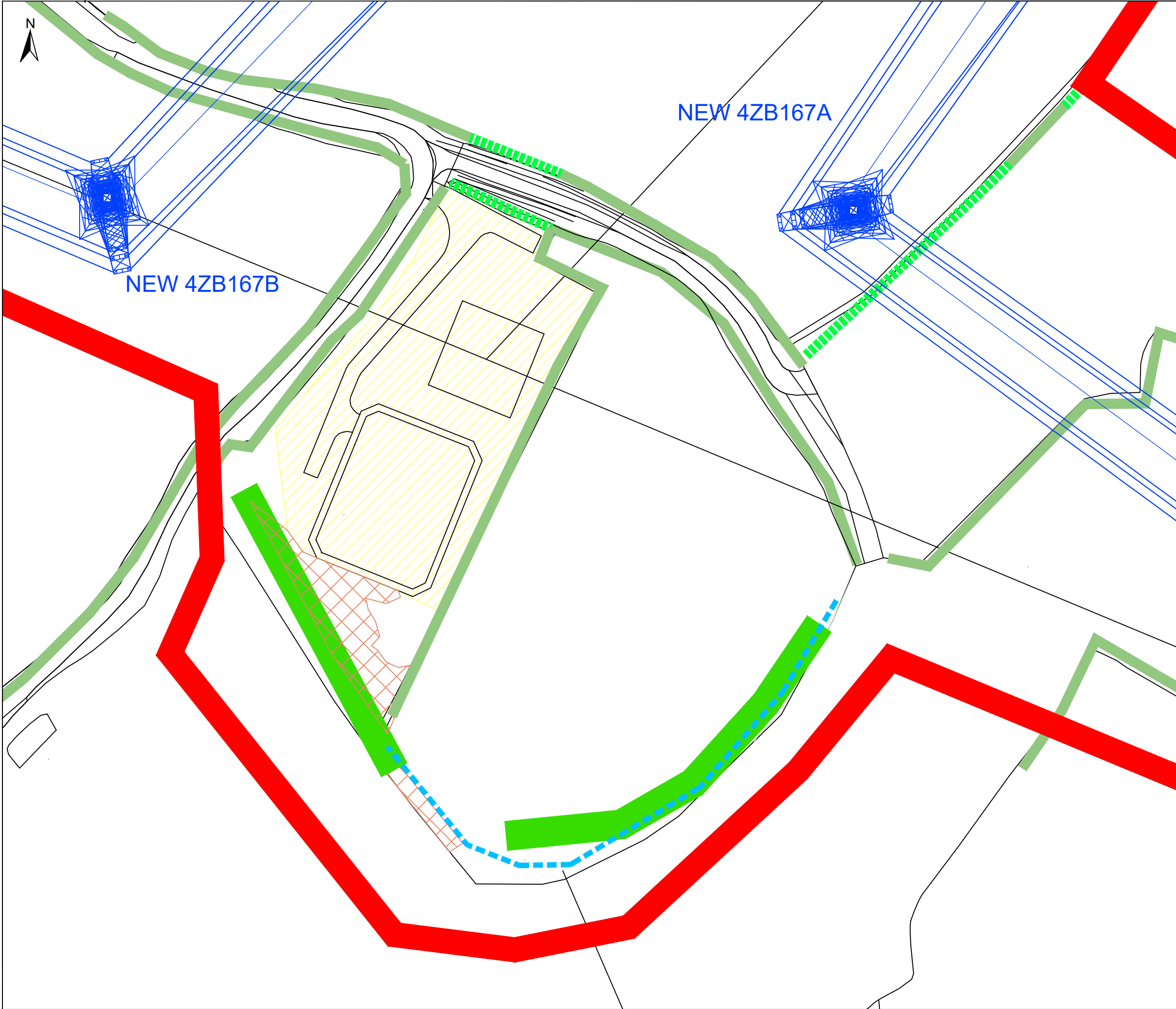
BODLEWYDDAN SUBSTATION

Drawing Title

ENVIRONMENTAL MASTERPLAN
GENERAL ARRANGEMENT
SHEET 2 OF 3

Drawing No.
B2416603_BODEL_MAS_002

Drawing Status
FINAL



Legend

- Works Boundary
- Existing retained hedgerows
- Existing lines of trees retained
- Existing mixed scrub retained
- Existing ditch retained
- Proposed Overhead Line improvements
- Proposed hedgerow replacement
- Proposed return to pasture land

P03	17/06/2025	WORKS BOUNDARY CHANGE	JP	JE	TW	KW
P02	18/02/2025	SCOPE CHANGE - CSEC UPDATE	JP	JE	TW	KW
P01	14/08/2024	FINAL	JP	RL	JE	KW
Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
Scale @ A3		Scale: 1:750		DO NOT SCALE		
Jacobs No. B2416603						
<div>Jacobs</div> <div>Client</div> <div>nationalgrid</div>						
<div>Project</div> <div>BODLEWYDDAN SUBSTATION</div>						
<div>Drawing Title</div> <div>ENVIRONMENTAL MASTERPLAN CABLE SEALING END COMPOUND SHEET 3 OF 3</div>						
<div>Drawing No.</div> <div>B2416603_BODEL_MAS_002</div>				<div>Drawing Status</div> <div>FINAL</div>		

Appendix O

Appendix P. Heritage Appraisal

Subject	Archaeological Appraisal	Project Name	Bodelwyddan
Attention	[REDACTED]	Project No.	B2416603
From	[REDACTED]		
Date	February 2025		

1. Introduction

This updated Heritage Appraisal has been prepared in support of the extension to the Bodelwyddan substation and associated overhead cable works and hereafter referred to as 'the Scheme'.

The Scheme is located to the immediate west and south-west of the existing substation, approximately centred on National Grid Reference 301049, 373402 and covers an area of 20 hectares, this taking into consideration the existing overhead cable routes into the substation and proposed reconfiguration of these.

The historic environment is defined by Planning Policy Wales (PPW) (Edition 12, February 2024) as follows:

'The historic environment comprises all the surviving physical elements of previous human activity and illustrates how past generations have shaped the world around us. It is central to Wales's culture and its character, whilst contributing to our sense of place and identity. It enhances our quality of life, adds to regional and local distinctiveness and is an important economic and social asset.'

The historic environment is identified to be made up of individual heritage assets (or features) examples of which include designated assets (World Heritage Sites, Scheduled Monuments, Listed Buildings, Conservation Areas, Registered Parks and Gardens, Registered Battlefields and Registered Historic Wrecks) and non-designated assets (for example: locally listed buildings, archaeological sites and monuments and historic landscapes).

Legislation, policy and guidance in respect of the historic environment in Wales includes the following:

- The Ancient Monuments and Archaeological Areas Act 1979 (legislation);
- Planning (Listed Buildings and Conservation Areas) Act 1990 (legislation);
- Historic Environment (Wales) Act 2016 (legislation);
- PPW provides the national planning policy framework for the consideration of the historic environment supplemented by guidance contained in Technical Advice Note 24: The Historic Environment (policy); and
- Cadw, the Welsh Government's historic environment service, provide associated best practice guidance on the historic environment (guidance).

The purpose of this appraisal is to review the available archaeological, built heritage and historic landscape baseline for the Scheme and identify any potential heritage constraints and risks.

2. Methodology

Data used to inform the baseline conditions of this appraisal were accessed from the following sources:

- British Geological Survey (BGS);
- Cof Cymru (National Historic Assets of Wales) for information of designated heritage assets;
- Clwyd Powys Archaeological Trust (CPAT) Historic Environment Record (HER) for information on non-designated archaeological sites and monuments; non-designated historic buildings and previous archaeological investigations;
- Planning Inspectorate for information on consented and current DCO projects being examined in the planning system for information on supporting studies and investigations, for example the Awel y Môr and Mona Offshore Wind Farms;
- Denbighshire County Council for information on consented and ongoing projects within the planning system for information on supporting studies and investigations, for example the proposed Bodelwyddan BESS and Solar Farm;
- Portable Antiquities Scheme (PAS) for information on finds made by metal detectorists;
- National Library of Wales for historic tithe mapping;
- Historic mapping and aerial imagery available online, including the National Library of Scotland; and
- National Resources Wales online for Light Detection and Ranging data (LiDAR)

Assets are referred to in the sections below by their unique Cadw and HER numbers.

The study area has been defined as the footprint of the Scheme (excluding access routes and areas where limited heritage impacts would occur, predominantly the restringing of existing overhead lines) plus a 500m radius surrounding area. The study area for this appraisal is considered appropriate in regard to archaeological remains, historic buildings and the historic landscape due to the nature of the proposed works and anticipated sensitivity of the receiving environment.

The study area allows for a consideration of direct physical impacts to heritage assets within the footprint of the Scheme; assessment of impacts to heritage assets as a result of changes to their settings; and provides an appropriate sample of the known historic environment resource within the area to predict the potential for previously unknown archaeological assets to be impacted (archaeological potential).

The heritage baseline is discussed by three sub-topics: Archaeological Remains, Historic Buildings and Historic Landscapes below.

A figure showing the locations of the heritage assets discussed below is provided at Appendix A and the HER data report is provided at Appendix B.

3. Geology, Soils and Topography

The solid geology of the Scheme comprises mudstone, siltstone and sandstone of the Warwickshire Group in the east. A geological fault runs north-west to south-east across the western part of the Scheme area. To the west of the fault, the solid geology comprises limestone of the Clwyd Limestone Group. Superficial deposits of Devensian glacial till are also recorded across the whole area of the Scheme (BGS 2025).

Soils within the Scheme are identified as slowly permeable, seasonally wet slightly acid but base-rich loamy and clayey soils (Soilscales 2025).

Topographically, levels across the Scheme grade up gently from north to south and east to west from approximately 43m above Ordnance Datum (aOD) to 51m aOD.

4. Archaeological Remains

4.1 Previous Archaeological Investigations

A programme of archaeological monitoring (watching brief) was undertaken as part of one of the planning conditions (Condition 16) during the construction of the adjacent Gwynt y Mor Offshore Windfarm Substation and existing National Grid substation (Planning Reference 31/2008/1123/PF).

The results of the archaeological works within the footprint of the substation were summarised as follows:

'The footprint was stripped to glacial horizon, exposing a re-brown boulder clay that was uniform across the area. The stripped area was subsequently sealed by geotextile membrane and imported stone gravel. Whilst the stripped area was of a considerable size, no archaeological receptors of note were identified and activity was limited to ceramic field drains and drainage channels. The substation footprint also included the line of existing main that had been removed and backfilled within the diversion area' (GAT, 2012).

Also of relevance to the Scheme is the results of a geophysical survey undertaken to support the Burbo Bank Extension Offshore Windfarm Project (Archaeophysics, 2012). No significant archaeological remains were identified by the survey work along the onshore cable routes.

As part of the assessment work undertaken to support the consented Awel y Môr Offshore Wind Farm, a programme of geophysical survey was also undertaken to the immediate west of the Scheme covering part of the onshore connection (Wessex Archaeology, 2022a). Within areas 8i and 8h, to the west of the Scheme, anomalies related to possible former field systems were identified along with traces of historic ploughing and modern service routes. The supporting desk-based assessment (Wessex Archaeology, 2022b) identified a modest potential for archaeological remains within the area adjacent to the Scheme.

Geophysical survey undertaken for the Mona Offshore Wind Farm, which is currently undergoing examination, covered the whole of the Scheme (Magnitude Surveys, 2023). The survey did not detect any anomalies considered of a possible or probable archaeological origin within the area of the Scheme. No trial trenches have been excavated within the area of the Scheme as part of the subsequent programme of investigation (Oxford Archaeology, 2024).

It is also noted that part of the Bodelwyddan BESS and Solar Farm project (Planning Reference 40/2024/1575/EIA-SCO) falls within the southern extent of the Scheme. This project is currently at the EIA scoping stage and the results of any supporting studies are not currently available.

A further eight previous archaeological interventions are recorded within the 500m study area. Where relevant, the results of these studies will be referred to in the discussion of archaeological potential below.

4.2 Designated Assets

There are no designated archaeological assets (Scheduled Monuments) within the Scheme or study area.

4.3 Non-designated Assets

There is one non-designated archaeological asset recorded within the Scheme (HER 143526) which relates to an area of former medieval ridge and furrow cultivation earthworks identified by CPAT from LiDAR data. Another area of ridge and furrow (HER 143532) lies to the immediate south. As these assets represent relict cultivation features that have already been recorded, they are considered of local archaeological interest at best (low value).

In the study area, a further 33 non-designated assets are recorded. The locations of these assets are shown on Figure 1 in Appendix A. Further details are also provided in the gazetteer at Appendix B.

Of these, 19 assets relate to additional areas of former ridge and furrow cultivation of limited archaeological interest; and seven assets represent the route of the former Roman Road which underlies the existing B5381 Glascoed Road approximately 300m to the north of the Scheme.

Only one prehistoric asset is identified within the study area, this comprises the site of a Bronze Age cairn (HER 101478) at Cae Garnedd approximately 400m to the west of the Scheme.

The remaining assets represent a variety of post-medieval findspots, milestones, lime kilns, wells and the sites of former buildings of local archaeological interest.

4.4 PAS

There are no finds recorded to have been found within the Scheme by the PAS.

In the 500m study area, the only artefact recorded is a post-medieval musket ball (HER 141423) found approximately 340m to the north-west of the Scheme. This asset has been removed from the study area and is therefore attributed a negligible value.

4.5 Historic Mapping and Aerial Imagery

The available Ordnance Survey mapping and aerial imagery shows the Scheme to have comprised part of a number of fields. Since the mid-19th century, the historic mapping records some loss of historic field boundaries. Many of the remaining boundaries are likely to date from at least the medieval period due to their curving form (Plates 4-1 to 4-2).

The construction of the adjacent Gwynt y Môr Offshore Windfarm Substation and Burbo Bank infrastructure is shown in the later satellite imagery (2015 onwards).



4.6 LiDAR

A plot of the Lidar data for the Scheme is shown in Plate 4-3. The only features of archaeological interest noted are the aforementioned two areas of slight ridge and furrow earthworks in the south-west and to the immediate south of the Scheme.



Plate 4-3. LiDAR data plot (1m DSM – Natural Resources Wales)

4.7 Archaeological Potential

Based on the findings of the previous archaeological investigation undertaken during the construction of the adjacent substation, the absence of any anomalies of potential or probable archaeological interest detect during the geophysical survey work undertaken for Mona Offshore Wind Farm, and taking into consideration the evidence discussed above, the risk of encountering significant previously unknown archaeological remains within the Scheme can reasonably be identified as low.

The Scheme has remained on the periphery of the known settlement cores from at least the medieval period and is likely to have been used as agricultural land. While there is some evidence of earlier prehistoric and Roman activity within the vicinity, no such evidence was found in the adjacent watching brief (GAT 2012) nor is such activity suggested by the results of the geophysical survey (Magnitude Survey 2023).

5. Historic Buildings

5.1 Designated Assets

There are no designated historic building assets (Listed Buildings) within the Scheme.

The Scheme is not located within a Conservation Area and there are no Conservation Areas recorded within the study area.

In the study area, one Grade II Listed Building is present. This comprises a sub-medieval vernacular thatched house (Cadw 19929) located approximately 170m to the south of the Scheme. As a designated Listed Building, this asset is identified to be of high value.

The setting of this asset is predominantly rural with its topographic position allowing for open views towards the existing overhead lines and substation to the north. In this instance setting is considered to make a small positive overall contribution to significance as the asset is a rural building set within a rural agricultural landscape that has undergone limited change.

5.2 Locally Listed Buildings

There are no locally listed building within the Scheme or 500m study area.

5.3 Non-designated Assets

There are no non-designated historic building assets within the Scheme.

In the study area, there are 34 non-designated historic buildings recorded by the HER as shown on Figure 1 in Appendix A. All these assets are post-medieval agricultural buildings (farmhouses and/or barns) of local historical and architectural interest (low value).

6. Historic Landscape

6.1 Designated Assets

There are no designated historic landscape assets (World Heritage Sites, Registered Battlefields of Registered Parks and Gardens) within the Scheme or study area.

6.2 Historic Landscape Character

The Historic Landscape Character (HLC) of the Scheme is identified to be irregular fieldscapes and woodland with hedgerow boundaries. This type of landscape is described as:

'Organic enclosures south and west of St Asaph, fieldscapes which have grown up over time, a predominantly rural environment'

The historic landscape is assessed to be of local (low) value.

7. Conclusion

There are no overarching heritage constraints in respect of the Scheme.

No designated heritage assets would be directly physically affected by the Scheme.

Taking into consideration the location of the Scheme, the distance, topography and presence of existing infrastructure, no significant adverse impacts on any designated assets as a consequence of a change to their wider settings are predicted (Grade II Listed Building located 170m to the south of the Scheme only).

One area of non-designated historic ridge and furrow cultivation earthworks is identified within the south-western part of the Scheme (HER 143526) – outside of the area of the proposed substation extension. This asset is considered of low value and would not be a constraint to any proposed works.

The potential for previously unknown archaeological assets within the Scheme can be reasonably identified as low based on the currently available evidence and survey work undertaken for associated developments.

No non-designated historic building assets would be affected.

While there would be a slight impact to the character of the historic landscape due to the addition of further infrastructure, this would not be a constraint to the Scheme.

8. References

Archaeophysica, 2012, Burbo Bank Extension Offshore Wind Farm Onshore Infrastructure Denbighshire: Geophysical Survey Report. Unpublished

BGS, 2025, Geoindex Onshore Viewer available online from:
https://mapapps2.bgs.ac.uk/geoindex/home.html?_ga=2.22415227.1100002020.1739962424-431993005.1739962424

GAT, 2012, Gwynt y Mor Offshore Windfarm – Archaeological Watching Brief. Unpublished

Magnitude Surveys, 2023, Geophysical Survey Report, Mona Onshore Cable Corridor, North Wales available from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010137/EN010137-000454-F7.5.3_Mona_ES_Onshore%20Geophysical%20Survey%20Report%20-%20Part%201.pdf

and:

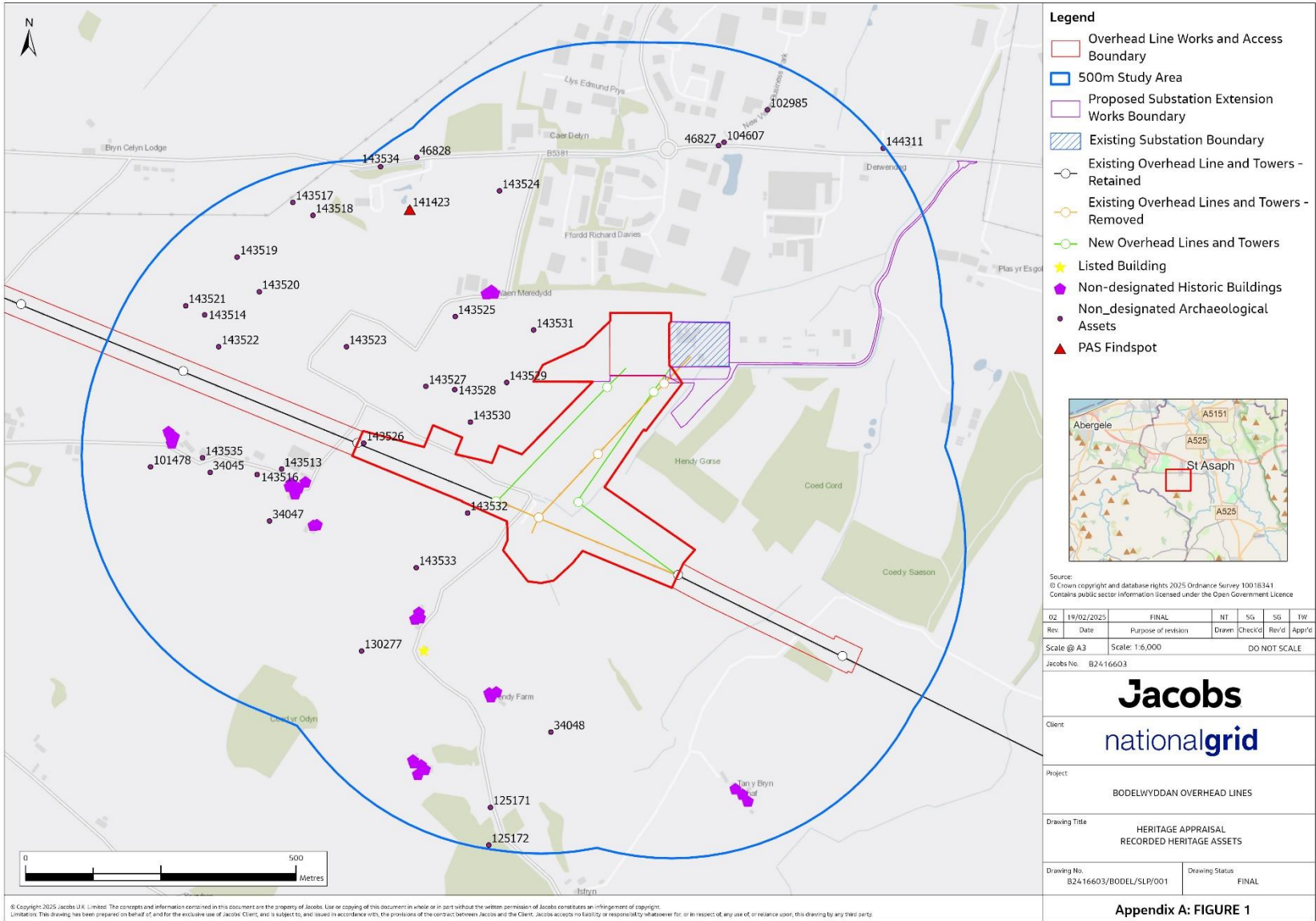
https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010137/EN010137-000455-F7.5.3_Mona_ES_Onshore%20Geophysical%20Survey%20Report%20-%20Part%202.pdf

Oxford Archaeology, 2024, Mona Offshore Wind Project Onshore Cable Route and Substation Abergele, Conwy, to St Asaph, Denbighshire, North Wales Archaeological Evaluation Report available online from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010137/EN010137-001977-S_D6_7_Mona_Trial%20Trenching%20Report.pdf

Soilscapes, 2025, Soilscapes Map Viewer available online from: <http://www.landis.org.uk/soilscapes/>

Wessex Archaeology, 2022a, Awel y Mor Offshore Wind Farm Detailed Gradiometer Survey Report available online from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010112/EN010112-000283-6.5.8.3%20AyM%20ES%20Annex%208.3_Detailed_Gradiometer_Report_Final.pdf

Wessex Archaeology, 2022b, Awel y Mor Offshore Wind Farm Archaeological Desk-Based Assessment available online from: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010112/EN010112-000281-6.5.8.1_AyM_ES_Volume5_Annex8.1_Archaeological_Desk-Based_Assessment_Final.pdf



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CLWYD-POWYS ARCHAEOLOGICAL TRUST HISTORIC ENVIRONMENT RECORD ENQUIRY REPORT - CORE RECORDS

Enquiry reference number: E6670

Prepared by: G. Duckers, Clwyd-Powys Archaeological Trust

Produced for: Nathan Thomas, Jacobs

The following information has been provided under the terms and conditions of access as detailed on the CPAT HER Enquiry form and in the Welsh Archaeological Trusts Access and Charging Policy. Copyright is reserved on all data supplied from the CPAT HER. All output resulting from the use of the data must acknowledge the source as follows:- **CPAT HER Charitable Trust data copyright and database right and in part Crown, 2021).**

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Search criteria

HER data within user supplied extent

PRN 141423 **NAME** Bodelwyddan, musket ball

NGR SJ0108973817 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FINDSPOT. Rank: 1

SUMMARY

DESCRIPTION A complete spherical lead alloy ball, probably a musket ball or shot, of Post Medieval dating (17th Century onwards). The lead shot is spherical in shape. A casting seam is present around the mid point of the musket ball. It is a light creamy colour with an uneven surface patina. Abrasion, caused by movement whilst within the plough soil, has resulted in the loss of some of the original surface detail. It has a diameter of 16.2 mm and weighs 24.3 grams. (PAS database)

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Same as PUBLIC-E32626CPAT140118, CPAT152997

SOURCES

Portable Antiquities Scheme Portable Antiquities Scheme Database

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

1 Lead MUSKET BALL A complete spherical lead alloy ball, probably a musket ball or shot, of Post Medieval dating (17th Century onwards). The lead shot is spherical in shape. A casting seam is present around the mid point of the musket ball. It is a light creamy colour with an uneven surface patina. Abrasion, caused by movement whilst within the plough soil, has resulted in the loss of some of the original surface detail. It has a diameter of 16.2 mm and weighs 24.3 grams. Returned to finder

C14 DATES

PHOTOS

3560-0101

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT141423>

PRN 34045 NAME Cae Capel fieldname

NGR SJ00727333 COMMUNITY Cefnmeiriadog

TYPE POST MEDIEVAL, CHAPEL. Rank: 1

SUMMARY

DESCRIPTION The name "Capel" suggests that the field may be the site of or associated with a chapel. There are no visible remains (Gibson, A M 1996d, 3). On the roadside, a building that on the first two editions of the Ordnance Survey map was termed Pentre-cefn had become Pentre-capel by the time of the 3rd edition in 1913. This building has now gone. While this might hint at a relatively late origin for the name, the assessment report from which this record originates includes the information, not recorded in the HER, that the source for the name is the Tithe map. This is confirmed with two names, one to either side of the road carrying the 'y capel' element. This is insufficient evident to confirm the existence and position of a medieval chapel site (although there is nothing to indicate a post-medieval foundation) but perhaps enough to hint at its former presence (Silvester et al 2011).

CONDITION Condition: Unknown Description: - Related event: - Date of entry: 1996-12-17 00:00:00

STATUS None recorded

CROSS REFERENCES - -CPAT309400, CPAT123175, CPAT123707, CPAT140118

SOURCES

Gibson, A M 1996 Proposed Cefn Meiriadog Watermains Refurbishment: archaeological assessment CPAT report 180
Clwyd Powys Archaeological Trust 1996 Site visit record - PRN34045

Silvester, R J, Hankinson, R, Owen, W and Jones, N 2011 Medieval and Early Post-Medieval Monastic and Ecclesiastical Sites in East and North-East Wales. The Scheduling Enhancement Programme CPAT report 1090
Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT34045>

PRN 101478 NAME Cae Garnedd cairn

NGR SJ00617334 COMMUNITY Cefnmeiriadog

TYPE BRONZE AGE, ROUND BARROW (CAIRN). Rank: 1

SUMMARY

DESCRIPTION Fieldname implicit of a mound or cairn. The RCAHM after a visit of 1911 believed that a concentration of stones in the north-west corner of the field was the site of the cairn - now destroyed (Gibson, A M 1996d, 3).

CONDITION Condition: Unknown Description: - Related event: - Date of entry: 1980-12-31 00:00:00

STATUS None recorded

CROSS REFERENCES - -CPAT312120, CPAT312121, CPAT35000, CPAT140118

SOURCES

Royal Commission on the Ancient and Historical Monuments of Wales 1914 Inventory of the Ancient Monuments in Wales and Monmouthshire - IV County of Denbigh

Gibson, A M 1996 Proposed Cefn Meiriadog Watermains Refurbishment: archaeological assessment CPAT report 180
Clwyd Powys Archaeological Trust 1996 Site visit record - PRN101478

Clwyd Powys Archaeological Trust 2002 CPAT Project Archive - 715

Jones, N W 1999 Prehistoric Funerary & Ritual Sites: Denbighshire and East Conwy CPAT report 314

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL
<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT101478>

PRN 193979 **NAME** Cae-llwyd farm

NGR SJ0111072790 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM. Rank: -

SUMMARY Farm complex identified on OS 2nd edition 25 inch map. Likely to contain traditional farm buildings (CPAT, Farms and Farmsteads, 2021)

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193979

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL
<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT193979>

PRN 195701 **NAME** Cae-llwyd farm, farm building

NGR SJ0111772782, SJ0110472773, SJ0109772794, SJ0109572799 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM BUILDING. Rank: -

SUMMARY Traditional farm building, or building now containing a traditional farm building, identified from OS 2nd edition 25 inch map by CPAT Farms and Farmst

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193979

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195701>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195702>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195703>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195704>

PRN 125171 NAME Cae-llwyd, limekiln

NGR SJ0123872711 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, LIME KILN. Rank: 1

SUMMARY

DESCRIPTION Lime kiln noted on early Ordnance Survey mapping during Glastir private woodland project

CONDITION Condition: Unknown Description: - Related event: - Date of entry: 2013-10-10 00:00:00

STATUS None recorded

CROSS REFERENCES - -

SOURCES

Ordnance Survey 1874 OS map, first edition, 25 inch, Denbighshire

Ordnance Survey 1899 OS map, second edition, 25 inch, Denbighshire

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT125171>

PRN 125172 NAME Cae-llwyd, mine shaft

NGR SJ0123572641 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, MINE SHAFT. Rank: 1

SUMMARY

DESCRIPTION Mine shaft noted on early Ordnance Survey mapping during Glastir private woodland project

CONDITION Condition: Unknown Description: - Related event: - Date of entry: 2013-10-10 00:00:00

STATUS None recorded

CROSS REFERENCES - -

SOURCES

Ordnance Survey 1874 OS map, first edition, 25 inch, Denbighshire

Ordnance Survey 1899 OS map, second edition, 25 inch, Denbighshire

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT125172>

PRN 130277 NAME DE HAVILLAND VAMPIRE FB5 WA417

NGR SJ0173 **COMMUNITY** Cefnmeiriadog

TYPE MODERN, AIR CRASH SITE. Rank: 1

SUMMARY

DESCRIPTION The Vampire was one of 320 delivered to the RAF by English Electric, Preston, between May 1950 and August 1951 to contract 6/Acft/2981. Its service life included assignments to 102 FRS/98 and 112 squadrons/5 FTS and 7 FTS. It dived into the ground recovering from a spin 4 miles south of Rhyl, Denbigh on 3/1/1957. (Halley, J J, 2003, Royal Air Force Aircraft WA100-WZ999, 2nd Ed, pg9) Entry 45. Lt J B Taylor. Wing/Squadron/flight: 7FTS. Ship/Station: HMS GOLDCREST. A/C Type: Vampire FB5. AC Number: WA417. Date of Death: 3/1/1957. Place of Death: Anglesey. Notes: HMS GOLDCREST Book of Remembrance. Aircraft accident reported from RAF Valley. A/C crashed into field after hitting cables. (Royal Fleet Air Arm Museum Database, RNAS Yeovilton, RCAHMW Digital Collections [faaroh.wales.htm]) Note discrepancy in reason for crash. (RH 31/7/2013)

CONDITION Condition: Not known Description: - Related event: 132131 Date of entry: 2012-01-12 00:00:00

STATUS None recorded

CROSS REFERENCES same as 515679CPAT132130, CPAT132131

SOURCES

Hankinson, R & Spencer, J 2014 Military Aircraft Crash Sites. Scheduling Enhancement Programme CPAT report 1249
English Heritage 2002 Military Aircraft Crash Sites. Archaeological guidance on their significance and future management

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT130277>

PRN 193986 **NAME** Groesffordd farm

NGR SJ0064773397 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM. Rank: -

SUMMARY Farm complex identified on OS 2nd edition 25 inch map. Likely to contain traditional farm buildings (CPAT, Farms and Farmsteads, 2021)

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193986

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT193986>

PRN 195717 **NAME** Groesffordd farm, farm building

NGR SJ0065373397, SJ0064373406, SJ0064973385 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM BUILDING. Rank: -

SUMMARY Traditional farm building, or building now containing a traditional farm building, identified from OS 2nd edition 25 inch map by CPAT Farms and Farmst

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193986

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195717>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195718>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195719>

PRN 143519 **NAME** Groesffordd ridge and furrow I

NGR SJ0077073728 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in fields at Groesffordd Marli, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143519>

PRN 143520 **NAME** Groesffordd ridge and furrow II

NGR SJ0081173664 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in fields at Groesffordd Marli, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143520>

PRN 143521 **NAME** Groesffordd ridge and furrow III

NGR SJ0067573638 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in fields at Groesffordd Marli, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143521>

PRN 143522 **NAME** Groesffordd ridge and furrow IV

NGR SJ0073673562 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in fields at Groesffordd Marli, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143522>

PRN 143514 **NAME** Groesffordd well

NGR SJ0071073621 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, WELL. Rank: 1

SUMMARY A post-medieval well in fields at Groesffordd Marli, west of St Asaph. Marked on the Ordnance Survey first edition 25" to the mile map of 1874.

DESCRIPTION Well depicted on OS 1st edition 25".

CONDITION Condition: NOT KNOWN Description: Related event: 140118 Date of entry: 2016-09-08 00:00:00

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143514>

PRN 193980 **NAME** Hen-dy farm

NGR SJ0123672923 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM. Rank: -

SUMMARY Farm complex identified on OS 2nd edition 25 inch map. Likely to contain traditional farm buildings (CPAT, Farms and Farmsteads, 2021)

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193980

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT193980>

PRN 195705 **NAME** Hen-dy farm, farm building

NGR SJ0123972916, SJ0124972925 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM BUILDING. Rank: -

SUMMARY Traditional farm building, or building now containing a traditional farm building, identified from OS 2nd edition 25 inch map by CPAT Farms and Farmst

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193980

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195705>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195706>

PRN 34048 **NAME** Hendy Farm ridge and furrow

NGR SJ01357285 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY

DESCRIPTION Ridge and furrow noted on AP RAF/501/206 3042 (taken 1948). Not visible at time of visit (Gibson, A M 1996d, 3).

CONDITION Condition: Damaged Description: - Related event: - Date of entry: 1996-12-17 00:00:00

STATUS None recorded

CROSS REFERENCES - -CPAT309402

SOURCES

Gibson, A M 1996 Proposed Cefn Meiriadog Watermains Refurbishment: archaeological assessment CPAT report 180
Clwyd Powys Archaeological Trust 1996 Site visit record - PRN34048

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT34048>

PRN 34047 NAME Pentre bach ridge and furrow

NGR SJ00837324 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY

DESCRIPTION Ridge and furrow noted on AP RAF/501/206 3042 (taken 1948). Not visible at time of visit (Gibson, A M 1996d, 3).

CONDITION Condition: Damaged Description: - Related event: - Date of entry: 1996-12-17 00:00:00

STATUS None recorded

CROSS REFERENCES - -CPAT309401, CPAT140118

SOURCES

Gibson, A M 1996 Proposed Cefn Meiriadog Watermains Refurbishment: archaeological assessment CPAT report 180
Clwyd Powys Archaeological Trust 1996 Site visit record - PRN34047

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT34047>

PRN 143535 NAME Pentre Chapel

NGR SJ0070673357 **COMMUNITY** Cefnmeiriadog

TYPE MODERN, CHAPEL. Rank: 1

SUMMARY An early 20th century chapel at Cefn Meiriadog south-west of St Asaph.

DESCRIPTION Built during the early 20th century.

CONDITION Condition: INTACT Description: Related event: 140118 Date of entry: 2016-09-08 00:00:00

STATUS None recorded

CROSS REFERENCES Same as 12582CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143535>

PRN 99661 NAME Pentre Meredydd

NGR SJ0112073000 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, HOUSE. Rank: 1

SUMMARY

DESCRIPTION Grade II listed house

CONDITION Condition: Unknown Description: - Related event: - Date of entry: 2006-07-01 00:00:00

STATUS listed building 19929 II

CROSS REFERENCES Same as 19929_1, Part of 193981

SOURCES

Cadw 2016 Database of Listed Buildings in Wales

The Handley Partnership 2014ff HAABase built heritage assessment system: Buildings at Risk database

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT99661>

PRN 193981 NAME Pentre Meredydd farm

NGR SJ0111672999 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM. Rank: -

SUMMARY Farm complex identified on OS 2nd edition 25 inch map. Likely to contain traditional farm buildings (CPAT, Farms and Farmsteads, 2021)

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193981

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT193981>

PRN 193984 NAME Pentre-bach farm

NGR SJ0091173233 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM. Rank: -

SUMMARY Farm complex identified on OS 2nd edition 25 inch map. Likely to contain traditional farm buildings (CPAT, Farms and Farmsteads, 2021)

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193984

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT193984>

PRN 195712 **NAME** Pentre-bach farm, farm building

NGR SJ0091773234 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM BUILDING. Rank: -

SUMMARY Traditional farm building, or building now containing a traditional farm building, identified from OS 2nd edition 25 inch map by CPAT Farms and Farmst

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193984

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195712>

PRN 143523 **NAME** Pentre-cefn ridge and furrow

NGR SJ0097273562 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in a field between Waen-Meredydd and Pentre-mawr, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR.

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143523>

PRN 193985 **NAME** Pentre-mawr farm

NGR SJ0088373302 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM. Rank: -

SUMMARY Farm complex identified on OS 2nd edition 25 inch map. Likely to contain traditional farm buildings (CPAT, Farms and Farmsteads, 2021)

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193985

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT193985>

PRN 195713 **NAME** Pentre-mawr farm, farm building

NGR SJ0089673313, SJ0087773291, SJ0086773305, SJ0087073311 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM BUILDING. Rank: -

SUMMARY Traditional farm building, or building now containing a traditional farm building, identified from OS 2nd edition 25 inch map by CPAT Farms and Farmst

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193985

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195713>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195714>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195715>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195716>

PRN 143513 NAME Pentre-mawr limekiln

NGR SJ0085273336 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, LIME KILN. Rank: 1

SUMMARY A post-medieval limekiln beside the lane between Pentre-cefn and Pentre-mawr, west of St Asaph. Marked on the Ordnance Survey first edition 25" to the mile map of 1874. Possibly associated with a nearby quarry (PRN143516).

DESCRIPTION Limekiln depicted on OS 1st edition 25".

CONDITION Condition: NOT KNOWN Description: - Related event: 140118 Date of entry: 2016-09-08 00:00:00

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143513>

PRN 143516 NAME Pentre-mawr quarry

NGR SJ0080773326 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, QUARRY. Rank: 1

SUMMARY A post-medieval stone quarry between Pentre-cefn and Pentre-mawr, west of St Asaph. Marked on the Ordnance Survey first edition 25" to the mile map of 1874. Possibly associated with a nearby limekiln (PRN143513).

DESCRIPTION Quarry depicted on OS 1st edition 25".

CONDITION Condition: NOT KNOWN Description: Related event: 140118 Date of entry: 2016-09-08 00:00:00

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143516>

PRN 143526 **NAME** Pentre-mawr ridge and furrow

NGR SJ0100473384 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in the field north-east of Pentre-mawr west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143526>

PRN 143532 **NAME** Pentre-Meredydd ridge and furrow I

NGR SJ0119673255 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in the field north-east of Tyddyn Meredydd, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR.

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143532>

PRN 143533 **NAME** Pentre-Meredydd ridge and furrow II

NGR SJ0110173154 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in the field immediately north of Tyddyn Meredydd, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS**C14 DATES****PHOTOS**

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143533>

PRN 144311 **NAME** Roman Road

NGR SJ0196473929 **COMMUNITY** St Asaph

TYPE ROMAN, ROAD. Rank: -

SUMMARY Possible section of the Varae-Kanovium Roman road. Revealed through excavation in 2018.

DESCRIPTION The watching brief produced evidence for a former, early road surface in the form of a stony deposit sealed beneath the existing modern carriageway of Glascoed Road. The surface was traced for almost the entire length of the modern carriageway where this was cut back for the widening works within the site; a length of at least 180m. The early road had been constructed using waterworn rounded gravel and cobble, laid directly onto the natural clay. No associated ditch was encountered running alongside the road, but any such feature, had it existed, may have been removed during insertion of the modern footpath (Earthworks Archaeology, 2018). No datable material was recovered during excavation. However, given the form and location of the feature, it is likely the Varae-Kanovium Roman road (PRN:46900 & 104607).

CONDITION Condition: DAMAGED Description: - Related event: 144310 Date of entry: 2018-06-18 00:00:00

STATUS None recorded

CROSS REFERENCES - -CPAT144310

SOURCES

Dodd, L 2018 New Access Road at St Asaph Business Park, Galscoed Road St. Asaph, Denbighshire Earthworks Archaeology E1405

ARTEFACTS**C14 DATES****PHOTOS**

-

ARCHWILIO URL

PRN 46827 **NAME** St Asaph - Caerhun

NGR SJ0166073934, SJ0110273912, SJ0097073913, SJ0092173915 **COMMUNITY** Bodelwyddan

TYPE POST MEDIEVAL, ROAD. Rank: 1
ROMAN, ROAD. Rank: 2
ROMAN, ROAD. Rank: 1

SUMMARY

DESCRIPTION Proposed line of roman road. Fossilised form. Modern road, raised up to 0.8m, probably on the line (JHW) (CPAT Roman Roads project, 2002-03)

CONDITION Condition: Unknown Description: - Related event: - Date of entry: 2002-11-21 00:00:00
Condition: Near destroyed Description: - Related event: - Date of entry: 2002-11-21 00:00:00

STATUS None recorded

CROSS REFERENCES part of 46800CPAT140118, CPAT152997,

SOURCES

Ordnance Survey undated Annotated record map
Clwyd Powys Archaeological Trust 2003 CPAT Project Archive
Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT46827>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT46828>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT46829>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT46830>

PRN 193977 **NAME** Tan-y-bryn farm

NGR SJ0170472736 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM. Rank: -

SUMMARY Farm complex identified on OS 2nd edition 25 inch map. Likely to contain traditional farm buildings (CPAT, Farms and Farmsteads, 2021)

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193977

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

PRN 195698 **NAME** Tan-y-bryn farm, farm building

NGR SJ0171472723, SJ0169172746 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM BUILDING. Rank: -

SUMMARY Traditional farm building, or building now containing a traditional farm building, identified from OS 2nd edition 25 inch map by CPAT Farms and Farmst

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193977

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195698>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195699>

PRN 143534 **NAME** Ty-cnap milestone

NGR SJ0103573895 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, MILESTONE. Rank: 1

SUMMARY A post-medieval (probably 18th century) milestone two miles west of St Asaph.

DESCRIPTION Milestone depicted on OS 1st edition 25" - Abergele 5, St Asaph 2

CONDITION Condition: NOT KNOWN Description: - Related event: 140118 Date of entry: 2016-09-08 00:00:00

STATUS None recorded

CROSS REFERENCES - -CPAT140118, CPAT152997

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143534>

PRN 143524 **NAME** Ty-cnap ridge and furrow

NGR SJ0125573850 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in a field at Ty-cnap, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprm=CPAT143524>

PRN 143517 **NAME** Ty-cnap ridge and furrow I

NGR SJ0087373829 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in a field at Ty-cnap, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR.

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprm=CPAT143517>

PRN 143518 **NAME** Ty-cnap ridge and furrow II

NGR SJ0091073805 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in a field at Ty-cnap, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118, CPAT152997

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143518>

PRN 193982 **NAME** Tyddyn Meredydd farm

NGR SJ0110873062 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM. Rank: -

SUMMARY Farm complex identified on OS 2nd edition 25 inch map. Likely to contain traditional farm buildings (CPAT, Farms and Farmsteads, 2021)

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193982

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT193982>

PRN 195707 **NAME** Tyddyn Meredydd farm, farm building

NGR SJ0109973060, SJ0110673072 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM BUILDING. Rank: -

SUMMARY Traditional farm building, or building now containing a traditional farm building, identified from OS 2nd edition 25 inch map by CPAT Farms and Farmst

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193982

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire

and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195707>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195708>

PRN 193987 **NAME** Tyddyn-eos farm

NGR SJ0046773368 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM. Rank: -

SUMMARY Farm complex identified on OS 2nd edition 25 inch map. Likely to contain traditional farm buildings (CPAT, Farms and Farmsteads, 2021)

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193987

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT193987>

PRN 195720 **NAME** Tyddyn-eos farm, farm building

NGR SJ0046673355, SJ0045973372, SJ0047573374 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM BUILDING. Rank: -

SUMMARY Traditional farm building, or building now containing a traditional farm building, identified from OS 2nd edition 25 inch map by CPAT Farms and Farmst

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193987

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195720>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195721>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195722>

PRN 104607 **NAME** Varae-Kanovium Roman Road RR67b

NGR SJ01677394 **COMMUNITY** St Asaph

TYPE ROMAN, ROAD. Rank: 1

SUMMARY

DESCRIPTION ROMAN ROAD THOUGHT TO LIE BENEATH PRESENT B5381 ROAD. A RIDGE RUNS FROM SJ02657389 TO SJ02507390 0.2M HIGH 5M WIDE. OS BELIEVES TOO NARROW TO BE ROMAN ROAD. ALSO PROMINENT RIDGE AT SJ02927387 MAY BE ROAD REMAINS.;

CONDITION Condition: Unknown Description: - Related event: - Date of entry: 1983-10-31 00:00:00

STATUS None recorded

CROSS REFERENCES part of 46900CPAT315276, CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1
Dodd, L 2018 New Access Road at St Asaph Business Park, Galscoed Road St. Asaph, Denbighshire Earthworks Archaeology E1405

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT104607>

PRN 193983 **NAME** Waen Meredydd farm

NGR SJ0124073663 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM. Rank: -

SUMMARY Farm complex identified on OS 2nd edition 25 inch map. Likely to contain traditional farm buildings (CPAT, Farms and Farmsteads, 2021)

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193983

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT193983>

PRN 195709 **NAME** Waen Meredydd farm, farm building

NGR SJ0124073667, SJ0123173661, SJ0124573662 **COMMUNITY** Cefnmeiriadog

TYPE POST MEDIEVAL, FARM BUILDING. Rank: -

SUMMARY Traditional farm building, or building now containing a traditional farm building, identified from OS 2nd edition 25 inch map by CPAT Farms and Farmst

DESCRIPTION

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES Part of 193983

SOURCES

McCullough, A E, Martin, C H R and Bayliss, N, 2021 Polygonisation of Traditional Farm Buildings in Denbighshire and eastern Conwy CPAT report 1784

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195709>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195710>, <http://archwilio.org.uk/arch/query/page.php?watprn=CPAT195711>

PRN 143525 **NAME** Waen-Meredydd ridge and furrow

NGR SJ0117373618 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in the field immediately south of Waen-Meredydd, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143525>

PRN 143527 NAME Waen-Meredydd ridge and furrow I

NGR SJ0111973489 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in the field immediately south of Waen-Meredydd, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143527>

PRN 143528 NAME Waen-Meredydd ridge and furrow II

NGR SJ0117273483 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in the field immediately south of Waen-Meredydd, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143528>

PRN 143529 NAME Waen-Meredydd ridge and furrow III

NGR SJ0126873496 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in the field immediately south of Waen-

Meredydd, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

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ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143529>

PRN 143530 **NAME** Waen-Meredydd ridge and furrow IV

NGR SJ0120173423 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in the field immediately south of Waen-Meredydd, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143530>

PRN 143531 **NAME** Waen-Meredydd ridge and furrow V

NGR SJ0131873593 **COMMUNITY** Cefnmeiriadog

TYPE MEDIEVAL, RIDGE AND FURROW. Rank: 1

SUMMARY Earthworks of probable medieval ridge and furrow cultivation in the field immediately south of Waen-Meredydd, west of St Asaph. Recognised from LiDAR imagery, the extent of the area has been mapped by CPAT.

DESCRIPTION Ridge and furrow identified from 1m LiDAR.

CONDITION Condition: Description: - Related event: - Date of entry:

STATUS None recorded

CROSS REFERENCES - -CPAT140118

SOURCES

Jones, N. W 2016 North Wales Wind Farm Connections: cultural heritage assessment CPAT Report No. 1423-1

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT143531>

PRN 102985 **NAME** Wernglodd Y Palmant Fieldname

NGR SJ01757400 **COMMUNITY** St Asaph

TYPE ROMAN, ROAD. Rank: 1

SUMMARY

DESCRIPTION FIELDNAME ON 1846 TITHE MAP SUGGESTING THE SITE OF A PAVEMENT OR ROAD. ROMAN ROAD 67B FROM VARAE TO KANOVIUM RUNS ADJACENT TO THE S EDGE OF THIS FIELD SO THE NAME PROB RELATES TO THAT.;

CONDITION Condition: Unknown Description: - Related event: - Date of entry: 1983-10-31 00:00:00

STATUS None recorded

CROSS REFERENCES - -CPAT313718

SOURCES

Clwyd Archaeology Service 1981 Site visit record - PRN102985

ARTEFACTS

C14 DATES

PHOTOS

-

ARCHWILIO URL

<http://archwilio.org.uk/arch/query/page.php?watprn=CPAT102985>

08.13.21 (10:08) - HTML file produced from CPAT HER, CPAT file number 1585.

Clwyd-Powys Archaeological Trust, The Offices, Coed y Dinas, Welshpool, SY21 8RP.

tel (01938) 553670, fax (01938) 552179, email her@cpat.org.uk, website <http://www.cpat.org.uk> target="_blank">www.cpat.org.uk

Please note that the sites listed above are only the sites of which we are aware at the current time and there may be others that have yet to be discovered.

While the Regional Historic Environment Record contains information on all of the following, we do not hold the definitive data for Listed Buildings, Scheduled Ancient Monuments, Registered Parks and Gardens or Registered Historic Landscapes, and it is recommended that you contact Cadw to ensure you have the most up to date data for these monuments - particularly if you require digital polygons showing the full extents of Registered or Scheduled areas. Similarly, there may also be additional sites in the area in the National Monuments Record of Wales, held by the Royal Commission on the Ancient and Historical Monuments of Wales, and again you are advised to contact them directly to obtain such information.

If your enquiry relates to a commercial development, and if you haven't already done so, please contact Mr Mark Walters (markwalters@cpat.org.uk), the Development Control Archaeologist for Clwyd and Powys who will provide further advice regarding best practice in mitigating against damage to any archaeological or historical remains which might exist within the area of the proposed works.

Enquirers are required to provide a copy (paper or digital) of any document or published report that makes use of information obtained from the HER for incorporation into the record.

Enquirers are required to include the following acknowledgement in any document or published report that makes use of information obtained from the HER: - *Information obtained from the Regional Historic Environment Record curated by the Clwyd-Powys Archaeological Trust* and the HER Enquiry Number.

Appendix Q. Construction Noise Statement

EEN/544/NOTE2023

Construction Noise Statement for Proposed National Grid Bodelwyddan Substation Extension

Document no: B2416603/BODEL/CNA/001
Version: 01

National Grid Electricity Transmission
B2416603

Bodelwyddan Substation Extension
29 November 2023

EEN/544/NOTE2023

Construction Noise Statement for Proposed National Grid Bodelwyddan Substation Extension

Client name: National Grid Electricity Transmission
Project name: Bodelwyddan Substation Extension
Client reference: B2416603
Document no: B2416603/BODEL/CNA/001
Version: 01
Date: 29 November 2023
Project no: B2416603
Project manager: [REDACTED]
Prepared by: [REDACTED]
File name: B2416603_BODEL_CNA_001
Bodelwyddan Extension Substation
Construction

Document status: First Draft

Document history and status

Version	Date	Description	Author	Checked	Reviewed	Approved
01	29/11/23	First draft	ME	RS	AB	KW

Distribution of copies

Version	Issue approved	Date issued	Issued to	Comments

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Contents

1.	Introduction	1
2.	Description of Area	2
3.	Assessment Methodology	3
3.1	Construction noise	3
3.2	Construction Deliveries	4
4.	Measures to Avoid or Reduce Impacts	6
5.	Potential Impacts	7
5.1	Construction noise	7
5.2	Delivery Traffic	7
5.3	Cumulative Assessment	8
6.	Summary and Conclusions	9

Appendices

Appendix A. Acoustic Terminology	10
Appendix B. References	12

Tables

Table 1: ABC Method for assessing construction noise at dwellings.	3
Table 2 Construction equipment to be used.	4
Table 3 Projected number of vehicles during construction.	5
Table 4 Predicted construction noise, $L_{Aeq,T}$ dB	7
Table 5 Predicted vehicle noise on access route $L_{Aeq, 1\text{-hour}}$ dB	7

Figures

Figure 2-1: Location of substation and surrounding receptors	2
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1. Introduction

National Grid is proposing to construct an extension to National Grid's existing Bodelwyddan 400 kilovolt (400kV) substation located at Glascoed Road, St Asaph, Denbighshire, LL17 0LL. The extension would be to the west of the existing substation and would approximately double the footprint of National Grid's operational land.

The proposed substation would facilitate the addition of twelve additional connection bays for new connections of renewable energy and an interconnector. A description of the project is provided in the Environmental Report prepared to accompany the planning application to Denbighshire County Council. The related overhead line works are considered in a separate report.

This statement considers the potential noise and vibration from construction. A statement of potential operational noise is provided separately.

This assessment of construction noise and vibration is based on guidance contained within British Standard 5228:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites, Part 1 – Noise (British Standards Institution, 2014) and Part 2 – Vibration (British Standards Institution, 2014).

A desk-based review of the layouts of the proposed works and location map has been undertaken in the first instance to inform the identification of potential noise and vibration sensitive receptors. Receptors that are potentially sensitive to construction noise comprise residential dwellings, educational establishments, hospitals or places of worship. Vibration sensitive locations can include any structure close to vibration generating activities, such as piling.

A radius of 300m around the proposed construction works is considered sufficient for assessing construction noise impacts, and a radius of 100m for construction vibration impacts.

2. Description of Area

The area of the works is rural with no major noise sources nearby, such as major trunk roads or railway lines. Existing baseline noise levels are expected to be relatively low.

Figure 2-1 shows the location of the existing and proposed substation in the context of the surrounding area. The proposed extension is immediately to the west of the existing substation. The existing site access route is shown east of the existing substation, moving north to join the B5381 Glascoed Road. The closest potentially noise sensitive receptors are indicated by orange triangles.

The closest noise sensitive receptors to the project are the residential dwellings of Waen Meredydd (receptor 1) which is approximately 160 m west-northwest of the substation extension, and Plas Yr Esgob Farm (receptor 3), which lies approximately 155 m east of the site access route. Immediately to the north of the existing and proposed substation extension lies a commercial area, and the Welsh Ambulance Service NHS Trust HQ (receptor 2) is also considered in the assessment. This is would not typically be considered as a noise sensitive receptor, but as there may be critical call centre activities being undertaken within the building it has been included in the assessment.

There are no sensitive receptors within 100m of the works, and so vibration from construction is not considered further.

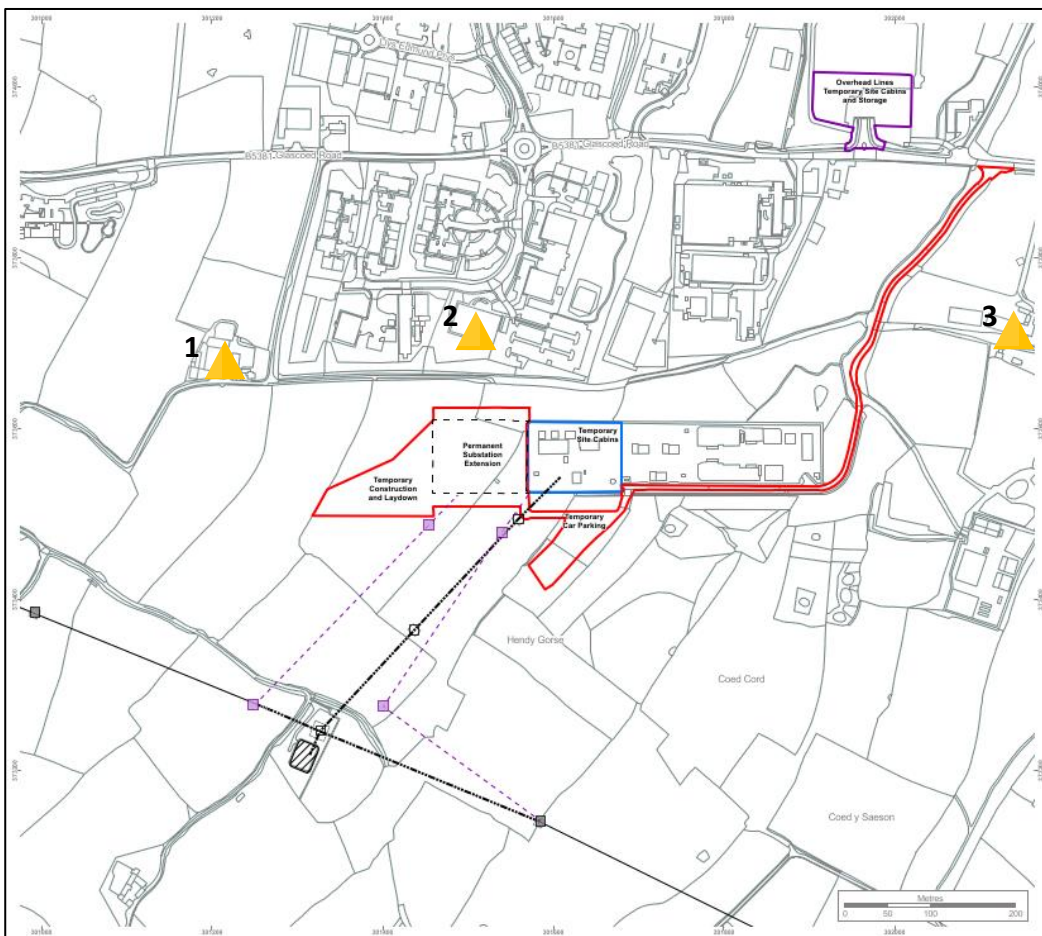


Figure 2-1: Location of substation and surrounding receptors

3. Assessment Methodology

This assessment of construction noise and vibration is based on guidance contained within British Standard 5228:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites, Part 1 – Noise (BS5228-1) (British Standards Institution, 2014).

3.1 Construction noise

A desk-based review of the layouts of the proposed works and location maps has been undertaken in the first instance to inform the identification of potential noise sensitive receptors. Receptors that are potentially sensitive to construction noise comprise residential dwellings, educational establishments, hospitals or places of worship.

A radius of 300m around the proposed construction works is considered sufficient for assessing construction noise impacts.

The significance of noise impacts caused by construction activities can be evaluated according to the methods described in Annex E of the BS 5228-1. Annex E describes methods for evaluating the potential significant impact of construction noise depending on the existing noise level at the site. The Annex presents the ABC method (see Table 1) which considers that a potential adverse effect is indicated when the noise from construction exceeds the value listed in an ABC category which is dictated by the existing noise level.

Table 1: ABC Method for assessing construction noise at dwellings.

Reference Period	Threshold value $L_{Aeq,T}$ dB		
	Category A ¹	Category B ²	Category C ³
Daytime weekday (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75
Evening's weekday (19:00-23:00), Saturdays (13:00-23:00) and Sundays (07:00-23:00)	55	60	65
Night-time (23:00-07:00)	45	50	55
¹ Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. ² Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. ³ Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			
Note 1: A potential significant effect is indicated if the L_{Aeq} , daytime noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.			

There is no baseline noise survey data available but given the rural nature of the area the lowest category A is considered suitable for this assessment.

Noise predictions from construction are undertaken using known noise levels from the various items of plant that would be used during the different activities associated with the construction of the substation. The works will be carried out during several consecutive phases. These are summarised in Table 2, together with the construction plant and equipment that are expected to be used.

For the times of operation of the construction works, activity time has been assumed to be 80% during each shift, allowing for breaks. Daytime working hours are assumed to be 07:00 to 19:00 hours Monday to Friday, and 07:00 and 13:00 on Saturday. No night-time or out of hours weekend working is expected. The acoustic on-time is the period of operation of the plant item where it is working within 3dB of its acoustic maximum.

Table 2 Construction equipment to be used.

Phase of Construction	Plant Description	No.	Acoustic on-time	Lw dB
Compound Construction	Tracked excavator	1	40%	101
	Lorry (4-axle wagon)	1	35%	108
	Vibratory roller	1	35%	95
	Lorry with lifting boom	1	30%	105
Earthworks	Tracked excavator	1	40%	99
	Articulated dump truck	1	30%	109
	Lorry (4-axle wagon)	1	30%	108
	Roller (rolling fill)	1	35%	107
Foundations	Tracked excavator	1	40%	99
	Hand-held circular saw	1	15%	112
	Concrete mixer truck & pump	1	30%	103
	Poker vibrator	1	20%	97
	Telehandler	1	35%	107
Equipment Installation	Mobile telescopic crane	1	40%	105
	Lorry	1	30%	111
	Lorry with lifting boom	1	25%	105
	Impact Wrench	1	20%	110
	Telehandler	1	35%	107
Ducting	Tracked excavator	1	40%	101
	Mini tracked excavator	1	40%	102
	Vibratory roller	1	35%	105
	Vibratory compacter	1	35%	110
Cabling	Petrol hand-held circular saw	1	20%	119
	Cable Winch	1	40%	93
	Mini tracked excavator	1	40%	102
	General 4x4	1	25%	108
Drainage	Tracked excavator	1	40%	101
	Dumper	1	35%	107
	Vibratory roller	1	30%	102
	Vibratory plate	1	30%	108
Road/track construction	Tracked excavator	1	40%	103
	Tracked excavator	1	40%	101
	Articulated dump truck	1	30%	109
	Roller	1	30%	107
	Dozer	1	25%	109
Fence construction	Wheeled excavator	1	40%	94
	Dumper	1	25%	107
	Cement mixer truck	1	25%	103
	Impact Wrench	1	10%	110
	General 4x4	1	20%	108

3.2 Construction Deliveries

Throughout construction, deliveries of equipment and materials will be required, and workers will access the site daily. The assessment of noise from construction traffic has been carried out using the Haul Route calculation methodology from Appendix F.2.5.2 of BS 5228-1. A sound pressure level is predicted from numbers of mobile plant and vehicles passing along a haul route at a rate per hour.

Table 3 indicates the number of vehicles expected to access the site per day monthly through the construction period.

Table 3 Projected number of vehicles during construction.

Vehicle Type	Average number of vehicles per day in month							
Month	1-3	4-6	7-17	18	19	20-22	23	24
Cars	5	5	5	5	5	5	5	5
Vans	20	20	20	34	54	39	21	4
HGVs	9	4	1	6	2	1	1	0

The peak month for vehicular access is the 19th month of the works when a total of 61 vehicles will access the site. Calculations have been carried out to demonstrate the hourly noise level from these vehicles, based on a 10-hour working day.

4. Measures to Avoid or Reduce Impacts

The use of Best Practicable Means (BPM) during construction will be adopted on-site in order to minimise construction noise levels. This is standard sector practice in accordance with British Standard 5228-1. Examples of BPM are as follows:

- Appropriate selection of plant and construction methods: only plant conforming with or better than relevant national or international standards, directives or recommendations on noise or vibration emissions will be used. Construction plant will be maintained in good condition with regard to minimising noise and vibration output.
- Construction plant will be operated and maintained appropriately, following manufacturer's written recommendations or using other appropriate operation and maintenance programmes that reduce noise and vibration emissions.
- Use of audible reversing warning systems on mobile plant and vehicles will be of a type which, whilst ensuring that they give proper warning, have a minimum noise impact.
- Stationary equipment e.g. pumps, compressors, generators, will be situated as far as practical from receptors, and where appropriate acoustic screens will be erected around them.
- Equipment known to emit noise strongly in one direction, where practical, will be orientated so that noise is directed away from noise sensitive areas.
- Screening will be used around piling equipment and plant will be maintained in good operational condition with all engines covered and noise control measures as provided in place.
- Equipment will be shut down when not in use.
- Haul roads will be well maintained and avoid, where feasible, the use of steep gradients.
- All site employees will be reminded of their obligation to minimise noise on site.
- Where possible, the contractor will consider the use of the quietest commercially available plant that is suitable for each specific operation.

5. Potential Impacts

5.1 Construction noise

Table 4 presents the predicted construction noise levels for a position 1m from the façade at the three identified closest sensitive receptors to the works.

Table 4 Predicted construction noise, $L_{Aeq,T}$ dB

Phase of Construction	Receptor		
	Waen Meredydd	Ambulance Service HQ	Plas Yr Esgob Farm
Compound Construction	53	56	43
Earthworks	53	60	45
Foundations	52	59	44
Equipment Installation	55	62	47
Ducting	53	60	45
Cabling	58	65	50
Drainage	52	59	44
Road/track construction	50	56	55
Fence construction	51	58	53

At the closest residential dwellings to the substation extension, the predicted daytime construction noise is below the threshold level of 65 dB.

At the Welsh Ambulance Service NHS Trust HQ predicted construction noise levels are below the 65 dB daytime threshold for all but one of the activities. The construction threshold of 65 dB is met during the construction phase of ducting, when these works are occurring at the closest point to this receptor. As this phase is a transient activity, works will be occurring at this threshold level for a short period relative to the whole construction period.

The impact of noise during the construction of the substation extension is therefore considered to be **not significant**.

5.2 Delivery Traffic

Table 5 presents the predicted construction noise levels from vehicles using the haul route during the peak traffic month of the works at receptors.

Table 5 Predicted vehicle noise on access route L_{Aeq} 1-hour dB

Receptor	Predicted hourly vehicle noise $L_{Aeq,T}$ dB
Waen Meredydd	36
Ambulance Service HQ	38
Plas Yr Esgob Farm	40

Predicted levels of noise from vehicles using the site access route during the peak construction traffic month are below the daytime construction noise threshold of 65 dB. As fewer vehicles are expected to access the site in the other months of the 24-month construction period, noise from construction traffic will be lower during these periods. These predicted noise levels are low compared to those from the works and would not contribute to increase the predicted levels shown in Table 4.

The impact of noise from construction vehicles is therefore considered to be **not significant**.

5.3 Cumulative Assessment

There is the potential for cumulative impacts from other nearby developments, where construction works are carried out consecutively within 300m of the receptors considered in this assessment. A review of nearby developments has been undertaken, and only the works associated with the construction of the new overhead lines would be within 300m of the study area associated with this scheme. No other developments are within 300m of the receptors considered in this assessment.

There will be some overlap of the works carried out to construct the substation, as outlined in this report, and for the overhead lines at two receptors. The highest calculated construction noise levels for these receptors have been taken from the associated report B2416603/BODEL/CAN/002 for the overhead lines and combined with the highest calculated construction noise level during the substation construction works to determine the worst case cumulative construction noise level, as indicated in Table 6.

Table 6 Predicted construction noise, $L_{Aeq,T}$ dB

Predicted $L_{Aeq,T}$ dB	Receptor	
	Waen Meredydd	Plas Yr Esgob Farm
Substation construction	58	55
Overhead line construction	53	47
Combined construction noise level	58	55

At the closest residential dwellings to the combined construction works for the substation and overhead lines the predicted daytime construction noise is below the threshold level of 65 dB.

The impact of cumulative construction noise therefore considered to be **not significant**.

6. Summary and Conclusions

This statement considers the potential for adverse impact during the construction phase of the proposed extension to Bodelwyddan substation.

The proposed construction noise threshold level of 65 dB for the works is not predicted to be exceeded at any receptor during the works, and also from construction traffic. This is based on the assumption that the works will be carried out during daytime working hours (07:00 to 19:00).

It is therefore concluded that construction noise from the proposed extension to Bodelwyddan substation would be **not significant**.

Cumulative construction noise levels from the overhead power line works occurring consecutively has been considered. Cumulative construction noise would be below construction noise threshold levels at residential receptors, and therefore **not significant**.

Appendix A. Acoustic Terminology

A sound wave travelling through the air is a regular disturbance in ambient atmospheric pressure. These pressure fluctuations, when of frequencies within the audible range, are detected by the human ear which passes nerve responses to the brain, producing the sensation of hearing. The audible range is generally quoted as 20 Hz to 20 kHz frequency range.

Noise has been defined in a variety of ways and is very much dependent on factors such as the listener's attitude to the source of the sound and their environment but is essentially any sound that is unwanted by the recipient.

It is impossible to measure the degree of nuisance caused by noise directly, as this is essentially a subjective response of the listener, but it is possible to measure the "loudness" of that noise. Loudness is related to both the sound pressure (the magnitude of the maximum excursion of the pressure wave around the ambient atmospheric pressure) and the frequency, both of which can be measured.

The human ear is sensitive to a wide range of sound levels; the sound pressure level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitude of the numbers involved, a logarithmic scale of decibels (dB) based on a reference level of the lowest audible sound is used.

The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured sound level per frequency to approximate human response. This is achieved by using filters to vary the sound contribution at different frequencies of a measured signal. The "A-weighting" network is the most commonly used and has been shown to correlate closely to the non-linear and subjective response of humans to sound. The use of this weighting is denoted by a capital A in the unit abbreviation (i.e. L_{Amax} , L_{Aeq} , L_{A90} etc.) or a capital A in brackets after a dB level (i.e. 3 dB(A)).

Sound Pressure Level: The sound pressure level (L_p or SPL) is the instantaneous acoustic pressure and is measured in decibels (dB). Since the ear is sensitive to variations in pressure, rather than source power or intensity, the measurement of this parameter gives an indication of the impact on people. The SPL is defined as:

$$SPL = 10 \log_{10} \left(\frac{p^2}{p_{ref}^2} \right) \quad \text{or} \quad SPL = 20 \log_{10} \left(\frac{p}{p_{ref}} \right)$$

where:

p is the rms pressure of the sound in question (in pascals)

p_{ref} is the reference sound pressure, defined as the limit of human audibility (2×10^{-5} Pa)

Sound Power Level: The sound power level (L_W or PWL) is a measure of the acoustic energy output of a source and is a property of the source itself. The PWL is also measured in dB and is given by:

$$PWL = 10 \log_{10} \left(\frac{W}{W_0} \right)$$

Where:

W is the sound power of the source (in watts)

W₀ is the reference sound power (10-12 watts)

Broadband: When the broadband term is used in conjunction with an acoustic measure (i.e. broadband sound pressure level) it reflects that the value of this measure is representative of the entire audible range.

Background Sound Level L_{A90 T}: A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

Equivalent continuous A-weighted sound pressure level L_{Aeq T}: The L_{Aeq T} is defined as the equivalent continuous sound level and is the most widely used parameter for assessing environmental noise. Since this descriptor is a type of average level, it must by definition have an associated time period over which the measurement is referring to. This is often included in the abbreviation in the form L_{Aeq, T}, where T is the time period (i.e. L_{Aeq, 5 min}). The formula for calculating the L_{eq} is:

$$L_{eq} = 10 \log_{10} \left(\frac{1}{t_2 - t_1} \int_{t_1}^{t_2} \frac{p^2}{p_{ref}^2} \cdot dt \right)$$

Ambient Sound: Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far.

Free-Field: The term “free-field” refers to sound levels that have been measured or predicted in the absence of any influence of reflections from nearby surfaces. In practice, a measurement is considered to be free field if it was taken at a distance of over 3.5 m from reflecting surfaces to the side of the source. Where a reflecting surface is perpendicular to the line between sound source and receptor/measurement position, a greater distance to the reflecting surface is required (around 10 m) for truly free-field conditions.

Facade Level: The term façade level refers to the sound level adjacent to a building that is assumed to be reflective to sound. Typically for a fully reflective façade a correction of 3dB would be added linearly to the predicted free field level to account for the sound energy reflected from the façade.

Appendix B. References

- British Standards Institution. 2014a. BS 5228-1: 2009 + A1: 2014 - Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.
- British Standards Institution. 2014b. BS 5228-2: 2009 + A1: 2014 - Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.

Appendix R. Operation Noise Statement

EEN/544/NOTE2024

Audible Noise Statement for Proposed National Grid Bodelwyddan Substation Extension

National Grid

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1.0 INTRODUCTION

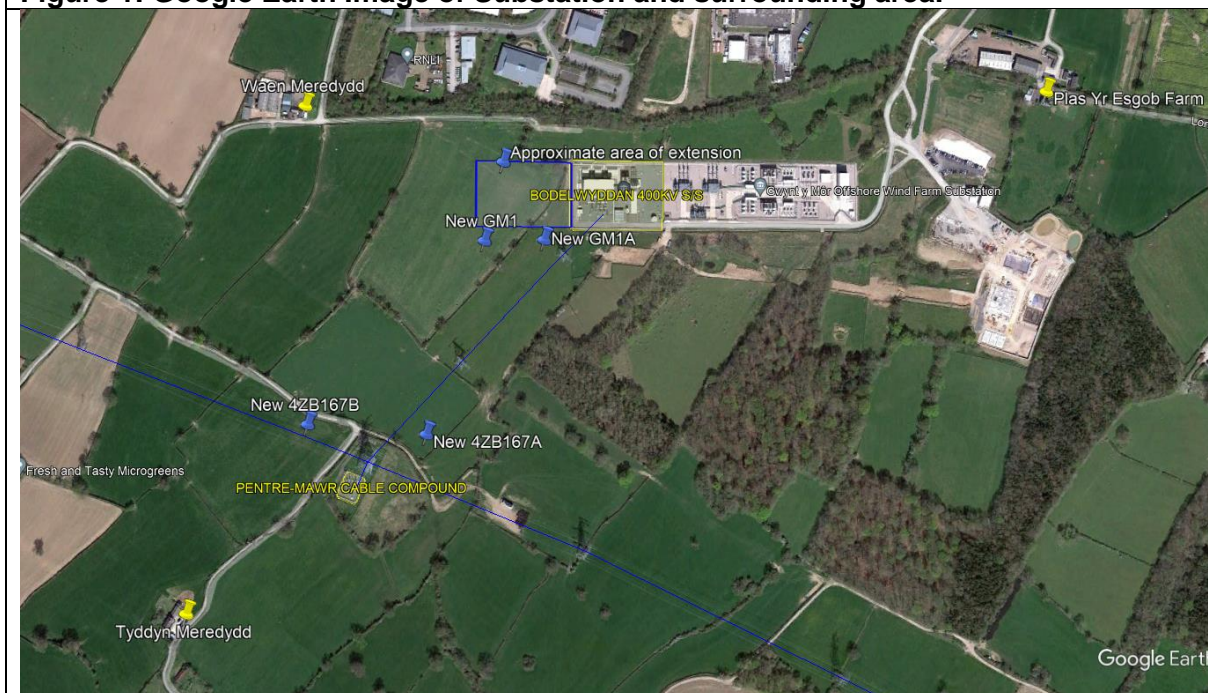
National Grid is proposing to extend the existing Bodelwyddan 400 kilovolt (400kV) substation located at Glascoed Road, St Asaph, Denbighshire, LL17 0LL. The proposed extension will facilitate the addition of twelve additional connection bays to connect new green energy to the transmission system. The connections include the BP & EnBw Mona offshore windfarm, RWE's Awel-y-Mor offshore and the proposed MaresConnect interconnector. The twelve bays include provision for additional feeder bays to accommodate the reconfiguration of the circuits connecting the substation to the transmission network. A full description of the project is provided in the Environmental Report accompanying the substation works planning application.

None of the proposed new infrastructure to be installed as part of the extension would be classified as significant noise sources. This Technical Note has therefore been prepared by National Grid Electricity Transmission's Environmental Engineering Team as good practice, for completeness and to provide the necessary information to demonstrate this.

2.0 DESCRIPTION OF AREA

Figure 1 below shows the location of the existing and proposed substation in the context of the surrounding area. The boundary of the proposed extension is indicated by the blue rectangle. Immediately to the east of this, highlighted in yellow and occupying approximately the same land area, is the existing National Grid 400kV substation. The facility to the east of the National Grid substation is the Gwynt y Mor Offshore Wind Farm Substation, this is not owned or operated by National Grid.

Figure 1: Google Earth Image of Substation and surrounding area.



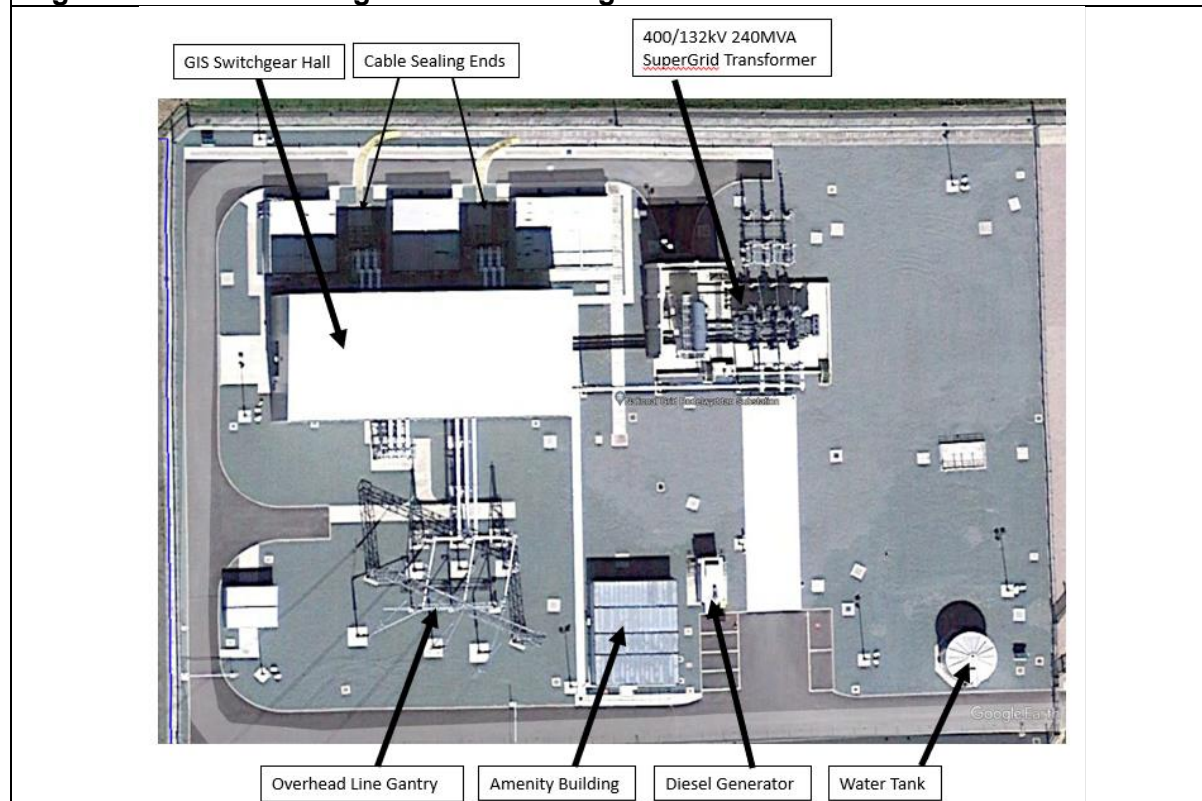
National Grid's 400kV '4ZB' overhead line (OHL) passes east-west to the south of the substation and connects to the existing substation via the short 'GM' overhead line and underground cabled circuit, both indicated by the blue lines. The single GM overhead line and cabled circuit would be replaced by two new double circuit overhead lines, requiring the construction of new and relocated pylons as indicated by the blue pushpins.

The nearest residential receptors to the project are Waen Meredydd which would be approximately 220 m west-northwest of the substation extension, and Tyddyn Meredydd, which lies approximately 250 m from the nearest point of the new OHL connections and 550 m from the substation extension. Immediately to the north of the existing and proposed substation extension lies a commercial area.

3.0 EXISTING NATIONAL GRID SUBSTATION AND INFRASTRUCTURE

The existing substation was constructed in 2014 and the principal equipment comprises: a substation building containing gas insulated switchgear (GIS), integral voltage and current transformers, circuit breakers, disconnectors and protection equipment. Externally there is one 400/132kV 240MVA supergrid transformer (SGT) with associated cooler, a standby diesel generator and a terminal overhead line (OHL) gantry which receives a single circuit high voltage connection from the 400kV '4ZB' overhead line which passes approximately 350 metres to the south of the substation. Other auxiliary equipment is generally contained within rooms either inside or outside the main GIS building, these include a telecommunications room, control room, relay room, battery room and low voltage alternating current (LVAC) room. There is also a small car park and utilities room on the site. The site is not permanently manned. Figure 2 below details the general arrangement of the existing substation.

Figure 2: General Arrangement of Existing Substation



Items of equipment generally termed 'reactive plant', which includes SGTs, are usually the only significant sources of noise on high voltage substations. Reactive plant is the source of the tonal 'hum' that is the noise most commonly associated with substations. The existing SGT operates continuously and is therefore the most significant noise source on the existing substation. The new substation would not include any additional reactive plant, hence there

would be no additional equipment of this type that would require noise assessment as part of the proposed development.

The next most significant noise source on the existing substation is the standby diesel generator, which under normal conditions operates only for 1 or 2 hours per month, daytime only, for routine testing purposes. Operation for extended periods of time would be on a temporary basis under emergency conditions only. The existing standby generator would remain in place and will provide emergency low voltage electricity supplies to both the existing site and the proposed substation extension on an emergency basis only.

The main GIS building houses switchgear which incorporates circuit breakers, disconnectors/isolators and current/voltage transformers. Switchgear noise is generated by the operation of circuit breakers and isolators. Switchgear is likely to operate very infrequently, typically only a few times a year for outages and maintenance, and in emergencies to protect the substation and electricity network infrastructure from lightning strikes or faults. Noise from switchgear is impulsive in character (i.e., of very short duration). Modern switchgear of the type installed at Bodelwyddan operates with a dull 'thud' while isolators would operate with a 'click'. No significant effects on noise sensitive receptors are anticipated due to the low noise level, infrequency of operation and the fact that the equipment is located within a building that provides acoustic attenuation. Other equipment located with the GIS building include voltage and current transformers, these are passive in operation and do not make noise.

The existing energised air insulated (AIS) components, which include: the short single circuit connection from the nearby 4ZB OHL, the terminal OHL span into the substation, insulators and air insulated bus bars, will under certain conditions 'crackle' or 'fizz' due to the occurrence of a phenomenon called corona discharge. Corona discharge occurs when the voltage gradient (or electrical stress) on the surface of energised components and fittings exceeds the corona inception level which is a function of the insulating properties of the surrounding air. Energised components are designed to operate below this level, however in certain conditions such as damp or wet weather and following long dry spells when surface contamination may build up, the corona inception level may be exceeded meaning corona discharge may occur. Corona discharge may be audible when close to the substation, but it is not continuous and not considered significant.

All other equipment on the existing substation, including the gas insulated bus bars (GIB), cable sealing ends and underground cables can be described as passive in operation, being either quiet in operation or not audible beyond the site boundary. All substation functions are fully automated meaning personnel do not need to be attendance for normal safe operation of the substation.

4.0 PROPOSED SUBSTATION EXTENSION

The substation extension would include the installation of 'passive' equipment to facilitate the addition of twelve additional connection bays. As stated above, the single GM overhead line and cabled circuit would be replaced by two new double circuit overhead lines.

As stated in the introduction, the proposed substation extension would not include any significant noise sources, for example reactive plant (such as SGTs) or any additional standby diesel generators.

The proposed general arrangement of the substation extension is shown below in Figure 3. The alignment of the proposed overhead line connections is shown in Figure 4.

Figure 3: Proposed General Arrangement of Substation Extension (shown in red)

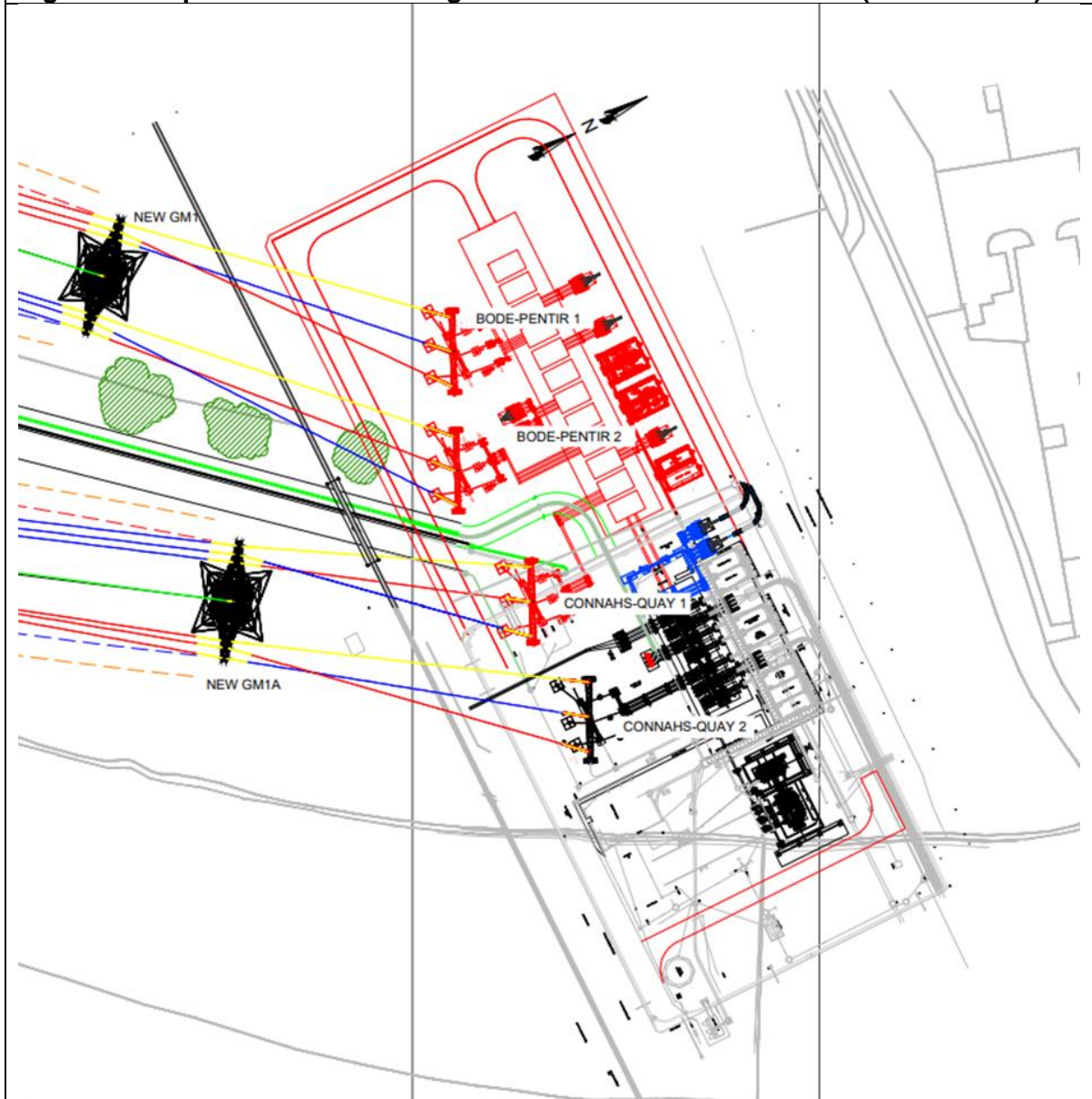
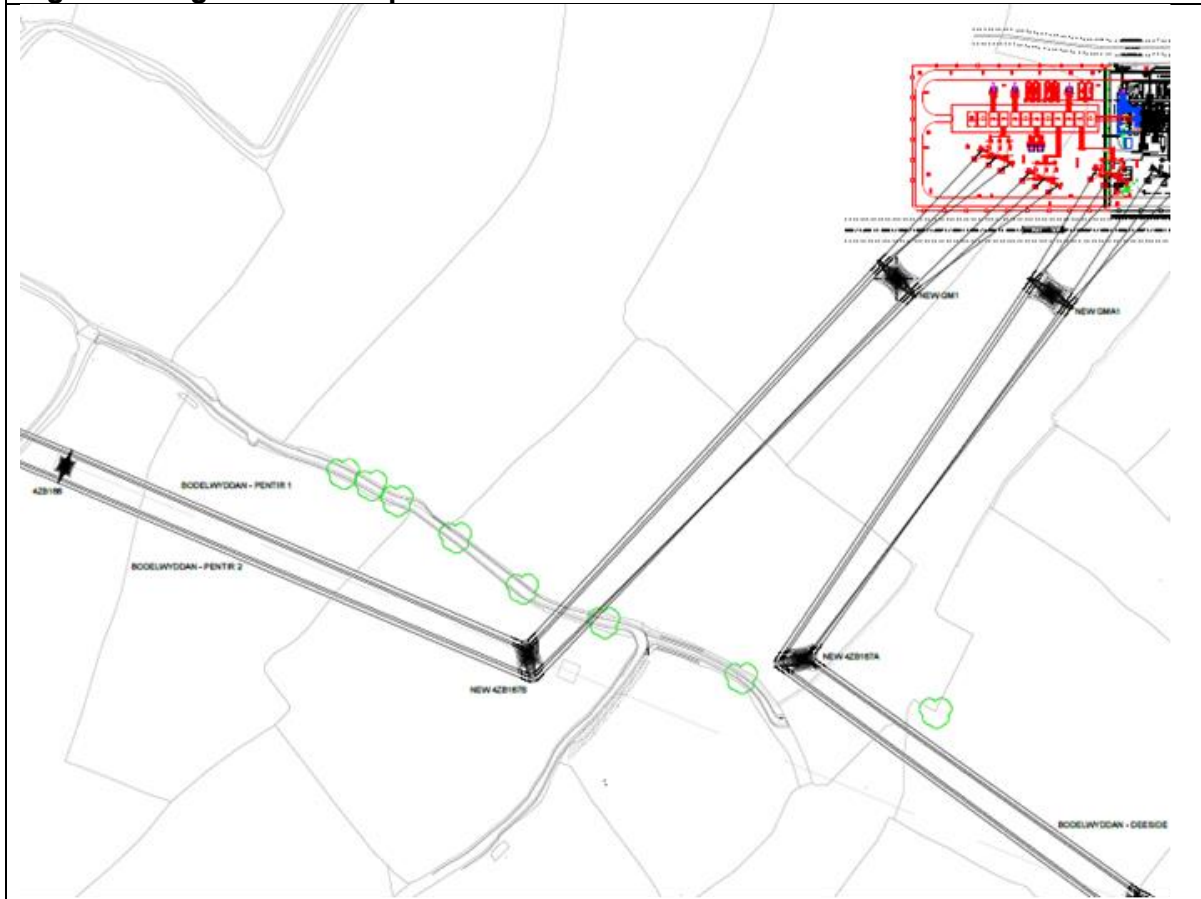


Figure 4: Alignment of Proposed Overhead Line Connections

All proposed equipment and their acoustic characters are described in detail in the following sections.

4.1 Proposed Auxiliary, Control and Security Equipment

Table 1 lists the auxiliary, control and security equipment likely to be on the proposed new substation and describes their general noise characteristics. These items do not make significant noise, with the exception of the site alarm which would operate under emergency conditions only.

Table 1: Auxiliary, control, and security equipment

Item	Equipment	Function	Noise Characteristics	Further info
A1	Telecoms room	Communications between control room and other substations	Quiet in operation	N/A
A2	Relay room	Substation bus bar protection and control	Quiet in operation	N/A
A3	Relay room	OHL and cable feeder protection houses the protection	Quiet in operation	N/A
A4	Control room	Houses the relays, protection and control panels	Quiet in operation	N/A
A5	Battery room	facility used to house batteries for backup or	Quiet in operation	N/A

Table 1: Auxiliary, control, and security equipment

		uninterruptible power systems		
A6	LVAC room	Low voltage alternating current for site supply	Quiet in operation	N/A
A7	Site lighting / fencing / gates	Safety and security	Quiet in operation	N/A
A8	Alarm / Siren	Security	Audible instruction Siren or claxon (Emergency use)	N/A

4.2 Proposed Energised Equipment

Table 2 lists energised equipment likely to be present on the substation extension and OHL connection to the existing National Grid 4ZB OHL. This equipment would connect to and would form part of the electricity transmission network and would facilitate connection of third-party infrastructure.

Table 2: Energised Infrastructure

Item	Equipment	Function	Noise Characteristics	Further info.
E1	Switchgear	Circuit breakers, switches and isolators are located within the main GIS building. Isolate equipment in emergency and for planned maintenance and switching in and out connections as required.	Equipment is passive for the vast majority of the time. When it operates noise is an impact noise best described as a thud or 'clack'.	See below
E2	GIB bus bars	Gas insulated bus bars. Carry the electrical current through the substation	Do not make noise	N/A
E3	Underground Cables	Carry the electrical current through the substation	Do not make noise	N/A
E4	Cable sealing ends	The connection point between GIS or AIS bus bars or conductors	Do not make noise	N/A
E6	OHL connection and line entries into substation on terminal gantries	Connects the existing substation and the proposed substation to the existing 400kV 4ZB OHL which passes approximately 350 metres to the south.	Energised OHL components may 'crackle' or 'fizz', especially during damp or wet weather. In certain conditions this may be accompanied by a 'hum'	See below

Switchgear

Switchgear noise is generated, in the main, by the operation of circuit breakers which would be located inside the main GIS building. Modern switchgear operates with a dull 'thud'. Switchgear of this type is already present on the existing substation and hence the presence of additional switchgear would not constitute a change in noise character compared to the existing infrastructure.

Switchgear operations would be very infrequent, typically a few 10's of activations during a year across the whole site. The main purpose of the switchgear is to protect the substation and overhead line infrastructure in the event of faults or events such as lightning strikes.

Noise due to the operation of switchgear is therefore considered **not significant**.

Audible Noise from High Voltage OHLs

Noise from high voltage transmission lines is primarily due to a phenomenon called corona discharge. Line noise is generated when the conductor surface voltage gradient (electric stress, or E_{max} expressed in kilovolts per centimetre (kV/cm)) exceeds the inception level for corona discharge activity which is released as acoustic energy and radiates into the air as sound. In UK conditions the corona inception level is regarded to occur when electric stress is in the range 17 to 20 kV/cm. Whilst most high voltage lines are designed to operate below this level, those that operate close to this may produce audible noise when enhancement of conductor surface electric stress occurs due to rainfall (wet noise) or the presence of conductor surface contamination (dry noise). Lines that operate significantly below the corona inception level are much less likely to produce audible noise.

When it occurs, OHL noise can be described as a 'crackle', which is sometimes accompanied by a tonal 'hum' in wet conditions. The highest noise levels generated by an OHL generally occur during rainfall. Hum, if it occurs, is typically more annoying than crackle alone and therefore the occurrence of wet noise is considered worst-case.

The proposed new OHL would carry a 'triple Araucaria' conductor system on lattice pylons, a similar design to the existing 4ZB 400kV OHL, which currently carries a 'quad Zebra' conductor system which is due to be replaced with the triple Araucaria system. Due to its geometrical configuration the triple Araucaria design is the least electrically stressed conductor system that National Grid uses. The maximum conductor surface electrical stress level of triple Araucaria on a lattice pylon is approximately 12 kV/cm when operated at 400kV. This is significantly below the corona inception level and is the best design available for reducing the effects of dry and wet noise from the proposed OHL during operation.

Where National Grid is proposing to construct new OHLs of this design in other parts of the UK operational noise assessment has been scoped out of the Environmental Impact Assessment.

OHL Connection and line entries

The single circuit overhead line connection would be replaced by two double circuit connections requiring the existing connection to be removed requiring one existing pylon (4ZB167) to be replaced with two new pylons (to be called 4ZB167A and 4ZB167B) and the existing low-height single circuit pylons (GM01 and GM02) to be replaced with two new full height twin circuit pylons (to be called GM1 and GM1A).

The new OHL connections would be constructed of lattice pylons carrying a 'triple Araucaria' conductor system. Triple Araucaria is the quietest conductor system that National Grid

operates at 400 kV. This is because the design operates under very low electrical stresses due to its physical size and geometry.

The nearest noise sensitive receptor is Waen Meredydd which is located approximately 250m to the northwest of the nearest line entry point to the proposed substation extension.

Annex 1 provides the technical basis to demonstrate that audible noise from this design of overhead line would be negligible given the distances to the surrounding noise sensitive receptors which are all more than 200 metres from the project.

Noise due to the operation of the OHL connections is therefore considered **not significant**.

5.0 SUMMARY AND CONCLUSIONS

This statement considers the potential for adverse impact due to operational noise from the proposed extension to Bodewyddan 400 kV substation and associated double-circuit 400 kV OHL connections. The noise characteristics of each item of proposed equipment is described. There would not be any significant noise sources introduced due to the proposed development.

It is therefore concluded that there would not be an adverse effect due operational noise from the proposed extension to Bodewyddan substation and the proposed OHL connections and therefore any operational noise impact would be negligible and **not significant**.

Annex A Bodelwyddan Substation Extension

Supporting Technical Information on Operational Audible Noise from the Proposed 400kV Overhead Line Turn-ins.

1.0 INTRODUCTION

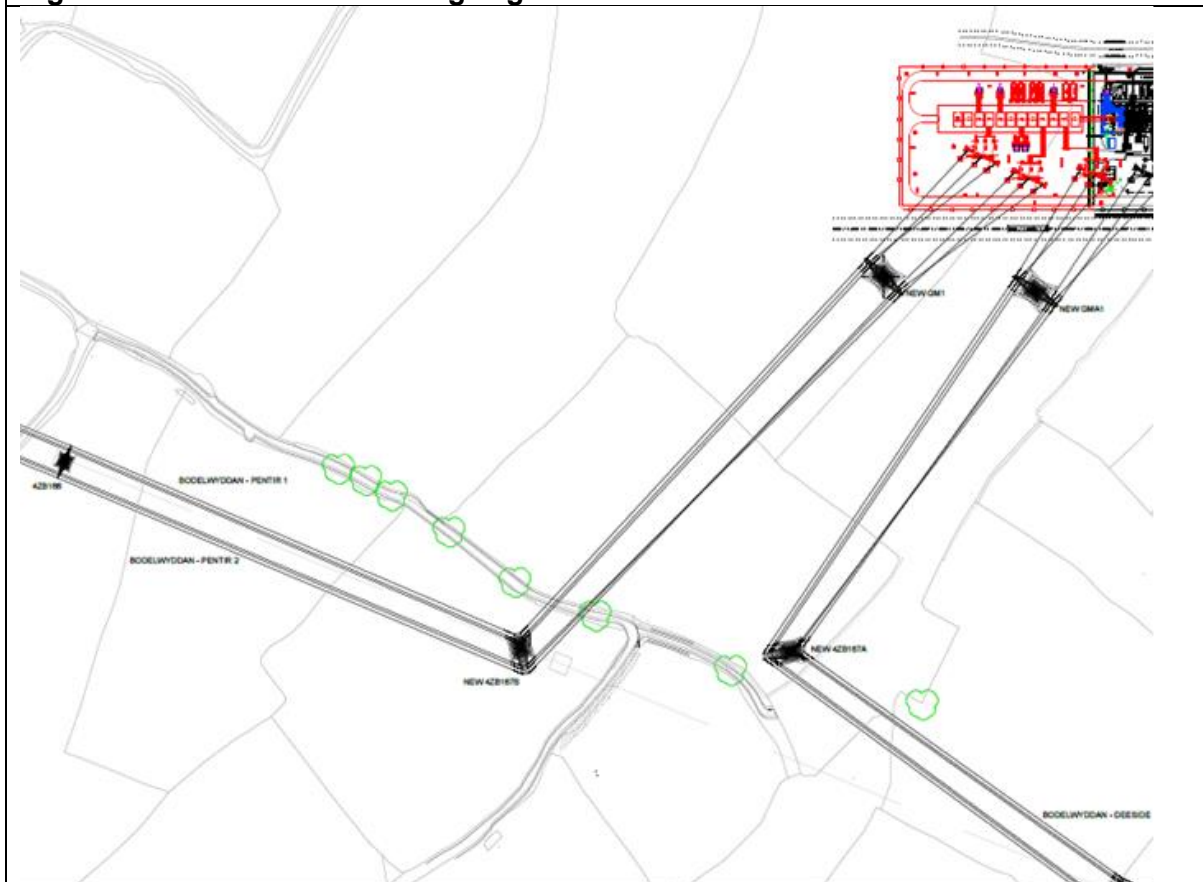
National Grid Electricity Transmission plc (here on referred to as National Grid) is proposing to construct an extension to National Grid's existing Bodelwyddan 400 kilovolt (400kV) substation located at Glascoed Road, St Asaph, Denbighshire, LL17 0LL.

The existing 400kV substation is connected to the nearby '4ZB' overhead line by the single-circuit 'GM' overhead line and a cabled circuit. The would be replaced by two new double circuit overhead lines, requiring the construction of new and relocated pylons as indicated by the blue pushpins in Figure 1 below.

This Annex presents the results of an assessment to demonstrate that the overhead line turn-ins would not result in significant noise levels at the nearest noise sensitive receptors. Chapter 2 of this appendix presents background assumptions and the existing policy and guidance that applies to designs of high voltage overhead lines.

This Annex provides the technical basis for the scoping out of operational noise from the proposed OHL turn-ins and provides information to demonstrate that any noise that may occur during the operation of the new 400kV OHL circuits would not be significant.

Figure A1: Aerial View showing alignment of OHL turn-ins



2.0 BACKGROUND

2.1 Noise from Overhead Lines

Noise from high voltage overhead lines is primarily due to a phenomenon called corona discharge. Line noise is generated when the conductor surface voltage gradient (electric stress, or E_{max} expressed in kilovolts per centimetre (kV/cm)) exceeds the inception level for corona discharge activity which is released as acoustic energy and radiates into the air as sound. In UK conditions the corona inception level is regarded to occur when electric stress is in the range 17 to 20kV/cm. Whilst most high voltage overhead lines are designed to operate below this level, those that operate close to this may produce audible noise when enhancement of conductor surface electric stress occurs due to rainfall (wet noise) or the presence of conductor surface contamination (dry noise). Overhead lines that operate significantly below the corona inception level are much less likely to produce audible noise.

When it occurs, overhead line noise can be described as a 'crackle', which is sometimes accompanied by a tonal 'hum' in wet conditions. The highest noise levels generated by an overhead line generally occur during rainfall. Hum, if it occurs, is typically more annoying than crackle alone and therefore the occurrence of wet noise is considered worst-case.

2.1 Embedded Measures

The proposed new OHL would carry a 'triple Araucaria' conductor system on lattice pylons, a similar design to the existing 4ZB 400kV OHL onto which the new turn-ins would connect. Due to its geometrical configuration the triple Araucaria design is the least electrically stressed conductor system that National Grid uses. The maximum electrical stress level of triple Araucaria on a lattice pylon is approximately 12 kV/cm when operated at 400kV.

This is significantly below the corona inception level and is the best design available for reducing the effects of dry and wet noise from the proposed OHL during operation.

3.0 NATIONAL GRID TECHNICAL GUIDANCE

National Grid has a suite of three documents relating to the management of audible noise from its OHLs. These documents are described in Table 1 below.

Table 1: National Grid Technical Guidance Documents

Document	Description
Policy Statement PS(T)134 ⁱ - Operational Audible Noise Policy for Overhead Lines (Issue 2, June 2021)	Applies to environmental noise due to the operation of new OHLs, reconductoring, diversion and uprating projects for OHLs operated at 275kV and 400kV. The policy describes a three-tier assessment process and sets noise impact criteria against which predicted levels of noise from operational OHLs can be assessed.
Technical Report TR(E)564 ⁱⁱ - Development of Method for Assessing the Impact of Noise from Overhead Lines (New Build, Reconductoring, Diversion and Uprating)	Explains how the noise criteria presented in PS(T)134 were developed, taking into account the UK noise policy context and UK national and international guidance, including World Health Organisation guidelines and evidence for health effects.

Document	Description
(Issue 1, February 2021)	
Technical Guidance Note TGN(E)322 ⁱⁱⁱ - Operational Audible Noise Assessment Process for Overhead Lines (New Build, Reconductoring, Diversion and Upgrading) (Issue 2, June 2021)	Provides guidance on the practical implementation of PS(T)134 and on noise impact and significance of effect for EIA's submitted as part of planning applications.

PS(T)134 describes a method for predicting the environmental impact due to audible noise caused by new, reconducted, diverted or uprated overhead transmission lines. The method uses internationally recognised line noise prediction methodology to calculate noise emission levels based on operating voltage, conductor design and pylon geometry. PS(T)134 also sets out noise criteria against which predicted levels of noise from operational OHLs can be assessed.

The PS(T)134 criteria apply a +6dB character correction to wet noise effects to account for the additional 'hum' generated during worst-case wet weather conditions and a +3dB correction to dry noise effects to account for the 'crackle'. This means that the assessment method is consistent with the guidance contained in section 9 of BS4142:2014+A1:2019^{iv}, 'Methods for rating and assessing industrial and commercial sound' (here on referenced as 'BS 4142:2014') which takes account of acoustic features by applying a character correction to the specific sound level to calculate a BS4142 rating level.

The OHL noise assessment process set out in PS(T)134 follows a three-tier 'screening' approach based on predicted source noise level and receptor distance. If predicted worst case wet-noise levels fail the Tier 1 test, a Tier 2 assessment would be undertaken and if predicted noise levels fail the Tier 2 test, a Tier 3 assessment would be undertaken. The three-tier approach comprises the following steps which are designed to screen out of further assessment receptors where there would be no adverse impact:

- **Tier 1:** A primary screening step based on 'worst-case' absolute wet noise effects and the pre-determined assessment criteria set out in PS(T)134.
- **Tier 2:** A further screening step based on combined absolute wet noise and dry noise effects and recalculated assessment criteria. This step takes account of the fact that wet noise occurs only during periods of wet weather and therefore does not occur all the time; and
- **Tier 3:** Full assessment following the principles of BS 4142:2014 for both wet noise and dry noise.

Noise criteria have been set taking account of the UK policy context and evidence from multiple sources, including the World Health Organisation^{v, vi, vii} and BS4142:2014, for noise and associated health impacts. The criteria have been developed by National Grid based on health impact data associated with the night-time period. The night-time period is considered more sensitive than the daytime as background sound levels are normally lower and people are trying to sleep. National Grid Technical Report TR(E)564 explains the reasoning behind the noise criteria set out in PS(T)134.

4.0 ASSESSMENT

4.1 Tier 1 Assessment for Proposed 400kV Overhead Lines

Tier 1 Assessment Criteria

The Tier 1 Assessment criteria set out in PS(T)134 are shown in Table 2. The 'No Adverse Impact' criteria applicable to residential receptors for worst-case wet weather noise is 34dB(A). In the case of the Tier 1 assessment, this includes a +6dB character correction to account for the occurrence of transmission line 'hum' in wet weather. The criteria for receptors that may be regarded as highly sensitive to noise (for example vulnerable subgroups as defined by the World Health Organisation) is 5dB lower, while the criteria for receptors that may be regarded as less sensitive to noise (for example those not used at night and those used for commercial purposes) is 5dB higher.

Table 2: Tier 1 Noise Impact Criteria (Wet Noise), from PS(T)134

Use	No Adverse Impact	Further Assessment Necessary
	Screened out	Tier 2 Assessment required
Vulnerable subgroups	< 29dBA	≥ 29dBA
Residential	< 34dBA	≥ 34dBA
Schools and Hotels	< 39dBA	≥ 39dBA

For the purposes of the Tier 1 assessment, 34dBA is considered to be the Lowest Observed Adverse Effect Level (LOAEL) for residential NSR used for sleeping at night. These levels are free-field and apply at the façade of an NSR. Where vulnerable subgroups are present, the LOAEL is 29dBA

Tier 1 Wet Noise Prediction

Worst-case wet noise levels for the proposed triple Araucaria conductor system have been predicted using the proprietary line noise prediction software EFC-400^{viii}. This software is widely used across the electricity industry to calculate conductor surface electrical stress, to assess compliance with Electric & Magnetic Field (EMF) guidelines and to predict transmission line noise levels under a range of weather conditions.

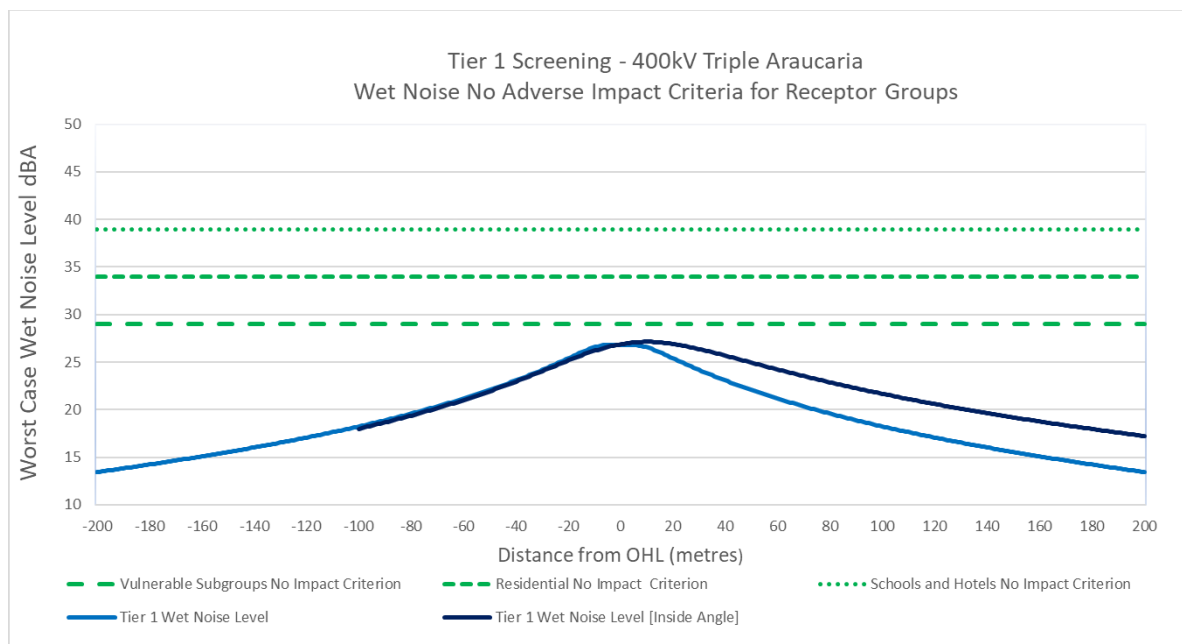
OHL noise source prediction is calculated by EFC-400 using the internationally recognised Electrical Power Research Institute (EPRI) method^{ix}. Propagation either side of a modelled line is calculated according to ISO 9613-2 Acoustics – Attenuation of sound during propagation outdoors^x. Modelling assumptions include:

- A normalised wet noise third octave spectrum which contains 'hum' at 100Hz and 200Hz, harmonics of the electricity supply frequency of 50Hz.
- Air temperature = 10°C
- Relative humidity = 90%
- Downwind propagation
- Porous ground = 1.0

Figure 1 shows the predicted worst-case wet noise levels at distances up to 200 metres either side of a proposed OHL centreline. Two scenarios are considered: a straight section of line (blue curve) and an angled section of line (dark blue curve). For the angled section, the inside of the angle is shown on the right of the chart. The consideration of an inside angle accounts for a receptor that may receive a greater combined effect from adjacent OHL spans due to the OHL deviating around the receptor and is the relevant curve in this case as the turn-ins will join the existing overhead line at approximately a 90° angle.

Figure 2 also shows the Tier 1 No Adverse Impact assessment criteria for each of the three receptor groups (green dashed lines).

Figure 2: EFC-400 Worst Case Tier 1 Wet Noise Prediction for Proposed OHL



The predicted noise levels are significantly below the No Adverse Impact Criteria for all three receptor categories.

This assessment is worst case as it assumes wet noise and hence hum would occur 100% of the time. In reality, these worst-case conditions are predicted to occur for approximately 8% of the year¹ in the project area.

The nearest receptor to the proposed overhead line turn-in is Waen Meredydd, approximately 250 metres distant from the nearest point of the new overhead line turn-ins. This receptor would potentially receive a noise contribution from both turn-ins (the second being over 300 metres distant) and a negligible contribution from the existing 4ZB overhead line which passes approximately 350 metres to the south. Even when allowing for two twin-circuit turn-ins by logarithmic addition of the two noise sources at 200 metres (+3dB if both sources are the same), plus a smaller contribution from the existing line (represented by the light blue curve), it can clearly be seen that the combined effect at distances over 200 metres the No Adverse Impact Criteria for all receptor groups are not exceeded.

¹ In the project area the historical annual average rainfall duration is 600 to 750 hours per year, or approximately 6.8 to 8.6% of the time, based on Met Office rainfall data for the period 2001 to 2010.

The nearest receptor to the south of the project is Tyddyn Meredydd which is approximately 260 metres south of the point where the turn-ins would join the existing line. A similar argument could be applied here where adding together negligible contributions from the existing line and the two new turn-ins (which would run directly away from this receptor), the No Adverse Impact Criteria for all receptor groups are not exceeded.

The Tier 1 assessment therefore concludes that the predicted worst-case noise rating level for operational noise at all potentially noise sensitive receptors due to the proposed new OHL turn-in OHL would be significantly below the 'No Adverse Impact' assessment criteria set out in PS(T)134.

As the worst-case wet noise from the triple Araucaria conductor design on lattice pylons is below the Tier 1 No Adverse Impact criteria for all receptor groups, there is no requirement to undertake a Tier 2 or Tier 3 assessment.

Operational noise from the proposed new OHL would therefore be Not Significant. It is therefore justified that operational noise from the proposed overhead line turn-ins is scoped out of the noise assessment.

4.2 OHL Fixtures and fittings

To be approved for use on the National Grid high voltage electricity transmission network, each fitting design must be Type Registered. Type registration comprises a series of tests on the fitting in question to ensure compliance with the relevant technical specification. These tests include performance requirements for corona inception and audible noise on all fittings along with wind tunnel testing of insulators for audible tones generated by Aeolian mechanisms.

Once the fitting has been type registered and approved for use, a number of further tests are also carried out post-manufacture in the form of Sample Testing. This ensures the fitting design conforms to the specification in the type registration document.

The Technical Specification and Type Registration processes reduce the potential for audible noise and tones to occur from all types of fittings, including insulators. Where noise does occur, it is likely to be localised and of short duration. If due to a fault, actions can be taken to rectify it. Where noise from fittings does occur, which results in a complaint, appropriate actions can be taken to seek to remedy the cause of the noise, usually through cleaning or replacement of the relevant fitting.

Therefore, noise from fixtures and fittings is scoped out of assessment.

5.0 CONCLUSION

This report presents the technical background to demonstrate that operational audible noise from the proposed new 400 kV overhead transmission line turn-ins to connect the proposed Bodelwyddan substation extension would be **Not Significant** due to the very low predicted noise levels even under worst-case wet noise conditions.

6.0 REFERENCES

i National Grid (2021). *Policy Statement PS(T)134 - Operational Audible Noise Policy for Overhead Lines*. National Grid, London.

ii National Grid (2021). *Technical Report TR(E)564 - Development of Method for Assessing the Impact of Noise from Overhead Lines (New Build, Reconductoring, Diversion and Uprating)*. National Grid, London.

iii National Grid (2021). *Technical Guidance Note TGN(E)322 - Operational Audible Noise Assessment Process for Overhead Lines (New Build, Reconductoring, Diversion and Uprating)*. National Grid, London.

iv British Standards Institute (2014). BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*. BSI, London

v World Health Organization (1999). *Guidelines for community noise*. WHO, Geneva.

vi World Health Organization (2009). *Night noise guidelines for Europe*. WHO, Copenhagen.

vii World Health Organization (2018). *Environmental Noise Guidelines for the European Region*. [online]. Available at: https://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf.

viii EFC-400 Magnetic and Electric Field Calculation, v2020, Narda Safety Test Solutions GmbH, Pfullingen, Germany

ix Electric Power Research Institute (1982). *Transmission Line Reference Book - 345kV and above, 2nd Edition*. EPRI, Palo Alto, California, USA.

x International Organization for Standardization (1996). *ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors: Part 2 General Method of Calculation*. ISO, London

Appendix S. Green Infrastructure Statement

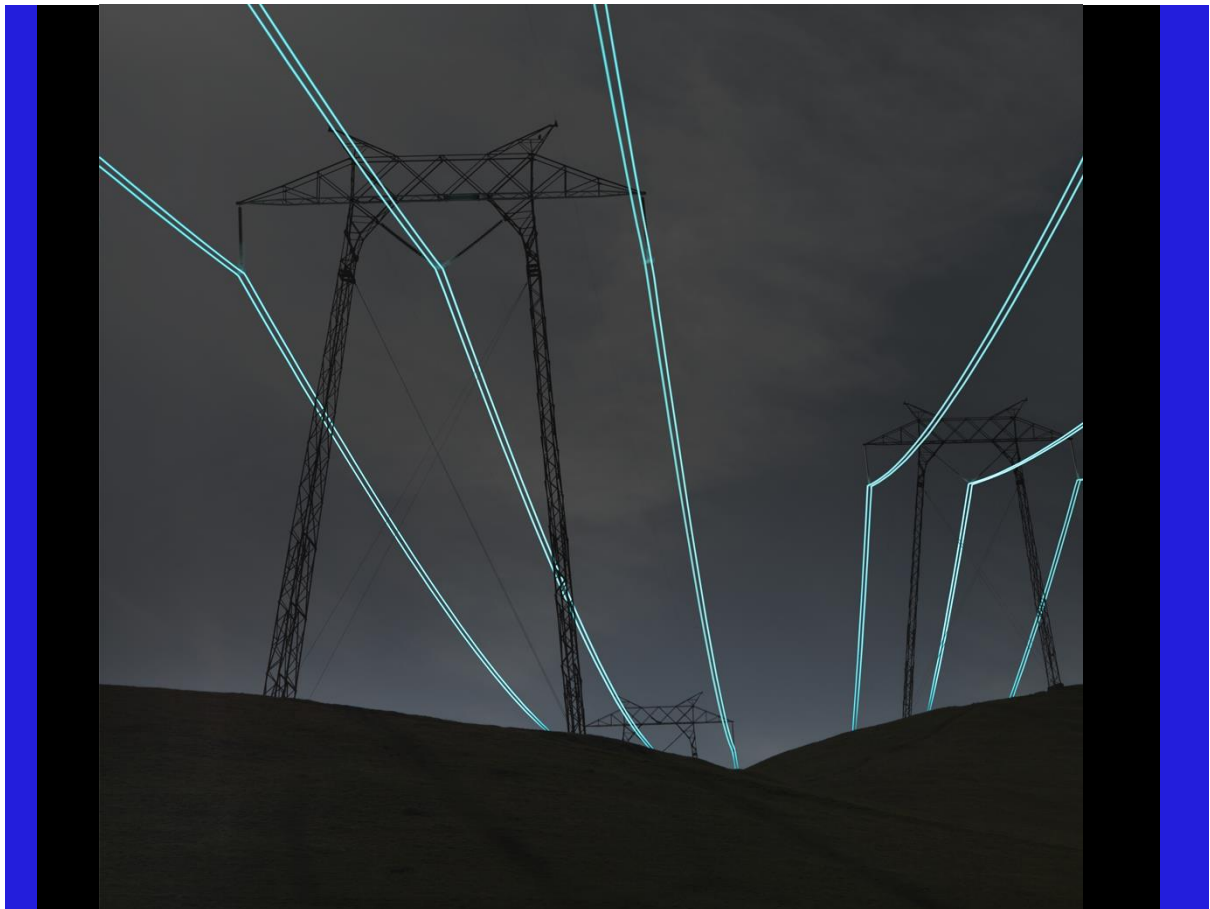
Green Infrastructure Statement

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Version: 01

National Grid Electricity Transmission
B2416603

Bodelwyddan Substation Extension
3 September 2024



Green Infrastructure Statement

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Contents

1.	Introduction.....	1
1.1	The Project.....	1
1.2	Need for and purpose of a Green Infrastructure Statement	1
2.	Site Assessment.....	2
2.1	Baseline data.....	2
2.2	Surveys and Assessments	2
2.3	Area Needs and Priorities.....	3
3.	Policy Context	4
3.1	Local Plan.....	4
3.2	Building with Nature Standards.....	4
4.	The Project Proposals	6
5.	The Step-Wise Approach	8
6.	Conclusions.....	10
	Acronyms, Abbreviations and References	11
	Acronyms and Abbreviations.....	11
	References.....	12

Appendices

Appendix A. Land Limitations Plan	13
Appendix B. Environmental Masterplan	14

1. Introduction

1.1 The Project

National Grid Electricity Transmission (NGET) ('the Applicant') is seeking an extension to the existing Bodelwyddan electricity substation ('the proposed development'). This Green Infrastructure Statement (GIS) is one of a number of documents prepared in support of a planning application, under the Town & Country Planning Act 1990, to Denbighshire County Council for the proposed development.

1.2 Need for and purpose of a Green Infrastructure Statement

Planning Policy Wales – Edition 12 (PPW12) issued in February 2024 contains a new requirement to prepare and submit a GIS with all planning applications (Paragraph 6.2.12) with the objective of integrating green infrastructure into development through appropriate site selection and use of creative design to *"embed the benefits of biodiversity and ecosystem services into new development"*.

Paragraphs 6.2.12 - 6.2.14 clarify this objective and set out the required nature and scope of a GIS. In this regard, Statements should: *"be proportionate to the scale and nature of the development proposed and describe how green infrastructure has been incorporated into the Proposal"* to effectively demonstrate the positive multi-functional outcomes which are appropriate to the development site i.e. how the Project will embed the benefits of biodiversity and ecosystem services into the development, help to overcome the potential for conflicting objectives and, contribute to health and well-being outcomes. The Statement should also demonstrate how the Step-Wise Approach has been applied.

Paragraph 6.2.14 of PPW12 states that: *"development proposals should be informed by the priorities identified in green infrastructure assessments and locally based planning guidance."* Whilst taking cognisance of the Building with Nature standards.

This GIS takes account of the Denbighshire County Council Local Development Plan 2006 – 2021, adopted in June 2013, and other relevant documents, in addressing the required elements set out in paragraphs 6.2.11 – 6.2.14 of PPW12.

The GIS is structured as follows:

- Sections 2.1 and 2.2 set out the baseline data in respect of ecology, biodiversity and landscape in relation to the site and surrounding area and the surveys and assessments undertaken to collect this;
- Section 2.3 details the area's needs and priorities in respect of biodiversity and landscape and identifies the constraints within the site that may impact on meeting those needs and priorities;
- Sections 3.1 and 3.2 set out the relevant planning policy context and Building with Nature Standards respectively;
- Section 4 sets out how the project proposals meet the needs and priorities set out in Part 2.3, taking into account any site constraints and suggesting where alternative provision may be appropriate;
- Section 5 sets out the Step-Wise Approach, as required by Paragraph 6.4.15 of PPW12, taking into cognisance paragraph 6.4.16; and
- Section 6 conclusions.

2. Site Assessment

2.1 Baseline data

The assessment of the site has been informed by a combination of appropriate desk study and field survey baseline data, which is outlined in the Bodelwyddan Substation Extension Substation Environmental Report (B2416603/BODEL/OHL/001). The baseline data has informed assessments for: ecology and biodiversity; landscape and visual; arboriculture; traffic and transport; archaeology and cultural heritage; socio-economics; air quality; noise and vibration; flood risk and water environment; and geology, soils, land contamination and waste.

The ecology and biodiversity baseline was informed by an ecological desk study (carried out in December 2022) and field surveys for habitats and species of note, i.e. UK Habitats Classification and protected species surveys for species such as *inter alia* bats and great crested newt. A Biodiversity Baseline is provided in the Appendices of each Environmental Report. The following data sets informed the baseline evaluation:

- Desk Study;
- UK Habitats Classification Survey;
- Arboricultural surveys;
- Great crested newt surveys; and
- Bat Surveys.

The landscape and visual baseline conditions have been informed by field surveys, aerial photographs, and a review of available online data sources such as LANDMAP, Natural Resource Wales Maps and Ordnance Survey (OS) data. Information has been collated on topography, landscape designations, heritage features, landscape character and the locations of potential visual receptors.

2.2 Surveys and Assessments

A UK Habitats Classification Survey has been carried out (initially undertaken in 2022 and updated in July 2024) to identify all habitats present within the project boundary. In addition, a review of OS mapping from Multi-Agency Geographic Information for the Countryside and Environmental Systems Research Institute aerial photography was undertaken to identify ponds within 250m of the project. Subsequent Habitat Suitability Index (HSI) assessment and environmental DNA (eDNA) surveys for great crested newts were then undertaken. A survey for bat roosts was also undertaken. This included initial ground-based assessments of trees for roosting bats, followed by a mixture of tree climbing inspection and emergence surveys (where appropriate). Desk study and habitat suitability were used to assess the likely presence and impact upon other protected and notable species.

As outlined in the Bodelwyddan Substation Extension Substation Environmental Report (B2416603/BODEL/OHL/001), a Landscape and Visual Appraisal (LVA) has been completed to identify the potential effects associated with the construction and operation of the proposed development on landscape character and views. This has been supported by a combination of desk study (see Section 2.1 above) and site survey work undertaken in August 2022 and March 2023.

Arboricultural Surveys were undertaken in June and October 2023 in accordance with BS 5837 by qualified arboriculturists. Subsequently assessments, in accordance with BS 5837:2012 'Trees in relation to design, demolition and construction – Recommendations', were made and which are provided as Appendices to the Environmental Report.

2.3 Area Needs and Priorities

The project is located within an area:

- Identified by Natural Resources Wales as having the potential to contribute to a Resilient Ecological Network in relation to lowland woodland (Natural Resources Wales, 2022) and has a woodland creation score of 26.5 (Natural Resources Wales, 2021c);
- Identified for potential GCN habitat creation (Natural Resources Wales, 2021a); and potential water vole habitat creation (Natural Resources Wales, 2021b).

Notwithstanding this, the existing, proposed and likely future development on and around the substation is prohibitive for such habitat creation proposals. Nevertheless, where the project and surrounding landscape allows e.g. where the cable sealing end compound area is being removed, there is the potential to transform the area into species rich grassland, scrub planting and hedgerow creation/enhancement; all features of benefit to biodiversity.

In addition, as outlined in the Bodelwyddan Substation Extension Substation Environmental Report (B2416603/BODEL/OHL/001), there is a need and priority to:

- Protect, preserve and/or enhance any habitats of ecological value within the site or within the immediate vicinity of the site;
- Protect/minimise disturbance to any protected species present within the site such as bats, great crested newt, breeding birds, reptile species, badgers or, existing habitats that may provide potential opportunities for them.

In the absence of a landscape character assessment, national LANDMAP datasets from Natural Resources Wales have been used to understand the area needs from a landscape perspective. The relevant LANDMAP datasets listed below provide local management guidelines for the landscape units located within the LVA study area.

- Landscape Habitat Aspect Area: Cefn Improved Grassland – *“Less intensive farming, more sympathetic management of hedgerows and encourage sapling growth in hedges. Manage existing and increase extent of broadleaved woodland, and restore parkland features”*; and
- Visual and Sensory Area: Cefn Estate – *“Where native species occur, reducing agricultural inputs to allow native species to re-colonise would aid biodiversity”*.

Restrictions on planting and the creation of green infrastructure may be hindered by the presence of a water pipeline to the immediate north of the site and a gas pipeline to the south. There would also be future underground cable connections into the substation from other developments to the north, west and south of the substation extension. In addition, due to access requirements by future connectors to the Bodelwyddan substation, it is not possible to state with certainty whether new planting around the proposed development would remain in the future.

3. Policy Context

3.1 Local Plan

The Denbighshire County Council Local Development Plan 2006 – 2021, adopted in June 2013, shows that the site is outside a defined settlement and therefore in the countryside for planning policy purposes. It is also not within a designated site or habitat. In planning policy terms generally, there are no particular or specific references to green infrastructure priorities in or close to the site.

Although the site is not within a development boundary, Policy RD 1: Sustainable development and good standard design sets out the general approach to good design. It states that development should protect and enhance the local natural environment, not unacceptably affect prominent public views into, out of, or across any settlement or area of open countryside and, incorporate sustainable landscape measures such as the creation and protection of green blue corridors and mature landscaping.

Technical Advice Note 5 (TAN5) Nature Conservation and Planning 2009, provides general advice relating to nature conservation in development control, requiring information to be submitted with planning applications proportionate to the likelihood of effects on nature conservation interests and to their potential significance. Measures to protect, enhance, mitigate and compensate through planning conditions and obligations are necessary to deliver to protection and enhancement of nature conservation.

Supplementary Planning Guidance (SPG) Note: Conservation and Enhancement of Biodiversity (July 2016) is one of a series of SPGs which amplify Denbighshire Local Development Plan and are a material consideration in the determination of planning applications. The SPG was produced in line with TAN5 and outlines the Council's expectations with regard to the form and content of biodiversity information to be submitted with a planning application including EIA and Habitat Regulations Assessment, where required. The importance of designing proposals to take account of the findings of early ecological assessments is emphasised.

SPG Note: Trees & Landscaping (July 2016) states that in the delivery of sustainable development: "*the retention and planting of new trees and hedges is crucial*" (Para 3.1) in terms of *inter alia* visual impact and screening; mitigation of landscape impacts and in biodiversity terms. Development design should take into account the constraints and opportunities posed by existing quality trees, woodland and hedgerows and provide adequate space for new planting.

Development which would result in damage and/or inappropriate felling of significant trees and hedgerows will not normally be permitted. Development proposed near to existing trees, woodlands or hedgerows must be in accordance with the design and protection principles set out in the SPG and BS 5837: 2012 "Trees in relation to design, demolition and construction - Recommendations" (or any subsequent revisions).

New trees should normally be native species and, if possible, grown locally. Development should be planned around significant trees and hedgerows, increasing tree cover with new planting, thereby enhancing local amenity. Trees and hedgerows of considerable age, visual amenity, and ecological or historical value are not easily replaced and should be retained and safeguarded. Where development results in the loss of trees and hedgerows, new planting of at least an equal number or canopy cover to those lost will usually be required to mitigate for the loss.

3.2 Building with Nature Standards

PPW12 requires that developers refer to the 'Building with Nature Standards' and use them in a way which is proportionate to the nature and scale of the Project.

The Building with Nature Standards have not informed the production of the environmental masterplan which was developed prior to the issue of PPW12. Their use was neither specifically requested during consultation with the appropriate Council departments.

Notwithstanding, the environmental masterplan and landscape mitigation strategy has been informed by a combination of site knowledge, good practice, and professional judgement.

For completeness, however, the Building with Nature Standards of relevance to the Project are listed below. A short summary of how they have been addressed in the design proposals is also provided for context.

- **Standard 1: Optimises Multifunctionality and Connectivity** – the proposed reinstatement, enhancement and creation of the hedgerow network will help to contribute to the restoration of the existing GI network and provide new features that connect to the existing network within the surroundings;
- **Standard 2: Positively Responds to the Climate Emergency** – new native species-rich grassland will help to provide long-term climate resilient benefits through low-maintenance design;
- **Standard 3: Maximises Environmental Net Gain** – where practicable, the proposals will provide new habitat creation and enhancement in the form of mixed native scrub and hedgerow planting, and the seeding of new native species rich grassland;
- **Standard 5: Creates Distinctive Places** – the proposals will help to reinforce the distinctiveness of the local character through the consideration of published LANDMAP management guidelines, the retention of most tree and hedgerow boundary features, and the provision of native species;
- **Standard 11: Delivers Wildlife Enhancement** – proposed habitat piles/ log piles will be located throughout the cable sealing end compound site to support the creation of resilient ecological habitats; and
- **Standard 12: Underpins Nature's Recovery** – links to existing features and habitats will be provided through new planting to help aid local nature recovery.

4. The Project Proposals

This section responds to the areas needs and priorities set out in Section 2 of this report. The needs are summarised and how the proposals respond is set out thereafter:

The area has the potential to contribute to a Resilient Ecological Network in relation to lowland woodland.

The proposed substation extension is designed to retain as many mature trees as practicable and avoid areas of woodland. To avoid/reduce the effects of local compaction of ground within the root protection zones of retained trees, or other accidental damage, appropriate tree protection measures would be implemented.

Protect, preserve and/or enhance any habitats of ecological value within the site or within the immediate vicinity of the site.

In line with the mitigation hierarchy, the design has avoided and minimised impacts on semi-natural habitats where practicable. This relates to the need to prioritise and protect any habitats within the site or immediate vicinity of ecological importance. There will be some unavoidable permanent and temporary loss of some habitats, including poor condition modified grassland, cropland, seven individual trees; one tree group and hedgerow. These would be reinstated once construction is complete. Further, where the cable sealing end compound area is being removed, there is the potential to transform the area into species rich grassland, scrub planting and hedgerow creation/enhancement; all features of benefit to biodiversity. The proposals in this area include:

- The enhancement of 294 linear metres of existing hedgerows to improve their condition and encourage more sapling growth;
- The creation of 189m² of mixed native scrub planting to increase the extent of broadleaved trees and shrubs already present within the site and maximise environmental net gain;
- 1.02 ha of grassland improvement, through the seeding of new native species rich grassland within two fields at the cable sealing end compound, to aid biodiversity and the recolonisation of native flora species, reduce the impacts from more intensive farming, and provide long-term climate resilient net benefits for nature;
- 102 linear metres of additional native hedgerow planting at the southern and eastern boundaries of the cable sealing end compound to provide new habitat creation and create new links with existing habitats to aid nature recovery;
- Proposed habitat piles/ log piles throughout the cable sealing end compound site (9No. in total) to support the creation of resilient ecological habitats.

It is also proposed to reinstate 178 linear metres of hedgerows throughout the wider area encompassing the overhead line proposals to help reconnect fragmented hedgerows and maintain the existing multifunction network of green infrastructure.

Protect/minimise disturbance to any protected species present within the site such as bats, great crested newt, breeding birds, reptile species, badgers or, existing habitats that may provide potential opportunities for them.

The presence of GCN outwith the site, but within 250m of the site boundary, has been confirmed.

The construction of the proposed substation extension would have a low impact on GCN. The majority of terrestrial habitat within the site boundary is sub-optimal for GCN as it is intensively grazed and poached grassland and cropland. The ponds where GCN presence has been confirmed are unlikely to form a single meta-population as they are separated by the existing substation which does not support suitable habitat for commuting newts. The hedgerow requiring removal is unlikely to be essential in the support of the local GCN or provide a significant refuge.

However, a GCN mitigation licence would be sought. In accordance with NRW guidelines, it is considered that the eDNA survey results are sufficient survey data to inform a low impact GCN licence. An ecologist would provide a watching brief and perform hand-searching of the vegetation during clearance and other works in habitat areas suitable for amphibians. There would be two-staged vegetation clearance to encourage amphibians to naturally move away from the works area. Any animals found would be relocated to alternative, undisturbed habitats nearby. All refugia or potential hibernation features would be disassembled by hand and relocated out of the work area during the amphibian active season (generally April-October). Refugia will be built within the site boundary out of the works area to provide additional terrestrial habitat. Further, where the existing cable sealing end compound is being removed, replacement grassland and hedgerow habitats would be provided, suitable for GCN in their terrestrial phase.

Standard best practice construction guidelines to avoid or reduce impacts to terrestrial, aquatic and riparian environment would be sufficient to prevent any impacts caused by accidental pollution incidents such as fuel spills and sediment release during construction activities as well as dust control.

As bats are present on the site, all works would commence during daylight hours. Where works occur during periods of low light, additional lighting may be needed in work-specific areas. Lighting columns already feature around the inside of the existing perimeter fence for security, although further lighting may be required for compound security. These would be designed in accordance with best practice guidance to avoid adverse effects.

Noise from construction activities would be generated, but this would be temporary and at a level that is unlikely to generate a disturbance response from noise sensitive species. In the unlikely event disturbance, for example, to birds were to occur, there is plentiful alternative habitat available nearby.

Sympathetic management of hedgerows and encouragement of sapling growth in hedges.

Although there will be the permanent loss of 89m of hedgerow within the red line boundary, the enhancement of existing and planting of new hedgerows within the site will create new and link into existing habitats. It is not possible to provide all compensation habitats onsite due to land ownership limitations (see plan in Appendix A) surrounding the substation and overhead lines. A specific commitment for offsite compensation to meet net biodiversity benefit targets would be developed upon agreement with the local planning authority.

Manage existing and increase extent of broadleaved woodland, and restore parkland features.

The substation extension will require removal of 5no. living and 1no. dead trees and some pruning of overhanging branches. Off-site tree planting to compensate the loss and meet net biodiversity benefit targets is proposed and will be addressed through agreement with the Council (see above and Appendix A).

Where native species occur, reduce agricultural inputs to allow native species to re-colonise.

The reduction of agricultural inputs is not relevant to this particular project.

5. The Step-Wise Approach

The Step-Wise approach is detailed in Section 5.0 of PPW12. The following text addresses the measures taken at each step of the process, where relevant.

Step 1. – Avoid damage to biodiversity and consideration of alternative sites

Where possible, any damage to biodiversity or harmful environmental effects would be avoided.

Because of the nature of the proposal, i.e. an extension to an existing sub-station with related overhead line works, the need to consider alternative sites is not relevant. The infrastructure can only be placed where it is needed for operational reasons. Extending the existing sub-station avoids the need to develop another sub-station site elsewhere and makes best use of adjacent land owned by National Grid.

Steps 2. And 3. – Avoidance of and mitigation of impacts

Although the design is largely driven by operational requirements, it has avoided and minimised impact on the site and surroundings as far as possible and, while no significant adverse effects on designated sites are anticipated from the construction phase of the proposed substation extension, there would be some permanent losses within the site boundary including:

- 5no. trees of fair to good quality and mid to mature age;
- 1no. dead tree;
- A fair condition, mid-age, linear boundary group;
- A 89m hedgerow;
- a small area of cropland;
- modified grassland.

These habitats are likely utilised by various species for foraging, breeding and commuting.

Notwithstanding this, within the local area, there is plentiful alternative, higher value habitat available for these species, for example, given the abundance and extent of hedgerows within adjacent habitats, the loss of hedgerow is not considered to be significant at a local level.

The permanent loss of this habitat resource is not therefore anticipated to negatively affect the conservation status of these species within the local area. Additionally, fragmentation and severance is anticipated to be minimal due to alternative retained hedgerow presence across the wider area. The loss of habitat is therefore considered to be a minor adverse effect to protected and notable species and is not significant.

There is limited scope for replacement habitat creation on or adjacent to the works site. The restriction in planting over buried services i.e. the water pipeline to the north and a gas pipeline to the west, and the unknown locations of future onsite developments, which would ultimately connect to the proposed substation extension, prohibit opportunities for habitat creation or enhancement of existing habitats.

Mitigation measures have however been incorporated into the environmental design, including the creation of a new area of habitat enhancement on land at the cable sealing end compound to the south of the existing substation within the red line boundary. This would include:

- The enhancement of 294 linear metres of existing hedgerow;
- The creation of 189sq.m. of mixed native scrub planting;
- 1.02 ha of grassland improvement through the seeding of new native species rich grassland within two fields;
- 102 linear metres of additional native hedgerow planting;
- 9no. habitat piles/log piles for ecological benefit.

Further, existing tree features identified to be retained as part of the proposed development will be protected during the construction phase, in accordance with BS 5837:2012.

The Biodiversity Baseline Report, submitted as part of the Bodelwyddan Substation Extension Substation Environmental Report (B2416603/BODEL/OHL/001), suggests that there may be some adverse effects upon species during construction through activities e.g. breeding birds, amphibians and reptiles are at risk of mortality during vegetation clearance and excavation work. However, these would either reduce or be avoided once measured. Development activities would however be confined to two fields and their boundaries and the effects on species are therefore considered likely to be localised and negligible in magnitude.

Step 4. Off-Site Compensation

It is accepted that the cable sealing end compound together with other losses sustained to accommodate the overhead line works (outside the remit of this application), would not be able provide sufficient remediation on site and an area(s) of land outside the application boundary would therefore need to be found to accommodate the required mitigation to achieve net benefit to biodiversity. Discussions with various landowners are taking place in this respect and any such planting and/or habitat creation would be subject to a formal agreement with the Planning Authority as part of any planning permission.

Step 5. Long-Term Management Plan

At present there is no overarching Management Plan for the proposed works, although they are referenced further within the submitted outline Environmental Masterplan and in the chapters of the Bodelwyddan Substation Extension Substation Environmental Report (B2416603/BODEL/OHL/001), which follows good practice. Once detailed planting design is known, a Management Plan can be written to reflect the requirements and specifics of the proposed planting layout.

6. Conclusions

This Green Infrastructure Statement demonstrates how the proposed Bodelwyddan substation extension has applied the Step-Wise Approach to deliver green infrastructure. It sets out the baseline data, surveys and assessments in respect of ecology, biodiversity and landscape. It also sets out the area's needs and priorities, identifies constraints within the site that may impact on meeting those needs and priorities, and sets out how the proposed development meets those needs and priorities in the context of relevant planning policy and Building with Nature Standards.

The proposed development has been designed to avoid impacts on habitats and species as far as reasonably practicable, through retaining trees, woodland and semi-natural habitats. Where impacts are unavoidable, they have been minimised where practicable through prioritisation and protection of habitats and species. Temporary loss of habitats would be reinstated once construction has been completed.

Permanent loss of habitats has been compensated on site where practicable, specifically at the transformed cable sealing end compound area which will include species rich grassland, scrub planting, hedgerow creation/enhancement and habitat piles to support the creation of resilient ecological habitats.

It is not possible to provide all compensation habitats on site due to land ownership limitations surrounding the substation and overhead lines, as such a specific commitment for offsite compensation would be developed upon agreement with the local planning authority.

Acronyms, Abbreviations and References

Acronyms and Abbreviations

eDNA	environmental DNA
GCN	Great Crested Newts
GIS	Green Infrastructure Statement
HSI	Habitat Suitability Index
LVA	Landscape and Visual Appraisal
NGET	National Grid Electricity Transmission
OS	Ordnance Survey
PPW12	Planning Policy Wales – Edition 12

References

BSI (2012). BS 5837:2012 Trees in relation to design, demolition and construction, Recommendations. BSI, London.

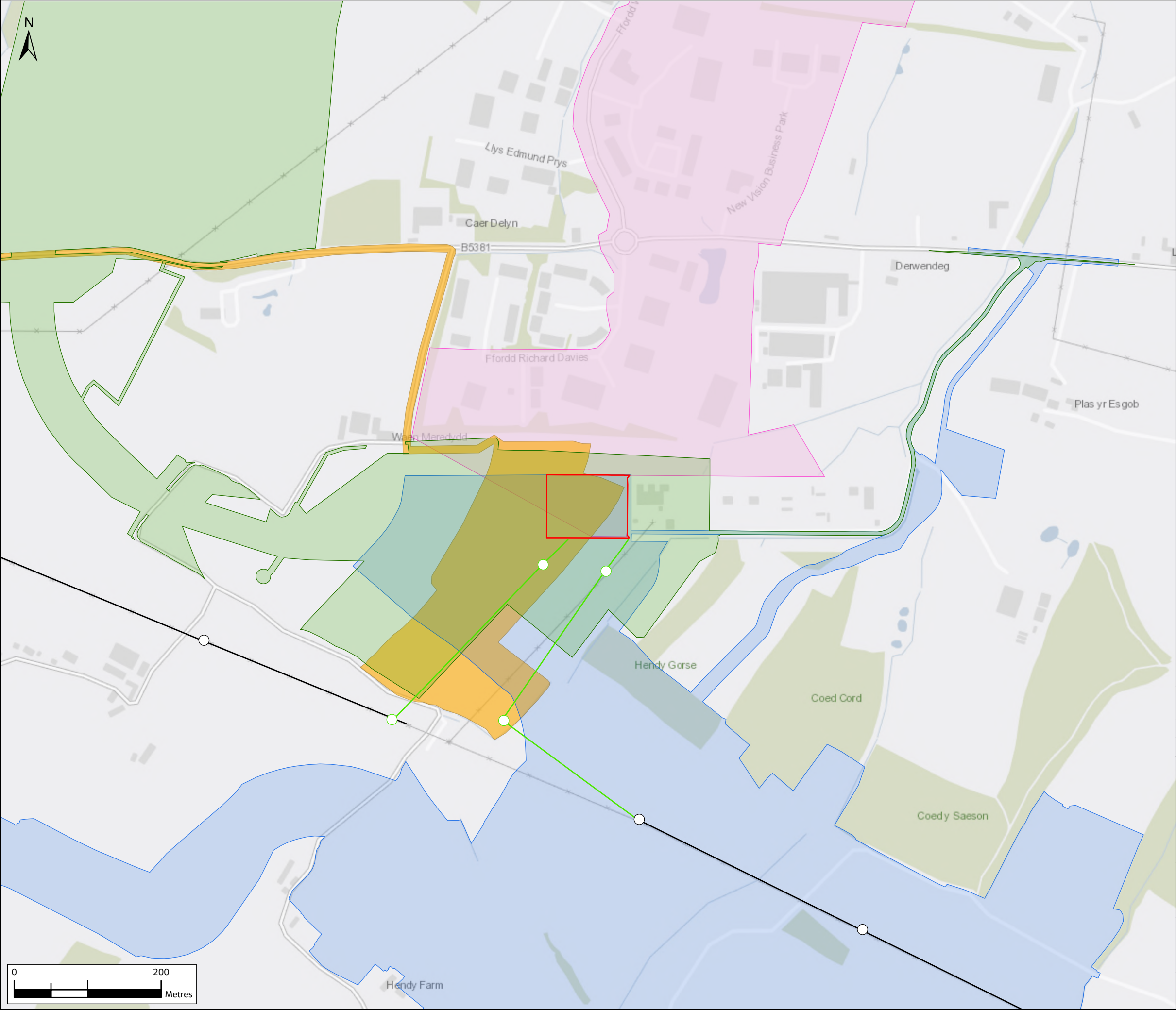
Natural Resources Wales (2021a) WOM21 Great Crested Newt (GCN) Potential Habitat – Voluntary. Available at: https://datamap.gov.wales/maps/new?layer=geonode:GWC21_GCN_Potential_Habitat_Voluntary#/

Natural Resources Wales (2021b) WOM21 Potential Habitat for Water Voles. Available at: https://datamap.gov.wales/maps/new?layer=geonode:GWC21_WaterVoles_Cleaned_to_100m2#/

Natural Resources Wales (2021c) Woodland Opportunity Map 2021. Available at: <https://datamap.gov.wales/maps/woodland-opportunity-map-2021/view#/>

Natural Resources Wales (2022) Habitats Networks. Available at : https://datamap.gov.wales/layergroups/geonode:nrw_habitat_network

Appendix A. Land Limitations Plan



- Legend**
- Substation Extension
 - Existing Overhead Line and Towers – Retained
 - New Overhead Lines and Towers
 - Awel-y-Môr Offshore Wind Farm Order Limits
 - Mona Offshore Wind Farm Order Limits
 - IGP Solar Farm Order Limits
 - Bodelwyddan BESS and Solar Farm Planning Casework Order Limits



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03	6/17/2025	FINAL	WW	TW	TW	KW
Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

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Jacobs No. B2416603

Jacobs

Client
nationalgrid

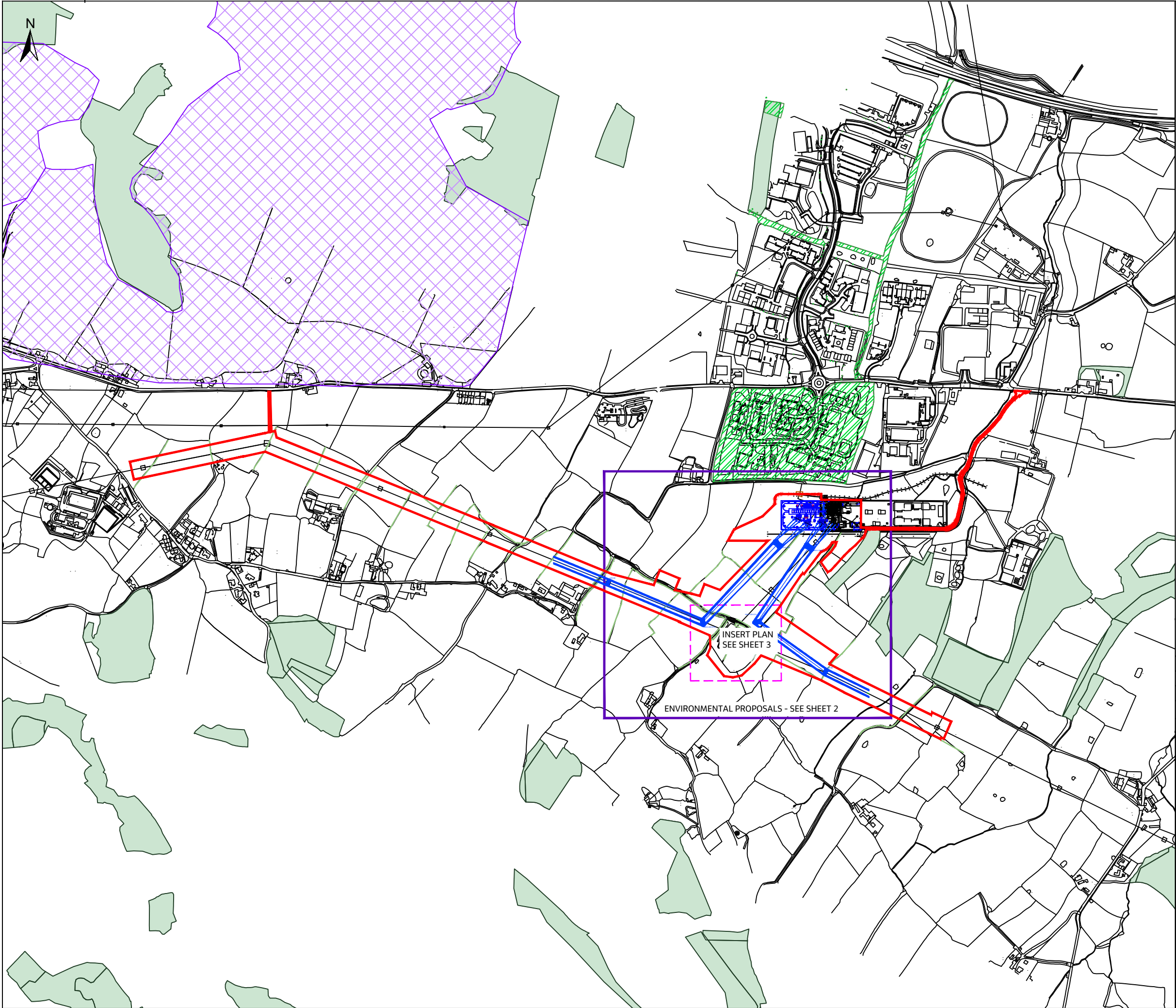
Project
BODELWYDDAN OVERHEAD LINES

Drawing Title
BODELWYDDAN LAND LIMITATION PLAN

Drawing No. B2416603/BODEL/LLP/001	Drawing Status FINAL
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APPENDIX A

Appendix B. Environmental Masterplan

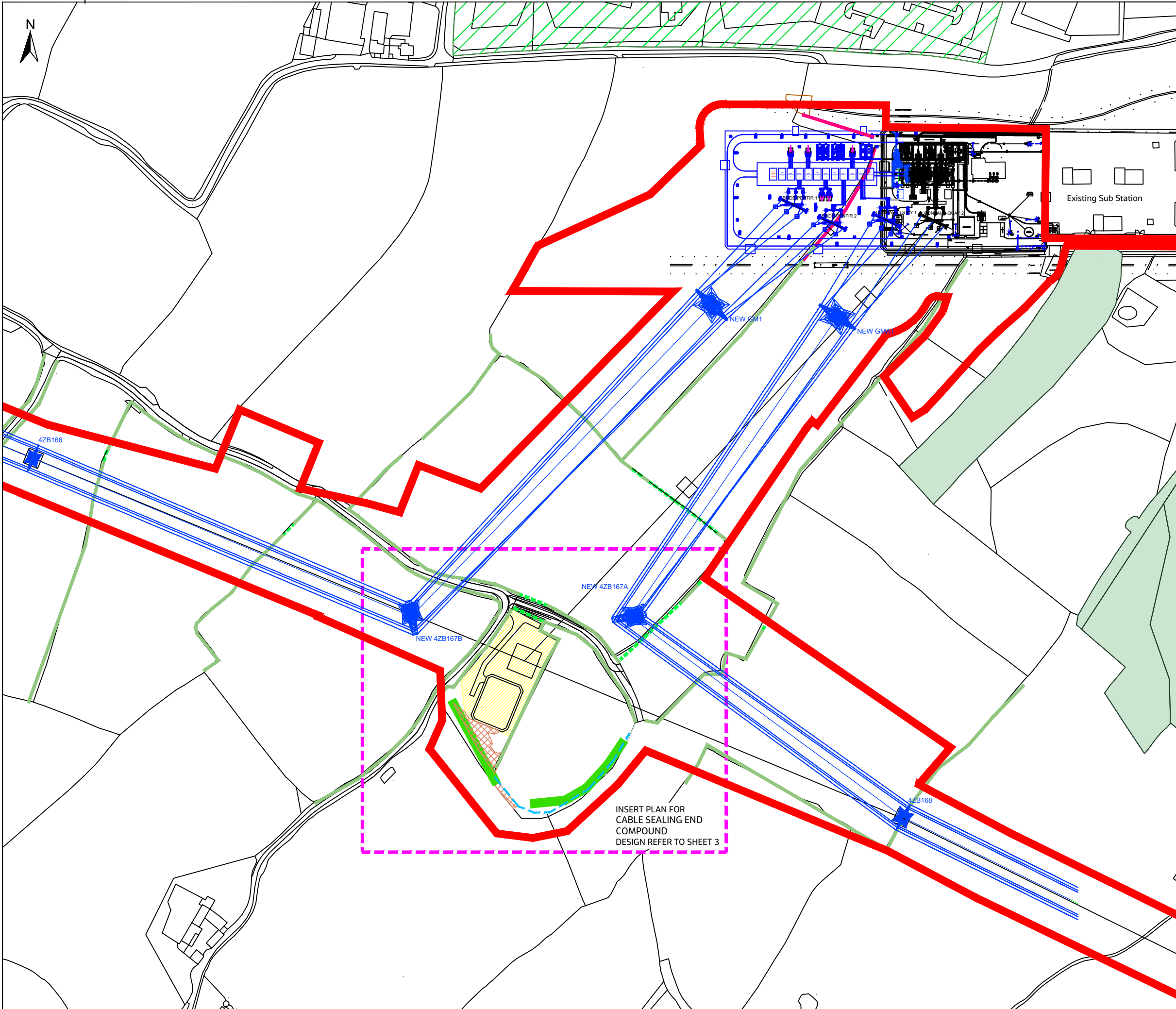


Legend

- Works Boundary
- Priority Habitat - Parkland
- Ancient Woodland
- Tree Preservation Order (TPO)
- Existing retained hedgerows

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P02	18/02/2025	SCOPE CHANGE - CSEC UPDATE	JP	JE	TW	KW
P01	14/08/2024	FINAL	JP	RL	JE	KW
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Drawing Title <div>ENVIRONMENTAL MASTERPLAN LAYOUT PLAN SHEET 1 OF 3</div>						
Drawing No. B2416603_BODEL_MAS_001				Drawing Status FINAL		

Appendix B



Legend

Works Boundary

Ancient Woodland

Tree Preservation Order (TPO)

Existing retained hedgerows

Existing Lines of Trees retained

Existing mixed scrub retained

Existing ditch retained

Existing Substation

Proposed Substation Extension

Proposed Overhead Line improvements

Hedgerows to be removed

Hedgerow replacement planting

Proposed return to pasture land

P03	17/06/2025	WORKS BOUNDARY CHANGE	JP	JE	TW	KW
P02	18/02/2025	SCOPE CHANGE - CSEC UPDATE	JP	JE	TW	KW
P01	14/08/2024	FINAL	JP	RL	JE	KW
Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd

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Jacobs No. B2416603

Jacobs

Client

nationalgrid

Project

BODLEWYDDAN OVERHEAD LINES

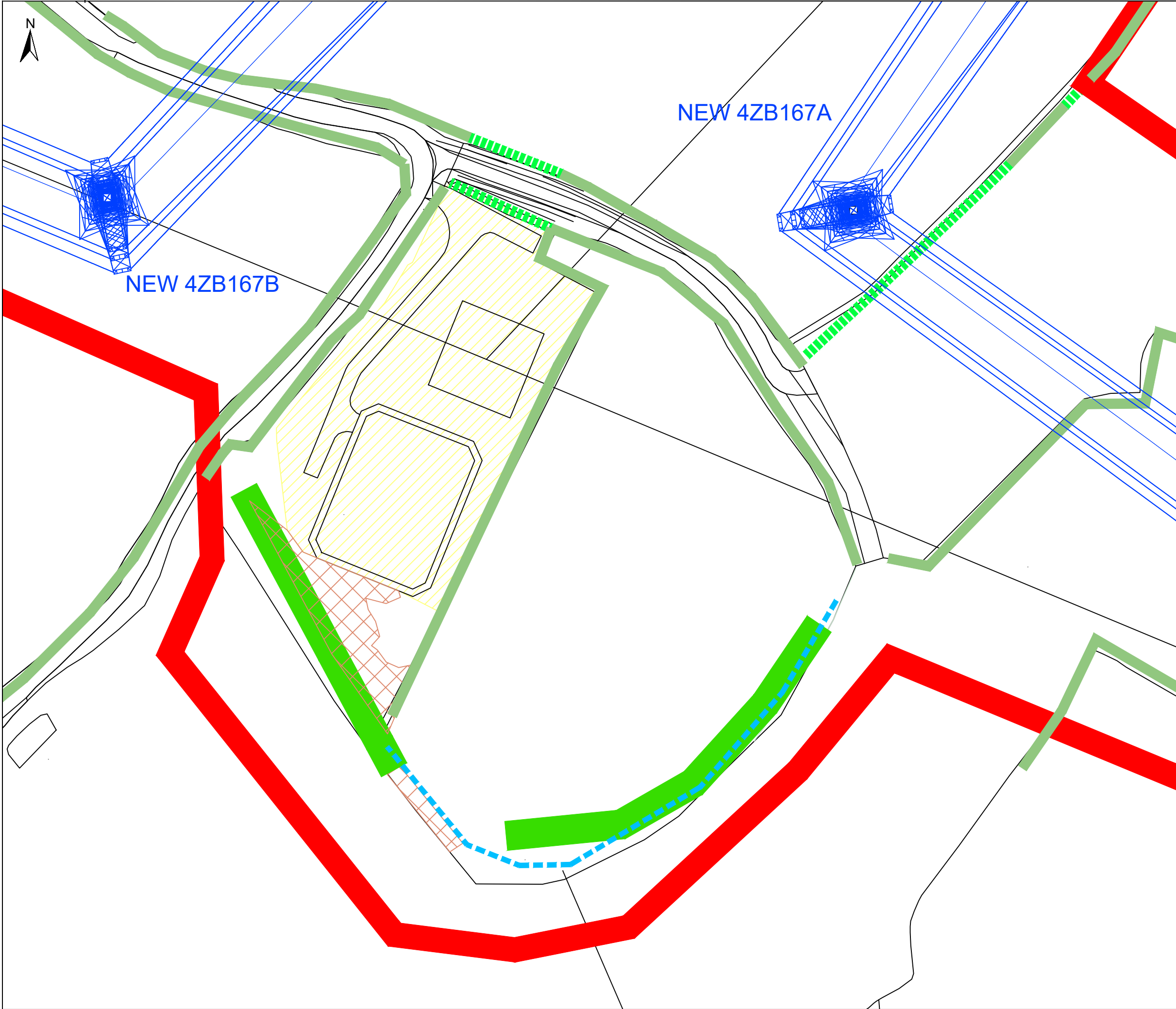
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ENVIRONMENTAL MASTERPLAN
GENERAL ARRANGEMENT
SHEET 2 OF 3

Drawing No.
B2416603_BODEL_MAS_001

Drawing Status
FINAL

Appendix B



Legend

- Works Boundary
- Existing retained hedgerows
- Existing lines of trees retained
- Existing mixed scrub retained
- Existing ditch retained
- Proposed Overhead Line improvements
- Proposed hedgerow replacement
- Proposed return to pasture land

P03	17/06/2025	WORKS BOUNDARY CHANGE	JP	JE	TW	KW
P02	18/02/2025	SCOPE CHANGE - CSEC UPDATE	JP	JE	TW	KW
P01	14/08/2024	FINAL	JP	RL	JE	KW
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<div>Drawing No.</div> <div>B2416603_BODEL_MAS_001</div>				<div>Drawing Status</div> <div>FINAL</div>		

Appendix B

Appendix T. Flood Consequences Assessment

Bodelwyddan Substation Extension Flood Consequences Assessment

Document no: B2416603/BODEL/FCA/002
Revision: P02

National Grid Electricity Transmission
B2416603

Bodelwyddan Substation Extension
18 June 2025



Bodelwyddan Substation Extension Flood Consequences Assessment

Client name:	National Grid Electricity Transmission	Project no:	B2416603
Project name:	Bodelwyddan Substation Extension	Project manager:	KW
Client reference:	B2416603	Prepared by:	AG
Document no:	B2416603/BODEL/FCA/002	File name:	B2416603_BODEL_FCA_002
Revision:	P02		Bodelwyddan Substation Extension
Date:	18 June 2025		FCA

Document history and status

Revision	Date	Description	Author	Checked	Reviewed	Approved
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P02	18/06/25	For submission	AG	JE	TW	KW

Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments

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Executive summary

National Grid Electricity Transmission have commissioned Jacobs to prepare a Flood Consequences Assessment to accompany an application under the Town and Country Planning Act 1990 to Denbighshire County Council for an extension to the existing Bodelwyddan electricity substation and to upgrade the fence to the existing substation to the west of St. Asaph.

This Flood Consequences Assessment has reviewed a range of sources of flood risk. It has considered risk to the site of the proposed construction and operational works, as well as the risk arising to third parties from the works interacting with flood sources. The proposed works have been considered in the context of the Planning Policy Wales Edition 12 information with associated information from Technical Advice Note 15, which was released in March 2025.

The proposed works is found to be at negligible risk from tidal, fluvial, sewers, reservoirs and canals, and at low risk from groundwater flooding.

The construction phase of the proposed works lie partially in surface water flood extents though no permanent assets are in flood extents. NGET has confirmed that appropriate mitigation will be provided in the construction management plan.

A Drainage Strategy has been developed and demonstrates how surface water generated by the proposed works will be managed in accordance with best practice avoiding exacerbation of surface water flood risks to third parties. This embedded mitigation reduces the risk of surface water flooding to third party receptors and has been developed to be in line with national standards.

Contents

Executive summary	iii
Acronyms and abbreviations.....	vi
1. Introduction.....	7
1.1 Context and Overview.....	7
1.2 Aims and Objectives	7
1.3 Synopsis	7
2. Proposed Substation Extension Works and Site Setting	8
2.1 Proposed Substation Extension Works	8
2.2 Site Setting.....	8
3. National Planning Policy, Guidance and Standards	15
3.1 Planning context	15
3.2 Climate Change.....	15
3.3 Vulnerability classifications.....	16
3.4 Local Planning Policy.....	16
3.5 Consultations	16
3.6 National Grid Development Standards.....	17
4. Flood Risk to the Proposed Works	18
4.1 Tidal Flood Risk.....	18
4.2 Fluvial Flood Risk	18
4.3 Surface Water Flood Risk	19
4.4 Groundwater Flood Risk	21
4.5 Flood Risk from Sewers and Artificial Drainage Systems	21
4.6 Flood Risk from Reservoirs.....	21
4.7 Flood Risk from Canals	21
5. Flood Risk from the Proposed Works	22
5.1 Impact on Tidal Flood Risk.....	22
5.2 Impact on Fluvial Flood Risk.....	22
5.3 Impact on Surface Water Flood Risk.....	22
5.4 Impact on Groundwater Flood Risk.....	22
5.5 Impact on Flood Risk from Sewers and Artificial Drainage	23
5.6 Impact on Flood Risk from Reservoirs	23
5.7 Impact on Flood Risk from Canals.....	23
6. Flood Mitigation Measures and Residual Risk	24
6.1 Summary of Flood Risk.....	24
6.2 Residual Risks	24
7. Conclusion and Recommendation	25
8. References	26

8.1	Figure Information	27
-----	--------------------------	----

Appendices

Appendix A. Proposed Works	28
Appendix B. Drainage Strategy	29

Tables

Table 3-1: Peak river flow allowances for the West Wales river basin district (using 1961 to 1990 baseline) .	15
Table 3-2: Change to extreme rainfall intensity that applies across Wales (compared to a 1961-1990 baseline).....	15
Table 3-3: TAN-15 development vulnerability classifications (Welsh Government, 2025a)	16
Table 6-1: Summary of flood risk to and from the proposed works	24

Figures

Figure 2-1: Site plan for the proposed works (Jacobs, 2025)	9
Figure 2-2: Digital Terrain Model of the site and surrounding area (Jacobs, 2025; Welsh Government, 2024a)	10
Figure 2-4: Main Rivers in the surrounding area (Jacobs, 2025; Welsh Government, 2022)	12
Figure 2-5: Local water bodies in proximity of the site (Jacobs, 2025; Welsh Government, 2021a)	13
Figure 2-6: Local flood defences and the respective area that is protected (Jacobs, 2025; Welsh Government 2025b; Welsh Government 2025c)	14
Figure 4-1: Natural Resources Wales Flood Zones 2 and 3 for tidal flood risk (Jacobs, 2025; Welsh Government, 2025d)	18
Figure 4-2: Natural Resources Wales Flood Zones 2 and 3 for fluvial flood risk (Jacobs, 2025; Welsh Government, 2025d)	19
Figure 4-3: Natural Resources Wales Flood Zones 2 and 3 for surface water and small watercourses flood risk (Jacobs, 2025; Welsh Government, 2025d)	20

Acronyms and abbreviations

AEP	Annual Exceedance Probability
DCWW	Dŵr Cymru Welsh Water
FCA	Flood Consequences Assessment
LDP	Local Development Plan
mAOD	Meters Above Ordnance Datum (meters above sea level)
NGET	National Grid Electricity Transmission
RMA	Risk Management Authority
SAB	SuDS Drainage Approval Body
TAN-15	Technical Advice Note 15

1. Introduction

1.1 Context and Overview

This Flood Consequences Assessment (FCA) has been prepared on behalf of National Grid Electricity Transmission (NGET) to accompany an application under the Town and Country Planning Act 1990 to Denbighshire County Council for an extension to the existing Bodelwyddan electricity substation and to upgrade the fence to the existing substation. This FCA complies with the requirements of the Planning Policy Wales.

This FCA screens a range of flood risk sources. It considers the risk to the site, as well as the risk arising to third parties as a consequence of the proposed construction and operational works interacting with local flood sources. Jacobs have requested flooding information from statutory consultees (Natural Resources Wales, Denbighshire County Council and Dŵr Cymru Welsh Water (DCWW)), as well as using publicly available sources of information.

1.2 Aims and Objectives

The aim of this FCA is to provide an assessment of flood risk to and arising from the proposed works, setting out appropriate mitigation measures where necessary. This has been achieved by:

- Liaising with local flood Risk Management Authorities (RMAs) for any information they hold in relation to flood risk and requirements they may have of new development with regards to the management of flood risk to and arising from the proposed works;
- Reviewing information available in the public domain from various websites (Natural Resources Wales's Flood Map for Planning (Natural Resources Wales, 2025), Technical Advice Note 15 (TAN-15) guidance (Welsh Government, 2025a), British Geological Survey GeoIndex) in combination with information on local planning policy and data provided by NGET and returned from consultation with RMAs;
- Undertaking a qualitative assessment of flood risk to and arising from the proposed works accounting for information supplied and gathered; and
- Where necessary identifying measures to mitigate for flood risk to and arising from the proposed works, including preparation of a surface water Drainage Strategy to comply with local policy and regulator requirements.

1.3 Synopsis

This FCA is structured as follows:

- Section 2 describes the setting of the site in relation to local features significant for the assessment of flood risk and the options currently under assessment for managing flood risk;
- Section 3 outlines the planning policies relevant to the proposed works with respect to flood risk;
- Section 4 presents information on the flood risk to the proposed works;
- Section 5 assesses how flood risk may change in the surrounding area as a result of any interaction of the proposed works with local flood sources;
- Section 6 describes the measures any proposed to mitigate unacceptable flood risks; and
- Section 7 summarises this FCA and outlines recommendations.

2. Proposed Substation Extension Works and Site Setting

This section provides details on the existing site relevant to the assessment of flood risk, and details of the proposed works.

2.1 Proposed Substation Extension Works

The proposed works involve an extension to the existing Bodelwyddan electricity substation and an upgrade to the fence, directly west of the existing site. NGET operates the existing Bodelwyddan 400 kilovolt substation and is required to extend the existing substation to accommodate connection requests. NGET is making an application under the Town and Country Planning Act 1990 to Denbighshire County Council.

This FCA is concerned with the extension outside the current operational substation ('the substation extension'). A separate FCA has been produced to accompany the proposed overhead line works.

Appendix A shows a drawing of the proposed works which comprises of the following:

- Telecommunications room – houses the communications connection which allows a connection to the control room and other substations for safety reasons;
- Control room – houses the relays, protection and control panels;
- Busbar protection relay room – houses the protection, control and supervision for busbars which conduct electricity;
- Battery room – facility used to house batteries for backup or uninterruptible power systems;
- Feeder protection relay room – houses the protection for overhead lines and cables to ensure the power grid continues to supply energy;
- Low voltage alternating current room – houses the low voltage alternating current supply distribution board; and
- Overhead line connection infrastructure and other infrastructure to support contracted user assets.

The substation extension permanent works comprise an area of approximately 0.9 hectares.

2.2 Site Setting

2.2.1 Site Location

The site is approximately 2 kilometres (km) west of St. Asaph in Denbighshire and immediately west of the existing Bodelwyddan substation. The proposed extension is centred at Ordnance Survey Grid Reference SJ017735. The site will be accessed from the existing substation access road off Glascoed Road (B5381).

St. Asaph Business Park is directly to the north of the site. The land to the south is predominantly farmland with some forested areas. The locale of the site can be seen in Figure 2-1:.

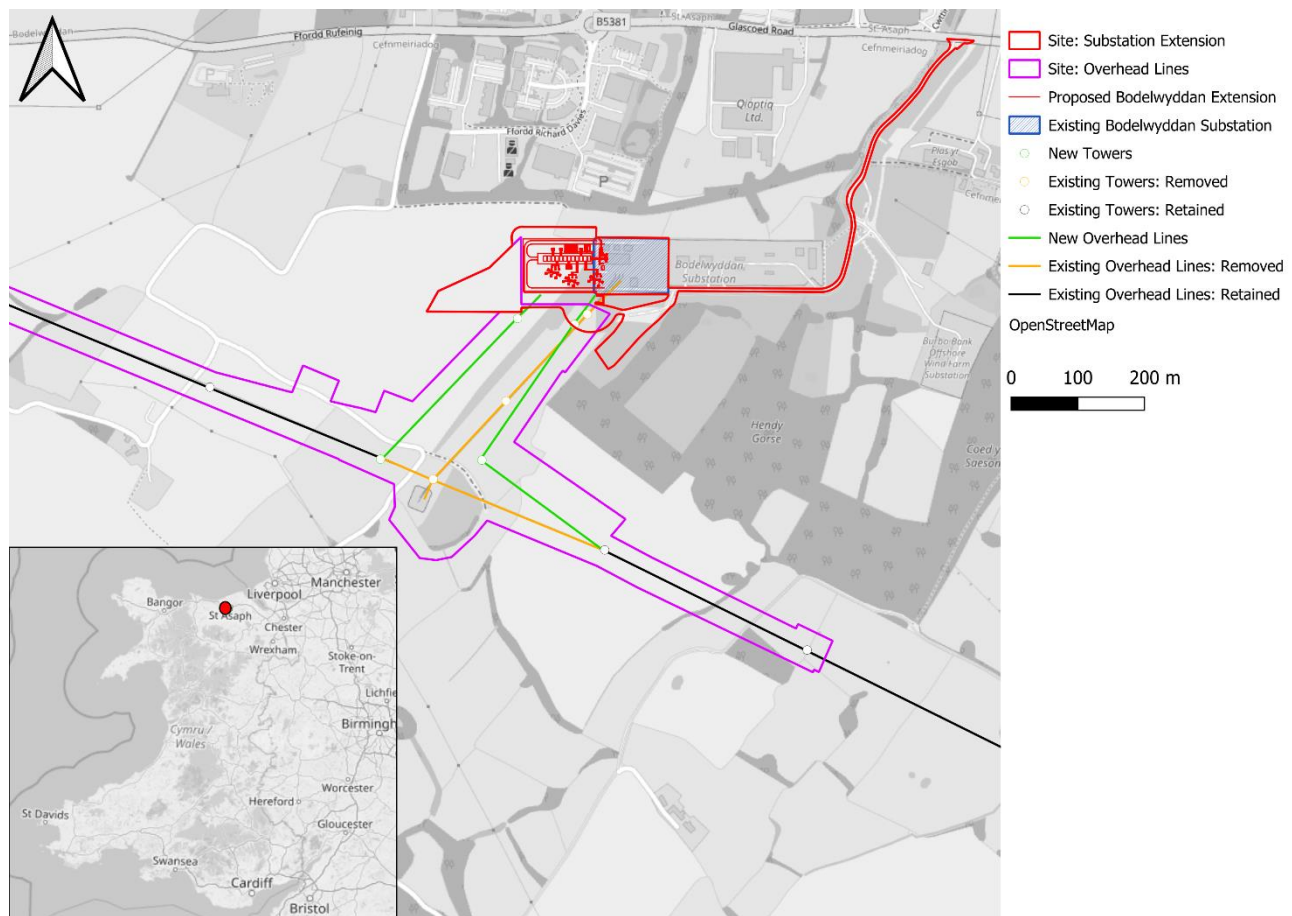


Figure 2-1: Site plan for the proposed works (Jacobs, 2025)

The elevation of the site extends from 45 metres Above Ordnance Datum (metres above sea level) (mAOD) in the northeast to 105mAOD in the west as seen in the digital terrain model in Figure 2-2, while the lowest point of the access road moves is 30mAOD. The surrounding area is relatively flat with elevation slightly increasing in the southwest. The digital surface model in Figure 2-3 shows the surrounding buildings and wooded areas.

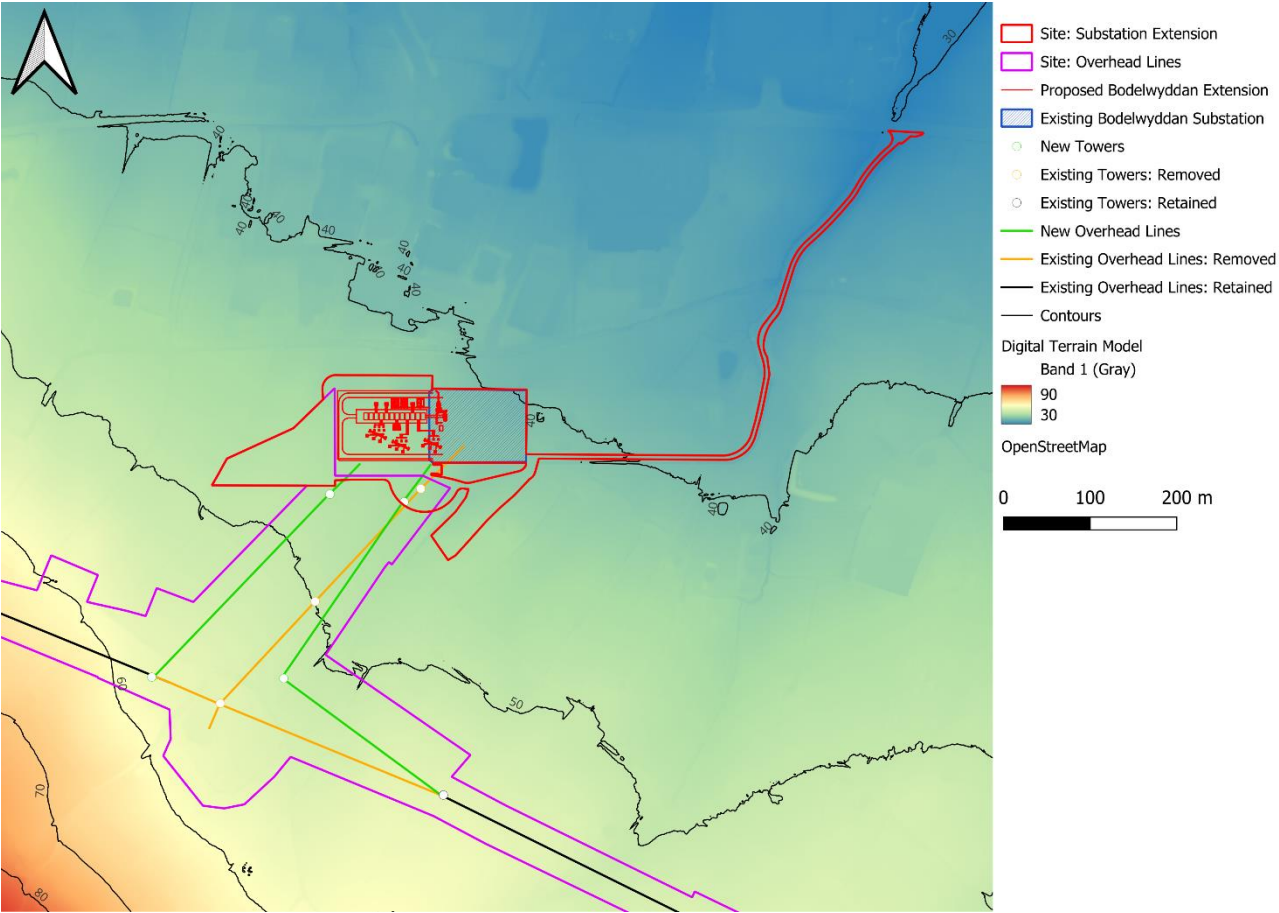


Figure 2-2: Digital Terrain Model of the site and surrounding area (Jacobs, 2025; Welsh Government, 2024a)

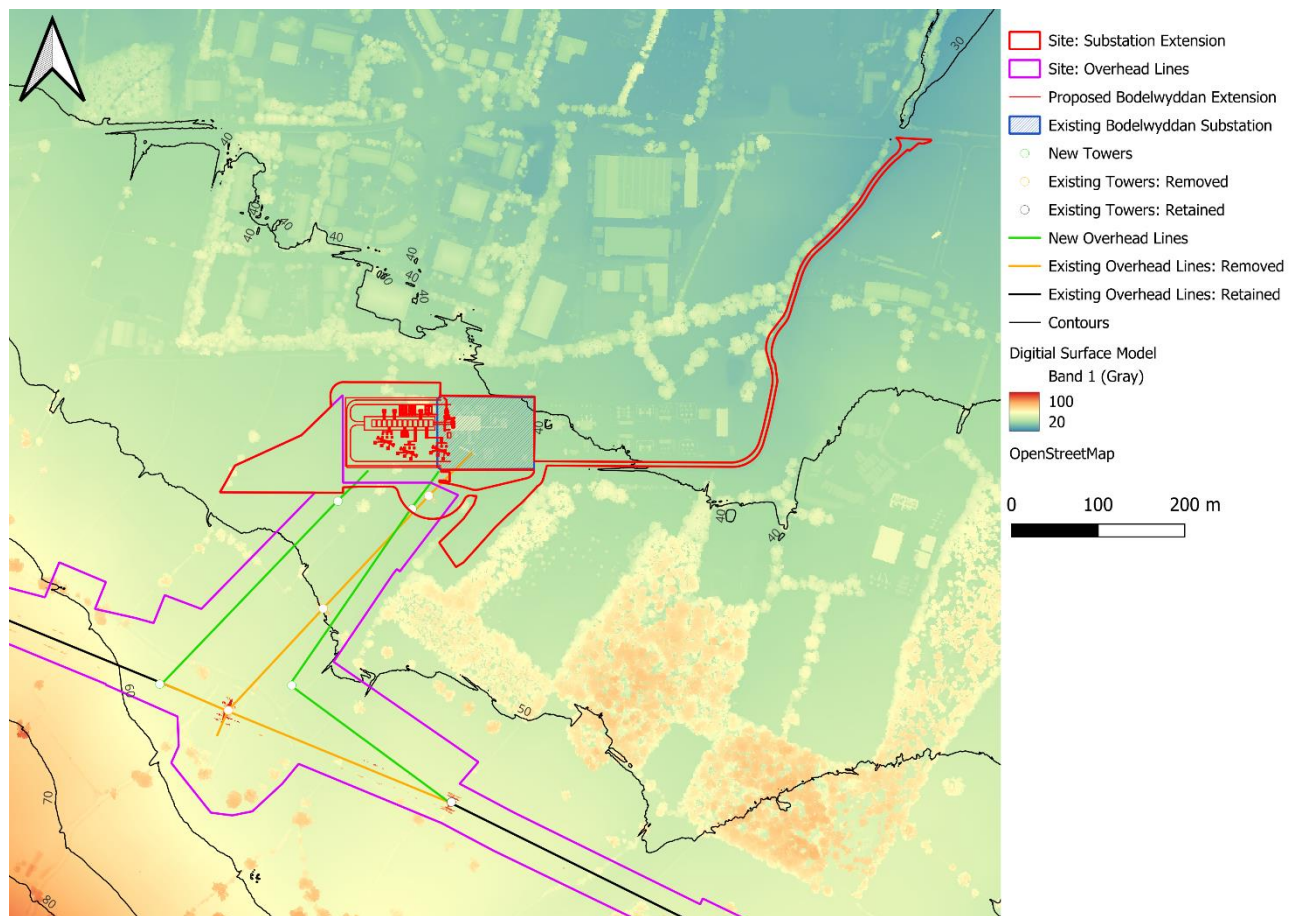


Figure 2-3: Digital Surface Model of the site and surrounding area (Jacobs, 2025; Welsh Government, 2024a)

2.2.2 Hydrology

The closest Main River to the proposed works is the River Elwy approximately 2.25km to the east as shown in Figure 2-4. There is a small ordinary watercourse to the northeast of the existing substation, approximately 400m from the site, which conveys flows north towards the River Clwyd. This location sits within the Gele Operational Catchment area (Welsh Government, 2015).

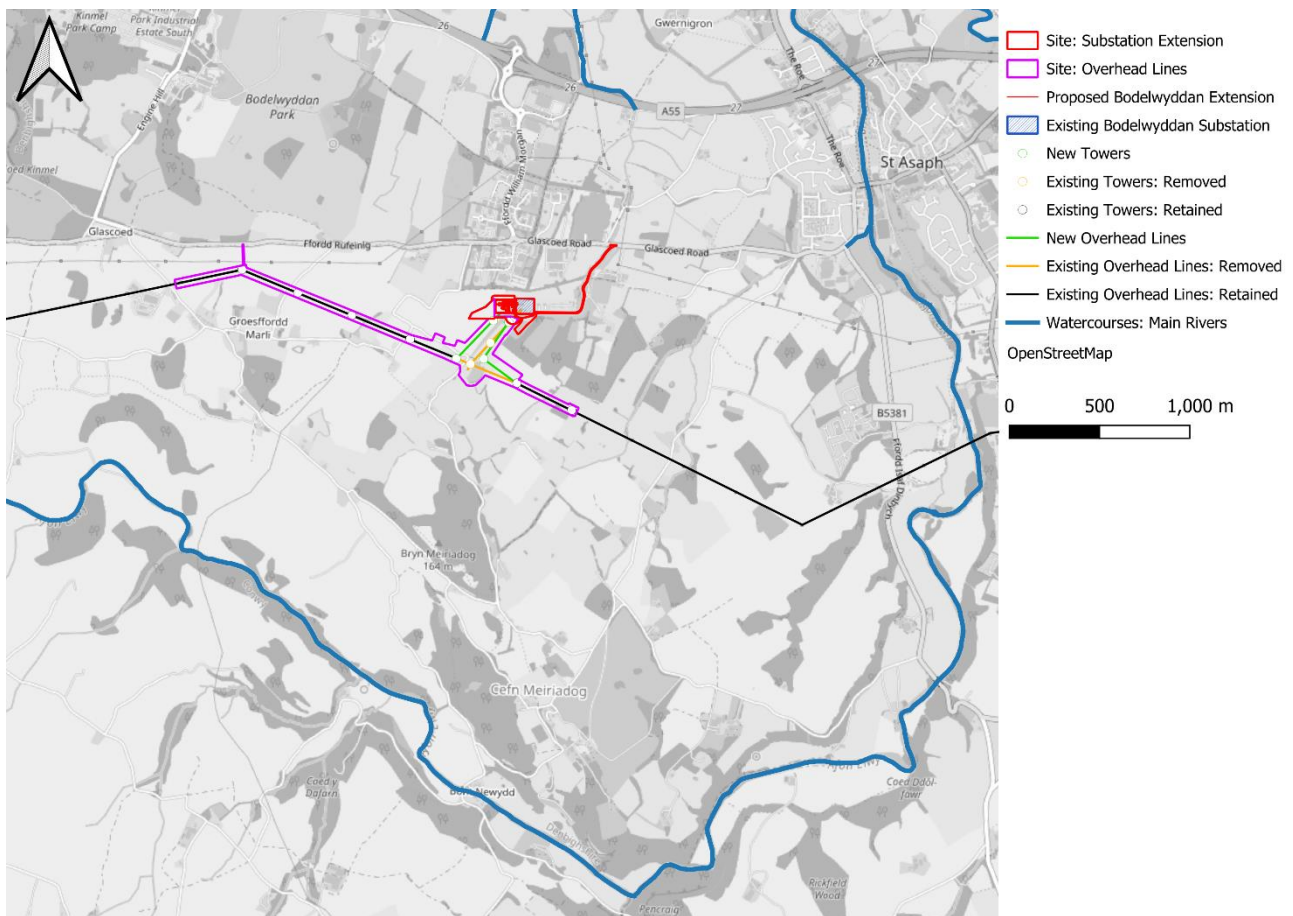


Figure 2-4: Main Rivers in the surrounding area (Jacobs, 2025; Welsh Government, 2022)

There is a small ditch along the border of the southern boundary of the existing Bodelwyddan substation as seen in Figure 2-5. This appears to subsequently drain north and ultimately converge with the River Clwyd and its tributaries.

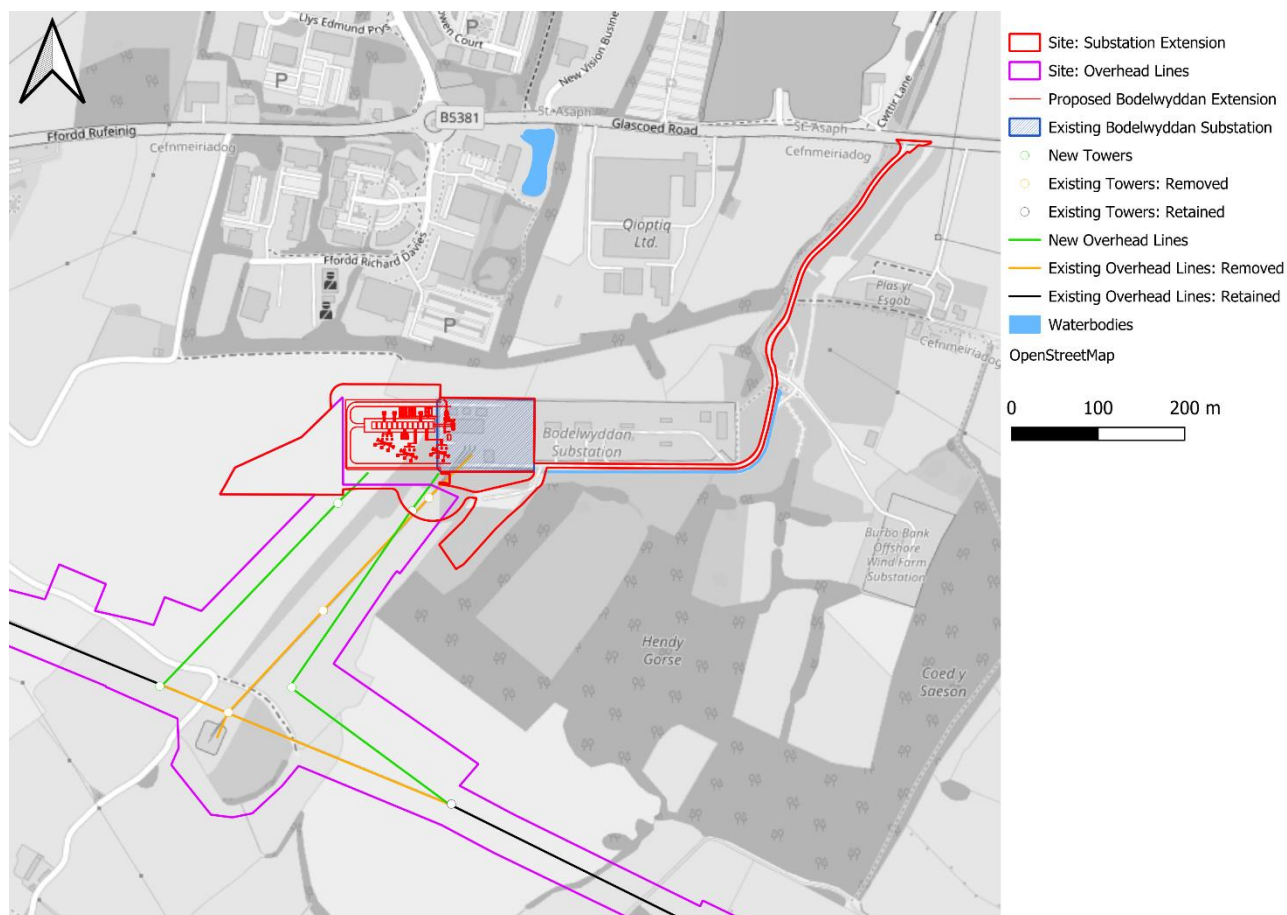


Figure 2-5: Local water bodies in proximity of the site (Jacobs, 2025; Welsh Government, 2021a)

2.2.3 Geology and Hydrogeology

The GeoIndex geology map from British Geological Survey (2025a) shows that the surrounding area around Bodelwyddan substation lies on Warwickshire group bedrock which comprises of mudstone, siltstone and sandstone. The area also includes Till superficial deposits which derived from a glacial parent unit (British Geological Survey, 2025b).

According to Natural Resources Wales's Source Protection Zones map (Welsh Government, 2024b), the site is not in a source protection zone. The groundwater vulnerability in this area is classed as low vulnerability (on a three-risk category scale: high, medium and low) over secondary aquifers (British Geological Survey, 2025a). This means that this area is categorised as having the highest protection to groundwater from pollution.

2.2.4 Existing flood defences

There are pre-existing flood defences in the St. Asaph area to the east of Bodelwyddan substation. These defences consist of embankments, walls and culverts that protect St. Asaph from the River Elwy (Welsh Government, 2025b). Despite these defences being relatively local, Bodelwyddan substation is not in the area that benefits from these defences.

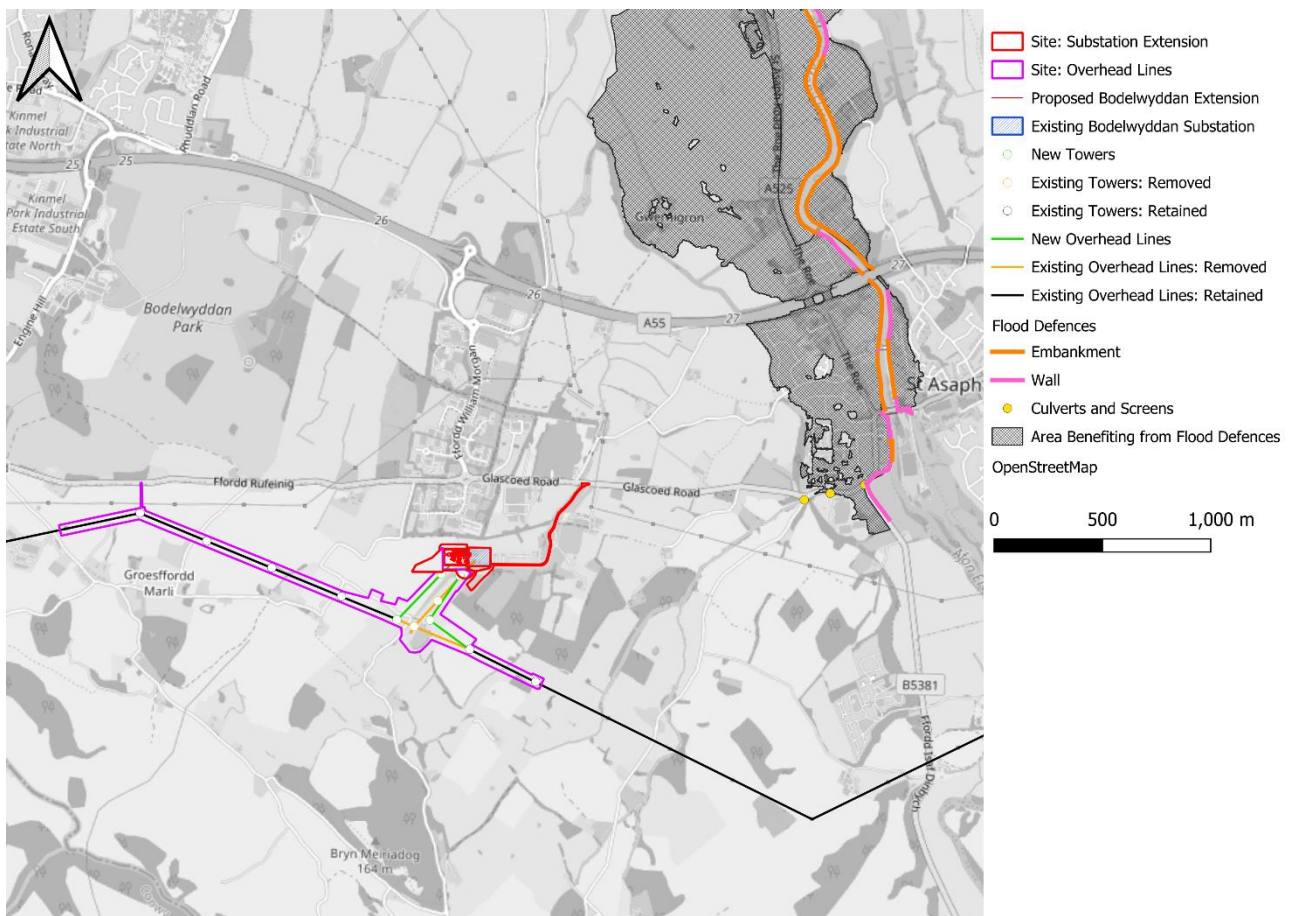


Figure 2-6: Local flood defences and the respective area that is protected (Jacobs, 2025; Welsh Government 2025b; Welsh Government 2025c)

3. National Planning Policy, Guidance and Standards

3.1 Planning context

Planning Policy Wales sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes, Welsh Government Circulars, and policy clarification letters.

TAN-15 introduced by the Welsh Government in 2004, provides technical guidance relating to development planning and flood risk in Wales. The initial requirements of TAN-15 are to identify the vulnerability classification(s) and flood zones relevant to a proposed works, and to apply this information to the application of the justification tests.

An update for TAN-15 was released on 31st March 2025 and replaces the previous version with immediate effect. TAN-15 refers to Flood Zones from Natural Resources Wales's Flood Map for Planning as opposed to the previous Development Advice Zones. Additionally, the flood zones include flood risk from rivers, the sea, surface water or ordinary watercourses and include an allowance for climate change based on the central allowance over 100 years.

3.2 Climate Change

Climate change in the UK is expected to increase the frequency and intensity of rainfall, increasing the risk of fluvial and surface water flooding. The Welsh government provides a range of climate change allowances based on geographic location.

The peak river flow and rainfall allowances relevant to the site provided by the Welsh Government (2021b) have been summarised in Table 3-1 and Table 3-2 below.

Table 3-1: Peak river flow allowances for the West Wales river basin district (using 1961 to 1990 baseline)

West Wales River Basin	Total potential change anticipated by the 2020s	Total potential change anticipated by the 2050s	Total potential change anticipated by the 2080s
Upper end estimate	25%	40%	75%
Central factor or central estimate	15%	25%	30%
Lower end estimate	5%	10%	15%

Table 3-2: Change to extreme rainfall intensity that applies across Wales (compared to a 1961-1990 baseline)

Applies across all of Wales	Total potential change anticipated for 202s (2015-2039)	Total potential change anticipated for 2050s (2040-2069)	Total potential change anticipated for 2080s (2070 to 2115)
Upper estimate	10%	20%	40%
Central estimate	5%	10%	20%

The Welsh Government also provides estimated mean sea level rise by 2100 and 2120; however, the works are not close enough to the coast for this to impact the site. Additionally, there are no main rivers or ordinary watercourses that will impact the site.

The drainage strategy, outlined in the Drainage Statement and summarised further in this document, has been designed with a 40% allowance for climate change.

3.3 Vulnerability classifications

TAN-15 assigns one of three flood risk vulnerability classifications to a development as shown in Table 3-3. The proposed works is considered to be highly vulnerable as an 'especially vulnerable industrial development'. This means that the proposed works must be flood free in the 1%+Climate Change for rivers and 0.5%+Climate Change for sea. Additionally, the tolerable flood depth and velocity conditions when assessed against the 0.1% event should not exceed 600 millimetres in depth and 0.15 metres per second in velocity.

Table 3-3: TAN-15 development vulnerability classifications (Welsh Government, 2025a)

Development Category	Types
Highly vulnerable development	All residential premises, schools and childcare establishments, colleges and universities, hospitals and GP surgeries, especially vulnerable industrial development, emergency services, buildings used to provide emergency shelter in time of flood.
Less vulnerable development	General industrial, employment, commercial and retail development, transport and utilities infrastructure, car parks, mineral extraction sites and associated processing facilities, public buildings, places of worship, cemeteries, equipped play areas, renewable area generation facilities.
Water compatible development	Boatyards, marinas, development associated with canals, flood defences and management infrastructure, open spaces, hydro renewable energy generation.

3.4 Local Planning Policy

The Denbighshire Local Development Plan (LDP) 2018-2033 is currently in its Draft Preferred Strategy stage. The previous LDP expired in 2021. The Draft Preferred Strategy outlines the aims for the LDP until 2033 which includes ensuring that '*new development is directed away from flood risk areas and that the longer term implications of climate change are considered*' (Denbighshire County Council, 2019).

3.5 Consultations

The following flood RMAs were contacted for information relevant to flooding in the area:

- Natural Resources Wales;
- Denbighshire County Council; and,
- DCWW.

Initial discussions were undertaken with Denbighshire County Council in relation to the proposed surface water drainage arrangements to inform the SuDS Drainage Approval Body (SAB) approval (where SuDS refers

to sustainable drainage systems). A separate statement has been prepared for submission given that the works extend to more than 100 square metres. This Drainage Statement is to be read in conjunction with the SuDS Approval Body Pre-Application Drainage Statement.

No responses on data requests have been received to date from Natural Resources Wales or DCWW.

3.6 National Grid Development Standards

NGET requires that there is no flooding on site for the 3.33% Annual Exceedance Probability (AEP) storm event (National Grid, 2016). It also requires no flooding to operational areas of the site for the 1% AEP storm event. Furthermore, NGET requires that the level of standing water on the site does not affect critical equipment during an extreme 0.1% (1 in 1000) AEP rainfall event.

Additionally, Section 4 of Technical Specifications 2.01 Substations (National Grid, 2021) states that:

"Substation primary equipment shall have an anticipated asset life of not less than 40 years unless an alternative value is agreed with National Grid prior to installation & commissioning".

The minimum design life of 40 years for the substation assets and equipment takes it into the 2070s epoch. Therefore, the appropriate allowance for accounting for the effects of climate change over the design life is a peak rainfall allowance of 40%.

4. Flood Risk to the Proposed Works

4.1 Tidal Flood Risk

Tidal flooding is flooding that arises from normal or adverse tidal conditions. Tidal flooding is limited to coastal areas and low-lying land in open connection to the coast. The site is approximately 7.5km inland and 2.3km from the nearest tidal flood risk area. The site is also above 40m AOD which further reduces risk. There is no area of tidal risk defined in the vicinity of the site, as shown in Figure 4-1.

Due to the distance from the coast and nearest tidal flood risk area, the risk to the proposed works is negligible and no mitigation measures are necessary.

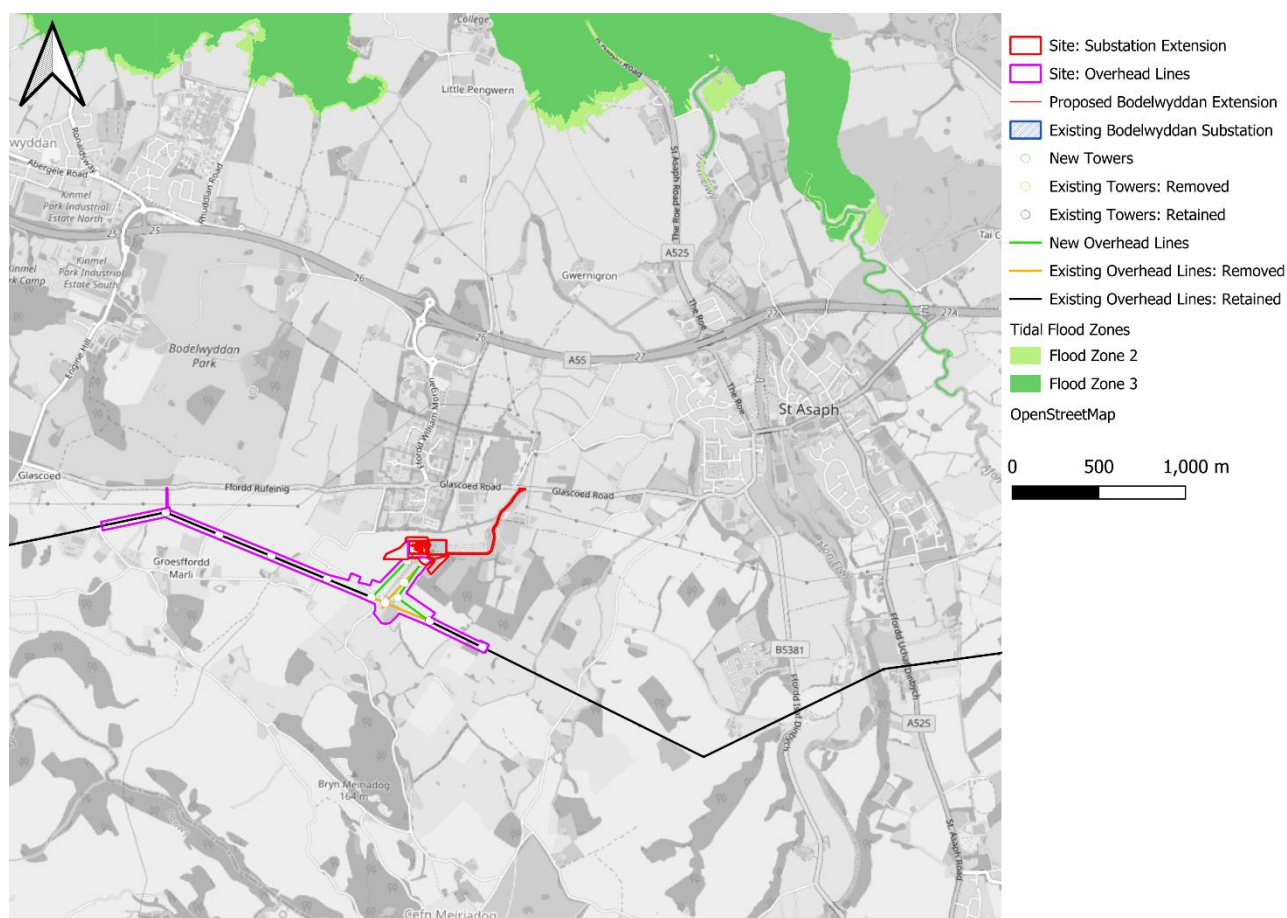


Figure 4-1: Natural Resources Wales Flood Zones 2 and 3 for tidal flood risk (Jacobs, 2025; Welsh Government, 2025d)

4.2 Fluvial Flood Risk

Natural Resources Wales's (2025a) Flood Map for Planning shows that the site is not in a fluvial flood risk zone. The nearest area of fluvial flood risk is associated with the River Elwy in the centre of St. Asaph approximately 1.2km east of the site as shown in Figure 4-2. Additionally, the site does not cross or interact with any mapped ordinary watercourses.

Consequently, the risk to the proposed works is negligible and no mitigation measures are necessary.

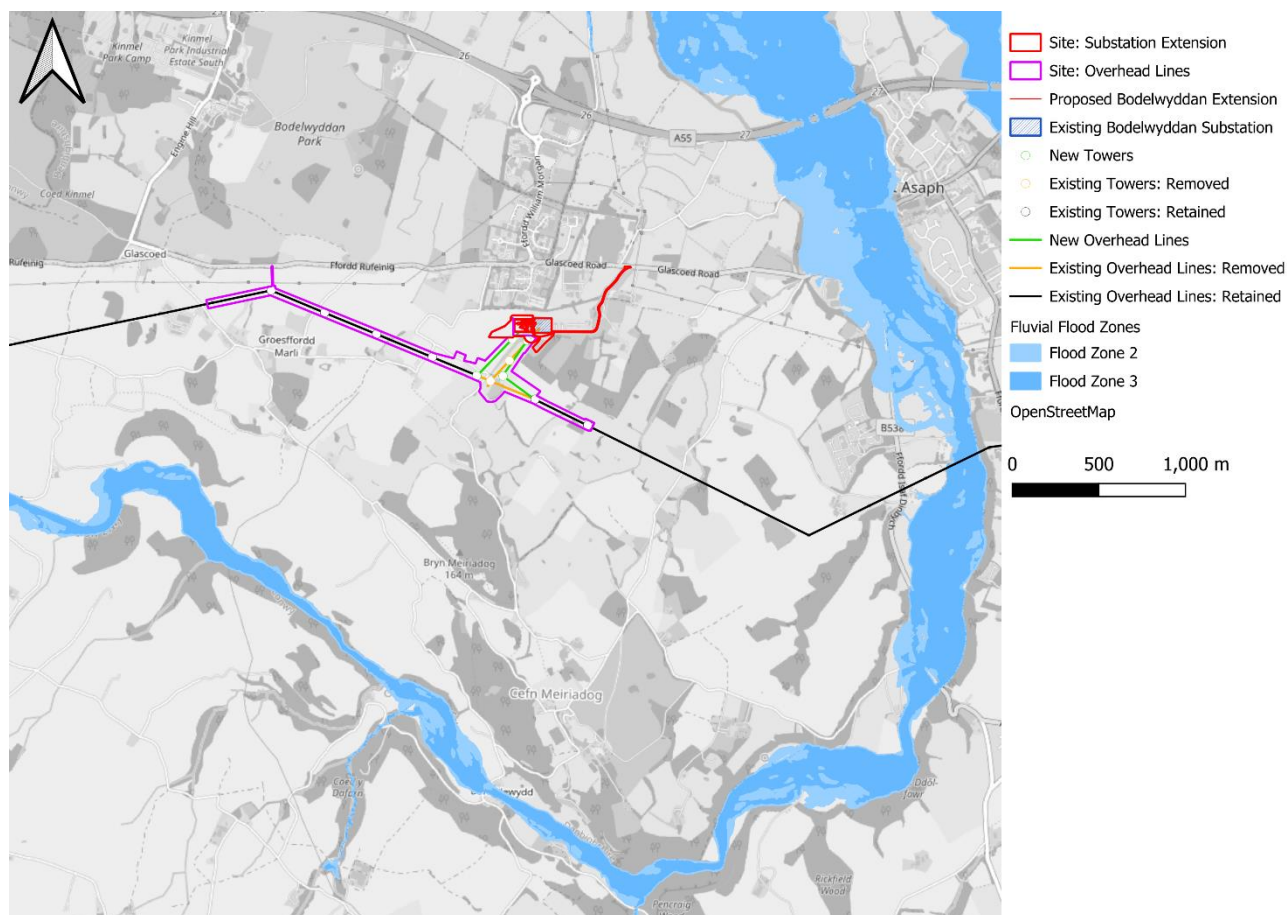


Figure 4-2: Natural Resources Wales Flood Zones 2 and 3 for fluvial flood risk (Jacobs, 2025; Welsh Government, 2025d)

4.3 Surface Water Flood Risk

Surface water flooding is flooding from runoff that has not reached a river, a drainage system or infiltrated to ground. Surface water flood risk can be defined using Natural Resources Wales's (2025a) Surface Water and Small Watercourses mapping, an extract of which is provided as Figure 4-3. It is worth noting that the mapping does not take into consideration existing below ground drainage networks and therefore the mapping is conservative.

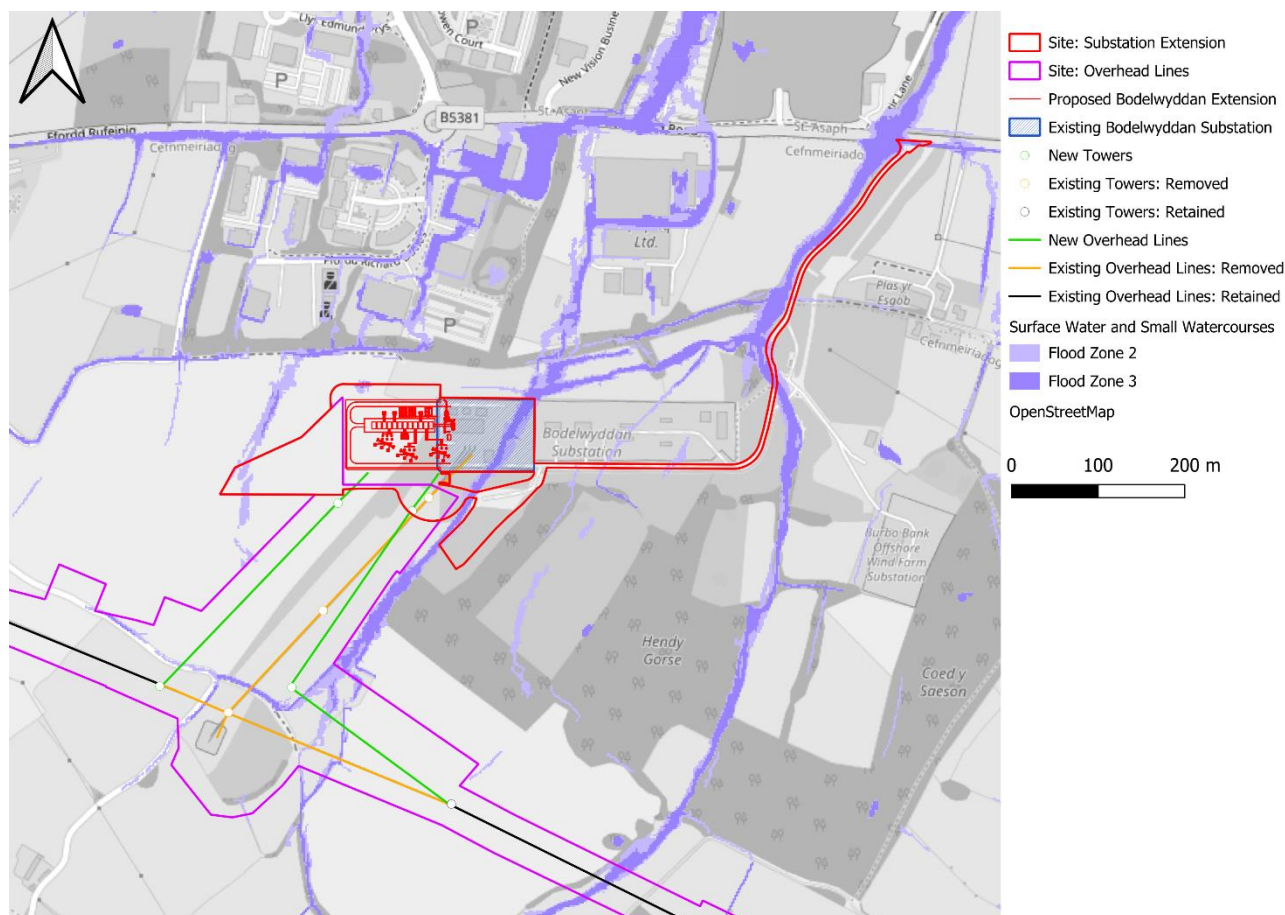


Figure 4-3: Natural Resources Wales Flood Zones 2 and 3 for surface water and small watercourses flood risk (Jacobs, 2025; Welsh Government, 2025d)

The mapping indicates that there are no permanent assets in surface water and small water courses flood risk extents; however, there are flood extents shown along the western boundary of the temporary construction compound boundary. The construction management plan will ensure that this existing surface water flow path is not impeded.

In addition, there are two significant flowpaths, shown to be partially at a high risk of surface water flooding, extending across the existing substation site and access road. It is assumed that consideration for these flood extents has been given at the time of construction, evidenced by a ditch along the southern boundary which is assumed to divert flows around the perimeter of the site before reconverging with a tributary of the River Elwy to the north.

The risk of surface water flooding to the permanent works associated with the proposed works is low, with a medium risk associated with the construction works.

The proposed works will include an appropriately designed drainage system accounting for the effects of climate change over its design life. Appendix B outlines the drainage strategy for the proposed works with further information given in Section 5 and in the associated drainage statement to be read in conjunction with this report.

4.4 Groundwater Flood Risk

Groundwater flooding is caused by unusually high groundwater levels. It occurs as excess water emerges at the ground surface or in manmade structures such as basements. Groundwater flooding tends to be more persistent than surface water flooding, in some cases lasting for weeks or months, and can result in damage to property. The risk of groundwater flooding depends on the nature of the geological strata underlying the site and the local topography. The bedrock geology is shown to be Warwickshire Group, which is predominantly mudstone, siltstone and sandstone. Sandstone is permeable whereas siltstone and mudstone are less permeable.

Both the Local Flood Risk Management Strategy (Denbighshire County Council, 2014) and Preliminary Flood Risk Assessment for Denbighshire County Council (2009) do not have any recorded histories of groundwater flooding or information that provides evidence of future groundwater flood risk throughout the county. Consequently, with the information available, the risk to the proposed works is low and mitigation measures are not necessary.

4.5 Flood Risk from Sewers and Artificial Drainage Systems

Flooding from surface water sewers most commonly occurs when the flow entering the sewer exceeds the capacity of the receiving system. Other causes include blocked drains and the inability of sewers to discharge into receiving watercourses. This results in flooding from manholes and drains.

There are no known incidences of flooding from this source in the vicinity of the site or known public sewers crossing the site (JBA Consulting, 2018). Given the current available information there is a low risk of sewers and artificial drainage systems posing a flood risk to the proposed works and no mitigation measures are necessary.

4.6 Flood Risk from Reservoirs

The probability of reservoir failure in the UK is extremely low, however, it can be a particularly dangerous form of flooding as it results in the sudden release of large volumes of water that can travel at high velocity. This can result in deep and widespread flooding, potentially resulting in loss of life and significant damage. The likelihood of a reservoir failure is very low.

The Natural Resources Wales's (2025b) Flood Risk from Reservoirs map determines that the site is not at risk from reservoir flooding. Consequently, the risk to the proposed works is negligible, and no mitigation measures are necessary.

4.7 Flood Risk from Canals

Canals and artificial waterways rarely flood as the water levels are generally managed all year round. However, large rainfall events, a lack of maintenance or overtopping from nearby rivers can cause flooding of canals and artificial waterways.

The nearest canal to the site is Chester Canal, approximately 40km to the southeast. Consequently, the risk to the proposed works is negligible and no mitigation measures are necessary.

5. Flood Risk from the Proposed Works

5.1 Impact on Tidal Flood Risk

Section 4.1 established that the site was approximately 7.5km inland and 2.3km from areas of tidal flood risk and so not at risk from flooding from the sea. Consequently, there is a negligible risk of the proposed works impacting tidal flood risk and no mitigation measures are necessary.

5.2 Impact on Fluvial Flood Risk

Section 4.2 established that the proposed works is 1.2km away from Flood Zones 2 and 3 according to Natural Resources Wales's (2025a) Flood Map for Planning and will not displace flood waters once operational. For this reason, the proposed works present a negligible risk of exacerbating fluvial flood risk and no mitigation measures are necessary.

5.3 Impact on Surface Water Flood Risk

Section 4.3 determined that the permanent works associated with the proposed works are not at risk from surface water flooding, however there are surface water flood extents shown in temporary construction works, which could impact these flows.

The construction management plan will ensure that this existing surface water flow path is not impeded.

In addition, there will be an increase in hardstanding as part of the proposed works, which will increase surface water runoff if not managed appropriately. This will be mitigated by the Drainage Strategy, provided as Appendix B, which has been designed to accommodate a 1 in 100 year event including a 40% climate change event and will ensure runoff rates do not exceed the existing greenfield runoff rate (QBAR). QBAR is the mean annual maximum flow rate of a catchment.

In order to achieve this, an attenuation tank will be provided within the site which will accommodate flows from the proposed roofs. A hydrobrake (or similar approved) will ensure rates are restricted prior to discharge into the wider drainage network associated with the existing substation. This network subsequently drains into a pond to the northeast of the substation.

All non-hardstanding areas in the site are made up of permeable gravel capping which allows rainwater to drain into the ground. Temporary access roads will be designed to fall towards this permeable area.

Maintenance of the features will be undertaken by NGET for the lifetime of the works.

With the embedded mitigation from the drainage strategy, the risk from the proposed works is low for the lifetime of the works.

5.4 Impact on Groundwater Flood Risk

Section 4.4 established that there are no historic or recorded instances of groundwater flooding in the area. As a result, the risk from the proposed works exacerbating this type of flooding is low and no mitigation measures are necessary.

5.5 Impact on Flood Risk from Sewers and Artificial Drainage

As identified in Section 4.5, there is no historic evidence of this type of flooding in the vicinity of the site. The proposed Drainage Strategy does not require a connection to any existing public sewer network and will therefore not exacerbate any flooding associated with it.

The risk of the proposed works exacerbating flood risk to third parties associated with sewers and artificial drainage is therefore negligible for which mitigation measures are not required.

5.6 Impact on Flood Risk from Reservoirs

As established in Section 4.6, there is no risk of reservoir flooding in the vicinity of the proposed works. Consequently, the risk of the proposed works exacerbating this source of flooding to third parties is negligible and mitigation measures are not required.

5.7 Impact on Flood Risk from Canals

As established in Section 4.7, there is no risk of canal flooding to the proposed works. The proposed works does not involve any construction which could compromise the structural integrity of any local canals.

Therefore, the risk of the proposed works exacerbating flood risk from canals to third parties is negligible, and mitigation measures are not required.

6. Flood Mitigation Measures and Residual Risk

6.1 Summary of Flood Risk

Sections 4 and 5 have discussed flood risk to and from the proposed works. Table 6-1 summarises these risks.

Table 6-1: Summary of flood risk to and from the proposed works

Flood Type	To the proposed works	From the proposed works	Mitigation needed
Tidal	Negligible	Negligible	No
Fluvial	Negligible	Negligible	No
Surface water	Medium during construction phase	Medium during construction phase	No
Groundwater	Low	Low	No
Sewers and artificial drainage systems	Negligible	Negligible	No
Reservoir	Negligible	Negligible	No
Canals	Negligible	Negligible	No

6.2 Residual Risks

No permanent assets are proposed in any areas of flood risk, but there are areas of surface water flooding and small watercourses shown to be in the temporary construction works. Therefore, there is a limited potential for temporary effects on the land drainage regime during construction.

During construction, mitigation to minimise increase in risks will be set out in the construction management plan by a competent contractor to be appointed by NGET. Land used temporarily during construction will be reinstated to its pre-construction condition and use.

Whilst the drainage for the proposed works has been designed to meet local and NGET Design Standards, there is a residual risk that the drainage will be unable to cope with events larger than the design event. This may lead to surface water flooding in the boundary of the substation or to uncontrolled runoff off site which would follow the existing topography and subsequently discharge to the nearest watercourse. A maintenance plan has been provided in the associated Drainage Statement to mitigate this risk.

7. Conclusion and Recommendation

NGET have commissioned Jacobs to prepare a FCA to accompany an application under the Town and Country Planning Act 1990 to Denbighshire County Council for an extension to the existing Bodelwyddan electricity substation and to upgrade the fence to the existing substation to the west of St. Asaph.

This FCA has reviewed a range of sources of flood risk. It has considered risk to the proposed works, as well as the risk arising to third parties as a consequence of the proposed works interacting with local flood sources.

The proposed works are found to be at negligible risk from tidal, fluvial, sewers, reservoirs and canals, and at low risk from groundwater flooding and flooding from surface water and small watercourses.

The construction phase of the proposed works lie partially in surface water flood extents. The impact on flood risk due to the works will inherently be temporary for the duration of the works period. During construction, mitigation to minimise increase in risks will be set out in the construction management plan by a competent contractor to be appointed by NGET.

A Drainage Strategy has been developed separately to this report to demonstrate how surface water will be managed at the site in accordance with best practice avoiding exacerbation of surface water flood risks to third parties.

There is a residual risk to the site of a larger than design event occurring and overwhelming the surface water drainage system which may result in surface water flooding in the boundary of the substation or uncontrolled runoff off site. Additionally, there is a risk of blockages or maintenance failures of the drainage assets which may also lead to flooding in the boundary of the substation or uncontrolled runoff off site. A maintenance plan has been provided in the associated Drainage Strategy document to mitigate this risk.

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8.1 Figure Information

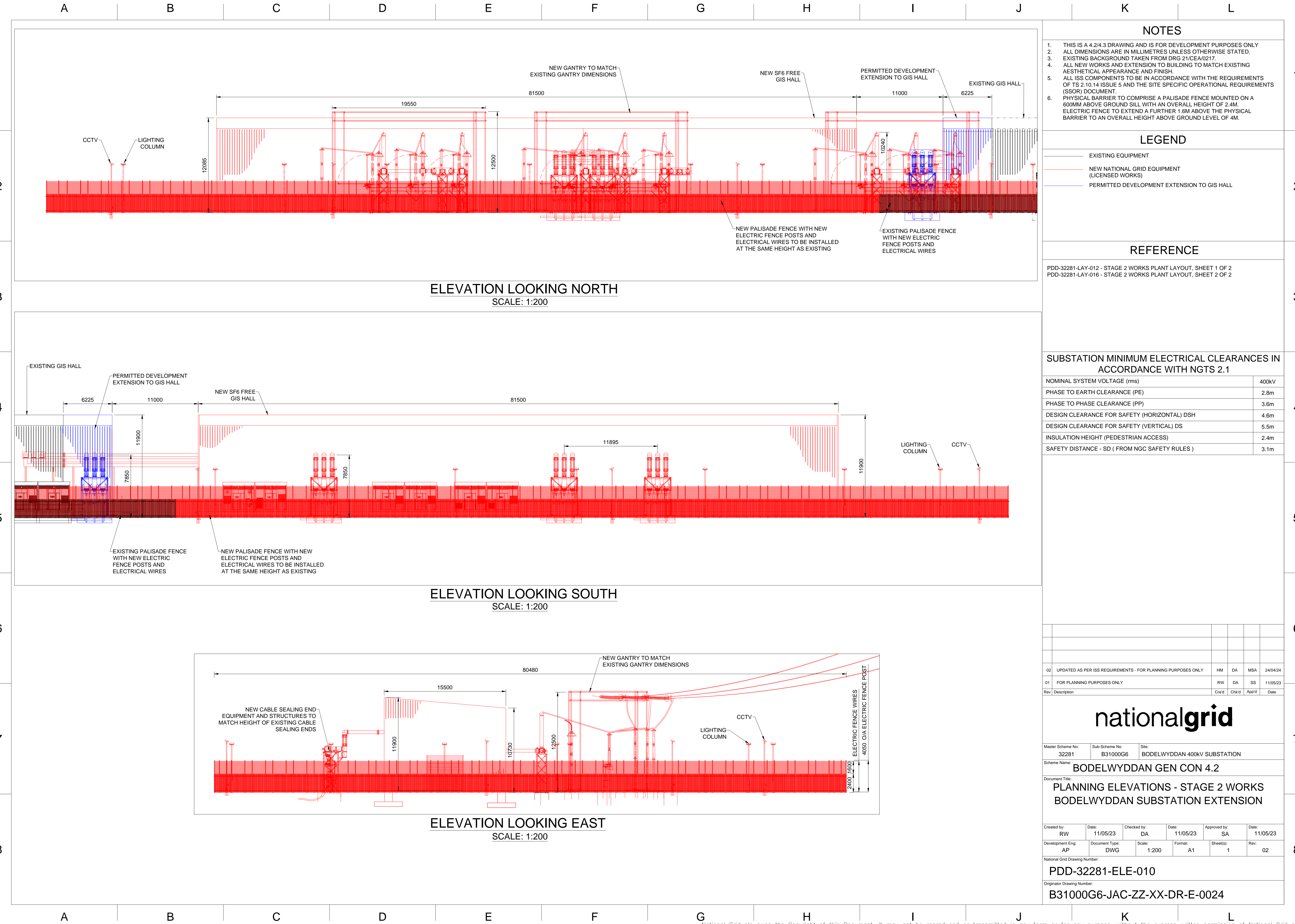
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Appendix A. Proposed Works



NOTES

- 1. THIS IS A 4.2/4.3 DRAWING AND IS FOR DEVELOPMENT PURPOSES ONLY
- 2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
- 3. EXISTING BACKGROUND TAKEN FROM DRG 21/CEA/0217.
- 4. ALL NEW WORKS AND EXTENSION TO BUILDING TO MATCH EXISTING AESTHETICAL APPEARANCE AND FINISH.
- 5. ALL ISS COMPONENTS TO BE IN ACCORDANCE WITH THE REQUIREMENTS OF TS 2.10.14 ISSUE 5 AND THE SITE SPECIFIC OPERATIONAL REQUIREMENTS (SSOR) DOCUMENT.
- 6. PHYSICAL BARRIER TO COMPRISE A PALISADE FENCE MOUNTED ON A 600MM ABOVE GROUND SILL WITH AN OVERALL HEIGHT OF 2.4M. ELECTRIC FENCE TO EXTEND A FURTHER 1.6M ABOVE THE PHYSICAL BARRIER TO AN OVERALL HEIGHT ABOVE GROUND LEVEL OF 4M.

LEGEND

- EXISTING EQUIPMENT
- NEW NATIONAL GRID EQUIPMENT (LICENSED WORKS)
- PERMITTED DEVELOPMENT EXTENSION TO GIS HALL

REFERENCE

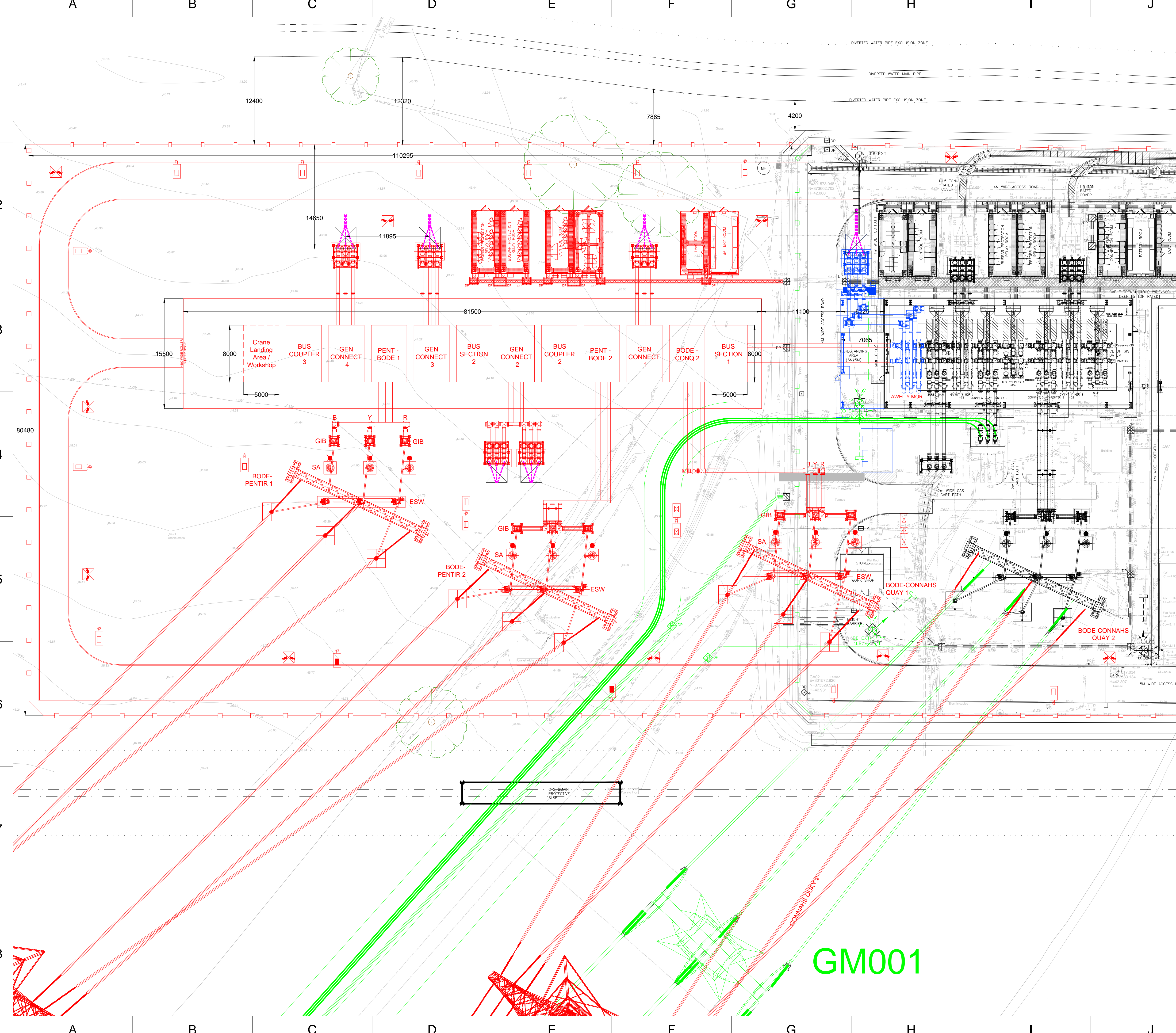
PDD-32281-LAY-012 - STAGE 2 WORKS PLANT LAYOUT, SHEET 1 OF 2
PDD-32281-LAY-016 - STAGE 2 WORKS PLANT LAYOUT, SHEET 2 OF 2

SUBSTATION MINIMUM ELECTRICAL CLEARANCES IN ACCORDANCE WITH NGTS 2.1

NOMINAL SYSTEM VOLTAGE (rms)	400kV
PHASE TO EARTH CLEARANCE (PE)	2.8m
PHASE TO PHASE CLEARANCE (PP)	3.6m
DESIGN CLEARANCE FOR SAFETY (HORIZONTAL) DSH	4.6m
DESIGN CLEARANCE FOR SAFETY (VERTICAL) DS	5.5m
INSULATION HEIGHT (PEDESTRIAN ACCESS)	2.4m
SAFETY DISTANCE - SD (FROM NGC SAFETY RULES)	3.1m

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
32281	B31000G6	BODELWYDDAN 400kV SUBSTATION
Scheme Name:		
BODELWYDDAN GEN CON 4.2		
Document Title:		
PLANNING ELEVATIONS - STAGE 2 WORKS BODELWYDDAN SUBSTATION EXTENSION		
Created by:	Date:	Checked by:
RW	11/05/23	DA
Development Eng:	Document Type:	Scale:
AP	DWG	1:200
Format:	Sheet(s):	Rev:
A1	1	02
National Grid Drawing Number:		
PDD-32281-ELE-010		
Originator Drawing Number:		
B31000G6-JAC-ZZ-XX-DR-E-0024		



NOTES

- 1. THIS IS A 4.2/4.3 DRAWING AND IS FOR DEVELOPMENT PURPOSES ONLY
- 2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
- 3. EXISTING BACKGROUND TAKEN FROM DRG 21/CEA/0217

LEGEND

- EXISTING EQUIPMENT
- NEW NATIONAL GRID EQUIPMENT (LICENSED WORKS)
- CONTRACTED USER ASSETS
- TO BE REMOVED
- PERMITTED DEVELOPMENT EXTENSION TO GIS HALL
- CCTV
- LIGHTING COLUMN

REFERENCE

PDD-32281-LAY-016 - STAGE 2 WORKS PLANT LAYOUT, SHEET 2 OF 2
PDD-32281-ELE-010 - PLANNING ELEVATIONS - STAGE 2 WORKS

SUBSTATION MINIMUM ELECTRICAL CLEARANCES IN ACCORDANCE WITH NGTS 2.1

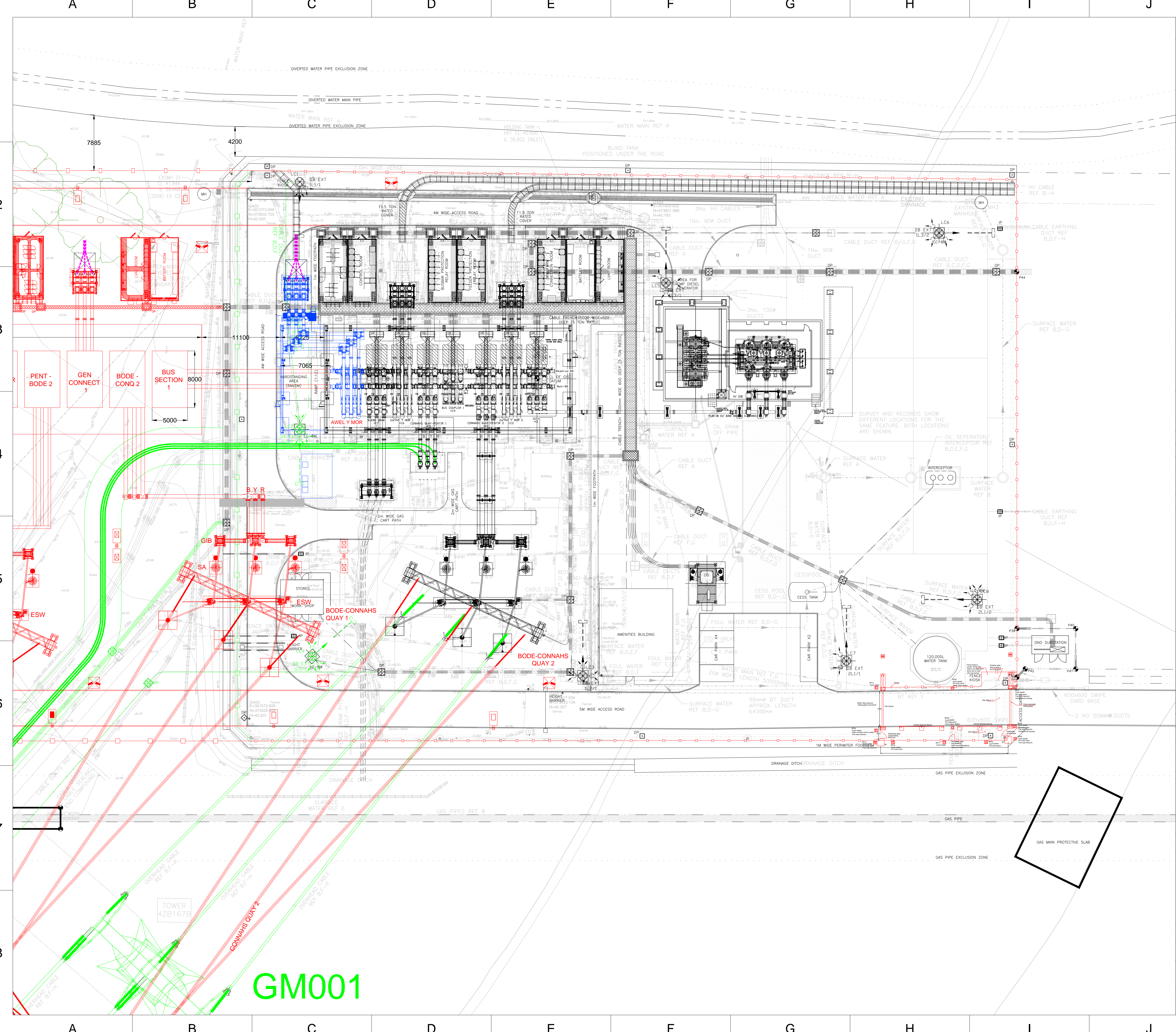
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DESIGN CLEARANCE FOR SAFETY (VERTICAL) DS	5.5m
INSULATION HEIGHT (PEDESTRIAN ACCESS)	2.4m
SAFETY DISTANCE - SD (FROM NGC SAFETY RULES)	3.1m

01	ISSUED FOR INFORMATION	DA	SA	SA	19/04/23
02	FOR PLANNING PURPOSES	RW	DA	SA	11/05/23
03	CUSTOMERS NAMES REMOVED	RW	DA	SA	19/07/23
04	UPDATED AS PER ISS REQUIREMENTS - FOR PLANNING PURPOSES ONLY	HM	DA	MSA	24/04/24
Rev	Description	Cre'd	Chk'd	App'd	Date

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Master Scheme No:	32281	Sub-Scheme No:	B31000G6	Site:	BODELWYDDAN 400kV SUBSTATION
Scheme Name:	BODELWYDDAN GEN CON 4.2				
Document Title:	STAGE 2 WORKS PLANT LAYOUT SHEET 1 OF 2 BODELWYDDAN 400KV SUBSTATION				
Created by:	HM	Date:	24/04/24	Checked by:	DA
Development Eng:	AP	Document Type:	DWG	Scale:	AS SHOWN
		Format:	A1	Sheet(s):	1 OF 2
		Rev:	04		
National Grid Drawing Number: PDD-32281-LAY-012					
Originator Drawing Number: B31000G6-JAC-ZZ-XX-DR-E-0016					

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NOTES

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- 2. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
- 3. EXISTING BACKGROUND TAKEN FROM DRG 21/CEA/0217

LEGEND

- EXISTING EQUIPMENT
- NEW NATIONAL GRID EQUIPMENT (LICENSED WORKS)
- CONTRACTED USER ASSETS
- TO BE REMOVED
- PERMITTED DEVELOPMENT EXTENSION TO GIS HALL
- CCTV
- LIGHTING COLUMN

REFERENCE

PDD-32281-LAY-012 - STAGE 2 WORKS PLANT LAYOUT, SHEET 1 OF 2
PDD-32281-ELE-010 - PLANNING ELEVATIONS - STAGE 2 WORKS

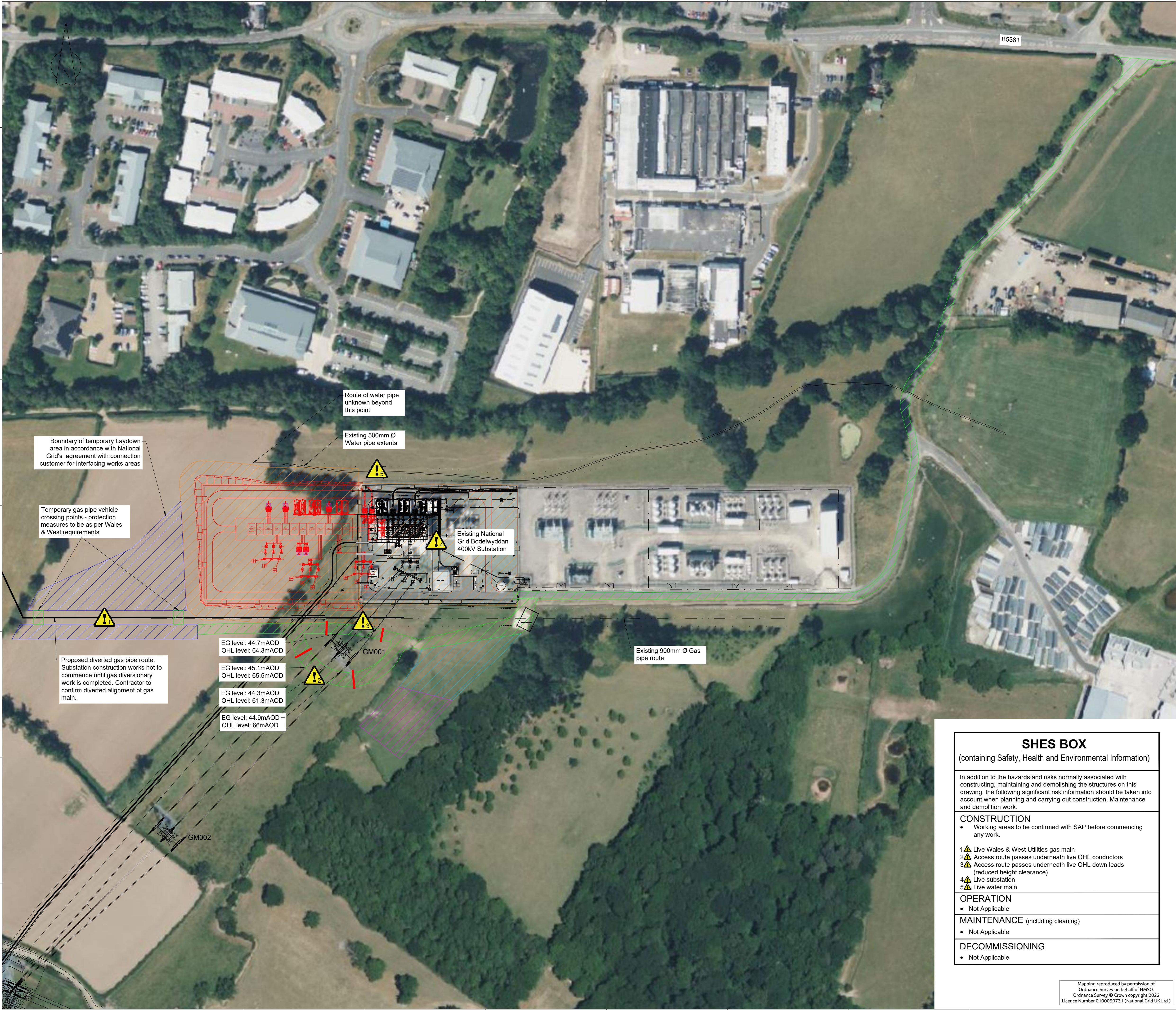
SUBSTATION MINIMUM ELECTRICAL CLEARANCES IN ACCORDANCE WITH NGTS 2.1

NOMINAL SYSTEM VOLTAGE (rms)	400kV
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INSULATION HEIGHT (PEDESTRIAN ACCESS)	2.4m
SAFETY DISTANCE - SD (FROM NGC SAFETY RULES)	3.1m

01	FOR PLANNING PURPOSES ONLY	HM	DA	MSA	24/04/24
Rev	Description	Cr'd	Chk'd	App'd	Date

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Master Scheme No:	Sub-Scheme No:	Site:
32281	B31000G6	BODELWYDDAN 400kV SUBSTATION
Scheme Name:		
BODELWYDDAN GEN CON 4.2		
Document Title:		
STAGE 2 WORKS PLANT LAYOUT SHEET 2 OF 2 BODELWYDDAN 400kV SUBSTATION		
Created by:	Date:	Checked by:
HM	24/04/24	DA
Development Eng:	Document Type:	Scale:
AP	DWG	AS SHOWN
National Grid Drawing Number:		Format:
PDD-32281-LAY-016		A1
Originator Drawing Number:		Sheet(s):
B31000G6-JAC-ZZ-XX-DR-E-0030		2 OF 2
		Rev:
		01



NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
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3. ALL WORKS WILL BE CARRIED OUT IN ACCORDANCE WITH NATIONAL GRID SAFETY RULES AND PROCEDURES.
4. FOR ADDITIONAL HEALTH AND SAFETY INFORMATION, REFER TO CONSTRUCTION METHOD STATEMENTS.
5. ALL CDM AREAS REQUIRE AGREEMENT WITH NATIONAL GRID SITE SAP PRIOR TO ESTABLISHMENT.
6. HERAS FENCING TO SURROUND SITE, INCLUDING COMPOUND AND LAYDOWN AREAS.
7. ACCESS ROUTES SUBJECT TO AGREEMENT BETWEEN NG AND LANDOWNERS.
8. FOR OHL WORKING AREAS, REFER TO "CDM PLAN - OHL WORKS".
9. OVERHEAD LINE CLEARANCES FROM GROUND LEVEL HAVE BEEN READ FROM LINE PROFILE DRAWING 28/NG/0409.
10. WORKS WITHIN 10m OF THE GAS AND WATER MAIN ARE TO BE NOTED TO RESPECTIVE OWNER.
11. ALIGNMENTS OF THE UTILITIES ARE INDICATIVE AND ARE TO BE CONFIRMED BY THE CONTRACTOR WHERE IN THE WORKING AREA.

LEGEND

- EXISTING EQUIPMENT
- NEW EQUIPMENT/CIVIL WORKS
- GS6 GOALPOSTS
- TEMPORARY PARKING AREA
- TEMPORARY CONTRACTOR ACCESS TRACK
- SITE CDM WORKING AREA
- STORAGE / LAYDOWN AREA
- WELFARE AND OFFICES AREA

REFERENCE

PDD-32281-LAY-012
PDD-32281-LAY-016
28_NG_0409

PLANT LAYOUT - STAGE 2 WORKS - SHEET 1 OF 2
PLANT LAYOUT - STAGE 2 WORKS - SHEET 2 OF 2
LINE PROFILE - TOWERS BODELWYDDAN TO 4ZB167R

SHES BOX

(containing Safety, Health and Environmental Information)

In addition to the hazards and risks normally associated with constructing, maintaining and demolishing the structures on this drawing, the following significant risk information should be taken into account when planning and carrying out construction, Maintenance and demolition work.

CONSTRUCTION

- Working areas to be confirmed with SAP before commencing any work.

- 1⚠️ Live Wales & West Utilities gas main
- 2⚠️ Access route passes underneath live OHL conductors
- 3⚠️ Access route passes underneath live OHL down leads (reduced height clearance)
- 4⚠️ Live substation
- 5⚠️ Live water main

OPERATION

- Not Applicable

MAINTENANCE (including cleaning)

- Not Applicable

DECOMMISSIONING

- Not Applicable

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Master Scheme No: 32281 Sub-Scheme No: B31000G6 Site: BODELWYDDAN 400kV SUBSTATION

Scheme Name: Bodelwyddan Generation Connection

Document Title: CDM PLAN
SUBSTATION EXTENSION

Created by: RW Date: 02/04/25 Checked by: CT Date: 02/04/25 Approved by: BG Date: 02/04/25

Development Eng: AP Document Type: DWG Scale: 1:1250 Format: A1 Sheet(s): 1 Rev: P01

National Grid Drawing Number: PDD-32281-LAY-109

Originator Drawing Number: B31000G6-JAC-14-XX-DR-C-0005

Appendix B. Drainage Strategy

SuDS Approval Body Pre-Application Drainage Statement

Date:	18 June 2025	The West Wing
Project name:	Bodelwyddan Substation Extension	1 Glass Wharf
Project no:	B24416603	Bristol, BS2 0EL
Company:	National Grid Electricity Transmission	United Kingdom
Prepared by:	EO	T +44 (0)117 457 2500
Reviewed by:	JE	https://www.jacobs.com/

Background

National Grid Electricity Transmission (NGET) have commissioned Jacobs to prepare a Drainage Statement to accompany the Denbighshire County Council SuDS Approval Body application (where SuDS refers to sustainable drainage system). The SuDS Approval Body application supports the planning application under the Town and Country Planning Act 1990 for an extension to the existing Bodelwyddan electricity substation and to upgrade the fence ('the proposed development').

The Welsh Government Advice note¹ states that SuDS Approval Body applications are required by law in Wales for any construction plan areas exceeding 100 square metres (m²). The advice note is to be read in conjunction with the Welsh Government's 'Statutory national standards for sustainable drainage systems'² which outlines six standards (S1-S6) in which applicants must demonstrate compliance.

Site Location

The site of the proposed development is immediately to the west of the existing substation, to the south of St. Asaph Business Park, and approximately 2 kilometres (km) west of St. Asaph, centred at Ordnance Survey Grid Reference SJ017735 and shown in Figure 1. The site sits within the Trefnant ward of Denbighshire County Council. The majority of land surrounding the substation is used as farmland, with a commercial business park, roads, and some residential areas to the north.

¹ Welsh Government (2022). Welsh Government Advice Note: SAB Applications for Single Dwellings, Extensions, and Parking and Access Areas. Available at: <https://www.gov.wales/sites/default/files/publications/2022-07/advice-note-sab-applications-for-single-dwellings-extensions-and-parking-and-access-areas.pdf> (accessed 16/06/2025)

² Welsh Government (2018). Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems. Available at : <https://www.gov.wales/sites/default/files/publications/2019-06/statutory-national-standards-for-sustainable-drainage-systems.pdf> (accessed 16/06/2025)

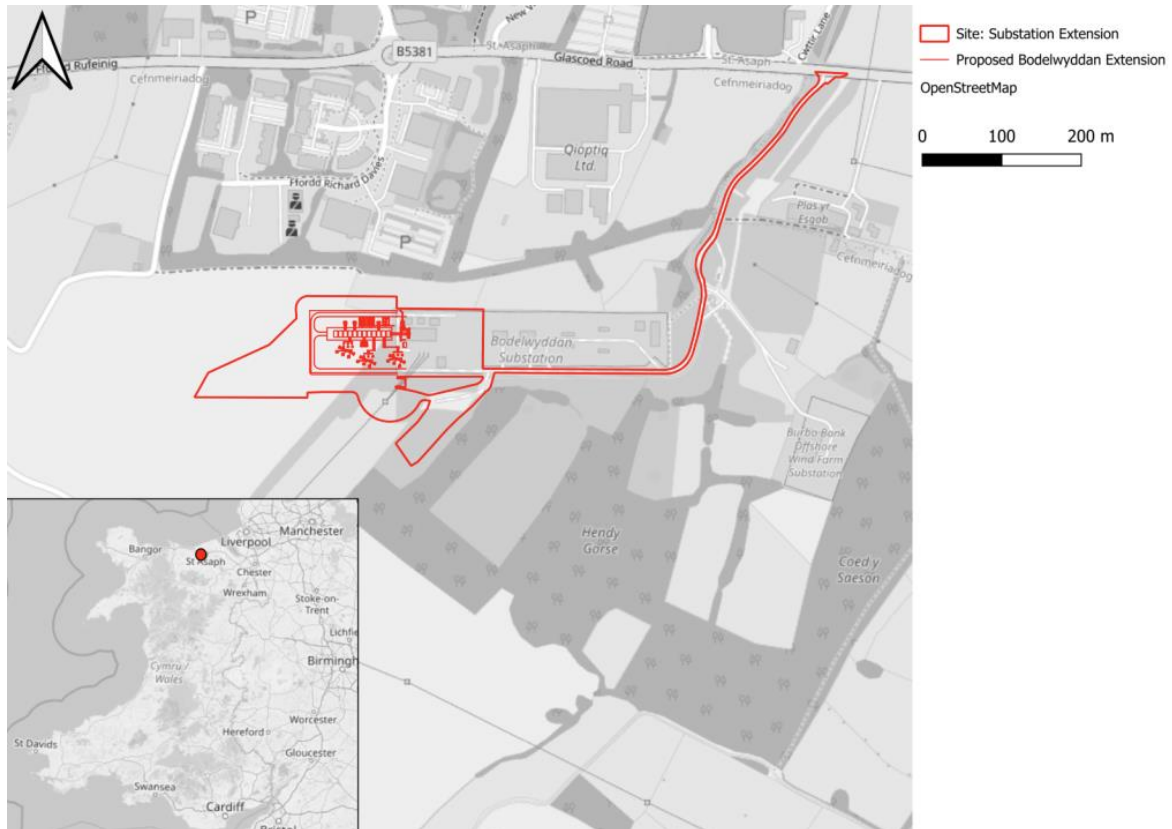


Figure 1: Site Boundary of Bodelwyddan Substation Extension

Proposed Works

The proposed development comprises an extension to the existing Bodelwyddan substation. This extends the substation directly west of the existing site. NGET operates the existing Bodelwyddan 400 kilovolt substation and is required to extend the existing substation to accommodate connection requests. The proposed development would be comprised of the following elements:

- Construction of a new bay and installation of new equipment in the existing substation under permitted development rights to allow connection of new generation prior to the substation extension;
- An extension outside the current operational demise of the substation to accommodate further connections, with a new fence;
- An upgrade to the fence around the existing substation so that it will match that for the substation extension; and
- Construction of two overhead lines which will connect to the substation.

This Drainage Statement specifically refers to the substation extension. The fence upgrade to the existing substation will not materially affect flood risk and the permanent works in the proposed overhead line changes fall below the 100m² threshold. Appendix A shows a drawing of the proposed development which comprises of the following:

- Telecommunications room – houses the communications connection which allows a connection to the control room and other substations for safety reasons;
- Control room – houses the relays, protection and control panels;

- Busbar protection relay room – houses the protection, control and supervision for busbar which conducts electricity;
- Battery room – facility used to house batteries for backup or uninterruptible power systems;
- Feeder protection relay room – houses the protection for overhead lines and cables to ensure the power grid continues to supply energy;
- Low voltage alternating current room – houses the Low voltage alternating current supply distribution board; and
- Overhead line connection infrastructure and other infrastructure to support contracted user assets.

The substation extension permanent works comprise approximately 0.9ha.

Assessment of Flood Risk

An assessment of flood risk has been conducted as part of the accompanying Flood Consequences Assessment which will be submitted to Denbighshire County Council and can be read alongside this technical note.

Flood Risk from Rivers and the Sea

The Natural Resources Wales Flood Map for Planning³, an extract of which is provided as Figure 2, indicates that the entire site, and surrounding area, is in Flood Zone 1 – low risk, corresponding to a less than 1-in-1000 year (plus climate change) chance of flooding each year.

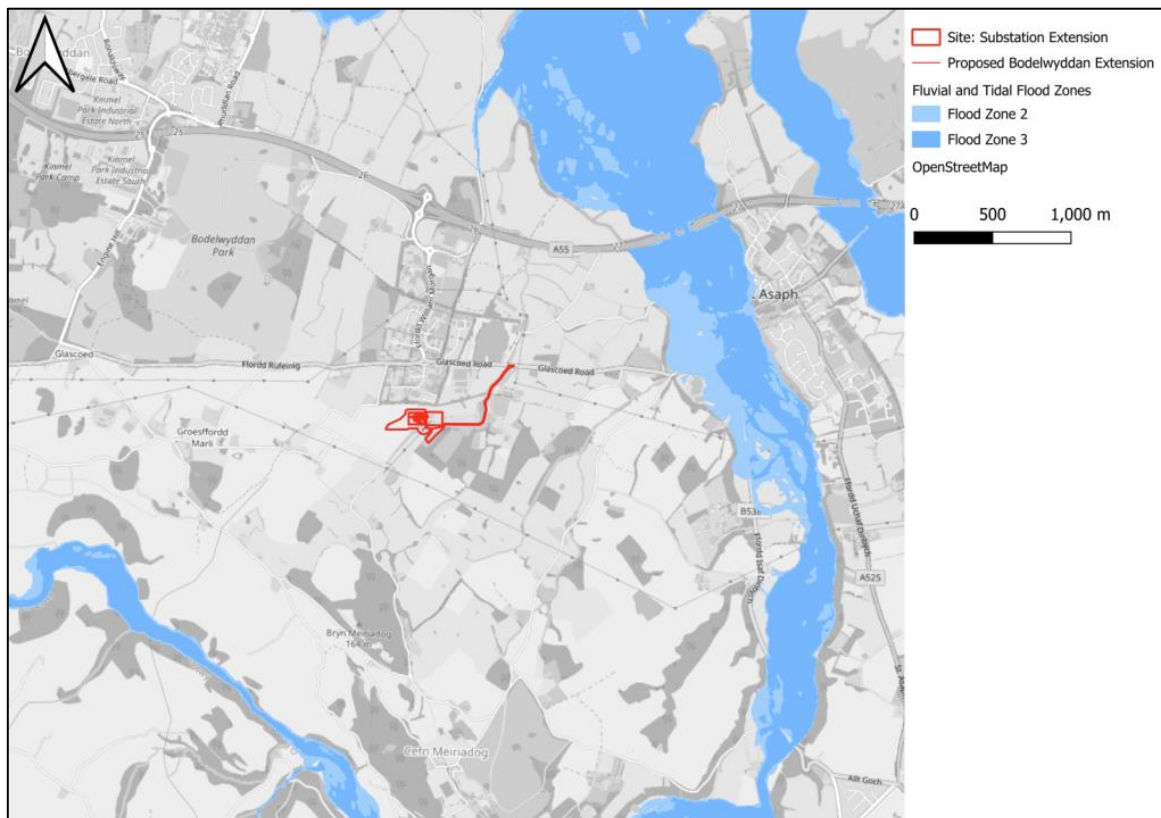


Figure 2: Natural Resources Wales Local Flood Risk from Rivers and the Sea - Flood Zones 2 and 3

³ Natural Resources Wales (2025). Flood Map for Planning. Available at : <https://flood-map-for-planning.naturalresources.wales/> (accessed 16/06/2025)

Flood Risk from Surface Water

An extract from Natural Resources Wales's Surface Water and Small Watercourses mapping⁴ is shown in Figure 3. The mapping indicates that there are no permanent assets in surface water and small water courses flood risk extents; however, there are flood extents shown along the western boundary of the temporary construction compound boundary. The construction management plan will ensure that this existing surface water flow path is not impeded.

In addition, there are two significant flowpaths, shown to be partially at a high risk of surface water flooding, extending across the existing substation site and access road. It is assumed that consideration for these flood extents has been given at the time of construction, evidenced by a ditch along the southern boundary which is assumed to divert flows around the perimeter of the site before reconverging with a tributary of the River Elwy to the north.

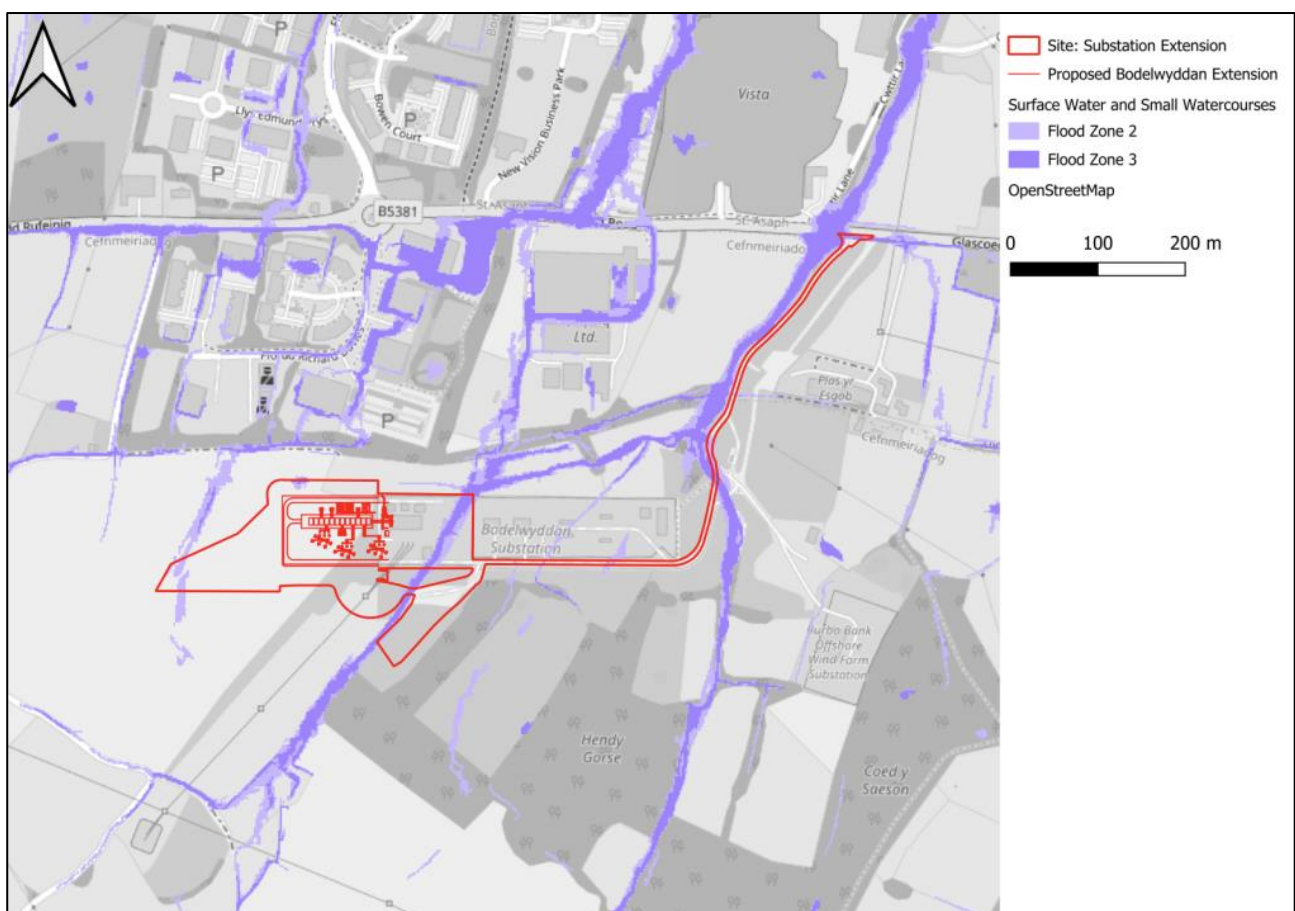


Figure 3: Natural Resources Wales Local Flood Risk from Surface Water - Flood Zones 2 and 3

⁴ Welsh Government (2025). DataMap Wales: Flood Map for Planning: Surface Water and Small Water Courses Flood Zones. Available at : https://datamap.gov.wales/maps/new?layer=inspire-nrw:NRW_FLOODZONE_SURFACE_WATER_AND_SMALL_WATERCOURSES#/ (accessed 16/06/2025)

Environmental Designation and Potential Risks

The proposed development is not within 2km of any environmental designations considered in the Natural Resources Wales Map Viewer⁵, including Sites of Special Scientific Interest, Special Areas of Conservation and Special Protection Areas.

Proposed Drainage Strategy

Compliance with Standard S1 – Surface water runoff destination

The substation is generally unmanned and there is little need for water reuse on the site, therefore rainwater harvesting has been discounted.

A review of the geology confirmed that the site is underlain by Warwickshire Group bedrock comprising mudstone, which is unlikely to be suitable as a sole discharge receptor, but soakaway testing will be undertaken to confirm this.

There are no watercourses in the site boundary. The closest main watercourse is the River Elwy approximately 2.25km to the east. There is a small ordinary watercourse to the northeast of the existing substation and approximately 400 metres from the proposed development which conveys flows north towards the River Clwyd.

It is therefore proposed to connect the surface water drainage system for the substation extension into the existing drainage network serving the adjacent existing substation. This piped network subsequently discharges into a pond to the northeast of the site, which then flows north through small watercourses, eventually draining into the River Clwyd.

Compliance with Standard S2 – Surface Water Runoff Hydraulic Control

Greenfield runoff rates

The site is currently greenfield and therefore the greenfield runoff rate has been estimated and provided in Table 1.

Table 1: Site Greenfield Run-off Rates (taken from Microdrainage)

Return Period	ICP SuDS - Q (litres per second)
Qbar	2.2
1	1.9
30	3.8
100	4.7

In order to ensure no increase in runoff rates, flows connecting into the adjacent drainage network will be restricted to the Qbar (mean annual maximum flow rate) runoff rate of 2.2 litres per second, for all events up to and including the 1 in 100 year event including a 40% allowance for climate change.

To achieve this restriction, storage onsite will be required to attenuate flows. This will be provided through an attenuation tank which will accommodate the runoff from the roofs of buildings proposed as part of the

⁵ Natural Resources Wales (2023). Interactive Map Viewer. Available at:
<https://experience.arcgis.com/experience/dd852f0e12864928973e3e165a1b4631/> (accessed 16/06/2025)

proposed development. This will accommodate a volume of 95 cubic metres and be 221m² with 0.4 metres depth. A Hydro-Brake (or similar approved) will be at the outfall to restrict flows prior to connecting into the existing drainage network serving the adjacent existing substation.

Whereas more sustainable drainage systems have been considered, due to the operational use of the site, with clearance required from assets, it is not practical to incorporate SuDS.

All non-hard standing areas in the site will be made up of a permeable gravel capping or chippings which will allow rainwater to drain into the ground. It is proposed that the access roads will also drain to this permeable gravel. This mimics the drainage strategy for the adjacent substation site.

The drainage proposals are shown on the drainage layout provided as Appendix B with associated calculations provided as Appendix C.

Compliance with Standard S3 – Water Quality

To ensure there is no detriment in water quality as part of the proposals, The SuDS Manual mitigation index has been reviewed to ensure that drainage features meet or exceed the pollution hazard index for the land type. There are no oily water assets proposed as part of the extension; therefore the land uses applicable to the extension are commercial roofs and low trafficked roads, the pollution indices and mitigation for which are demonstrated in Tables 2 to 5.

Commercial Roofs

Table 2: Pollution Hazard Indices based on land uses in the proposed development

Land Use	Pollution hazard level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other roofs (typically commercial or industrial roofs)	Low	0.3	0.2	0.05

The roof drainage will discharge via piped network into the drainage network of the adjacent existing substation (via an attenuation tank), which ultimately discharges via an existing interceptor into a pond to the northeast of the existing substation site.

Table 3: Simple SuDS Mitigation Index for proposed mitigation methods

	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Pond	0.7	0.7	0.5

The above demonstrates that the pond provides sufficient mitigation for the roof.

Low Traffic roads

Table 4: Pollution Hazard Indices based on land use in the proposed development

Land Use	Pollution hazard level	TSS	Metals	Hydrocarbons
Low traffic roads i.e. <300 traffic movements per day	Low	0.5	0.4	0.4

The roads will be designed to fall towards the permeable gravels in the site, which will act as a permeable paving feature.

Table 5: Simple SuDS Mitigation Index for proposed mitigation methods

	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Pervious pavement	0.7	0.6	0.7

The above demonstrates that the permeable paving provides sufficient mitigation for the low trafficked roads.

Compliance with Standard S4 – Amenity and Compliance with Standard S5 Biodiversity

The proposed development, like the adjacent existing substation, will be an operational substation with assets that require clearance for safety purposes. Introduction of landscaped areas to this site would require frequent maintenance at the site to ensure no interaction with assets, and the introduction of biodiversity could be hazardous for both the site and for any introduced flora and fauna.

There is therefore no scope to propose amenity or biodiversity improvements due to the constraints of the site. However, the drainage strategy demonstrates there will be no increase in runoff rate or increase in pollutant loading to ensure no detriment to downstream biodiversity.

Compliance with Standard S6 – Construction and Maintenance

It will be the responsibility of NGET to maintain effective drainage measures and rectify drainage measures that are not functioning adequately in the site.

Management and maintenance of features

All catchpits and manholes in the existing surface water drainage system will need to be opened periodically to facilitate inspections. Typically, such inspections should be undertaken half yearly and should include inspecting inlet and outlet pipework and any associated control system for blockages, clogging, standing water and structural damage. It is noted that catchpits will be provided with a sump at the bottom to retain sediments and prevent them entering the carrier drains.

Blockages can be cleared and sediments removed from carrier drains by jetting high pressure water through the affected carrier drains or inserting rodding equipment either through rodding eyes or at manholes and catchpits. Manual rodding can be undertaken for small scale silt build-up. The location of proposed rodding

eyes needs to be confirmed as part of the detailed design. Similar maintenance would be required for any sealed surface water carrier drains.

Maintenance requirements for the attenuation tank will be referenced in supporting documents provided by the manufacturer but will typically include being kept clear of litter and debris, while the inlets and outlets should be checked and cleared of sediment build up as and when required. Condition assessment may be required typically every five years to ensure the structural integrity of the tank including associated remedial works.

NGET employ specialist external contractors to carry out regular and periodic inspections and maintenance of their drainage systems, including the specialist emptying and cleaning of their interceptors.

Construction management plan

During construction, surface water runoff will require to be managed during all phases to avoid silt-laden or contaminated water run-off.

Construction stage water management proposals will be developed by the Principal Contractor for the upgrade works in a Pollution Prevention Plan. NGET will monitor and enforce this requirement.

Conclusion

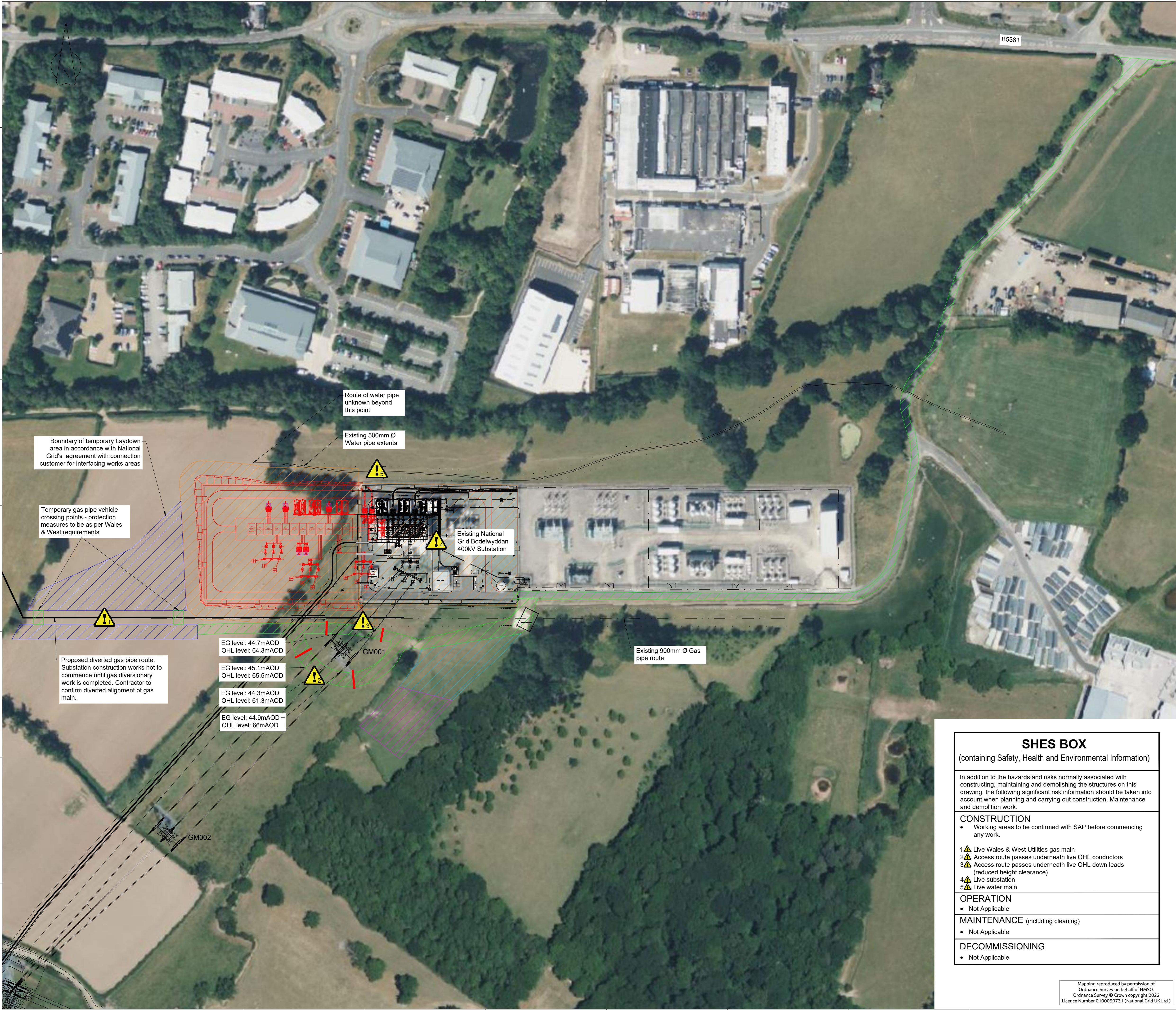
Given that there will be an increase in impermeable area as part of the proposals for an extension to the existing Bodelwyddan substation, a drainage strategy has been proposed to ensure that there is no increase in runoff rates or pollutants as part of the proposals. The proposals are in line with the Welsh Government Advice note and the statutory national standards for sustainable drainage solutions.

The drainage strategy will comprise a piped network to convey flows from the roof into an attenuation tank in the site. This will then discharge into the existing piped network, via a Hydro-Brake (or similar approved) which will restrict rates to the greenfield runoff rate, in the adjacent site which subsequently discharges into a pond in the northeast.

All non-hardstanding areas in the site are made up of a permeable gravel capping which allows rainwater to drain into the ground. It is proposed that the access roads will also drain to the permeable areas.

Maintenance of the features will be undertaken by NGET for the lifetime of the development.

Appendix A – Proposed Development



NOTES

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11. ALIGNMENTS OF THE UTILITIES ARE INDICATIVE AND ARE TO BE CONFIRMED BY THE CONTRACTOR WHERE IN THE WORKING AREA.

LEGEND

- EXISTING EQUIPMENT
- NEW EQUIPMENT/CIVIL WORKS
- GS6 GOALPOSTS
- TEMPORARY PARKING AREA
- TEMPORARY CONTRACTOR ACCESS TRACK
- SITE CDM WORKING AREA
- STORAGE / LAYDOWN AREA
- WELFARE AND OFFICES AREA

REFERENCE

PDD-32281-LAY-012
PDD-32281-LAY-016
28_NG_0409

PLANT LAYOUT - STAGE 2 WORKS - SHEET 1 OF 2
PLANT LAYOUT - STAGE 2 WORKS - SHEET 2 OF 2
LINE PROFILE - TOWERS BODELWYDDAN TO 4ZB167R

SHES BOX

(containing Safety, Health and Environmental Information)

In addition to the hazards and risks normally associated with constructing, maintaining and demolishing the structures on this drawing, the following significant risk information should be taken into account when planning and carrying out construction, Maintenance and demolition work.

CONSTRUCTION

- Working areas to be confirmed with SAP before commencing any work.

- 1. Live Wales & West Utilities gas main
- 2. Access route passes underneath live OHL conductors
- 3. Access route passes underneath live OHL down leads (reduced height clearance)
- 4. Live substation
- 5. Live water main

OPERATION

- Not Applicable

MAINTENANCE (including cleaning)

- Not Applicable

DECOMMISSIONING

- Not Applicable

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Master Scheme No: 32281
Sub-Scheme No: B31000G6
Site: BODELWYDDAN 400kV SUBSTATION

Scheme Name: Bodelwyddan Generation Connection

Document Title: CDM PLAN
SUBSTATION EXTENSION

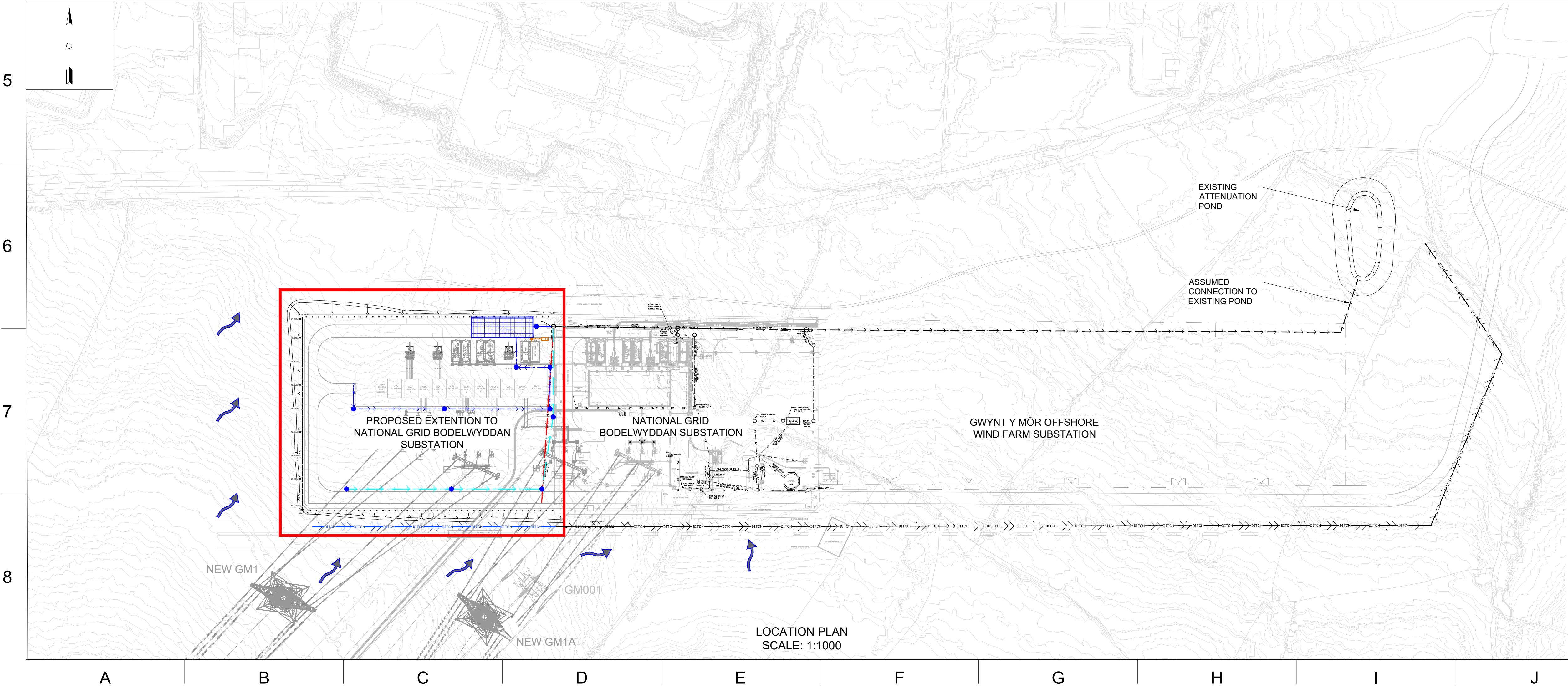
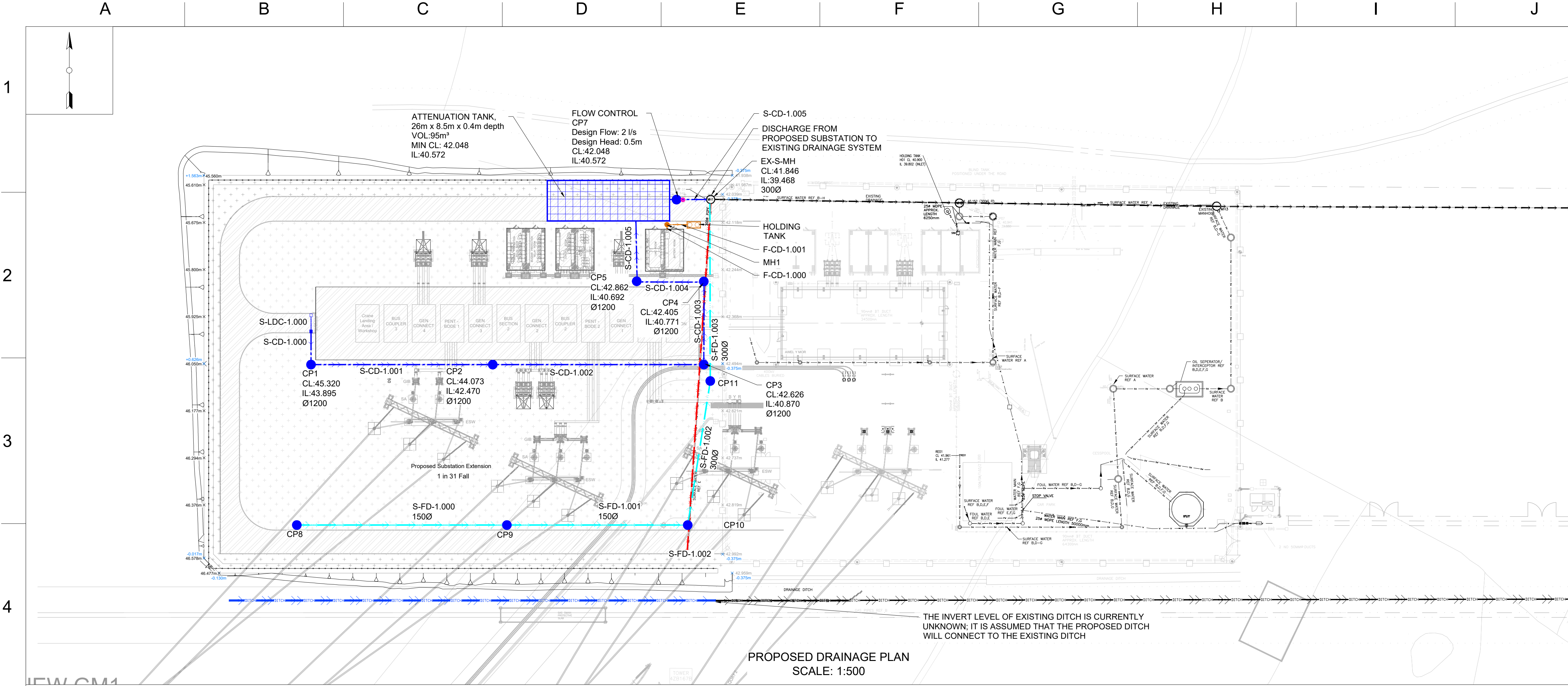
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Date: 02/04/25
Checked by: CT
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Approved by: BG
Date: 02/04/25

Development Eng: AP
Document Type: DWG
Scale: 1:1250
Format: A1
Sheet(s): 1
Rev: P01

National Grid Drawing Number: PDD-32281-LAY-109

Originator Drawing Number: B31000G6-JAC-14-XX-DR-C-0005

Appendix B – Drainage Layout



NOTES

- Do not scale from this drawing.
- All dimensions are in millimetres and levels in metres AOD (relative to Ordnance Datum Newlyn) unless otherwise stated.
- Drawing is to be printed in colour.
- This is a 4.3 drawing and is for development purposes only.
- Any drawing errors or discrepancies should be brought to the attention of Jacobs.
- All work to be in accordance with NG Specification: TS 2.10.09 Site Drainage Specification.
- Site finish around all foundations shall be min 75mm thick chippings over minimum of 300mm sub-base Type 3 compacted in accordance with SHW.
- All drainage system are to be constructed in accordance with CIRIA 753, the SuDS Manual (2015).
- All spatial coordinates relate to the Ordnance Survey, British National Grid (OSGB36).
- Installation of all Proprietary products as per the Suppliers Manufacturer Guidelines and Recommendations.
- A Hydro Brake has been proposed as part of the strategy to ensure there is no increase in runoff rates as part of the proposals. Refer to the SuDS Approval Body Pre-Application Drainage Statement for details.
- As per the National Grid guidance TS 2.10.09 all access roads will have sufficient cross fall to drain into the adjacent stone surfacing.

LEGEND

- Proposed Surface Water Carrier Drain
- Proposed Surface Water Filter Drain
- Proposed Chamber
- Proposed Chamber with Flow Control Device
- Proposed Headwall
- Proposed Ditch
- Existing Attenuation Pond
- Proposed Attenuation Tank
- Proposed Foul Water Pipe
- Proposed Foul Water Chamber
- Proposed Cesspool
- Proposed Impermeable Area Road and Roof
- Proposed Permeable Platform
- 300mm minimum type 3 granular material. See note 12
- Cut / Fill Earthworks
- Fence
- Existing Filter drain to be removed
- Existing Drainage
- Existing Ditch
- Flow Routes

REFERENCE

Rev	Description	Cre'd	Chk'd	App'd	Date
P01	Issued for information	MR	AW	KW	13/06/25

nationalgrid

Master Scheme No: 32281 Sub-Scheme No: B31000G6 Site: BODELWYDDAN 400KV SUBSTATION

Scheme Name: Bodelwyddan Generation Connection

Document Title: DRAINAGE LAYOUT
MARES & AWEL-Y-MOR EXTENSION
BODELWYDDAN 400KV SUBSTATION

Created by:	Date:	Checked by:	Date:	Approved by:	Date:
MR	13/06/25	AW	13/06/25	KW	13/06/25


Development Eng: AP Document Type: DWG Scale: 1:500 Format: A1 Sheet(s): 1 OF 1 Rev: P01

National Grid Drawing Number:

Originator Drawing Number:
B31000G6-JAC-18-XX-DR-D-0001

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Appendix C – Drainage Calculations

Jacobs Engineering Limited		Page 1
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Date 05/06/2025 11:03	Designed by RuppenM2	
File	Checked by	
Innovyze	Source Control 2020.1.3	
<p style="text-align: center;"><u>ICP SUDS Mean Annual Flood</u></p> <p style="text-align: center;">Input</p> <p>Return Period (years) 100 Soil 0.300</p> <p>Area (ha) 0.913 Urban 0.000</p> <p>SAAR (mm) 880 Region Number Region 9</p> <p style="text-align: center;">Results 1/s</p> <p>QBAR Rural 2.2</p> <p>QBAR Urban 2.2</p> <p>Q100 years 4.7</p> <p>Q1 year 1.9</p> <p>Q30 years 3.8</p> <p>Q100 years 4.7</p>		
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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm








Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	17.200	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.600
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.70
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	38.631	1.425	27.1	0.024	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	44.869	1.600	28.0	0.063	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	17.796	0.099	179.8	0.063	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	14.273	0.079	180.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	12.705	0.071	178.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	9.813	0.049	200.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	7.236	0.061	118.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	43.22	5.26	43.895	0.024	0.0	0.0	0.0	2.52	100.3	2.8
S1.001	42.20	5.56	42.470	0.087	0.0	0.0	0.0	2.48	98.6	10.0
S1.002	41.22	5.86	40.870	0.150	0.0	0.0	0.0	0.97	38.6	16.8
S1.003	40.47	6.11	40.771	0.150	0.0	0.0	0.0	0.97	38.5	16.8
S1.004	39.84	6.32	40.692	0.150	0.0	0.0	0.0	0.97	38.7	16.8
S1.005	39.33	6.50	40.621	0.150	0.0	0.0	0.0	0.92	36.6	16.8
S1.006	39.05	6.60	40.572	0.150	0.0	0.0	0.0	1.20	47.7	16.8

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Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Roof	100	0.024	0.024	0.024
1.001	Classification	Roof	100	0.063	0.063	0.063
1.002	Classification	Roof	100	0.063	0.063	0.063
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.150	0.150	0.150

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	----------	--------

S1.006 S 41.846 40.511 0.000 0 0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.200	Storm Duration (mins)	30
Ratio R	0.350		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S7, DS/PN: S1.006, Volume (m³): 2.0

Unit Reference

MD-SHE-0074-2000-0500-2000

Design Head (m)

0.500

Design Flow (l/s)

2.0

Flush-Flo™

Calculated

Objective

Minimise upstream storage

Application

Surface

Sump Available

Yes

Diameter (mm)

74

Invert Level (m)

40.572

Minimum Outlet Pipe Diameter (mm)

100

Suggested Manhole Diameter (mm)

1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	2.0	Kick-Flo®	0.342	1.7
Flush-Flo™	0.149	2.0	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	0.800	2.5	2.000	3.8	4.000	5.2	7.000	6.8
0.200	2.0	1.000	2.7	2.200	3.9	4.500	5.5	7.500	7.1
0.300	1.8	1.200	3.0	2.400	4.1	5.000	5.8	8.000	7.3
0.400	1.8	1.400	3.2	2.600	4.3	5.500	6.1	8.500	7.5
0.500	2.0	1.600	3.4	3.000	4.6	6.000	6.3	9.000	7.8
0.600	2.2	1.800	3.6	3.500	4.9	6.500	6.6	9.500	8.0

Storage Structures for Storm

Tank or Pond Manhole: S7, DS/PN: S1.006

Invert Level (m) 40.572

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	237.5	0.400	237.5	0.401	0.0

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
S1.000	S1	1.612	1.488	0.000	3.100
S1.001	S2	1.813	1.736	0.000	3.549
S1.002	S3	1.986	0.660	0.000	2.646
S1.003	S4	1.848	0.520	0.000	2.368
S1.004	S5	2.454	0.457	0.000	2.912
S1.005	S6	1.977	0.342	0.000	2.319
S1.006	S7	1.669	0.264	95.079	97.012
Total		13.359	5.468	95.079	113.906



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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.200 Cv (Summer) 1.000
Region England and Wales Ratio R 0.350 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 40, 40

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
S1.000	S1	15 Summer		1	+0%					43.923	-0.197	0.000
S1.001	S2	15 Summer		1	+0%	100/15 Summer				42.522	-0.173	0.000
S1.002	S3	15 Summer		1	+0%	30/15 Summer				40.989	-0.106	0.000
S1.003	S4	15 Summer		1	+0%	30/15 Summer				40.890	-0.106	0.000
S1.004	S5	15 Summer		1	+0%	30/15 Summer				40.813	-0.104	0.000
S1.005	S6	15 Summer		1	+0%	30/15 Summer				40.749	-0.097	0.000
S1.006	S7	480 Summer		1	+0%	30/120 Summer				40.647	-0.150	0.000

				Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded		
S1.000	S1	0.04			3.5	OK			
S1.001	S2	0.12			11.1	OK			
S1.002	S3	0.54			18.7	OK			
S1.003	S4	0.55			18.6	OK			
S1.004	S5	0.56			18.6	OK			
S1.005	S6	0.61			18.6	OK			
S1.006	S7	0.05			1.6	OK			



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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
 Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.200 Cv (Summer) 1.000
 Region England and Wales Ratio R 0.350 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status OFF
 Inertia Status OFF

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 40, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level	Surcharged Depth	Flooded Volume
									(m)	(m)	(m³)
S1.000	S1	15 Summer	30	+40%					43.948	-0.172	0.000
S1.001	S2	15 Summer	30	+40%	100/15 Summer				42.583	-0.112	0.000
S1.002	S3	15 Summer	30	+40%	30/15 Summer				42.001	0.906	0.000
S1.003	S4	15 Summer	30	+40%	30/15 Summer				41.621	0.625	0.000
S1.004	S5	15 Summer	30	+40%	30/15 Summer				41.305	0.388	0.000
S1.005	S6	15 Summer	30	+40%	30/15 Summer				41.020	0.174	0.000
S1.006	S7	360 Summer	30	+40%	30/120 Summer				40.843	0.046	0.000

PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Half Drain Time (mins)	Pipe Flow (l/s)	Status	Level
							Exceeded
S1.000	S1	0.13			11.9	OK	
S1.001	S2	0.50			46.8	OK	
S1.002	S3	1.99			69.0	SURCHARGED	
S1.003	S4	1.97			66.4	SURCHARGED	
S1.004	S5	2.00			66.8	SURCHARGED	
S1.005	S6	2.19			66.6	SURCHARGED	
S1.006	S7	0.06			2.0	SURCHARGED	



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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.200 Cv (Summer) 1.000
Region England and Wales Ratio R 0.350 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 40, 40

										Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)	
S1.000	S1	15 Summer	100	+40%					43.956	-0.164	0.000	
S1.001	S2	15 Summer	100	+40%	100/15 Summer				42.908	0.213	0.000	
S1.002	S3	15 Summer	100	+40%	30/15 Summer				42.498	1.403	0.000	
S1.003	S4	15 Summer	100	+40%	30/15 Summer				41.950	0.954	0.000	
S1.004	S5	15 Summer	100	+40%	30/15 Summer				41.512	0.595	0.000	
S1.005	S6	15 Summer	100	+40%	30/15 Summer				41.120	0.274	0.000	
S1.006	S7	360 Winter	100	+40%	30/120 Summer				40.952	0.155	0.000	

					Half Drain	Pipe			Level
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded		
S1.000	S1	0.16			15.4	OK			
S1.001	S2	0.59			55.3	SURCHARGED			
S1.002	S3	2.35			81.3	FLOOD RISK			
S1.003	S4	2.35			79.2	SURCHARGED			
S1.004	S5	2.37			79.1	SURCHARGED			
S1.005	S6	2.59			78.7	SURCHARGED			
S1.006	S7	0.06			2.0	SURCHARGED			

Appendix U. Drainage Statement

SuDS Approval Body Pre-Application Drainage Statement

Date:	18 June 2025	The West Wing
Project name:	Bodelwyddan Substation Extension	1 Glass Wharf
Project no:	B24416603	Bristol, BS2 0EL
Company:	National Grid Electricity Transmission	United Kingdom
Prepared by:	EO	T +44 (0)117 457 2500
Reviewed by:	JE	https://www.jacobs.com/

Background

National Grid Electricity Transmission (NGET) have commissioned Jacobs to prepare a Drainage Statement to accompany the Denbighshire County Council SuDS Approval Body application (where SuDS refers to sustainable drainage system). The SuDS Approval Body application supports the planning application under the Town and Country Planning Act 1990 for an extension to the existing Bodelwyddan electricity substation and to upgrade the fence ('the proposed development').

The Welsh Government Advice note¹ states that SuDS Approval Body applications are required by law in Wales for any construction plan areas exceeding 100 square metres (m²). The advice note is to be read in conjunction with the Welsh Government's 'Statutory national standards for sustainable drainage systems'² which outlines six standards (S1-S6) in which applicants must demonstrate compliance.

Site Location

The site of the proposed development is immediately to the west of the existing substation, to the south of St. Asaph Business Park, and approximately 2 kilometres (km) west of St. Asaph, centred at Ordnance Survey Grid Reference SJ017735 and shown in Figure 1. The site sits within the Trefnant ward of Denbighshire County Council. The majority of land surrounding the substation is used as farmland, with a commercial business park, roads, and some residential areas to the north.

¹ Welsh Government (2022). Welsh Government Advice Note: SAB Applications for Single Dwellings, Extensions, and Parking and Access Areas. Available at: <https://www.gov.wales/sites/default/files/publications/2022-07/advice-note-sab-applications-for-single-dwellings-extensions-and-parking-and-access-areas.pdf> (accessed 16/06/2025)

² Welsh Government (2018). Statutory standards for sustainable drainage systems – designing, constructing, operating and maintaining surface water drainage systems. Available at : <https://www.gov.wales/sites/default/files/publications/2019-06/statutory-national-standards-for-sustainable-drainage-systems.pdf> (accessed 16/06/2025)

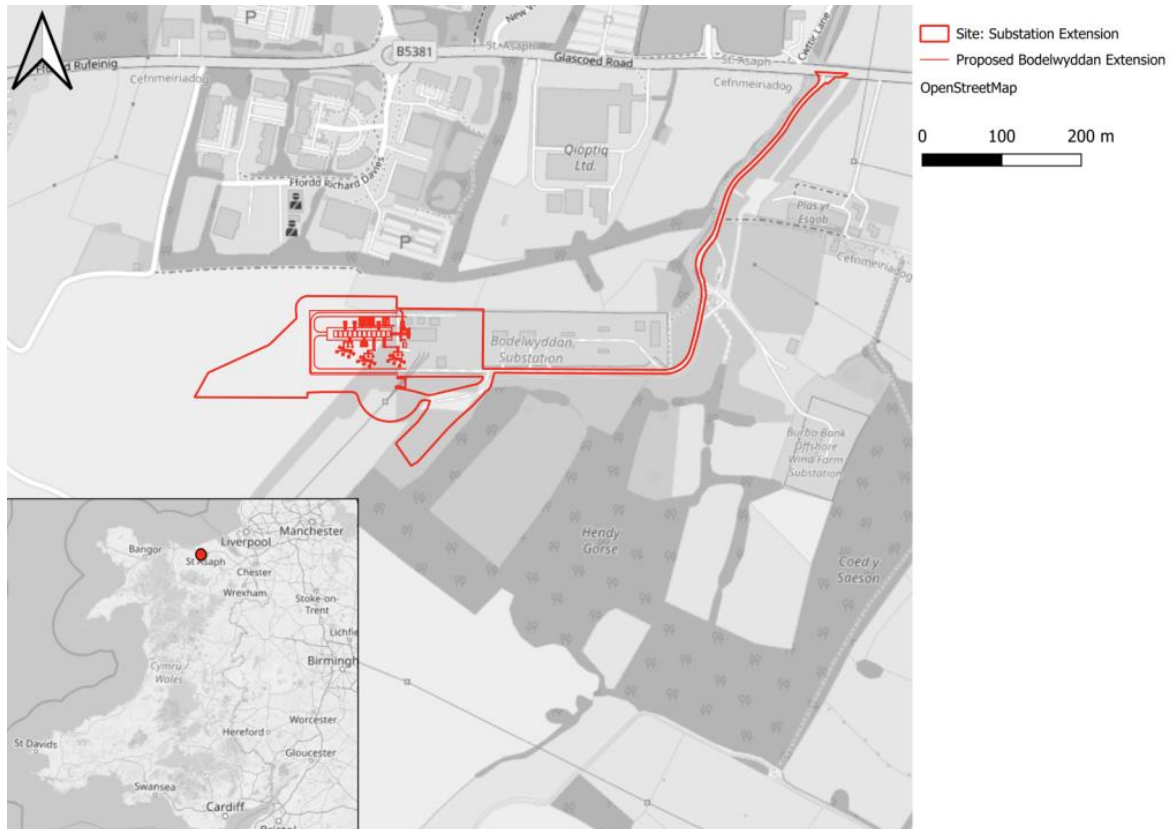


Figure 1: Site Boundary of Bodelwyddan Substation Extension

Proposed Works

The proposed development comprises an extension to the existing Bodelwyddan substation. This extends the substation directly west of the existing site. NGET operates the existing Bodelwyddan 400 kilovolt substation and is required to extend the existing substation to accommodate connection requests. The proposed development would be comprised of the following elements:

- Construction of a new bay and installation of new equipment in the existing substation under permitted development rights to allow connection of new generation prior to the substation extension;
- An extension outside the current operational demise of the substation to accommodate further connections, with a new fence;
- An upgrade to the fence around the existing substation so that it will match that for the substation extension; and
- Construction of two overhead lines which will connect to the substation.

This Drainage Statement specifically refers to the substation extension. The fence upgrade to the existing substation will not materially affect flood risk and the permanent works in the proposed overhead line changes fall below the 100m² threshold. Appendix A shows a drawing of the proposed development which comprises of the following:

- Telecommunications room – houses the communications connection which allows a connection to the control room and other substations for safety reasons;
- Control room – houses the relays, protection and control panels;

- Busbar protection relay room – houses the protection, control and supervision for busbar which conducts electricity;
- Battery room – facility used to house batteries for backup or uninterruptible power systems;
- Feeder protection relay room – houses the protection for overhead lines and cables to ensure the power grid continues to supply energy;
- Low voltage alternating current room – houses the Low voltage alternating current supply distribution board; and
- Overhead line connection infrastructure and other infrastructure to support contracted user assets.

The substation extension permanent works comprise approximately 0.9ha.

Assessment of Flood Risk

An assessment of flood risk has been conducted as part of the accompanying Flood Consequences Assessment which will be submitted to Denbighshire County Council and can be read alongside this technical note.

Flood Risk from Rivers and the Sea

The Natural Resources Wales Flood Map for Planning³, an extract of which is provided as Figure 2, indicates that the entire site, and surrounding area, is in Flood Zone 1 – low risk, corresponding to a less than 1-in-1000 year (plus climate change) chance of flooding each year.

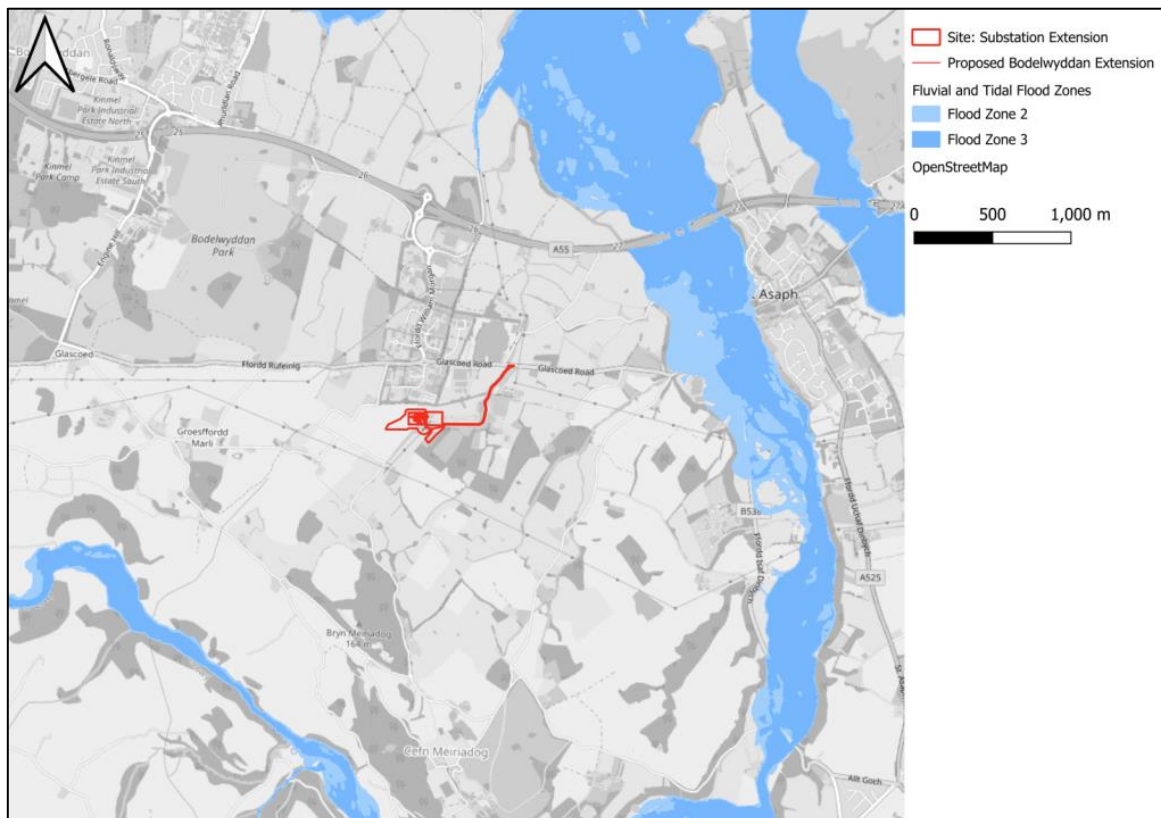


Figure 2: Natural Resources Wales Local Flood Risk from Rivers and the Sea - Flood Zones 2 and 3

³ Natural Resources Wales (2025). Flood Map for Planning. Available at : <https://flood-map-for-planning.naturalresources.wales/> (accessed 16/06/2025)

Flood Risk from Surface Water

An extract from Natural Resources Wales's Surface Water and Small Watercourses mapping⁴ is shown in Figure 3. The mapping indicates that there are no permanent assets in surface water and small water courses flood risk extents; however, there are flood extents shown along the western boundary of the temporary construction compound boundary. The construction management plan will ensure that this existing surface water flow path is not impeded.

In addition, there are two significant flowpaths, shown to be partially at a high risk of surface water flooding, extending across the existing substation site and access road. It is assumed that consideration for these flood extents has been given at the time of construction, evidenced by a ditch along the southern boundary which is assumed to divert flows around the perimeter of the site before reconverging with a tributary of the River Elwy to the north.

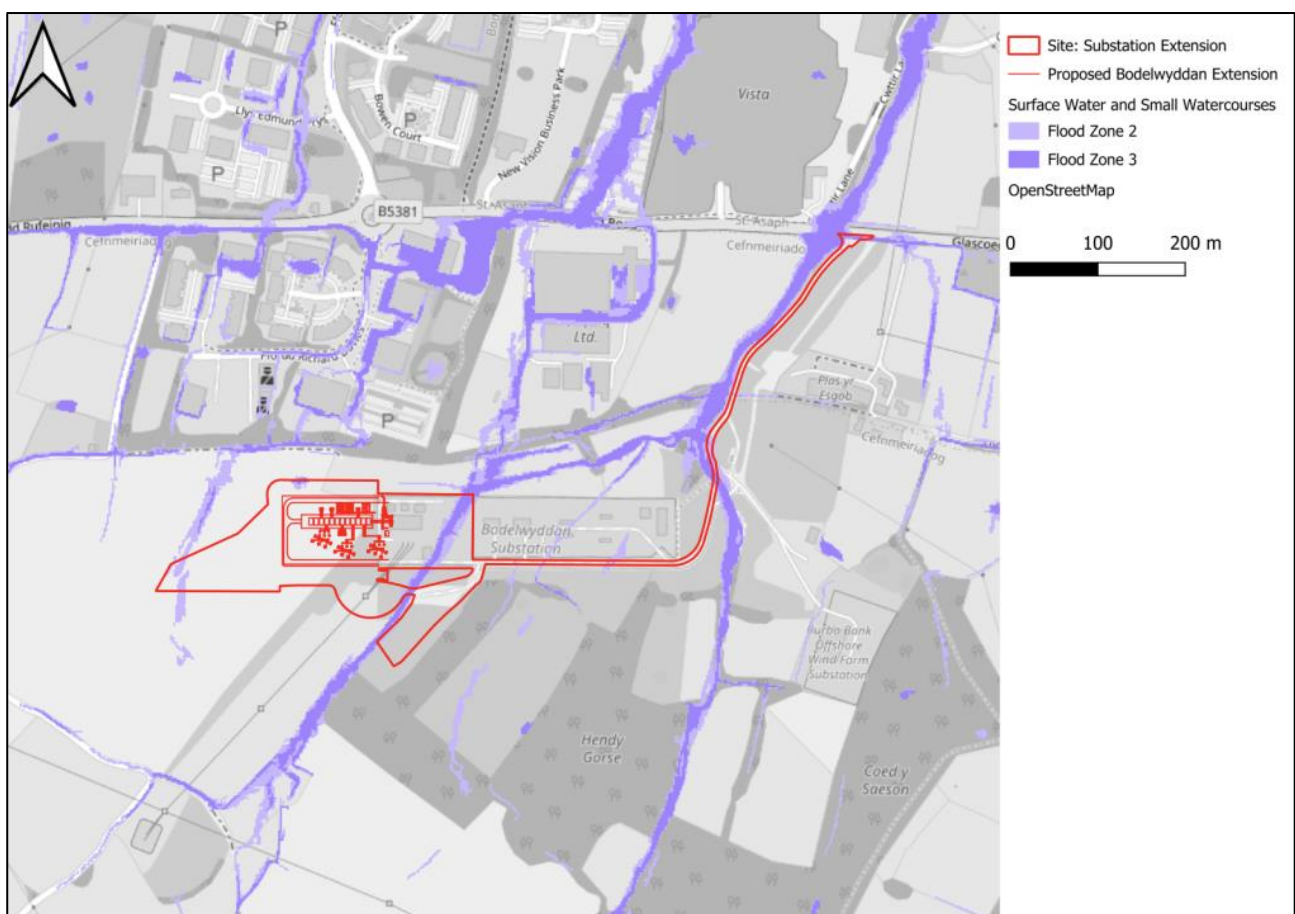


Figure 3: Natural Resources Wales Local Flood Risk from Surface Water - Flood Zones 2 and 3

⁴ Welsh Government (2025). DataMap Wales: Flood Map for Planning: Surface Water and Small Water Courses Flood Zones. Available at : https://datamap.gov.wales/maps/new?layer=inspire-nrw:NRW_FLOODZONE_SURFACE_WATER_AND_SMALL_WATERCOURSES#/ (accessed 16/06/2025)

Environmental Designation and Potential Risks

The proposed development is not within 2km of any environmental designations considered in the Natural Resources Wales Map Viewer⁵, including Sites of Special Scientific Interest, Special Areas of Conservation and Special Protection Areas.

Proposed Drainage Strategy

Compliance with Standard S1 – Surface water runoff destination

The substation is generally unmanned and there is little need for water reuse on the site, therefore rainwater harvesting has been discounted.

A review of the geology confirmed that the site is underlain by Warwickshire Group bedrock comprising mudstone, which is unlikely to be suitable as a sole discharge receptor, but soakaway testing will be undertaken to confirm this.

There are no watercourses in the site boundary. The closest main watercourse is the River Elwy approximately 2.25km to the east. There is a small ordinary watercourse to the northeast of the existing substation and approximately 400 metres from the proposed development which conveys flows north towards the River Clwyd.

It is therefore proposed to connect the surface water drainage system for the substation extension into the existing drainage network serving the adjacent existing substation. This piped network subsequently discharges into a pond to the northeast of the site, which then flows north through small watercourses, eventually draining into the River Clwyd.

Compliance with Standard S2 – Surface Water Runoff Hydraulic Control

Greenfield runoff rates

The site is currently greenfield and therefore the greenfield runoff rate has been estimated and provided in Table 1.

Table 1: Site Greenfield Run-off Rates (taken from Microdrainage)

Return Period	ICP SuDS - Q (litres per second)
Qbar	2.2
1	1.9
30	3.8
100	4.7

In order to ensure no increase in runoff rates, flows connecting into the adjacent drainage network will be restricted to the Qbar (mean annual maximum flow rate) runoff rate of 2.2 litres per second, for all events up to and including the 1 in 100 year event including a 40% allowance for climate change.

To achieve this restriction, storage onsite will be required to attenuate flows. This will be provided through an attenuation tank which will accommodate the runoff from the roofs of buildings proposed as part of the

⁵ Natural Resources Wales (2023). Interactive Map Viewer. Available at:
<https://experience.arcgis.com/experience/dd852f0e12864928973e3e165a1b4631/> (accessed 16/06/2025)

proposed development. This will accommodate a volume of 95 cubic metres and be 221m² with 0.4 metres depth. A Hydro-Brake (or similar approved) will be at the outfall to restrict flows prior to connecting into the existing drainage network serving the adjacent existing substation.

Whereas more sustainable drainage systems have been considered, due to the operational use of the site, with clearance required from assets, it is not practical to incorporate SuDS.

All non-hard standing areas in the site will be made up of a permeable gravel capping or chippings which will allow rainwater to drain into the ground. It is proposed that the access roads will also drain to this permeable gravel. This mimics the drainage strategy for the adjacent substation site.

The drainage proposals are shown on the drainage layout provided as Appendix B with associated calculations provided as Appendix C.

Compliance with Standard S3 – Water Quality

To ensure there is no detriment in water quality as part of the proposals, The SuDS Manual mitigation index has been reviewed to ensure that drainage features meet or exceed the pollution hazard index for the land type. There are no oily water assets proposed as part of the extension; therefore the land uses applicable to the extension are commercial roofs and low trafficked roads, the pollution indices and mitigation for which are demonstrated in Tables 2 to 5.

Commercial Roofs

Table 2: Pollution Hazard Indices based on land uses in the proposed development

Land Use	Pollution hazard level	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Other roofs (typically commercial or industrial roofs)	Low	0.3	0.2	0.05

The roof drainage will discharge via piped network into the drainage network of the adjacent existing substation (via an attenuation tank), which ultimately discharges via an existing interceptor into a pond to the northeast of the existing substation site.

Table 3: Simple SuDS Mitigation Index for proposed mitigation methods

	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Pond	0.7	0.7	0.5

The above demonstrates that the pond provides sufficient mitigation for the roof.

Low Traffic roads

Table 4: Pollution Hazard Indices based on land use in the proposed development

Land Use	Pollution hazard level	TSS	Metals	Hydrocarbons
Low traffic roads i.e. <300 traffic movements per day	Low	0.5	0.4	0.4

The roads will be designed to fall towards the permeable gravels in the site, which will act as a permeable paving feature.

Table 5: Simple SuDS Mitigation Index for proposed mitigation methods

	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Pervious pavement	0.7	0.6	0.7

The above demonstrates that the permeable paving provides sufficient mitigation for the low trafficked roads.

Compliance with Standard S4 – Amenity and Compliance with Standard S5 Biodiversity

The proposed development, like the adjacent existing substation, will be an operational substation with assets that require clearance for safety purposes. Introduction of landscaped areas to this site would require frequent maintenance at the site to ensure no interaction with assets, and the introduction of biodiversity could be hazardous for both the site and for any introduced flora and fauna.

There is therefore no scope to propose amenity or biodiversity improvements due to the constraints of the site. However, the drainage strategy demonstrates there will be no increase in runoff rate or increase in pollutant loading to ensure no detriment to downstream biodiversity.

Compliance with Standard S6 – Construction and Maintenance

It will be the responsibility of NGET to maintain effective drainage measures and rectify drainage measures that are not functioning adequately in the site.

Management and maintenance of features

All catchpits and manholes in the existing surface water drainage system will need to be opened periodically to facilitate inspections. Typically, such inspections should be undertaken half yearly and should include inspecting inlet and outlet pipework and any associated control system for blockages, clogging, standing water and structural damage. It is noted that catchpits will be provided with a sump at the bottom to retain sediments and prevent them entering the carrier drains.

Blockages can be cleared and sediments removed from carrier drains by jetting high pressure water through the affected carrier drains or inserting rodding equipment either through rodding eyes or at manholes and catchpits. Manual rodding can be undertaken for small scale silt build-up. The location of proposed rodding

eyes needs to be confirmed as part of the detailed design. Similar maintenance would be required for any sealed surface water carrier drains.

Maintenance requirements for the attenuation tank will be referenced in supporting documents provided by the manufacturer but will typically include being kept clear of litter and debris, while the inlets and outlets should be checked and cleared of sediment build up as and when required. Condition assessment may be required typically every five years to ensure the structural integrity of the tank including associated remedial works.

NGET employ specialist external contractors to carry out regular and periodic inspections and maintenance of their drainage systems, including the specialist emptying and cleaning of their interceptors.

Construction management plan

During construction, surface water runoff will require to be managed during all phases to avoid silt-laden or contaminated water run-off.

Construction stage water management proposals will be developed by the Principal Contractor for the upgrade works in a Pollution Prevention Plan. NGET will monitor and enforce this requirement.

Conclusion

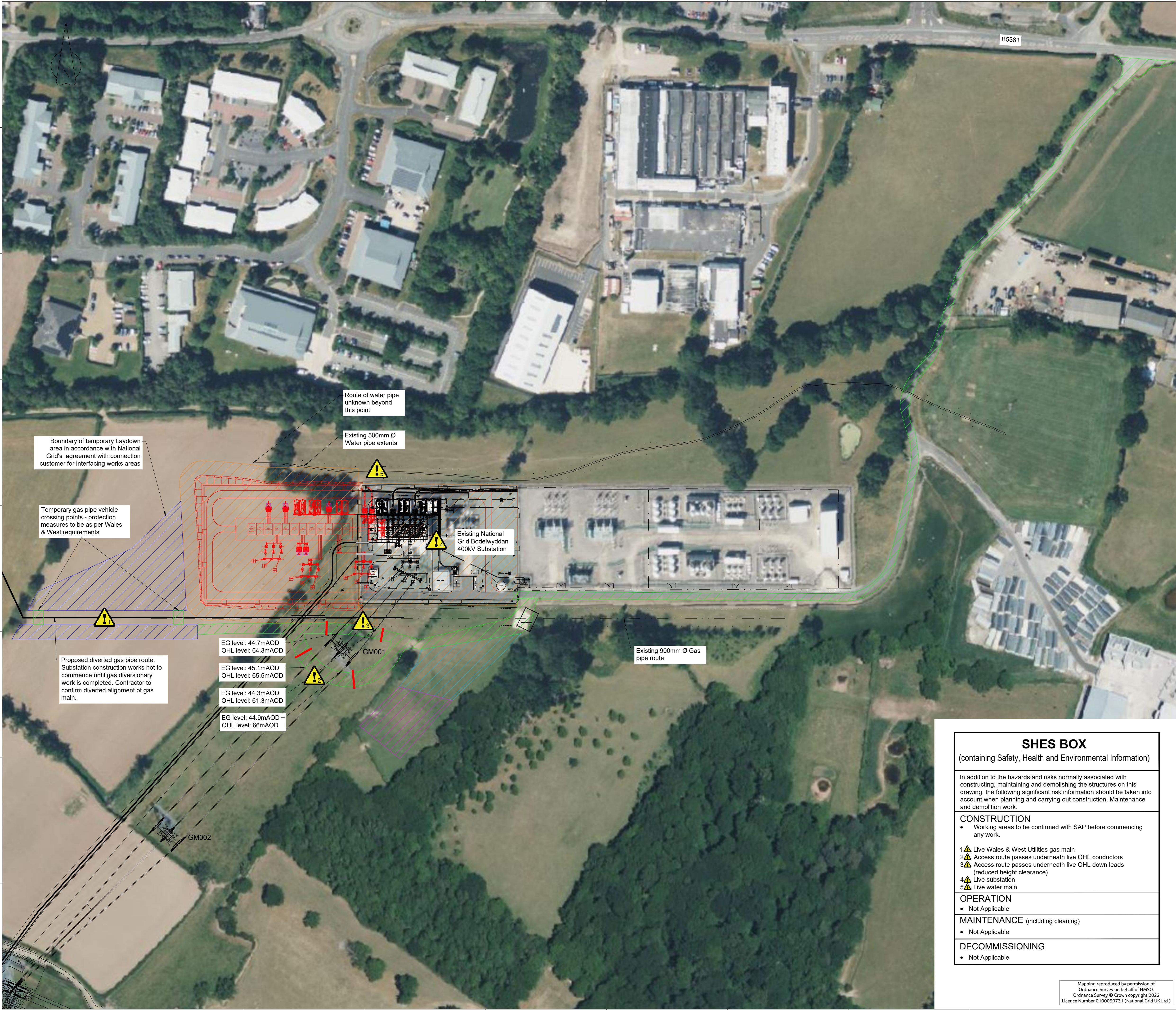
Given that there will be an increase in impermeable area as part of the proposals for an extension to the existing Bodelwyddan substation, a drainage strategy has been proposed to ensure that there is no increase in runoff rates or pollutants as part of the proposals. The proposals are in line with the Welsh Government Advice note and the statutory national standards for sustainable drainage solutions.

The drainage strategy will comprise a piped network to convey flows from the roof into an attenuation tank in the site. This will then discharge into the existing piped network, via a Hydro-Brake (or similar approved) which will restrict rates to the greenfield runoff rate, in the adjacent site which subsequently discharges into a pond in the northeast.

All non-hardstanding areas in the site are made up of a permeable gravel capping which allows rainwater to drain into the ground. It is proposed that the access roads will also drain to the permeable areas.

Maintenance of the features will be undertaken by NGET for the lifetime of the development.

Appendix A – Proposed Development



NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. CDM AREAS ARE SHOWN INDICATIVELY AND MAY BE DEVELOPED AS THE PROJECT PROGRESSES.
3. ALL WORKS WILL BE CARRIED OUT IN ACCORDANCE WITH NATIONAL GRID SAFETY RULES AND PROCEDURES.
4. FOR ADDITIONAL HEALTH AND SAFETY INFORMATION, REFER TO CONSTRUCTION METHOD STATEMENTS.
5. ALL CDM AREAS REQUIRE AGREEMENT WITH NATIONAL GRID SITE SAP PRIOR TO ESTABLISHMENT.
6. HERAS FENCING TO SURROUND SITE, INCLUDING COMPOUND AND LAYDOWN AREAS.
7. ACCESS ROUTES SUBJECT TO AGREEMENT BETWEEN NG AND LANDOWNERS.
8. FOR OHL WORKING AREAS, REFER TO "CDM PLAN - OHL WORKS".
9. OVERHEAD LINE CLEARANCES FROM GROUND LEVEL HAVE BEEN READ FROM LINE PROFILE DRAWING 28/NG/0409.
10. WORKS WITHIN 10m OF THE GAS AND WATER MAIN ARE TO BE NOTED TO RESPECTIVE OWNER.
11. ALIGNMENTS OF THE UTILITIES ARE INDICATIVE AND ARE TO BE CONFIRMED BY THE CONTRACTOR WHERE IN THE WORKING AREA.

LEGEND

- EXISTING EQUIPMENT
- NEW EQUIPMENT/CIVIL WORKS
- GS6 GOALPOSTS
- TEMPORARY PARKING AREA
- TEMPORARY CONTRACTOR ACCESS TRACK
- SITE CDM WORKING AREA
- STORAGE / LAYDOWN AREA
- WELFARE AND OFFICES AREA

REFERENCE

PDD-32281-LAY-012
PDD-32281-LAY-016
28_NG_0409

PLANT LAYOUT - STAGE 2 WORKS - SHEET 1 OF 2
PLANT LAYOUT - STAGE 2 WORKS - SHEET 2 OF 2
LINE PROFILE - TOWERS BODELWYDDAN TO 4ZB167R

SHES BOX

(containing Safety, Health and Environmental Information)

In addition to the hazards and risks normally associated with constructing, maintaining and demolishing the structures on this drawing, the following significant risk information should be taken into account when planning and carrying out construction, Maintenance and demolition work.

CONSTRUCTION

- Working areas to be confirmed with SAP before commencing any work.

- 1⚠️ Live Wales & West Utilities gas main
- 2⚠️ Access route passes underneath live OHL conductors
- 3⚠️ Access route passes underneath live OHL down leads (reduced height clearance)
- 4⚠️ Live substation
- 5⚠️ Live water main

OPERATION

- Not Applicable

MAINTENANCE (including cleaning)

- Not Applicable

DECOMMISSIONING

- Not Applicable

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nationalgrid

Master Scheme No: 32281
Sub-Scheme No: B31000G6
Site: BODELWYDDAN 400kV SUBSTATION

Scheme Name: Bodelwyddan Generation Connection

Document Title: CDM PLAN
SUBSTATION EXTENSION

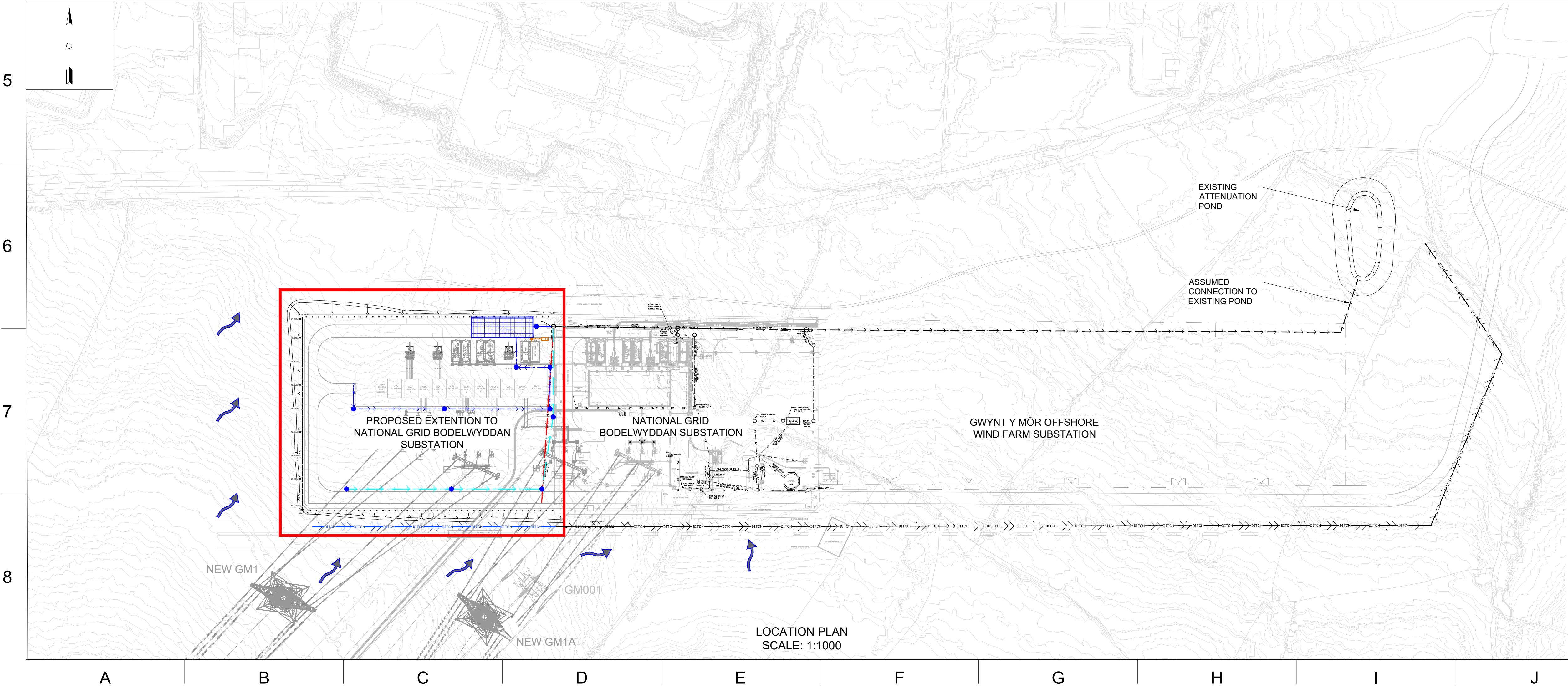
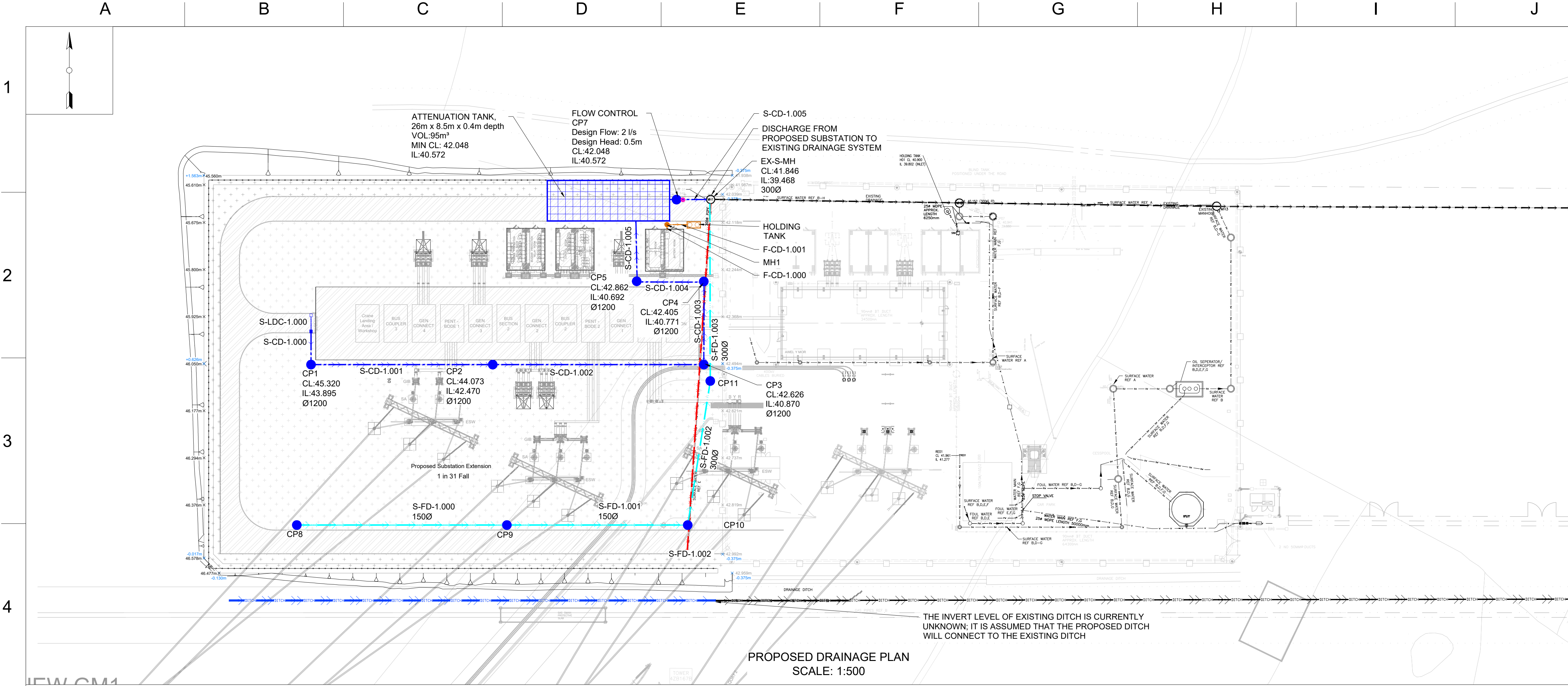
Created by: RW
Date: 02/04/25
Checked by: CT
Date: 02/04/25
Approved by: BG
Date: 02/04/25

Development Eng: AP
Document Type: DWG
Scale: 1:1250
Format: A1
Sheet(s): 1
Rev: P01

National Grid Drawing Number:
PDD-32281-LAY-109

Originator Drawing Number:
B31000G6-JAC-14-XX-DR-C-0005

Appendix B – Drainage Layout



NOTES

1. Do not scale from this drawing.
2. All dimensions are in millimetres and levels in metres AOD (relative to Ordnance Datum Newlyn) unless otherwise stated.
3. Drawing is to be printed in colour.
4. This is a 4.3 drawing and is for development purposes only.
5. Any drawing errors or discrepancies should be brought to the attention of Jacobs.
6. All work to be in accordance with NG Specification: TS 2.10.09 Site Drainage Specification.
7. Site finish around all foundations shall be min 75mm thick chippings over minimum of 300mm sub-base Type 3 compacted in accordance with SHW.
8. All drainage system are to be constructed in accordance with CIRIA 753, the SuDS Manual (2015).
9. All spatial coordinates relate to the Ordnance Survey, British National Grid (OSGB36).
10. Installation of all Proprietary products as per the Suppliers Manufacturer Guidelines and Recommendations.
11. A Hydro Brake has been proposed as part of the strategy to ensure there is no increase in runoff rates as part of the proposals. Refer to the SuDS Approval Body Pre-Application Drainage Statement for details.
12. As per the National Grid guidance TS 2.10.09 all access roads will have sufficient cross fall to drain into the adjacent stone surfacing.

LEGEND

- Proposed Surface Water Carrier Drain
- Proposed Surface Water Filter Drain
- Proposed Chamber
- Proposed Chamber with Flow Control Device
- Proposed Headwall
- Proposed Ditch
- Existing Attenuation Pond
- Proposed Attenuation Tank
- Proposed Foul Water Pipe
- Proposed Foul Water Chamber
- Proposed Cesspool
- Proposed Impermeable Area Road and Roof
- Proposed Permeable Platform
- 300mm minimum type 3 granular material. See note 12
- Cut / Fill Earthworks
- Fence
- Existing Filter drain to be removed
- Existing Drainage
- Existing Ditch
- Flow Routes

REFERENCE


P01	Issued for information	MR	AW	KW	13/06/25
Rev	Description	Cre'd	Chk'd	App'd	Date

nationalgrid

Master Scheme No:	Sub-Scheme No:	Site:
32281	B31000G6	BODELWYDDAN 400KV SUBSTATION
Scheme Name:		
Bodelwyddan Generation Connection		
Document Title:		
DRAINAGE LAYOUT		
MARES & AWEL-Y-MOR EXTENSION		
BODELWYDDAN 400KV SUBSTATION		
Created by:	Date:	Checked by:
MR	13/06/25	AW
Development Eng:	Document Type:	Scale:
AP	DWG	1:500
National Grid Drawing Number:		Format:
		A1
		Sheet(s):
		1 OF 1
		Rev:
		P01

Originator Drawing Number:
B31000G6-JAC-18-XX-DR-D-0001

Appendix C – Drainage Calculations

Jacobs Engineering Limited		Page 1
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Date 05/06/2025 11:03	Designed by RuppenM2	
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Innovyze	Source Control 2020.1.3	
<div>ICP SUDS Mean Annual Flood</div> <div>Input</div> <div>Return Period (years) 100 Soil 0.300</div> <div>Area (ha) 0.913 Urban 0.000</div> <div>SAAR (mm) 880 Region Number Region 9</div> <div>Results 1/s</div> <div>QBAR Rural 2.2</div> <div>QBAR Urban 2.2</div> <div>Q100 years 4.7</div> <div>Q1 year 1.9</div> <div>Q30 years 3.8</div> <div>Q100 years 4.7</div>		
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STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm








Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - England and Wales

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	17.200	Add Flow / Climate Change (%)	0
Ratio R	0.350	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	0.600
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.70
Volumetric Runoff Coeff.	0.750	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	38.631	1.425	27.1	0.024	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	44.869	1.600	28.0	0.063	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	17.796	0.099	179.8	0.063	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	14.273	0.079	180.7	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	12.705	0.071	178.9	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	9.813	0.049	200.3	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.006	7.236	0.061	118.6	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	43.22	5.26	43.895	0.024	0.0	0.0	0.0	2.52	100.3	2.8
S1.001	42.20	5.56	42.470	0.087	0.0	0.0	0.0	2.48	98.6	10.0
S1.002	41.22	5.86	40.870	0.150	0.0	0.0	0.0	0.97	38.6	16.8
S1.003	40.47	6.11	40.771	0.150	0.0	0.0	0.0	0.97	38.5	16.8
S1.004	39.84	6.32	40.692	0.150	0.0	0.0	0.0	0.97	38.7	16.8
S1.005	39.33	6.50	40.621	0.150	0.0	0.0	0.0	0.92	36.6	16.8
S1.006	39.05	6.60	40.572	0.150	0.0	0.0	0.0	1.20	47.7	16.8

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Network 2020.1.3

Area Summary for Storm

Pipe Number	PIMP Type	PIMP Name	PIMP (%)	Gross Area (ha)	Imp. Area (ha)	Pipe Total (ha)
1.000	Classification	Roof	100	0.024	0.024	0.024
1.001	Classification	Roof	100	0.063	0.063	0.063
1.002	Classification	Roof	100	0.063	0.063	0.063
1.003	-	-	100	0.000	0.000	0.000
1.004	-	-	100	0.000	0.000	0.000
1.005	-	-	100	0.000	0.000	0.000
1.006	-	-	100	0.000	0.000	0.000
				Total	Total	Total
				0.150	0.150	0.150

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
---------------------	--------------	--------------	--------------	------------------	----------	--------

S1.006 S 41.846 40.511 0.000 0 0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Additional Flow - % of Total Flow	0.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.750
Region	England and Wales	Cv (Winter)	0.840
M5-60 (mm)	17.200	Storm Duration (mins)	30
Ratio R	0.350		

Online Controls for Storm

Hydro-Brake® Optimum Manhole: S7, DS/PN: S1.006, Volume (m³): 2.0

Unit Reference

MD-SHE-0074-2000-0500-2000

Design Head (m)

0.500

Design Flow (l/s)

2.0

Flush-Flo™

Calculated

Objective

Minimise upstream storage

Application

Surface

Sump Available

Yes

Diameter (mm)

74

Invert Level (m)

40.572

Minimum Outlet Pipe Diameter (mm)

100

Suggested Manhole Diameter (mm)

1200

Control Points	Head (m)	Flow (l/s)	Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.500	2.0	Kick-Flo®	0.342	1.7
Flush-Flo™	0.149	2.0	Mean Flow over Head Range	-	1.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	1.9	0.800	2.5	2.000	3.8	4.000	5.2	7.000	6.8
0.200	2.0	1.000	2.7	2.200	3.9	4.500	5.5	7.500	7.1
0.300	1.8	1.200	3.0	2.400	4.1	5.000	5.8	8.000	7.3
0.400	1.8	1.400	3.2	2.600	4.3	5.500	6.1	8.500	7.5
0.500	2.0	1.600	3.4	3.000	4.6	6.000	6.3	9.000	7.8
0.600	2.2	1.800	3.6	3.500	4.9	6.500	6.6	9.500	8.0

Storage Structures for Storm

Tank or Pond Manhole: S7, DS/PN: S1.006

Invert Level (m) 40.572

Depth (m)	Area (m²)	Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	237.5	0.400	237.5	0.401	0.0

Volume Summary (Static)

Length Calculations based on True Length

Pipe Number	USMH Name	Manhole Volume (m³)	Pipe Volume (m³)	Storage Structure Volume (m³)	Total Volume (m³)
S1.000	S1	1.612	1.488	0.000	3.100
S1.001	S2	1.813	1.736	0.000	3.549
S1.002	S3	1.986	0.660	0.000	2.646
S1.003	S4	1.848	0.520	0.000	2.368
S1.004	S5	2.454	0.457	0.000	2.912
S1.005	S6	1.977	0.342	0.000	2.319
S1.006	S7	1.669	0.264	95.079	97.012
Total		13.359	5.468	95.079	113.906



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1 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.200 Cv (Summer) 1.000
Region England and Wales Ratio R 0.350 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 40, 40

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
S1.000	S1	15 Summer		1	+0%					43.923	-0.197	0.000
S1.001	S2	15 Summer		1	+0%	100/15 Summer				42.522	-0.173	0.000
S1.002	S3	15 Summer		1	+0%	30/15 Summer				40.989	-0.106	0.000
S1.003	S4	15 Summer		1	+0%	30/15 Summer				40.890	-0.106	0.000
S1.004	S5	15 Summer		1	+0%	30/15 Summer				40.813	-0.104	0.000
S1.005	S6	15 Summer		1	+0%	30/15 Summer				40.749	-0.097	0.000
S1.006	S7	480 Summer		1	+0%	30/120 Summer				40.647	-0.150	0.000

				Half Drain		Pipe			
PN	US/MH Name	Flow / Cap.	Overflow (l/s)	Time (mins)	Flow (l/s)	Status	Level Exceeded		
S1.000	S1	0.04			3.5	OK			
S1.001	S2	0.12			11.1	OK			
S1.002	S3	0.54			18.7	OK			
S1.003	S4	0.55			18.6	OK			
S1.004	S5	0.56			18.6	OK			
S1.005	S6	0.61			18.6	OK			
S1.006	S7	0.05			1.6	OK			

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.200 Cv (Summer) 1.000
Region England and Wales Ratio R 0.350 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 40, 40

									Water	Surcharged	Flooded
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Level (m)	Depth (m)	Volume (m³)
S1.000	S1	15 Summer	30	+40%					43.948	-0.172	0.000
S1.001	S2	15 Summer	30	+40%	100/15 Summer				42.583	-0.112	0.000
S1.002	S3	15 Summer	30	+40%	30/15 Summer				42.001	0.906	0.000
S1.003	S4	15 Summer	30	+40%	30/15 Summer				41.621	0.625	0.000
S1.004	S5	15 Summer	30	+40%	30/15 Summer				41.305	0.388	0.000
S1.005	S6	15 Summer	30	+40%	30/15 Summer				41.020	0.174	0.000
S1.006	S7	360 Summer	30	+40%	30/120 Summer				40.843	0.046	0.000

				Half Drain	Pipe		
	US/MH	Flow /	Overflow	Time	Flow		Level
PN	Name	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded
S1.000	S1	0.13			11.9	OK	
S1.001	S2	0.50			46.8	OK	
S1.002	S3	1.99			69.0	SURCHARGED	
S1.003	S4	1.97			66.4	SURCHARGED	
S1.004	S5	2.00			66.8	SURCHARGED	
S1.005	S6	2.19			66.6	SURCHARGED	
S1.006	S7	0.06			2.0	SURCHARGED	



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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coeffiecient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Offline Controls 0 Number of Time/Area Diagrams 0
Number of Online Controls 1 Number of Storage Structures 1 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR M5-60 (mm) 17.200 Cv (Summer) 1.000
Region England and Wales Ratio R 0.350 Cv (Winter) 1.000

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status OFF
Inertia Status OFF

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 240, 360, 480, 960, 1440
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 40, 40

									Water	Surcharged	Flooded	
	US/MH			Return	Climate	First (X)	First (Y)	First (Z)	Overflow	Level	Depth	Volume
PN	Name	Storm		Period	Change	Surcharge	Flood	Overflow	Act.	(m)	(m)	(m³)
S1.000	S1	15 Summer		100	+40%					43.956	-0.164	0.000
S1.001	S2	15 Summer		100	+40%	100/15 Summer				42.908	0.213	0.000
S1.002	S3	15 Summer		100	+40%	30/15 Summer				42.498	1.403	0.000
S1.003	S4	15 Summer		100	+40%	30/15 Summer				41.950	0.954	0.000
S1.004	S5	15 Summer		100	+40%	30/15 Summer				41.512	0.595	0.000
S1.005	S6	15 Summer		100	+40%	30/15 Summer				41.120	0.274	0.000
S1.006	S7	360 Winter		100	+40%	30/120 Summer				40.952	0.155	0.000

				Half Drain	Pipe		
	US/MH	Flow /	Overflow	Time	Flow		Level
PN	Name	Cap.	(l/s)	(mins)	(l/s)	Status	Exceeded
S1.000	S1	0.16			15.4	OK	
S1.001	S2	0.59			55.3	SURCHARGED	
S1.002	S3	2.35			81.3	FLOOD RISK	
S1.003	S4	2.35			79.2	SURCHARGED	
S1.004	S5	2.37			79.1	SURCHARGED	
S1.005	S6	2.59			78.7	SURCHARGED	
S1.006	S7	0.06			2.0	SURCHARGED	