Port Talbot Connection Substation

Siting Study

On behalf of **National Grid**

Project Ref: 331201497 | Version: FINAL v2 | Date: January 2025

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For and on behalf of Stantec UK Limited				

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1 Introduction

1.1 This Report

1.1.1 Stantec UK Limited ('Stantec') has been appointed by National Grid Electricity Transmission ('National Grid') to undertake a Siting Study identifying potential options for the location of a new National Grid 275kV GIS substation.

1.1.2 This Siting Study identifies potentially suitable locations for the development of the new substation, using constraints mapping, which are then assessed in relation to environmental and socio-economic constraints as well as technical considerations.

1.1.3 This Siting Study has been produced to inform the siting decision for the substation and relies on publicly available information, data and records supplemented by site-based surveys viewed from publicly accessible locations.

1.1.4 Stantec acknowledge that National Grid has already explored an option to develop the site adjacent to the existing Margam substation (referred to within this document as Option 2) and has undertaken pre-application discussions on this proposal with the Local Authority.

1.1.5 It is important however to be transparent about this decision and verify the rationale behind it. The approach taken in this Siting Study involves conducting a thorough back check to ensure that no other reasonable alternative sites were overlooked. This process is essential to validate the decision and confirm that Option 2 remains the most appropriate choice.

1.1.6 The Siting Study Area is located in southern Wales, spanning two council boundaries. It primarily falls within the local administrative boundaries of Neath Port Talbot Council (NPTC), however the potential substation options are also located within the administrative boundary of Bridgend County Borough Council (BCBC).

1.2 Background

1.2.1 National Grid Electricity Transmission plc (National Grid) owns, maintains and operates the high voltage (275kV and 400kV) electricity transmission system throughout England and Wales. National Grid is also the system operator for the whole of the British transmission system, which includes that part of the system in Scotland (owned by the Scottish Transmission Owners). National Grid has duties under the Electricity Act 1989 to develop and maintain an 'economical, efficient and co-ordinated' system of electricity transmission.

1.2.2 The transmission system comprises approximately 7200 route kilometres of overhead transmission lines and approximately 660 circuit kilometres of underground transmission cable. The system also has over 300 substations which is where the primary transmission voltage (400kV or 275kV) is transformed to a lower voltage (132kV or less) and delivered as direct connections to the eight distribution network operators (DNOs), who take supplies and distribute electricity at lower voltages to consumers.

1.3 Needs Case

1.3.1 The drivers for this project and the need to upgrade our energy infrastructure include:

- Enabling room for future increased capacity needs, ensuring the UK has a reliable energy system for generations to come;
- Customer demands;
- Energy security; and

- Investing for growth

1.3.2 Tata Steel is proposing the construction and operation of a new electric arc furnace (EAF) based steel production facility and associated infrastructure within the existing Port Talbot Steelworks boundary. The proposal forms part of a £1.25bn investment that is the largest in South Wales industry for many decades and will secure steelmaking in Port Talbot for the foreseeable future. A new substation is required to support this development.

1.3.3 Whilst the Tata Steel connection is one such customer demand, there are other customer demands which must also be met. The proposed works at are required to be undertaken regardless of Tata's proposed planning application for the EAF Facility as the substation needs to be upgraded to support other projects in the area.

1.3.4 Without the necessary upgrades to the energy infrastructure, then National Grid (NG) cannot guarantee there is sufficient capacity within the network to support economic growth and energy security within the region.

1.3.5 A new substation is therefore required at a point along the existing 275kV OHL route that traverse the existing substations (Margam, Baglan Bay or Pyle substations) to facilitate this demand. Further information on the specific need for the new substation can be found in **Chapter 3** of this Siting Study.

1.4 Report Structure

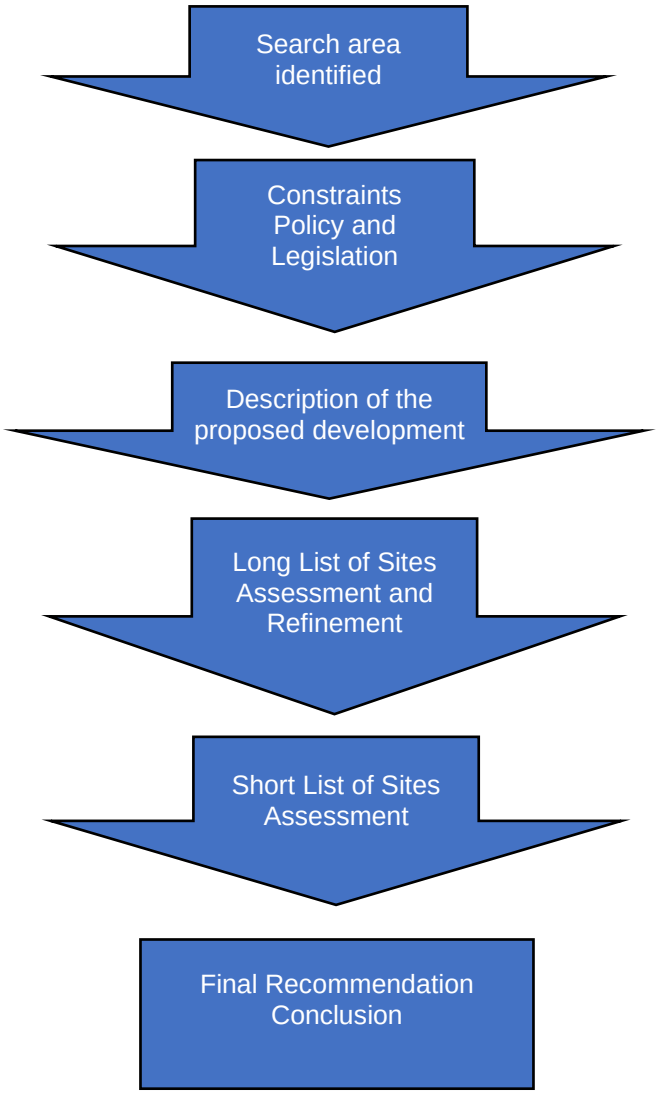
1.4.1 The Siting Study undertakes a comprehensive assessment of sites within the Siting Study Area, identifying potential sites and going on to assess these against defined criteria to a shortlist of sites. The shortlisted sites are then assessed in detail to identify the optimum site.

1.4.2 As part of the assessment, a desktop mapping exercise was undertaken by Stantec to identify environmental and socio-economic constraints pertaining to the Siting Study Area via digitised layers included in an online GIS database.

1.4.3 The report focuses on environmental effects, including landscape and visual, ecology, cultural heritage, transport, planning and socio-economic impacts, which have been considered based mainly on information collected through desk studies and a site visit.

1.4.4 The stages of the report are as below in **Figure 1.1.**

Figure 1.1 – Report Stages



1.5 Siting Study Limitations

1.5.1 At this stage of the project, specific design details and the layout of the key project components have yet to be defined. Whilst preliminary design parameters give a good indication of likely effects, these cannot be determined in detail until the proposed design is developed and further analysis is undertaken.

1.5.2 Further site-specific surveys, investigations and assessment will be required to allow the optimum site to be considered suitable to be progressed as part of any application for planning permission.

1.5.3 The aim of this Siting Study has been to identify a site that is preferred on environmental and landscape and visual grounds, whilst accounting for access, technical and cost implications as far as reasonably possible at this stage (acknowledging that detailed engineering and costing information is not currently available). The Siting Study is, therefore, set out so that the preferred option can be taken forward for detailed siting and design as well as external engagement.

1.5.4 The Study has been undertaken using publicly available datasets and requested additional datasets from the respective authority. Some of the publicly available datasets used are not

mapped with the precision that would be needed if National Grid proceeded with detailed design and an application for planning permission. However, the data is considered to be appropriate for the purposes of this Siting Study.

1.5.5 National Grid's '*Our Approach to Options Appraisal'* guidance requires an evaluation of corridors and/or final alignment/siting options to follow a High-Level Options Appraisal. This Siting Study has included a high-level consideration of potential route distances. Route measurements assume that the shortest distance would be used and that the technical complexity of rerouting the OHL correlates to the distance.

1.5.6 It is assumed that the substation will serve the customer clients of National Grid and that once the substation and connection to the National Grid network is established, the customer client will need to construct a local network connection from the substation to their own infrastructure. For the connection into TATA steel from the Margam substation, this is likely to require a larger, high voltage (HV) connection cable to be constructed.

2 Policy and Legislation

2.1 National Grid's statutory responsibilities

2.1.1 National Grid is the only company licenced to transmit electricity in England and Wales. National Grid's Transmission Licence was granted under the Electricity Act 1989, Section 6(1)(b).

2.1.2 When developing proposals for new network infrastructure, National Grid has a duty under the Electricity Act 1989 to do so in an efficient, co-ordinated and economical way. National Grid is also required, under Section 38 of the Electricity Act 1989, to comply with the provisions of Schedule 9 of the Act. Schedule 9 requires licence holders, in the formulation of proposals to transmit electricity, to:

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

2.1.3 National Grid also has a statutory duty under Section 9 (2) of the Electricity Act 1989:

- "(…) to develop and maintain an efficient, coordinated and economical system of electricity transmission; and
- (…) to facilitate competition in the supply and generation of electricity."

2.1.4 National Grid's statutory responsibilities have been adhered to from the outset of this Siting Study.

2.2 National Grid's Approach to Consenting

2.2.1 In addition to the statutory requirements imposed by the Electricity Act 1989, National Grid has its own project development and delivery process that it follows for its infrastructure projects, as set out in their report titled '*Our Approach to Consenting*', dated April 2022.

Approach to Consenting

2.2.2 The above-mentioned guidance describes the process of how National Grid develops electricity transmission projects. It includes an explanation of how National Grid identifies the most appropriate locations and technologies for any new transmission route and/or infrastructure site and the approach taken to mitigate the impact of transmission infrastructure through careful routeing/siting, planting and undergrounding as appropriate.

The Holford Rules

2.2.3 The Holford Rules provide specific guidance on routeing OHLs which are applied by National Grid when undertaking routeing studies. The Holford Rules were reviewed by National Grid in 1992 and is accepted within the electricity industry as the basis for OHL routeing.

2.2.4 Additional rules relating to the siting of substations are described below, however, substation siting can also be influenced by the ability to appropriately route OHL connection infrastructure to those locations. For example, the location of substations must consider the feasibility of

connecting overhead lines to them. When siting substations, it is important to take into account the visual impact and environmental effects. This includes considering the effects of terminal towers and line connections that will need to be made.

2.2.5 While this Siting Study focuses on optimal location for the Margam Substation only and does not consider the proposed routing between the Margam and proposed Port Talbot substation, it acknowledges that the environmental implications of the cable route between the two substations is also a significant consideration. This is considered further in **Section 3.8**.

The Horlock Rules

2.2.6 National Grid published guidance[1] sets out their approach towards substation developments and provides guidelines on their siting and design to both mitigate environmental effects and meet overarching policy requirements and objectives.

2.2.7 The 'Horlock Rules' comprise a series of criteria applicable to new substations, substation extensions and modifications which cover the following considerations:

Overall System Options and Site Selection

2.2.8 In the development of system options including new (or replacement) substations, consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum.

Amenity, Cultural or Scientific Value of Sites

2.2.9 The siting of new (or replacement) National Grid substations, cable sealing end (CSE) compounds and line entries should, as far as reasonably practicable, seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections.

2.2.10 Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable.

Local Context, Land Use and Site Planning

2.2.11 The siting of substations, extensions and associated proposals should take advantage of the screening provided by landform and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum.

2.2.12 The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum.

2.2.13 The land use effects of the proposal should be considered when planning the siting of substations or extensions.

Design

2.2.14 In the design of new substations or line entries, early consideration should be given to the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum.

[1] https://www.nationalgrid.com/sites/default/files/documents/13796-The%20Horlock%20Rules.pdf

2.2.15 Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation.

2.2.16 The design of access roads, perimeter fencing, earth shaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings.

2.2.17 Application of the above assists the achievement of environmentally acceptable siting and design solutions for substation developments and has been adhered to throughout the preparation of this Siting Study.

2.2.18 A copy of the Horlock Rules is provided in **Appendix A**.

Approach to Options Appraisal

2.2.19 National Grid's '*Our Approach to Options Appraisal*'[2] reflects its statutory duties by underpinning a set of overarching principles which assist in decision making and help to achieve an appropriate balance between competing interests that must be taken into account in options appraisal.

2.2.20 Options are considered to have an advantage if:

- They can use or adapt existing infrastructure, or where National Grid can negotiate different commercial arrangements with its customers to achieve a need, rather than building new infrastructure;
- They are shorter, compared with longer routes;
- They are financially less expensive compared to other more expensive options;
- They avoid or mitigate environmental or socio-economic impacts.

2.2.21 Options appraisal is therefore a robust and transparent process used to compare options and to assess the positive and adverse effects they may have across a wide range of criteria including environmental, socio-economic, technical and cost factors.

2.2.22 The topics and subtopics considered are presented in **Table 2.1** below.

Table 2.1 – Options Appraisal Topics and their constituent sub-topics

Topic	**Subtopic**
Environmental	Landscape and Visual Amenity; Ecology; Historic Environment; Local Air Quality; Noise and Vibration; Soils and Geology; Water.
Socio-economic	Local Economic Activity; Traffic and Transport.
Cost	Technical Feasibility; Approximate capital cost of connecting from the new substation back to the existing Main Interconnected System, including considerations of existing infrastructure and length.

[2] https://www.nationalgrid.com/uk/electricity-transmission/document/96531/download

2.2.23 One of the guiding principles in the Options Appraisal guidance document, states that: "*Options which avoid or minimise and mitigate impacts on environmental or socio-economic constraints will generally be of benefit/advantage compared with those which have likely significant residual effects*".

2.2.24 Other detailed environmental aspects (e.g. local air quality, vibration, geology, local economic activity) have not been assessed at this stage but will require consideration and as the preferred option progresses to the planning application stage.

2.3 Planning Policy Wales (PPW) (Edition 12, February 2024)

2.3.1 In February 2024, the Welsh Government released Planning Policy Wales Edition 12 (PPW). This document serves as the primary national planning policy framework for Wales and is a key consideration in planning decisions. It aims to promote sustainable development through the planning system, emphasizing a presumption in favour of sustainability and a strong commitment to enhancing population wellbeing.

2.3.2 Chapter 5 of the PPW discusses Wales energy goals. Paragraph 5.7.1 states that: "***The Welsh Government's highest priority is to reduce demand wherever possible and affordable. Low carbon electricity must become the main source of energy in Wales***."

2.3.3 Chapter 5 also encourages planning authorities to help facilitate improvements in grid infrastructure. Paragraph 5.7.10 states that: *"**Planning authorities should plan positively for grid infrastructure. Development plans should facilitate the grid infrastructure required to support the renewable and low carbon energy potential for the area, particularly areas identified for such development. Planning authorities should support appropriate grid developments, whether or not the developments to be connected are located within their authority."***

2.3.4 Paragraph 6.4.12 outlines the six steps in the step-wise approach: avoid, minimise, mitigate/restore, compensate on-site, compensate off-site, and refuse planning permission. The paragraph states that once following the step-wise approach and providing evidence in the Green Infrastructure Statement, a scheme of enhancements must ensure a net benefit for biodiversity.

2.3.5 Paragraph 6.4.15 provides further detailed guidance on the 6 steps of the step-wise approach. In summary, planning authorities must prioritise avoiding damage to biodiversity and ecosystem functioning, considering alternative sites and designs to minimise harm. Proposals in designated sites or those with irreplaceable habitats and species are unacceptable. If avoiding damage isn't possible, authorities must minimise impacts by retaining and managing habitats, ensuring connectivity, and using innovative solutions. If damage occurs, mitigation or restoration measures should repair habitats and support ecosystem resilience. As a last resort, off-site compensation must fully compensate for any loss, involving habitat restoration or creation, guided by ecological assessments and the Green Infrastructure Assessment. Each step must include a long-term management plan for avoidance, minimisation, mitigation, and compensation measures. If adverse effects outweigh other considerations, the development should be refused.

2.4 Future Wales: The National Plan 2040

2.4.1 Published by the Welsh Government in February 2021, Future Wales (FW) serves as the national development framework, outlining the development trajectory for Wales up to 2040. FW tackles essential national priorities such as fostering a vibrant economy, achieving decarbonisation and climate resilience, and enhancing the health and well-being of communities. It is heavily influenced by Planning Policy Wales (PPW), which sets forth fundamental principles for the planning system.

2.4.2 Outcome 11 of Future Wales states that: *"**decarbonisation commitments and renewable energy targets will be treated as opportunities to build a more resilient and equitable low carbon economy".***

2.4.3 The following polices are pertinent to the Proposed Development:

- Policy 3 (Supporting Urban Growth and Regeneration – Public Sector Leadership) states that the Welsh Government will actively support urban growth and regeneration by assembling land, investing in infrastructure, and preparing development sites. They will collaborate with local authorities and public sector bodies to unlock land potential and enhance their development roles.

- Policy 17 (Renewable and Low Carbon Energy Infrastructure) - the Welsh Government supports developing renewable and low carbon energy at all scales to meet future energy needs. Planning applications for such developments must prioritise Wales's international commitments and the goal to generate 70% of electricity from renewables by 2030. Proposals should outline the social, economic, environmental, and cultural benefits to local communities. New grid infrastructure should minimise visual impact on nearby communities. The Welsh Government will collaborate with stakeholders to transition to a multi-vector grid network and reduce barriers to new infrastructure.

2.5 Technical Advice Notes

2.5.1 The following technical advice notes have been identified as of relevance to the proposed development:

- Nature and Conservation Planning (TAN 5) – This TAN offers guidance on how the land use planning system can help protect and enhance biodiversity and geological conservation.

- Development and Flood Risk (TAN 15) – This TAN offers technical guidance that supplements the policy outlined in Planning Policy Wales regarding development and flooding. It provides advice on development and flood risk in relation to sustainability principles and establishes a framework for assessing risks from river and coastal flooding, as well as additional run-off from development in any location.

- The Historic Environment (TAN 24) – The purpose of this TAN is to guide how the planning system considers the historic environment during development plan preparation and decision-making on planning and Listed Building applications.

2.6 Department for Energy Security & Net Zero National Policy Statement (NPS)

2.6.1 The National Policy Statements (NPS) sets out the government's policy for the delivery of energy and electricity infrastructure and provides the legal framework for planning decisions.

Overarching National Policy Statement for Energy (EN-1) (updated 17 January 2024)

2.6.2 The updated NPS EN–1 was published in November 2023 and sets out the UK Government's commitment to increasing renewable generation capacity.

2.6.3 Paragraph 2.1.3 states that to produce enough energy required for the UK and ensure it can be transported to where it is needed, a significant amount of infrastructure is needed at both local and national scale. It highlights that high quality energy infrastructure is crucial for economic growth, boosting productivity and competitiveness. Paragraph 2.3.4 adds achieving these objectives requires significant new energy infrastructure, from large national projects to

small local developments. This includes converting primary energy sources (e.g., wind) into carriers (e.g., electricity or hydrogen), storing and transporting fuels and energy, and capturing, transporting, and storing carbon dioxide. This infrastructure will create opportunities and support jobs in the UK's clean energy industry and local supply chains.

2.6.4 Paragraphs 3.3.62 - 63 states that the government has identified a critical national priority (CNP) for nationally significant low carbon infrastructure. The urgent need for CNP infrastructure to meet energy objectives, along with its national security, economic, commercial, and net zero benefits, generally outweighs any residual impacts that cannot be mitigated.

Electricity Networks Infrastructure (EN-5) (updated 17 January 2024)

2.6.5 NPS EN-5 provides the primary basis for decisions by the SoS on applications for electricity networks infrastructure such as overhead lines, and associated development of electrical networks infrastructure (such as substations).

2.6.6 The guidance aims to make it easier for decision makers, applicants, and the wider public to understand government policy on the need for nationally significant infrastructure projects (NSIPs), how applications for energy infrastructure will be assessed, and the way in which impacts and mitigations will be judged. The document covers various aspects such as factors influencing site selection by applicants, general assessment principles for electricity networks, climate change adaptation, consideration of good design, impacts of electricity networks, biodiversity and geological conservation, landscape and visual, noise and vibration, and electric and magnetic fields (EMFs).

2.6.7 Part 2 of NPS EN-5 provides guidance regarding the assessment of impacts specific to electricity networks infrastructure. In respect of climate change adaptation, paragraph 2.3.2 of NPS EN-5 states that applicants should set out the extent to which the proposed development would be vulnerable and how it would be resilient to: flooding; the effects of wind and storms; higher average temperatures; and earth movement or subsidence. The Project is considered further in this respect in **Chapter 7** of this Siting Study, within the Options Appraisal Summary Tables (OAST).

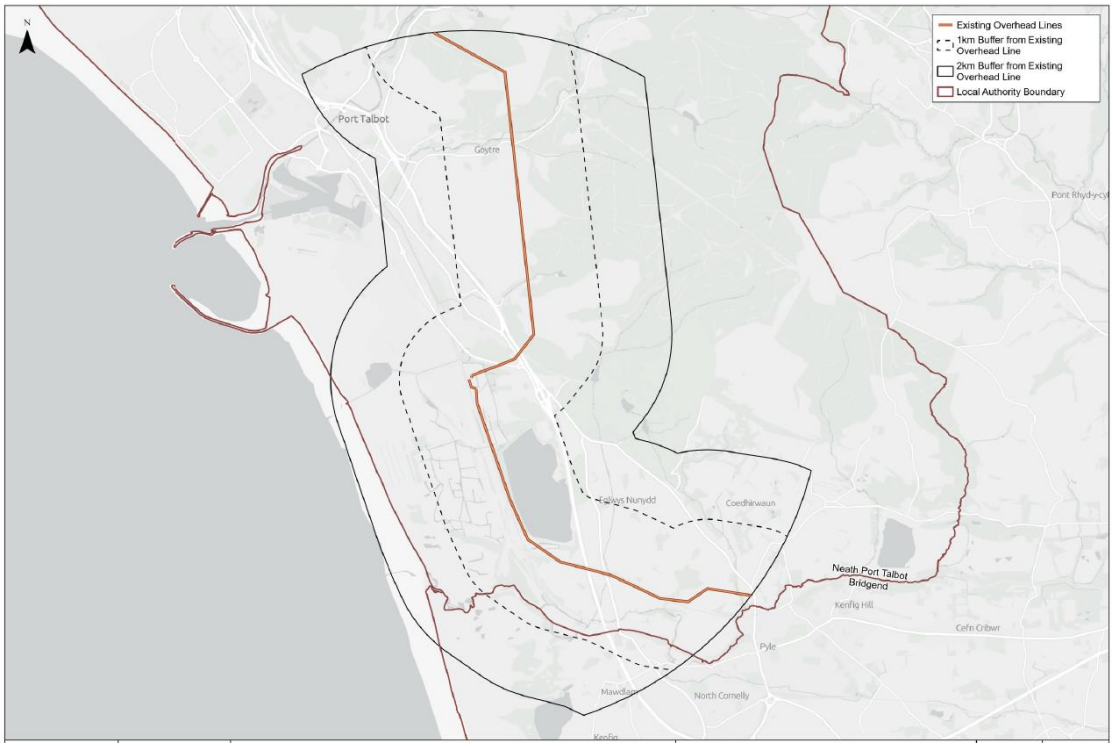
2.6.8 The Proposed Development includes the development of a new substation and parts of overhead line. Accordingly, the Project has had regard to the provisions of NPS EN-5 as they relate to substations and the consideration of Electrical Connections. The project however is not a nationally significant infrastructure project.

2.7 Local Policy Context

2.7.1 The majority of the Siting Study Area falls within the administrative boundaries of Neath Port Talbot Council. Additionally, it also includes Bridgend County Borough Council. This section of the Siting Study summarises the current and emerging local planning policy context for the proposed cable routes.

2.7.2 A map illustrating the administrative boundaries is shown below in **Figure 2.1**.

Figure 2.1 – Siting Study Area Administrative Boundaries



Neath Port Talbot Council Local Development Plan (2011-2026)

2.7.3 The Neath Port Talbot Local Development Plan, adopted in January 2016, covers the period up to 2026. This plan outlines four overarching objectives:

- Minimise the causes and consequences of climate change through reduced greenhouse gas emissions and adapt to climate change through consideration of its effects in the design and location of new development.
- Reduce people's exposure to the determinants of poor health and provide an environment that encourages healthy, active and safer lifestyles.
- Deliver sustainable, safe and confident communities and develop vibrant settlements supporting a range and mix of facilities and services.
- Maximise accessibility to a range of leisure, recreational, health, social and community facilities in line with the role and function of settlements.

2.7.4 Regarding the local policies set out in the plan, the following have been identified as most pertinent to the Proposed Development:

2.7.5 **Policy SP4 – Infrastructure**: Developments will be expected to make efficient use of existing infrastructure and where required make adequate provision for new infrastructure, ensuring that there are no detrimental effects on the area and acceptable community. Where necessary, Planning Obligations will be sought to ensure that the effects of developments are fully addressed in order to make the development.

2.7.6 **Policy SP18 – Renewable and Low Carbon Energy**: A proportionate contribution to meeting national renewable energy targets and energy efficiency targets will be made while balancing the impact of development on the environment and communities. This will be achieved by:

- Encouraging where appropriate, all forms of renewable energy and low carbon technology development;
- Encouraging energy conservation and efficiency measures in all new major development proposals;
- Ensuring that development will not have an unacceptable impact on the environment and amenity of local residents.

Neath Port Talbot Replacement Local Development Plan

2.7.7 Neath Port Talbot County Borough Council is in the process of developing a new Local Development Plan for the Borough. The plan is currently in its initial stages, with a call for site proposals conducted in late 2023. The plan is anticipated to be adopted by 2027.

Bridgend County Borough Local Development Plan 2018-2033

2.7.8 The Bridgend Local Development Plan outlines its objectives for the period up to 2033. The plan states that it:

- Will deliver sustainable, transit-orientated development;
- Maximises well-being and creating sustainable places through placemaking;
- Builds upon, and adds value to the national development framework and national planning policies and guidance produced by the Welsh government;
- Reflects local aspirations for the county borough, based on a vision agreed by the council and other stakeholders;
- Expresses in land-use terms the objectives of the well-being of future generations (Wales) act 2015 and priorities of the Bridgend public services board's well-being plan;
- Provides a basis for rational and consistent development management decisions;
- Guides growth and change, while protecting local diversity, character, and sensitive environments;
- Ensures the social and economic resilience of settlements and their ability to adapt to change over the long term; and
- Shows why, how and where change will occur over the plan period.

2.7.9 The following policies have been considered pertinent to the Proposed Development:

2.7.10 **SP13: Renewable and Low Carbon Energy Development**: Renewable and low carbon development proposals which contribute to meeting national and local renewable and low carbon energy and energy efficiency targets will be permitted where:

- It can be demonstrated that there will be no unacceptable impacts on the natural and historic environment or local communities (such as noise and air pollution) and that no other unacceptable cumulative impacts will arise;
- The proposal (inclusive of its associated infrastructure) has sought to minimise the landscape and visual impact through its design and micro-siting, particularly where in close proximity to homes and tourism receptors;

- Proposals make provision for the appropriate restoration and after care of the land for its beneficial future re-use; d) The proposal can facilitate a connection to the grid network;
- There would not be an unacceptable impact on access and highway safety; and
- There would not be unacceptable impact on the amenity of residential properties or tourist accommodation.

3 Substation Requirements

3.1 Introduction

3.1.1 Substations are an integral part of the UK electrical transmission system. They are a method of controlling power flows and voltages around the transmission and distribution systems and are used to connect sources of electricity generation to those systems.

3.1.2 Substations will generally comprise elements such as transformers and switchgear. A transformer within a substation will change (or “transform”) the level of voltage from one value to another value. Switchgear is used to provide operational safety and flexibility to the network to enable efficient power flows and ensure the network operates safely and reliably.

3.1.3 Substations can take the form of either an Air Insulated Switchgear (AIS) substation, or a Gas Insulated Switchgear (GIS) substation. A GIS solution is the preferred National Grid option for this project due to the smaller footprint required for this technology.

3.2 Needs Case for the new Substation

3.2.1 The drivers for this project and the requirement to upgrade our energy infrastructure include:

- Enabling room for future increased capacity needs, ensuring the UK has a reliable energy system for generations to come;
- Customer demands;
- Energy security; and
- Investing for growth.

3.2.2 Tata Steel is proposing the construction and operation of a new electric arc furnace (EAF) based steel production facility and associated infrastructure within the existing Port Talbot Steelworks boundary. The proposal forms part of a £1.25bn investment that is the largest in South Wales industry for many decades and will secure steelmaking in Port Talbot for the foreseeable future.

3.2.3 As part of the new EAF, significant upgrades to the electricity network are required, which may include:

- An upgrade to one of NG’s electrical substations in the vicinity of the Tata Steel site, either by identifying a new site for a new substation or extending an existing substation (Margam, Baglan Bay or Pyle substations);
- The construction of a new electrical substation at Port Talbot steelworks (‘Port Talbot Substation’) which is currently subject to a live planning application (P2024/0711);
- The installation of electrical cables to provide a connection between the new substation location and the Port Talbot Substation. The timing of this infrastructure is due to be connected by October 2027.

3.2.4 The Port Talbot substation is part of Tata Steel’s planning application. National Grid is responsible for securing permission for and delivering the remaining proposed upgrades listed above (substation upgrade or replacement works, and the installation of electrical cables).

3.2.5 Whilst the Tata Steel connection is one such customer demand, there are other customer demands which must also be met. The proposed works at are required to be undertaken

regardless of Tata's proposed planning application for the EAF Facility as the substation needs to be upgraded to support other projects in the area.

3.2.6 Without the necessary upgrades to the energy infrastructure, then National Grid (NG) cannot guarantee there is sufficient capacity within the network to support economic growth and energy security. As stated in **Section 2.4**, Outcome 11 of Future Wales: The National Plan 2040 states that: "*decarbonisation commitments and renewable energy targets will be treated as opportunities to build a more resilient and equitable low carbon economy*." This aligns with this project's objectives, highlighting the need for the proposed substation upgrades. These upgrades are important to meet the growing energy demands and support the transition to a low carbon economy. There aren't any viable alternatives that can offer the same level of support for decarbonisation and energy security, making this project crucial for achieving the goals set out in Future Wales.

3.2.7 A new substation is therefore required at a point along the 275kV OHL routes that traverse the existing substations (Margam, Baglan Bay or Pyle substations) to facilitate this demand.

3.3 Margam Substation

3.3.1 The new electrical substation at Port Talbot steelworks ('Port Talbot Substation') will be connected to the wider National Grid Transmission System through the construction of a new 275kV substation.

3.3.2 To accommodate the additional circuits required to feed the new Port Talbot substation, the switchgear at the Margam substation needs to be reconfigured.

3.3.3 The decision to replace or extend the Margam Substation is based on its strategic location. Margam Substation is the closest existing substation to the proposed Port Talbot Substation, situated approximately 1.2 kilometres away. This proximity makes it the most practical and cost-effective option for establishing the necessary electrical connections. The other substations in the vicinity that were considered were Baglan Bay 275kV (7.7km to the north) and Pyle 275kV (6km to the south). These distances would result in higher costs and greater logistical challenges for connecting to the new substation.

3.3.4 By choosing Margam Substation, the project can minimize the length of new transmission lines required, reduce potential environmental impacts, and streamline the construction process.

3.4 Existing Margam Substation Site

3.4.1 The existing Margam substation (the 'existing substation') is a 275kV AIS substation. It was built in 1972 and has been operational for 52 years.

3.4.2 The existing substation is one of National Grid's electrical switchgear stations serving South Wales. It comprises a secure compound containing an extensive array of high voltage electrical infrastructure.

Site Location

3.4.3 The existing Margam 275kV AIS substation is located in Port Talbot, South Wales, approximately 14km south-east of Swansea. The existing Margam substation is in close proximity to the Tata steelworks complex.

3.4.4 The existing substation is located within the administrative boundary of Neath Port Talbot Council (NPTC).

3.4.5 Access to the existing Margam substation is currently available from the north via the A4241 Harbour Way and from the south-east via Heol Cae'r Bont.

Surrounding Area

3.4.6 The existing Margam substation is located in an industrial area. To the east, approximately 290 meters away, is the Western Wood Energy Plant and Margam Green Energy Plant. Further east, approximately 823 meters away, is the A48 (Margam Road) and the M4 motorway, with the Margam Moors beyond. Directly to the west lies the Tata Steelworks and the London to Swansea railway.

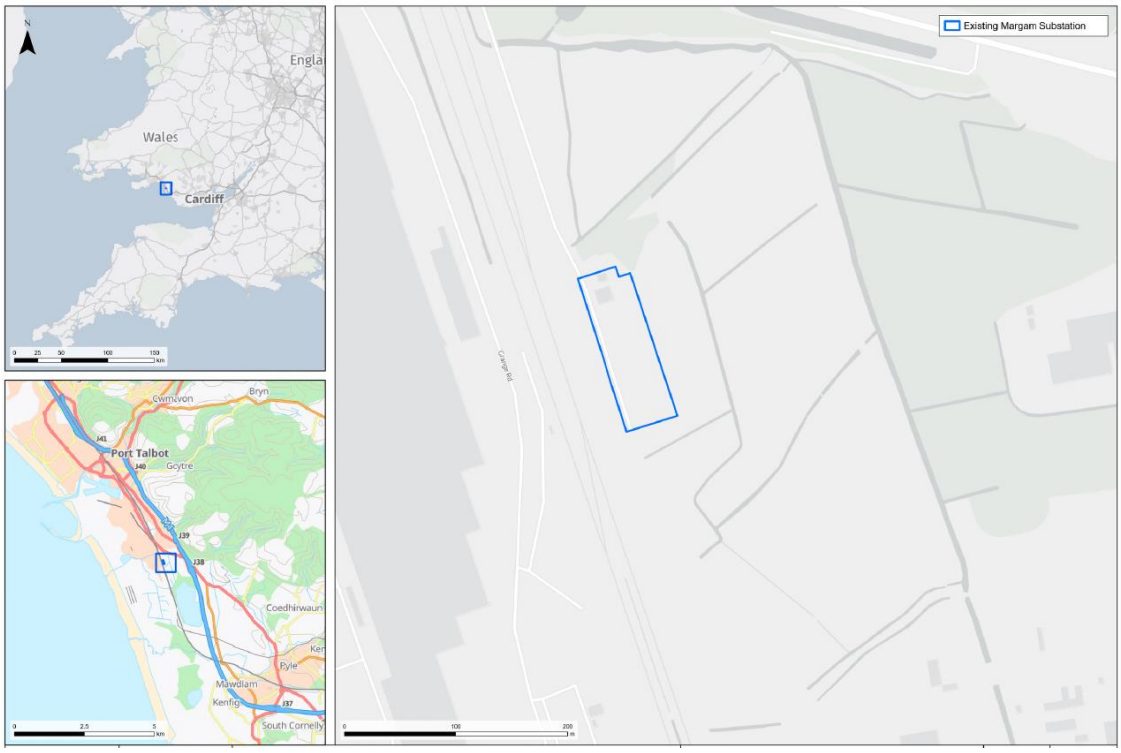
3.4.7 The nearest residential properties to the existing Margam substation are located approximately 550 meters northeast of the substation on Abbots Close. The A4241 Harbour Way road serves as a buffer between the site and these residences.

3.4.8 The existing Margam Substation is located within an area characterised by significant industrial and energy production activities. Key businesses and industries in the vicinity include:

- **Western Wood Energy Plant:** The power station is situated approximately 400m southeast of Margam Substation;
- **Margam Green Energy Plant:** The power station is located approximately 310m east of Margam Substation;
- **BOC industrial Gas Plant:** Located approximately 345m southeast of the Margam Substation.
- **Tata Steel:** The Port Talbot Steelworks, operated by Tata Steel is located immediately west of the Margam Substation.

3.4.9 **Figure 3.1** below shows the location of the existing Margam Substation in relation to the wider context of Margam and Port Talbot.

Figure 3.1 – Site Location with local context



3.5 Substation Planning History

3.5.1 An application was made in 2009 to Neath Port Talbot Council for the development of a new GIS substation proposed to be located to the north of the existing AIS substation. As part of this application, an EIA Screening Opinion was requested for a proposed Margam 275kv Gas-Insulated Switchgear (GIS) substation on land 500m north of British Oxygen Company (BOC) land, Margam, Port Talbot. Neath Port Talbot Council adopted the opinion that the development was not EIA development, and that the application need not be accompanied by an Environmental Statement.

3.5.2 On 01.04.2010 Neath Port Talbot Council granted full permission for the erection of 275kV gas insulated switchgear (GIS) substation and associated laydown areas at Margam, South Wales (Ref No. P2009/0267). However, it was not implemented.

3.5.3 Since this permission was granted, there were some minor material amendments to the scheme as a result of further detailed design. As the original planning consent did not include a planning condition listing approved plans then these minor material amendments cannot be addressed via a variation of a planning condition, and hence a new planning application was required in 2012 (ref. P2012/0832). This included Section 37 consents and OHL works, and subsequently received planning permission.

3.5.4 Neither the 2009 nor the 2012 applications for the development of a new GIS substation were ultimately implemented.

3.6 Replacement Substation Requirements

3.6.1 The substation is to be a Gas Insulated Switchgear (GIS) 275kV substation with a footprint of up to 300 x 250m. This larger footprint allows for sufficient land for the substation footprint, together with construction compounds, landscaping, net benefit for biodiversity and drainage.

3.6.2 The actual layout of the substation may be amended during detailed design but should be within these parameters.

3.6.3 It is understood that the updated substation will comprise a new 275 double busbar GIS Hall.

GIS Substation (Non SF6)

3.6.4 The compound footprint generally measures approximately 150m X 180m. The GIS building, which would house the majority of the high voltage switchgear, is approximately 90m X 23m with an approximate height of 15m. Terminal towers will be required to connect to the existing and new OHL connections.

3.6.5 These heights and sizes are indicative and will ultimately depend on the OHL route, tower type and location along the route.

3.6.6 The building would typically be of a steel portal frame design and clad with profiled steel or similar to the roof and walls. The colour of the structure is typically natural or neutral to blend with the surrounding landscape (light green/grey shades).

3.6.7 The external area would accommodate the gas insulated equipment (pipework/tubing) that connects the switchgear to the existing and new overhead line connections. The number, type and proposed location of overhead line towers is similar to an AIS substation.

3.6.8 The precise details of the terminal tower design are unknown at this stage, as the final design may vary because of choices by the delivery contractor(s). However, it is anticipated that the terminal towers will likely have a triple cross-arms arrangement to allow for management of conductors around the tower and dropping into the substation. There will be no conductor(s) between the towers, other than possibly for a temporary configuration during construction. Key

dimensions for these types of towers are that they are 49m high, have a 14.5m x 14.5m base footprint and the spacing will be at 50m and Gantries in the substation at ~50m from OHL centre line.

3.6.9 The new substation associated equipment will be secured by a perimeter fence and access gates as required for the site.

3.6.10 The site would be provided with a standby diesel generator to provide backup supplies in the event that DNO supplies to the site are interrupted. The generator would run only in this emergency situation, or for short durations during typically monthly routine testing which would be carried out during normal daytime working hours.

3.7 Extension vs new substation

3.7.1 National Grid's '*Our Approach to Options Appraisal*'[3] reflects its statutory duties by underpinning a set of overarching principles which assist in decision making and help to achieve an appropriate balance between competing interests that must be taken into account in options appraisal.

3.7.2 Options are considered to have an advantage if they can use or adapt existing infrastructure, or where National Grid can negotiate different commercial arrangements with its customers to achieve a need, rather than building new infrastructure. Options are also considered to have an advantage if they are shorter, compared with longer routes.

3.7.3 Extending an existing substation is generally preferable to constructing a new facility in a greenfield location for several reasons. Firstly, it capitalises on established infrastructure, which can significantly reduce environmental impacts through a reduced developable footprint, the time required for implementation and security and construction costs. This approach particularly minimises environmental impacts by avoiding the disruption of undeveloped land and preserving local ecosystems including the reduction in cable lengths required. Additionally, extending an existing site allows for better integration with current electrical networks, enhancing operational efficiency and maintaining energy security.

3.7.4 For these reasons, as part of the scope of this Siting Study, a site directly adjacent to the existing Margam Substation (named Option 2) has been taken into consideration.

3.7.5 In the context of the Siting Study, including the extension of the existing Margam Substation as a viable option ensures that we adopt the most efficient and sustainable approach to meeting energy demands. By incorporating this extension into the long list of sites, we recognise the advantages of utilising existing infrastructure, which not only reduces environmental impact and cost but also facilitates a quicker implementation timeline.

3.7.6 This proactive measure streamlines the Siting Study process, allowing the extension to be evaluated alongside other potential sites.

3.8 Connection to Port Talbot Substation

3.8.1 The proposed Margam Substation will need to connect to the new Port Talbot Substation.

3.8.2 This Siting Study relates to the siting of the new Margam Substation only and does not consider the siting of the new Port Talbot Substation (which is subject to a live planning application), or the potential cable route options between Margam Substation and Port Talbot Substation. The Port Talbot Substation and laying up cables to the Tata Steel boundary from the location of the new Margam substation is subject to separate planning processes.

[3] https://www.nationalgrid.com/uk/electricity-transmission/document/96531/download

3.8.3 While the Siting Study focuses on optimal location for the Margam Substation only and does not consider the proposed routing between the two substations, it acknowledges that the environmental implications of the cable route between the two substations is also a significant consideration.

3.8.4 It is important to note that the distance between the new Port Talbot substation and any new Margam substation will significantly influence the length and impact of the cable installation. A greater distance will result in a longer cable route, and as such potentially increased environmental and logistical challenges. These challenges include potential disruptions to the land, ecosystems, and communities along the route. Therefore, careful consideration of the cable route is essential to minimize these impacts and ensure a more efficient and environmentally responsible installation. The cable routing will go through a separate optioneering process once the location of the new Margam substation has been determined.

3.8.5 The Siting Study has therefore assessed the distances involved (as the crow flies) and the potential environmental impacts of this connection, prioritizing potential sites that are located closer to the proposed Port Talbot Substation. The potential environmental impacts of any connection required between the Margam Substation and the Port Talbot Substation will be considered within the analysis of each shortlisted site.

3.9 Position of the Site in relation to the OHL

3.9.1 A substation needs to be sited either side of the OHL but not through it. The rationale behind this is primarily for security of supply. For instance, if an OHL conductor was to collapse onto a live substation, the entire substation will be switched, causing a catastrophic failure on the NG transmission system.

3.9.2 The substation location is therefore required to be adjacent to the OHL network, not directly below it, which has led to the siting decisions for the long list.

3.10 Access

3.10.1 Permanent vehicular access would be required to the substation compound to enable regular inspection and maintenance of the substation equipment. Access would be via existing roads wherever possible or by creating new accesses from the local or trunk road network, if necessary.

3.10.2 A permanent metalled road of up to 5m in width (with passing places) would typically need to be constructed from the existing road network (or suitable existing tracks available or capable of upgrade) into the compound to allow for installation and maintenance.

3.10.3 As a number of transformers will be required at site, a route suitable to site for delivering any Abnormal Indivisible Loads (AILs) to the substation is required.

3.10.4 A solution to delivering AILs can be achieved in most instances but will require time and cost. The cost is likely to escalate the further the substation is from main roads.

3.11 Land Rights

3.11.1 National Grid will require land ownership and/or rights over land to construct and thereafter operate the substation site. This would also include obtaining suitable land on a temporary basis for construction working/laydown areas. It is expected that land would be able to be obtained through negotiations with landowners. However, National Grid is also able to seek the use of compulsory acquisition powers to obtain rights over land to deliver its energy infrastructure where necessary.

3.11.2 Land ownership has not been considered as a differentiating factor in the outcome of this Siting Study.

4 Identification of the Siting Study Area

4.1.1 The Siting Study Area refers to the specific location or region being evaluated for the potential placement of facilities, buildings, or equipment – in this case, substation locations.

4.1.2 To meet the identified needs case, the new substation will be ideally located in close proximity to the existing Margam Substation and the existing overhead lines in the vicinity of the existing Margam substation. This would reduce any additional overhead line connections into the new site.

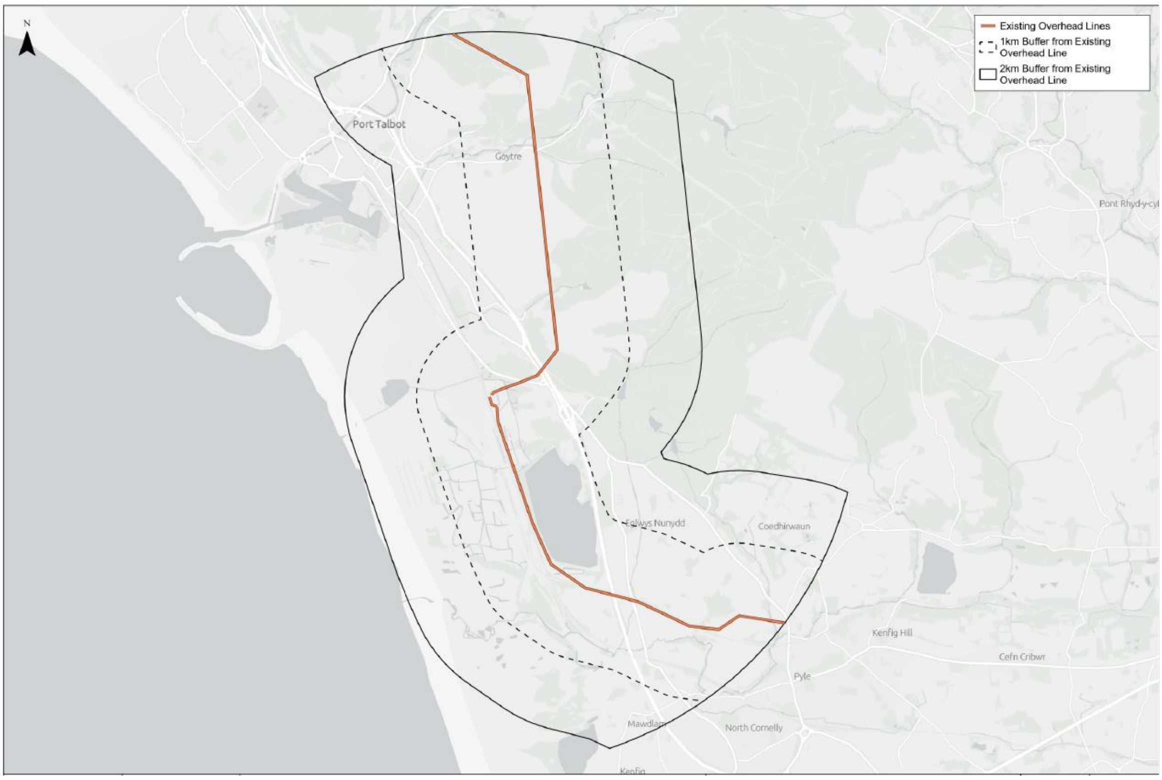
4.1.3 The Siting Study Area has been determined by factors such as the connection end points, the location of existing settlements or built-up areas, and physical constraint features. Proximity to the existing OHL is a key consideration and determines the Siting Study Area in order to minimise the length of additional infrastructure required, including new towers and OHL to connect back into the existing OHL.

4.1.4 The Siting Study Area has been determined by National Grid to be an area of 2km on either side of the existing overhead line ('OHL') that runs from North to South, within 5km from the existing Margam substation.

4.1.5 If suitable sites cannot be identified within this radius, then National Grid would need to consider sites within a wider Study Area.

4.1.6 The Siting Study Area is presented below in **Figure 4.1**.

Figure 4.1 – The Siting Study Area



5 Constraints Mapping

5.1 Constraints Maps

5.1.1 An initial identification and appraisal of site options was undertaken using Geographic Information Systems (GIS) mapping, which identified areas of potential environmental and land use constraints within the Siting Study Area. Mapping was used to exclude areas in the Siting Study Area (as far as reasonably possible) in order to minimise potential direct effects upon key environmental receptors.

5.1.2 Key receptors with the following attributes were considered in the constraints mapping process:

Planning

- Development Plan policies, designations, and land allocations (including Green Belt / Green Wedge, local landscape and wildlife designations).
- TCPA and DCO consents and pending major applications.

Landscape and Visual

- National Parks
- Areas of Outstanding Natural Beauty (AONBs)
- National Landscape Character Areas (NLCA)
- World Heritage Sites (WHS) and Buffer Zones
- National Trails

Ecology

- European/Natura 2000 Sites (i.e., Special Area of Conservation (SACs) and Special Protection Area (SPAs) incl cSACs and pSPAs)
- Sites of Importance for Nature Conservation (SINCs)[4]
- Ramsar Sites
- Sites of Special Scientific Interest (SSSIs)
- National Nature Reserves (NNRs) and Marine Nature Reserves (MNRs)
- Ancient Woodlands

Historic Environment

- Scheduled Monuments (SMs) and Listed Buildings
- Other historical structures, landscapes or assets of at least national importance.

[4] *For the areas within 2km of the existing Margam Substation only.*

Air Quality

- Air Quality Management Areas (AQMAs)

Noise

- Major Settlements

Geology and Soils

- Geoparks and Geological Sites of Special Scientific Interest
- Peatlands of Wales

Water

- National Flood Zones

Socio-Economics

- Trans-European Networks (roads or national/European walking/cycling routes)
- Major utilities and other installations

5.2 Topography

5.2.1 Site topography and landform can be a significant constraint and can influence cost. Flatter topography means less earthworks is required for construction, as it reduces the need for excavation, embankment, and levelling of the land surface.

5.2.2 While the general landform of the siting study area is predominantly flat, there are areas with notable slopes that necessitate careful consideration in the site selection process. These notable slopes are shown in **Figure 5.1** below.

Figure 5.1 – Siting Study Area Topography

5.2.3 Consequently, some sites with potentially steep terrain have been included in the siting study, as these areas are unavoidable, acknowledging that while topography poses challenges, these locations may still offer viable options for substation development.

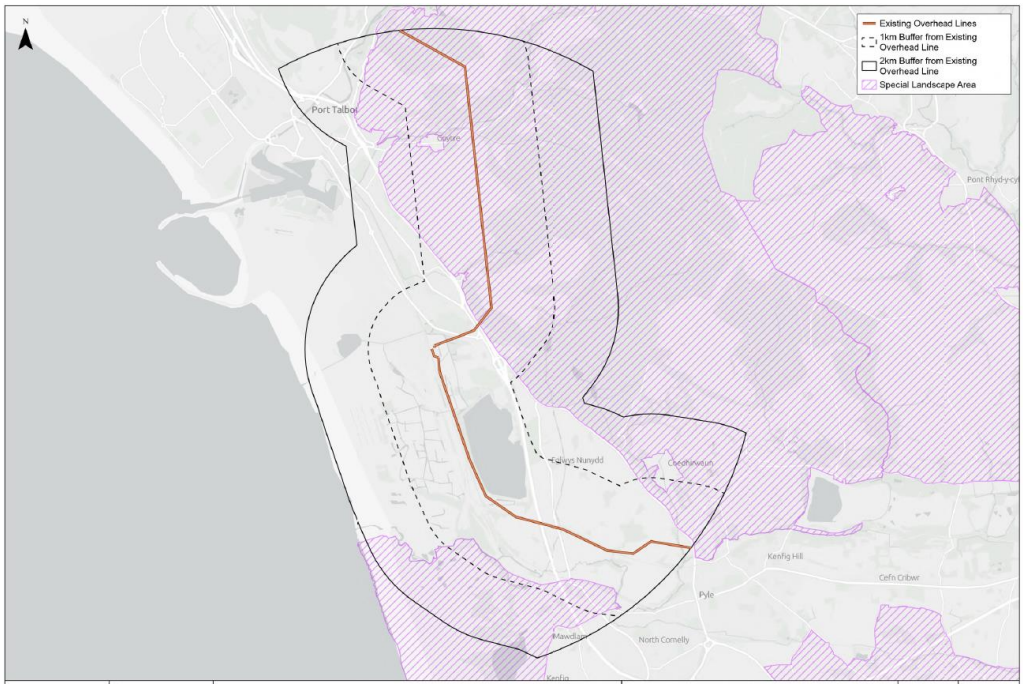
5.2.4 The potential impact of challenging topography or terrain will be analysed for each site, as well as any intervening topography that could help screen the site from adversely affecting neighbouring residential amenity standards.

5.3 Special Landscape Character Areas

5.3.1 Special Landscape Areas (SLAs) are a non-statutory designation applied by a local authority to define areas of high landscape importance within their administrative boundary.

5.3.2 Mapping was utilized to identify special landscape character areas within the region. SLA covers the majority of the land to the east of the M4 and therefore a significant portion of the siting study area, as shown below in **Figure 5.2.**

Figure 5.2 – Special Landscape Area



5.3.3 Although these landscape allocations are typically viewed as constraints, they have not been excluded from the Siting Study search area. This decision reflects the understanding that the presence of such locally designated landscapes is widespread and cannot be entirely avoided.

5.3.4 The Siting Study Area encompasses diverse landscapes, which presents unique challenges. While sites that sit outside of, or with minimal impact on special landscape character areas, are preferred, those with manageable impacts where appropriate mitigation measures can be implemented are also considered acceptable for development.

5.4 Flood Risk

5.4.1 The Siting Study Area comprises varied landscapes and presents flood risk challenges. Areas with low flood risk (as far as possible) are preferred, although sites with manageable flood risks where mitigation measures could create a suitably safe development platform are also acceptable.

5.4.2 Development and Flood Risk TAN-15 encourages the application of the 'sequential approach' in the master-planning process for new development, i.e., locating the more sensitive/vulnerable elements of new development in the areas which lie at lowest probability of flooding and, conversely, reserve the areas of the site at greatest risk of flooding for the least vulnerable elements of the development (or, preferably, leave such areas undeveloped or as soft landscaping). TAN-15 therefore requires local Planning Authorities to apply the Sequential Test to steer new development towards areas of lowest flood risk.

5.4.3 The sequential approach will be applied to the Substation development proposals and the layout, by using updated flood modelling to inform the location of more vulnerable uses of development in areas with the lowest risk of flooding.

5.4.4 A detailed assessment of flood risk and ground conditions has not been undertaken as part of this Siting Study. A Flood Consequence Assessment and Drainage Strategy will be required for the Site that is chosen as the preferred option for the substation. Detailed assessment will include consideration of potential future impacts of climate change on flood risk, as well as the impact of surface water network.

5.5 Consideration of Planning Context

5.5.1 It is important to consider planning applications within the Siting Study Area in order to assess the cumulative impact of the proposed development.

5.5.2 A planning history search of the Siting Study Area has been undertaken (based on the records available on Neath Port Talbot and Bridgend Borough County Council's website).

5.5.3 Given the scale of the Siting Study Area and nature of the proposed project, the following parameters have been applied to the planning application search:

- Only planning applications within 2km from the existing OHL's have been considered;
- Only planning applications approved within the last 5 years and which remain extant will be considered;
- Only planning applications that have been granted permission and/or are registered or undecided will be considered;
- Minor residential and commercial alterations (e.g., extensions, window fitting, tree felling, change of use etc.) are to be excluded from the search;
- Environmental Impact Assessment Screening requests and Screening reports have been included in the planning history search; however, these are not planning applications and therefore have not had a bearing on the Siting Study Area.

5.5.4 The Planning Inspectorate database of Nationally Significant Infrastructure Projects ('NSIP') has also been checked.

5.5.5 It is noted that Bridgend County Borough Council does not offer a map function for searching planning history, which has resulted in limitations when investigating past planning applications.

5.5.6 There are 3 relevant planning permissions that would have a bearing upon the siting of the proposed substation location.

5.5.7 The relevant planning application history for the search radius has been highlighted in **Table 5.1** below.

Table 5.1 – Relevant Planning History

Application no.	Application Address	Description of Development	Decision	Decision Date
P2021/1255	Land West of Junction 38 Of the M4 Port Talbot Margam SA13 2NU	Full planning application of the development of a metal processing facility totalling 28,500sq.m of floorspace comprising a powder processing plant (17,377sq.m), warehouse and store (5,428 sq.m) office building (1,442 sq.m), amenity building (776 sq.m), laboratory (200 sq.m), services building (470 sq.m), substation (107 sq.m), phase 2 (2,700 sq.m), CCTV, storage tanks and plant, parking, servicing and roads and associated works.	Approved	13 Jan 2023
P2024/0296	Western Wood Energy Biomass Plant Longland Lane Margam Neath Port Talbot SA13 2NR	Construction and operation of a hydrogen production facility including associated compression, storage and infrastructure, a hydrogen tube-trailer filling station and renewable electricity connection via a private wire from the existing biomass plant.	Approved	23 October 2024
P2024/0029	Y Bryn Wind Farm Land North-East Of The M4 Motorway Between Port Talbot And Maesteg	Development of National Significance: Installation of up to 18 wind turbines with maximum heights ranging between up to 206m, up to 230m, and up to 250m to blade tip. Each with foundations, external transformer housings, crane hardstanding and erection area; together with ancillary infrastructure and construction enabling works including substation, control building and compound;	Pending determination	N/A

Application no.	Application Address	Description of Development	Decision	Decision Date
		energy storage facility; two permanent wind monitoring locations; upgraded and new access tracks and highway junctions; underground cable runs; site signage; borrow pits; temporary construction and storage compounds and laydown areas.		

5.6 Constraints Mapping Results

5.6.1 GIS analysis and mapping was used to identify constrained land and discount areas in the Siting Study Area. The following maps represent the specific constraints applied, in order to identify the long list of sites. **Figure 5.3** shows the hard constraints (Ecology, Historic Environment, Water/Flood Risk and Socio-Economic). **Figure 5.4** shows the planning constrains.

Figure 5.3 – Hard Constraints

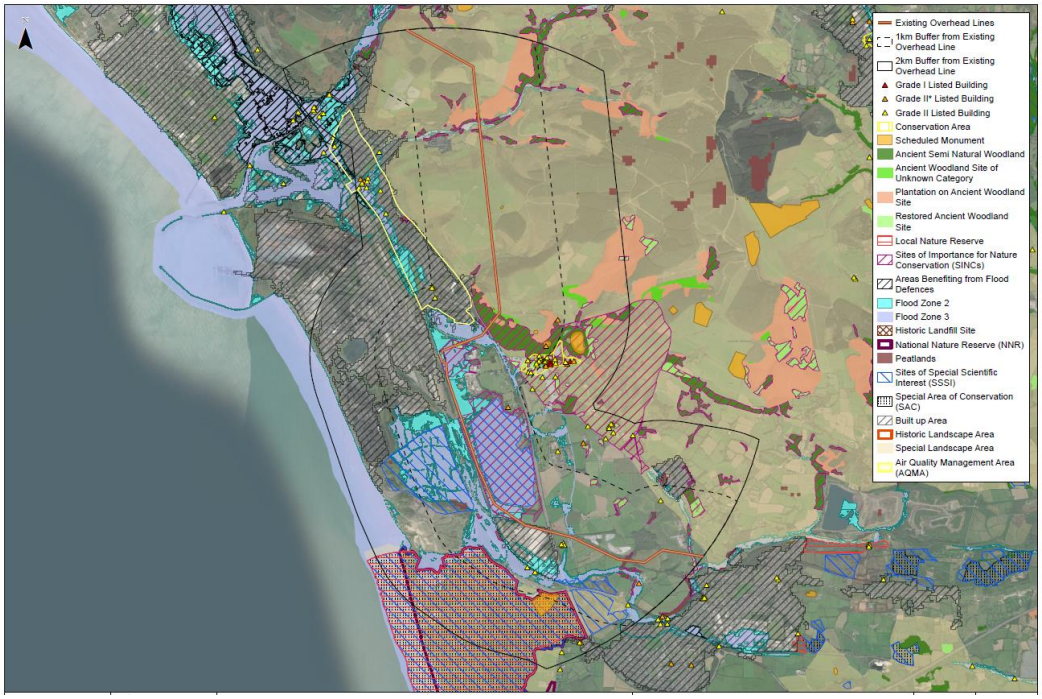


Figure 5.4 - Planning Constraints

6 Long List of Sites

6.1 Methodology

6.1.1 The site selection process involved screening initial sites against a range of criteria that assessed their suitability, as listed in **Section 2.2 (Approach to Options Appraisal)** and **Section 5.1 (Hard Constraints).**

6.1.2 In accordance with Horlock Rule 1, consideration was given to the likely environmental issues, balanced with the socio economic impacts, technical benefits and capital cost requirements.

Option 1 and Option 2

6.1.3 Two additional site options (Options 1 and 2) have been suggested and requested by National Grid to be included in the siting study despite being on land typically excluded. This is due to their strategic proximity to the existing Margam substation.

6.1.4 Option 1 benefits from its closeness to the proposed Port Talbot Substation, enhancing its viability by facilitating efficient integration with existing infrastructure. Meanwhile, Option 2's location allows for potential extension, making it a relevant consideration.

6.1.5 The justification for including these options is grounded in the National Grid's document, '*Our Approach to Options Appraisal*', which emphasizes balancing competing interests and utilizing existing infrastructure. This approach highlights that options are advantageous when they can adapt existing facilities, thereby minimizing environmental impacts and reducing costs.

6.1.6 By incorporating these options into the study, we align with the principles outlined in the options appraisal document, ensuring a sustainable and efficient strategy for meeting energy demands while streamlining the evaluation process alongside other potential sites.

6.2 Chosen Long List

6.2.1 Following this process, a total of 10 potential long list sites were considered, named 'Option 1' to 'Option 10'.

6.2.2 **Figure 6.1** shows the location of the long list of 10 site options identified within the Siting Study Area, as listed out below.

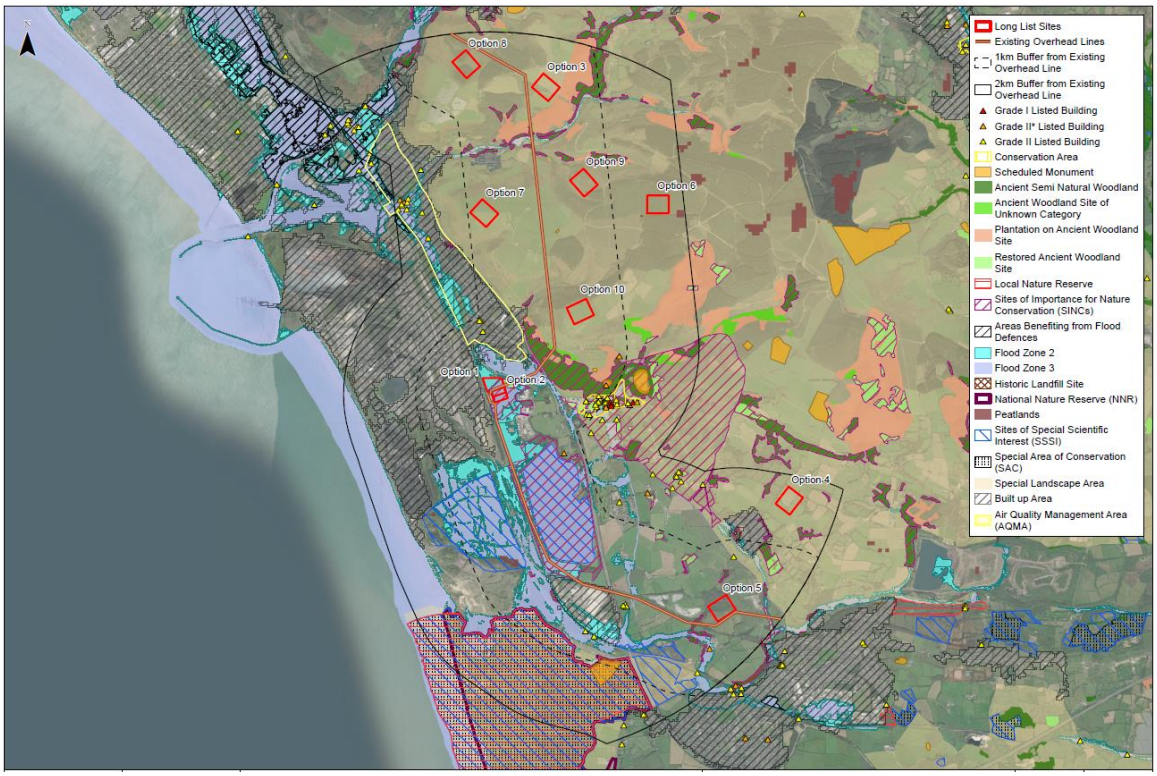
- **Option 1** – located at the site of the planning application approved in 2009. It is bordered to the southwest by the existing Margam substation. To the north, Option 1 adjoins the TATA golf course, with the A4241 located just beyond.
- **Option 2** – located directly adjacent to the existing Margam Substation and on the opposite side of the railway to the existing Tata Steelworks site.
- **Option 3** – located within the valley nearest to the village of Goytre, in the northern most part of the Siting Study area.
- **Option 4** – located adjacent to the Coed Hirwaun village, on the eastern most part of the Siting Study area.
- **Option 5** – located on elevated and vegetated land, between the Cae Garw Caravan Site and the Caergarw Solar Farm.
- **Option 6** – located within the steep and vegetated valley, near the Margam Mountain

- **Option 7** – located near the village of Taibach, on the top of the hill and adjacent to the Myndd Brombil Wind Farm.
- **Option 8** – located within the Margam Forest, adjacent to a solar farm accessed by the farm buildings in the northern most part of the Siting Study area.
- **Option 9** – located within a steep and vegetated valley, accessed via the village of Goytre via a forestry access route.
- **Option 10** – located adjacent to some isolated residential dwellings, including the Crugwyllt Farm, accessed off the A48.

Figure 6.1 – Long List Sites

6.2.3 **Figure 6.2** shows the location of the long list of 10 site options, along with the Hard Constrains plan.

Figure 6.2 – Long List Sites and Hard Constraints



6.3 Site Visit

6.3.1 A site visit was undertaken by a member of the landscape architecture team at Stantec on 22nd October to all the long list sites.

6.3.2 The purpose of site visit was to:

- 'Truth' the data captured during the desk-based element of the study, as far as practical;
- Identify any additional potential site options;
- Identify further constraints that may be present, but had not been identified through the desk-based element of the study; and
- Undertake a field appraisal of the options in order to inform the overall selection process.

6.4 Refinement of the Long List

6.4.1 Following the identification of the 'Long List' sites above, each site was examined using the criteria topics identified in **Section 2**. This then allowed the sites to be compared against each other.

6.4.2 Once the investigation was complete, each site was determined as either having beneficial attributes against other sites or as not showing any benefit over other sites.

6.4.3 In accordance with National Grid's '*Our Approach to Options Appraisal*', options are considered to be able to have an advantage if they can use or adapt existing infrastructure, provide for shorter (compared with longer) overhead line routes, they are financially less expensive compared to other more expensive options, and they avoid or mitigate environmental or socio-economic effects.

6.4.4 Options appraisal is therefore a robust and transparent process used to compare options and to assess the positive and adverse effects they may have across a wide range of criteria including environmental, socio-economic, technical and cost factors. The topics and subtopics considered are presented in **Table 6.1** below.

Table 6.1: Options Appraisal Topics and their constituent sub-topics

Topic	**Subtopic**
Environmental	Landscape and Visual Amenity; Ecology; Historic Environment; Local Air Quality; Noise and Vibration; Soils and Geology; Water.
Socio-economic	Local Economic Activity; Traffic and Transport.
Cost	Technical Feasibility; Approximate capital cost of connecting from the new substation back to the existing Main Interconnected System, including considerations of existing infrastructure and length.

6.4.5 Based on the topics identified in **Table 6.1** above, the key criteria used in assessing the sites were:

- The proximity to settlements and more rural isolated dwellings, and the degree to which existing features (e.g., woodland belts) contribute to visual containment or existing industrial character;
- The presence of any rights of way, access routes or other recreational receptors. There are no National Trails within the Siting Study Area, however a range of recreational routes and local PRoWs are present;
- Ease of access for general construction traffic based on any access restrictions;
- Known designated or non-designated heritage assets within the approximate site boundary;
- The presence or absence of designated or non-designated ecological sites within the approximate site boundary;
- The presence of waterbodies such as ponds within 500m of the approximate site boundary;
- The extent of the site (including access routes) within Flood Zone 2 and 3;
- Local policy designations and planning history;
- Presence of planning applications highlighted in **Table 5.1**;
- Proximity to the existing Margam substation and proximity to the proposed location for the Port Talbot substation;
- Landform and topographic constraints; and
- Potential 400kV overhead line work required to connect the site to the existing OHL.

6.4.6 Based on the key assessment criteria listed above, the appraisal of the 10 long list sites resulted in 5 of them being discounted from the Siting Study.

6.4.7 The sites which were discounted, and the specific technical reason for doing so, is shown below in **Table 6.2.**

Table 6.2: Discounted Long List Sites

Long List Site	Justification
5	Option 5 is located in close proximity to the existing overhead line network, which also follows the path of the local railway line. There are no significant ecological designations in the immediate vicinity, with the exception of several Sites of Importance for Nature Conservation (SINC). There are also areas of ancient woodland surrounding and adjacent to Option 5. Option 5 is situated on higher elevated ground, on top of a small hill covered in vegetation, which makes topography difficult at this location, as well as the low potential for micro siting due to the present of the solar farm to the west and the traveler residential community approximately 250m to the east. A well-established traveler community, based on the Caegarw Road off Pyle Road, is located in close proximity to Option 5 and could create significant objections to the substation in this development, and/or create security risks. Access to Option 5 could potentially be achieved by utilizing the existing access to the solar farm located west of Option 5. However, this possibility is subject to further exploration and needs to be checked with the highways team. **Option 5 has not been included in the shortlist due to topographical challenges, limited micro siting potential, potential community objections and security risks, and access issues.**
6	Option 6 is located within a Special Landscape Area, which covers the majority of the land to the east of the M4. Special Landscape Areas (SLAs) are a non-statutory designation applied by a local authority to define areas of high landscape importance. The site is located within a steep and heavily vegetated valley, believed to be associated with the Nant Cwm-Y-Garn river. The topography and vegetation on this site make both access and constructability of the substation extremely challenging. There are no significant ecological designations in the immediate vicinity, with the exception of several Sites of Importance for Nature Conservation (SINC). These SINCs are primarily located within the valley and encompass areas of dense vegetation. A public right of way is located to the west. This pathway connects the forest commission road with the wider valley. Although the accessibly of the PRoW was not confirmed during the site visit, the area was constrained by restricted access routes and access to residential properties. Access to the site is currently limited. However, there is potential to access the site using the forestry commission route currently used to access Bryn Wood, from the Goytre Road. However, this possibility is subject to further exploration and needs to be checked with the highways team.

	Option 6 is situated within the red line boundary of the Planning Application '*P2024/0029 - Development of National Significance: Installation of up to 18 Wind Turbines*.' This application was validated in April 2024 and is currently under review. However, the potential for a substation in this area poses a planning risk, as it would directly conflict with the proposed wind turbine development. **Option 6 has not been included in the shortlist because the steep and heavily vegetated valley makes access and constructability extremely challenging, despite its proximity to the existing overhead line network and potential access routes.**
8	Option 8 is located within a Special Landscape Area, which covers the majority of the land to the east of the M4. Special Landscape Areas (SLAs) are a non-statutory designation applied by a local authority to define areas of high landscape importance. There are no significant ecological designations in the immediate vicinity, with the exception of several Sites of Importance for Nature Conservation (SINC). These SINCs are primarily located within the valley and encompass areas of dense vegetation. A public right of way is located to the east of the site. This pathway connects the farm building and the road to the nearby villages of Goytre and Port Talbot. The site is in close proximity to the existing overhead line network, which is situated to the north of Option 8. Although the topography of Option 8 is preferable to Option 3, the site is covered by dense vegetation and the Ynys-Y-Gaws Brook, which creates the potential for drainage ditches to exist on the site. Access to the site is currently limited by smaller roadways. However, there is potential to achieve better access using a newly constructed access route from the A4107 (Afan Valley Road). **Option 8 has not been included in the shortlist because it is heavily covered with dense vegetation and trees. Potential drainage issues due to the Ynys-Y-Gaws Brook could pose environmental challenges. Current limited access via smaller roadways could pose logistical challenges.**
9	Option 9 is located within a Special Landscape Area, which covers the majority of the land to the east of the M4. Special Landscape Areas (SLAs) are a non-statutory designation applied by a local authority to define areas of high landscape importance. The site is located within a steep and heavily vegetated valley, believed to be associated with the Nant Cwm-Y-Garn river. The topography and vegetation on this site make both access and constructability of the substation extremely challenging. There are no significant ecological designations in the immediate vicinity, with the exception of several Sites of Importance for Nature Conservation (SINC). These SINCs are primarily located within the valley and encompass areas of dense vegetation. A public right of way is located to the east. This pathway connects the forest commission road with the wider valley. Although the accessibly of the PRoW

	was not confirmed during the site visit, the area was constrained by restricted access routes and access to residential properties. The site is in close proximity to the existing overhead line network, which is situated to the west of Option 9. Access to the site is currently limited. However, there is potential to access the site using the forestry commission route currently used to access Bryn Wood, from the Goytre Road. However, this possibility is subject to further exploration and needs to be checked with the highways team. Option 9 is situated within the red line boundary of the Planning Application '*P2024/0029 - Development of National Significance: Installation of up to 18 Wind Turbines*.' This application was validated in April 2024 and is currently under review. However, the potential for a substation in this area poses a planning risk, as it would directly conflict with the proposed wind turbine development. **Option 9 has not been included in the shortlist because the steep and heavily vegetated valley makes access and constructability extremely challenging, despite its proximity to the existing overhead line network and potential access routes.**
10	Option 10 is located within a Special Landscape Area, which covers the majority of the land to the east of the M4. Special Landscape Areas (SLAs) are a non-statutory designation applied by a local authority to define areas of high landscape importance. Option 10 is located directly north of the Cryfwyllt Fach Farm and other nearby residential receptors located approximately 300m away, which would have direct sight of the substation in this location. The site is located directly adjacent to a steep and heavily vegetated valley, although the topography of Option 10 itself is suitable, and it is not covered in vegetation itself. To the north of Option 10 is a thick belt of vegetation that separates the site from the Brombil Reservoir, which is popular hiking spot and natural landscape. The site immediately slopes down towards the reservoir on the boundary of Option 10, which would make micro siting difficult. There are no significant ecological designations in the immediate vicinity, with the exception of a Site of Importance for Nature Conservation (SINC) located to the south-west. A well established and open public right of way is located to the south-east of Option 10, associated with the access to the farm and residential buildings and a popular walking spot. The site is in close proximity to the existing overhead line network, which is situated to the west of Option 10. Access to the site is currently limited and would be via the existing small access road the residential properties and farm. Option 10 is situated directly adjacent to the red line boundary of the Planning Application '*P2024/0029 - Development of National Significance: Installation of up to 18 Wind Turbines*.' This application was validated in April 2024 and is currently under review. However, the potential for a substation in this area poses a planning risk, as it would directly conflict with the proposed wind turbine development.

	Option 10 has not been included in the shortlist because of its proximity to Cryfwyllt Fach Farm and nearby residential receptors would result in direct visibility of the substation, and the adjacent steep, vegetated valley and slope towards Brombil Reservoir complicate micro siting and access.

6.5 Conclusions

6.5.1 Each long list site was examined using the criteria topics identified in **Table 2.1**. This then allowed the sites to be compared against each other, as shown in **Table 6.2**.

6.5.2 The appraisal of the 10 long list sites resulted in 5 of them being discounted from the Siting Study.

6.5.3 5 locations were taken forward to the short list. These are as follows:

- Option 1
- Option 2
- Option 3
- Option 4
- Option 7

6.5.4 Further detail on the 5 sites that have been progressed to the Short List is provided within the Options Appraisal Summary Tables (OAST) in **Section 7.**

7 Short List of Sites

7.1 Introduction

7.1.1 This section provides a comparison and analysis of the shortlisted sites.

7.2 Options Appraisal Summary Tables (OAST)

7.2.1 Options 1, 2, 3, 4 and 7 were taken forward for further analysis using Options Appraisal Summary Tables (OAST tables).

7.2.2 **Figure 7.1** below shows the location of these 5 Sites in relation to the Siting Study Area.

Figure 7.1 – Shortlist Sites and Study Area

7.2.3 The OAST tables examine environmental, socio economic and technical information related to the sites in further detail and how they might be affected by construction and operation of the substation. In accordance with Horlock Rule 1, consideration will be given to the likely environmental issues early on to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum.

7.2.4 The OAST tables utilise information gathered from various sources, as follows:

- Desk-based review of publicly available information;
- Publicly available mapping, including:
  - Ordnance Survey mapping and aerial photography (2024);
  - Satellite Imagery from Google Maps (2024) and Street View (2024) and;

- Defra Multi-Agency Geographic Information for the Countryside (MAGIC) Map Application (2024).

- Information from the site visit.

7.2.5 The OAST assessment has been conducted using a high-level approach, primarily relying on desktop-based sources. At this stage, no up to date survey information was available on any of the shortlist sites to inform the analysis. Consequently, the findings and recommendations are based on existing data, and further detailed surveys and field studies will be necessary at the next stage of the project.

7.2.6 The following topics are discussed in each OAST table:

- **Landscape and Visual Amenity** - The sensitivity of each site was determined by assessing how the proposed substation would affect the landscape character, features, and visual amenity.

- **Ecology** - In line with Horlock Rules 2 and 3, all sites taken forward for the shortlist avoid internationally and nationally designated ecological sites. Proximity to designated ecological receptors (National Nature Reserves, Biological Sites of Special Scientific Interest (SSSIs) etc.) have therefore been considered. Sites likely to have residual effects on ecology as a result of proposed development are viewed less favorably.

- **Historic Environment -** Horlock Rule 2 states that the siting of infrastructure should seek to avoid, where practicable, effects upon designated areas of the highest cultural value (including their settings). None of the shortlisted sites directly affect any heritage assets, including Registered Parks and Gardens, Listed Buildings, Scheduled Monuments or World Heritage Sites. The following OAST tables therefore consider the proximity of the sites to these receptors.

- **Water, Geology and Soils** - The assessment for water, geology and soils focused on the proximity of receptors, assessing the flood zone the site is in and examining the classification of the land.

  - It is noted that locating some type of sustainable drainage system (SuDS) features and using the land for appropriate flood alleviation will help make the best use of all sites.

- **Noise** – During operation, noise from the substation will adhere to requirements specified by the Local Authority in order to minimise noise break out from the facility. As such, it is expected that the effect on noise sensitive receptors will not be significant. However, there may be a need to provide acoustic screening during construction works to limit impacts on noise sensitive receptors. The noise section considers the proximity of the site to noise sensitive receptors.

- **Traffic and Transport** - All sites would require the construction of some new temporary and permanent accesses.

- **Technical Complexity (Proximity to Existing OHL)** - Increased distance from the existing OHL is considered to increase potential technical and cost constraints. Therefore, as set out within the scope, a preference for sites more closely located to the OHL will be applied unless outweighed by other potential environmental effects.

- **ALC -** The Agricultural Land Classification of each site was evaluated to understand the impact on agricultural productivity. Sites on lower-grade agricultural land (Grades 3b, 4, and 5) are generally preferred over those on higher-grade land (Grades 1, 2, and 3a) to preserve valuable agricultural resources. The assessment also considered the potential for mitigating impacts on agricultural land through careful site design and micro siting.

- **Potential for Extension of the Existing Substation** – the potential for an extension of the existing Margam substation has been considered for all options. This is in accordance with National Grid's document, '*Our Approach to Options Appraisal*,' which emphasizes balancing competing interests and utilizing existing infrastructure.

- **Distance to the proposed Port Talbot Substation** - The proximity of each option to the proposed Port Talbot Substation has been evaluated. Closer options can significantly reduce the length of cable connections required, which not only lowers construction costs but also minimizes the potential for environmental disruption during installation and operation.

7.2.7 A summary of the key considerations and constraints explained within the OAST tables is provided in **Section 8 'Summary of Shortlisted Sites'**.

7.3 Option 1

Figure 7.1 – Option 1 Site Location

Table 7.1 – Option 1 OAST

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Environment			
Landscape and Visual Amenity	Option 1 is situated at the site of the planning application approved in 2009. It is bordered to the southwest by the existing Margam substation. To the north, Option 1 adjoins the TATA golf course, with the A4241 located just beyond. It is located approximately 14km southeast of Swansea and around 4km southeast to the centre of Port Talbot. Option 1 consists of areas of grassland and vegetation but is in an industrial area. To the east, approximately 290 meters away, is the Western Wood Energy Plant and Margam Green Energy Plant. Further east, approximately 823 meters away, is the A48 (Margam Road) and the M4 motorway, with the Margam Moors beyond. Directly to the west lies the TATA Steelworks and the London to Swansea railway. The landscape character of Option 1 is significantly shaped by the industrial activities of Tata Steelworks, as well as the nearby Western Wood Energy Plant and Margam Green Energy Plant. As a result, Option 1 is expected to have minimal impact on the surrounding landscape character however vegetation within the Site would be lost as a result of the proposals, therefore there would affect to landscape features.	There is potential for shrub and tree planting around the periphery of the substation to reinforce existing features and provide effective screening and integration of the development from visual receptors. Planting should be substantive in form and relatively diverse to include a mix of species to afford screening all year round.	There would continue to be loss of existing landscape features, however the development is not considered out of character given the location adjacent to the industrial forms present in the nearby vicinity. The development is likely to remain visible in a worst case even with the establishment of mitigation, however adverse effects are likely to remain limited given the industrial context of the Site

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	The development will likely be visible from nearby receptors (residential areas, local PRoW, and road network), but overall it is considered adverse effects will be limited given the already established industrial character of the region. Views of Option 1 are also possible from distant locations on elevated landform to the east, however these are back dropped by the industrial forms and therefore the potential for adverse effects is limited. The nearest PRoW is located on the other side of the A4241 and therefore is not expected to be impacted. The topography of Option 1 is relatively flat and level and therefore considered suitable for the development of a substation.		
Ecology	The boundaries of fields within Option 1 are delineated by a parcel of woodland to the east. Isolated trees are located along the northern boundary and within the site area and outside of the site boundary. Option 1 is located approximately 1 km from the Eglwys Nunydd Reservoir, which is designated as a Site of Special Scientific Interest (SSSI). Furthermore, Margam Moors (SSSI) lies about 840 meters southwest of Option 1. There are no other statutory designated ecological sites within 1km of the site. No major direct or indirect impacts are expected on these designations during the construction phase due to the	Further ecological surveys would be required to confirm habitat extents and conditions and determine the presence/absence of protected or otherwise notable species. Measures would be provided to avoid entrapment of animals during construction. Habitat clearance would be programmed to avoid sensitive periods for fauna. Where practicable, construction phase lighting would be designed to reduce light	The construction of the proposed substation would result in the loss of hedgerow and woodland which may potentially support protected species (if present). The SINC supports habitats listed under Section 7 of the Environment (Wales) Act 2016, which are of principal importance for maintaining and enhancing biodiversity in Wales. There is potential for residual effects on protected species (if present) through direct loss of habitat.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	distance and physical separation from the proposed development. Option 1 is situated within a Site of Importance for Nature Conservation (SINC) (Junction 38 Wetland Complex SINC) designated for its wetland habitats (including Section 7 Priority Habitats[5]) and areas designated as Ancient Woodland (the ancient woodland area lies to the east of the Option 1 site boundary). Habitats within and surrounding the Option 1 site could have the potential for supporting commuting and foraging species, such as bats, breeding birds and reptiles.	spill on important light-sensitive important biodiversity features. An Ecological Clerk of Works (ECoW) would be present on site during key periods of the construction phase. The ECoW would be required to make certain that all committed mitigation measures are adhered to. Realignment of field drainage ditches where present may be required. This may require secondary consents (such as Land Drainage Consent) and may also have Water Framework Directive (WFD) implications. Paragraph 6.4 of the Planning Policy Wales states that the planning system must ensure development results in a net benefit for biodiversity and ecosystem resilience to enhance wellbeing. Biodiversity enhancements within and potentially outside the site would therefore likely be required to enable delivery of net benefit.	Species may be disturbed by increased light levels and noise levels during the construction period. However, the site is already within an industrial area, so the established industrial character of the region may mitigate potential lighting and noise impacts upon species. There is potential for indirect construction impacts on ancient woodland, such as dust deposition, however measures to control dust and other pollutants during construction would be set out in a CEMP.

[5] Section 7 Priority Habitats = those habitats listed in accordance with Section 7 of the Environment Wales (2016) Act as those habitats which are considered of key significance to sustain and improve biodiversity in relation to Wales. Note Section 7 habitats are described here as a result of information taken from the SINC designation and Section 7 Habitats aren't specifically considered in the methodology of the siting study (Section 5).

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Historic Environment	Option 1 is located approximately 1.15 km west from the nearest heritage receptors. Both Margam Mountain, recognised for its historic landscape, and the Margam Park conservation area are marked on the Neath Port Talbot policies map. Additionally, Margam Abbey, a scheduled monument, is located about 1.37 km to the east of Option 1. Regarding listed buildings, to the north of Option 1, the milepost at Tollgate Park (Grade II) is situated approximately 659 meters away, while the Belulah Calvinistic Methodist Church (Grade II*) is about 808 meters to the north. Both structures are located north of the A4241 and are screened by residential properties. Additionally, to the east, there are several listed buildings graded II, II*, and I, with the closest being approximately 1.2 kilometres away. These buildings are also well-screened by existing infrastructure and are positioned east of the A48 and M4. Finally, Margam crematorium (II*) is located approximately 1.12km southeast which is well screened by Western Bio-Energy Plant. All historic designations in proximity to Option 1 are positioned across the A48 and M4, suggesting that the impact on these assets is expected to be minimal.	A detailed landscape and visual impact assessment would include consideration of the impact of the proposed substation on any heritage assets or areas of Historic Landscape in the vicinity. In terms of archaeological impacts, a desk-based assessment would be required to provide a more detailed understanding. This may then need to be supplemented with intrusive investigations. Early consultation / engagement with Historic England and county archaeologist and heritage officer would be recommended. Adopting appropriate landscaping design to screen the proposed substation would be recommended.	Any anticipated direct archaeological impacts would be mitigated through advance excavation and recording (‘preservation by record’) and through the development of a Written Scheme of Investigation (‘WSI’). Construction of the proposed development would not result in direct impacts to any Scheduled Monuments or Listed Buildings within 1km of Option 1. There is the potential for impacts on the setting of Margam Abbey, Margam Mountain and Margam Park Conservation. However, minimal impacts are predicted due to shielding by hedges, trees, the A48 and M4. Additionally, the substation on this plot will not increase the impacts already associated with the industrial landscape.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Water, Geology and Soils	Option 1 is located within areas of Flood Zone 1 and 2.	Generic pollution control mitigation would be adopted through a Construction Environmental Management Plan (CEMP). A Flood Consequence Assessment and Drainage Strategy will be required.	No residual effects on hydrology and geology are anticipated. Any works within flood zones would require a Flood Risk Assessment. Consents / permits from the Environment Agency may be required. Early consultation / mitigation with the Environment Agency is recommended.
Noise	The closest noise receptors are several residential buildings situated about 350 meters northeast of Option 1. However, these buildings are located on the opposite side of the A4241, so no adverse impacts are anticipated during either the construction or operational phases. The same applies to the Public Right of Way (PRoW), which is also positioned across the A4241. During operation, the substation is unlikely to produce noise that is audible outside of the immediate site boundary. Therefore, no adverse impacts are predicted.	Construction noise effects are typically mitigated through standard control measures outlined in a CEMP and agreed with the local authority environmental health officer. During operation, noise from the substation will adhere to requirements specified by the Local Authority in order to minimise noise break out from the facility.	There is the potential for residual impacts on noise sensitive receptors as a result of an increase in noise and traffic along the local road network as a result of construction activities. It is assumed that standard construction control measures or Best Practical Means would be adhered to within a CEMP which would reduce construction noise effects. Ensuring the siting of the proposed substation is undertaken sensitively would ensure operational noise impacts are minimised e.g. through maximising separation distances / building proximity distances where possible between the proposed substation and sensitive receptors. It is expected that the impact on noise sensitive receptors will not be significant.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Agricultural Land Classification	The site is located within ALC Grade 4, meaning the land suffers severe limitations that significantly restrict the range and/or yield of crops to be grown.	Grade 4 land is ALC with severe limitations which significantly restrict the range of crops and/or the level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable.	Grade 4 land does not require strict protection. This will allow for the construction of the substation without significant concerns for future agricultural use.
Socio-economic			
Traffic and Transport	Access to Option 1 would be achieved via the already existing maintenance access road that leads to the existing substation from the A48 Margam Interchange located west of the M4. There is the potential to directly affect roads, nearby residential and commercial properties as a result of increased traffic on the local road network during construction	Sensitive hedge removal and re-planting for access road. Construction effects on road infrastructure is typically mitigated through standard control measures outlined in a CEMP or Construction Traffic Management Plan ('CTMP').	There are potential effects caused by traffic disturbance to local residences. However, based on the assumption that no regular HGV or notable load traffic will be required during operation this is not likely to be significant as it will be for the duration of construction only. The diversions required may also impact of existing properties in the area - the diversion of traffic and pedestrians during construction may affect amenity.
Technical and Cost			
OHL	Option 1 is in very close proximity to the existing OHL. In addition, Option 1 is also located in National Grid land and therefore there is no need to establish new land ownership.	Option 1 is considered to have low technical and cost implications resulting from OHL re-routing.	Option 1 is not anticipated to result in high technical and cost implications due to the proximity to the OHL.
Extension of existing substation	This option does not facilitate the extension of the existing Margam Substation, which results in greater environmental and economic impacts. Without the ability to leverage established		Option 1 requires a newly built replacement substation – this is less suitable and more resource-intensive

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	infrastructure, this approach necessitates the construction of a new facility in a greenfield location.		compared to extending the existing substation.
Margam Substation to Port Talbot	Option 1 is strategically located in close proximity to the proposed Port Talbot Substation, which is approximately 1km to the west of Option 1. This proximity enhances integration with existing electrical infrastructure, improving operational reliability. It also reduces the length of cable connections, leading to lower construction costs and a smaller environmental impact. Additionally, this location allows for quicker implementation, effectively addressing energy demands while supporting economic and environmental sustainability.		The close proximity of Option 1 to the Port Talbot Substation presents enhanced operational efficiency and reduced infrastructure costs due to shorter cable runs. This location can minimize environmental impacts by limiting land disturbance.

7.4 Option 2

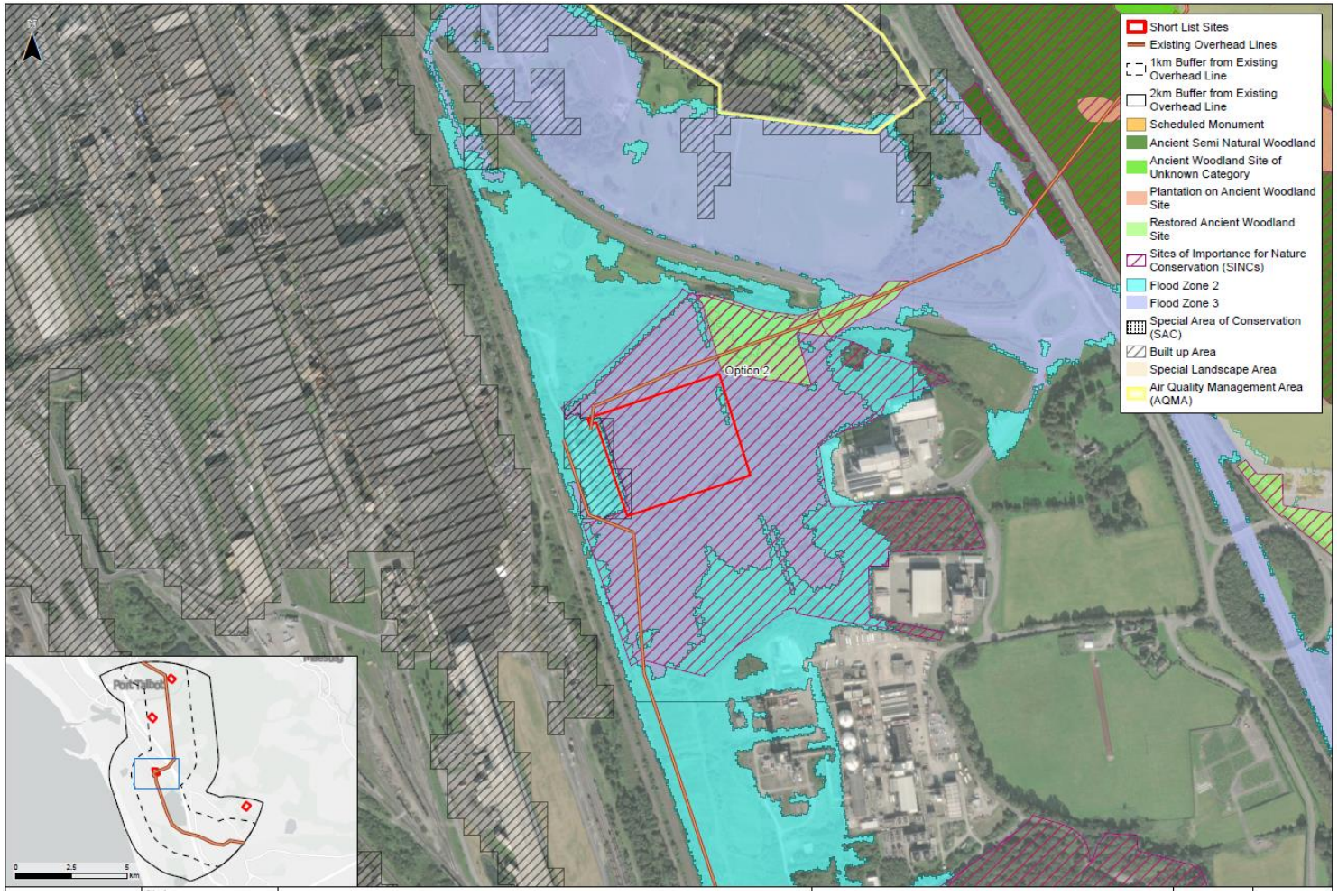


Figure 7.2 – Option 2 Site Location

Table 7.2 – Option 2 OAST

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Environment			
Landscape and Visual Amenity	Option 2 is located directly adjacent to the existing Margam Substation and on the opposite side of the railway to the existing Tata Steelworks site. It is located approximately 14km southeast of Swansea and around 4km southeast to the centre of Port Talbot. Option 2 occupies an area of existing vegetation. It is bordered by the current Margam Substation to the west, with the London Swansea railway and TATA steelworks beyond. To the east, approximately 290 meters away, is the Western Wood Energy Plant and Margam Green Energy Plant. Further east, approximately 823 meters away, is the A48 (Margam Road) and the M4 motorway, with the Margam Moors beyond. Therefore, the landscape character of Option 2 is significantly shaped by the industrial activities, and the development is expected to have minimal impact on the surrounding landscape character. Vegetation within the Site would however be lost as a result of the proposals, therefore there would affect to landscape features. The nearest PRoW is located on the other side of the A4241 and therefore is not expected to be impacted.	There is potential for shrub and tree planting around the periphery of the substation to reinforce existing features and provide effective screening and integration of the development from visual receptors. Planting should be substantive in form and relatively diverse to include a mix of species to afford screening all year round.	There would continue to be loss of existing landscape features, however the development is not considered out of character given the location adjacent to the industrial forms present in the nearby vicinity. The development is likely to remain visible in a worst case even with the establishment of mitigation, however adverse effects are likely to remain limited given the industrial context of the Site

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	The nearest residential properties are located approximately 553 meters northeast of Option 2. These are also located 250m beyond on the other side of the A4241. Therefore, visual impacts are expected to be minimal. Views of Option 2 are possible from distant locations on elevated landform to the east, however these are back dropped by the industrial forms and therefore the potential for adverse effects are limited. The topography of Option 2 is suitable for the development of a substation. Overall, it is considered adverse effects will be limited given the already established industrial character of the region.		
Ecology	The boundaries of fields within Option 2 are delineated by a parcel of woodland to the east. Isolated trees are located within and outside of the site boundary. Option 2 is located approximately 955m northwest from the Eglwys Nunydd Reservoir, which is designated as a Site of Special Scientific Interest (SSSI). Furthermore, Margam Moors (SSSI) lies about 840 meters southwest of Option 1. There are no other statutory designated ecological sites within 1km of the site. No major direct or indirect impacts on these designations	Further ecological surveys would be required to confirm habitat extents and conditions and determine the presence/absence of protected or otherwise notable species. Measures would be provided to avoid entrapment of animals during construction. Habitat clearance would be programmed to avoid sensitive periods for fauna. Where practicable, construction phase lighting would be designed to reduce light	The construction of the proposed substation would result in the loss of hedgerow and woodland which may potentially support protected species (if present). The SINC supports habitats listed under Section 7 of the Environment (Wales) Act 2016, which are of principal importance for maintaining and enhancing biodiversity in Wales. There is potential for residual effects on protected species (if present) through direct loss of habitat.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	are anticipated during the construction phase due to the distance and physical separation from the proposed development. Option 2 is situated within a Site of Importance for Nature Conservation (SINC) (Junction 38 Wetland Complex SINC) designated for its wetland habitats (including Section 7 Priority Habitats[6]) and areas designated as Ancient Woodland (the ancient woodland area lies to the east of the Option 2 site boundary). Habitats within and surrounding the site could have the potential for supporting commuting and foraging species, such as bats, breeding birds and reptiles.	spill on important light-sensitive important biodiversity features. An Ecological Clerk of Works (ECoW) would be present on site during key periods of the construction phase. The ECoW would be required to make certain that all committed mitigation measures are adhered to. Realignment of field drainage ditches where present may be required. This may require secondary consents (such as Land Drainage Consent) and may also have Water Framework Directive (WFD) implications. Paragraph 6.4 of the Planning Policy Wales states that the planning system must ensure development results in a net benefit for biodiversity and ecosystem resilience to enhance wellbeing. Biodiversity enhancements within and potentially outside the site would therefore likely be required to enable delivery of net benefit.	Species may be disturbed by increased light levels and noise levels during the construction period. However, the site is already within an industrial area, so the established industrial character of the region may mitigate potential lighting and noise impacts upon species. There is potential for indirect construction impacts on ancient woodland, such as dust deposition, however measures to control dust and other pollutants during construction would be set out in a CEMP.

[6] Section 7 Priority Habitats = those habitats listed in accordance with Section 7 of the Environment Wales (2016) Act as those habitats which are considered of key significance to sustain and improve biodiversity in relation to Wales. Note Section 7 habitats are described here as a result of information taken from the SINC designation and Section 7 Habitats aren't specifically considered in the methodology of the siting study (Section 5).

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Historic Environment	Option 2 is located approximately 1.26 km west from the nearest heritage receptors. Both Margam Mountain, recognised for its historic landscape, and the Margam Park conservation area are marked on the Neath Port Talbot policies map. Additionally, Margam Abbey, a scheduled monument, is located about 1.46 km to the east of Option 2. Regarding listed buildings, to the north of Option 1, the milepost at Tollgate Park (Grade II) is situated approximately 866 meters away, while the Belulah Calvinistic Methodist Church (Grade II*) is about 1km to the north. Both structures are located north of the A4241 and are screened by residential properties. Additionally, to the east, there are several listed buildings graded II, II*, and I, with the closest being approximately 1.16 kilometres away. These buildings are also well-screened by existing infrastructure and are positioned east of the A48 and M4. Finally, Margam crematorium (II*) is located approximately 1.14km southeast which is well screened by Western Bio-Energy Plant. All historic designations in proximity to Option 2 are positioned across the A48 and M4, suggesting that the impact on these assets is expected to be minimal.	A detailed landscape and visual impact assessment would include consideration of the impact of the proposed substation on any heritage assets or areas of Historic Landscape in the vicinity. In terms of archaeological impacts, a desk-based assessment would be required to provide a more detailed understanding. This may then need to be supplemented with intrusive investigations. Early consultation / engagement with Historic England and county archaeologist and heritage officer would be recommended. Adopting appropriate landscaping design to screen the proposed substation would be recommended.	Any anticipated direct archaeological impacts would be mitigated through advance excavation and recording (‘preservation by record’) and through the development of a Written Scheme of Investigation (‘WSI’). Construction of the proposed development would not result in direct impacts to any Scheduled Monuments or Listed Buildings within 1km of Option 2. There is the potential for impacts on the setting of the Margam Abbey, Margam Mountain and Margam Park Conservation. However, minimal impacts are predicted due to shielding by hedges, trees, the A48 and M4. Additionally, the substation on this plot will not increase the impacts already associated with the industrial landscape.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Water, Geology and Soils	Option 2 is located within areas of Flood Zone 1 and 2.	Generic pollution control mitigation would be adopted through a Construction Environmental Management Plan (CEMP). A Flood Consequence Assessment and Drainage Strategy will be required.	No residual effects on hydrology and geology are anticipated. Any works within flood zones would require a Flood Risk Assessment. Consents / permits from the Environment Agency may be required. Early consultation / mitigation with the Environment Agency is recommended.
Noise	The closest noise receptors are several residential buildings situated about 553 meters southeast of Option 2. However, these buildings are located on the opposite side of the A4241, so no adverse impacts are anticipated during either the construction or operational phases. The same applies to the Public Right of Way (PRoW), which is also positioned across the A4241. During operation, the substation is unlikely to produce noise that is audible outside of the immediate site boundary. Therefore, no adverse impacts are predicted.	Construction noise effects are typically mitigated through standard control measures outlined in a CEMP and agreed with the local authority environmental health officer. During operation, noise from the substation will adhere to requirements specified by the Local Authority in order to minimise noise break out from the facility.	There is the potential for residual impacts on noise sensitive receptors as a result of an increase in noise and traffic along the local road network as a result of construction activities. It is assumed that standard construction control measures or Best Practical Means would be adhered to within a CEMP which would reduce construction noise effects. Ensuring the siting of the proposed substation is undertaken sensitively would ensure operational noise impacts are minimised e.g. through maximising separation distances / building proximity distances where possible between the proposed substation and sensitive receptors. It is expected that the impact on noise sensitive receptors will not be significant.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Agricultural Land Classification	The site is located within ALC Grade 4, meaning the land suffers severe limitations that significantly restrict the range and/or yield of crops to be grown.	Grade 4 land is ALC with severe limitations which significantly restrict the range of crops and/or the level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable.	Grade 4 land does not require strict protection. This will allow for the construction of the substation without significant concerns for future agricultural use.
Socio-economic			
Traffic and Transport	Access to Option 2 would be achieved via the already existing maintenance access road that leads to the existing substation from the A48 Margam Interchange located west of the M4. There is the potential to directly affect roads, nearby residential and commercial properties as a result of increased traffic on the local road network during construction.	Sensitive hedge removal and re-planting for access road. Construction effects on road infrastructure is typically mitigated through standard control measures outlined in a CEMP or Construction Traffic Management Plan ('CTMP').	There are potential effects caused by traffic disturbance to local residences. However, based on the assumption that no regular HGV or notable load traffic will be required during operation this is not likely to be significant as it will be for the duration of construction only. The diversions required may also impact of existing properties in the area - the diversion of traffic and pedestrians during construction may affect amenity.
Technical and Cost			
OHL	Option 2 is in very close proximity to the existing OHL. Option 2 is also located in National Grid land and therefore there is no need to establish new land ownership.	Option 2 is considered to have low technical and cost implications resulting from OHL re-routing.	Option 2 is not anticipated to result in high technical and cost implications due to the proximity to the OHL.
Extension of existing substation	Option 2 allows for the extension of the existing Margam Substation, leading to reduced environmental and economic impacts.		Extending the existing substation is a more suitable and sustainable choice

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
			compared to constructing a new replacement substation.
Margam Substation to Port Talbot	Option 2 is strategically located in close proximity to the proposed Port Talbot Substation, which is approximately 1km to the west of Option 2. This proximity enhances integration with existing electrical infrastructure, improving operational reliability. It also reduces the length of cable connections, leading to lower construction costs and a smaller environmental impact. Additionally, this location allows for quicker implementation, effectively addressing energy demands while supporting economic and environmental sustainability.		The close proximity of Option 2 to the Port Talbot Substation presents enhanced operational efficiency and reduced infrastructure costs due to shorter cable runs. This location can minimize environmental impacts by limiting land disturbance.

7.5 Option 3

Figure 7.3 – Option 3 Site Location

Table 7.3 – Option 3 OAST

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Environment			
Landscape and Visual Amenity	Option 3 is located approximately 1km north east the village of Goytre, 1.1km south west of the town of Cwmafan and approximately 1.5km north east of the town of Port Talbot. There is a solar farm development located approximately 920m to the west of the site, as well as Goytre town football club approximately 540m to the south west and Goytre Valley Holiday Park / Activity Centre located approximately 580m to the south west. Option 3 consists of agricultural land and is bordered by hedgerows. This option is located within a Special Landscape Area which covers the majority of land to the east of the M4. The nearest publicly accessible point is the small access track / PRoW approximately 120m north of the site. This PRoW connects to a nearby farm building, village of Goytre and town of Port Talbot. There is an isolated farm building located approximately 280m northeast of the site. Desk-study and aerial review identified approximately fifteen isolated residential and/or farm building properties within 1km of the site. Visual receptors would also include recreational users of the PRoW and Goytre Holiday Park,	There is an opportunity to reinforce existing characteristic features (including hedgerows and tree groups) in the wider elevated landscape to screen the development from local receptors. Given the presence of existing woodland it is considered extensive planting could be accommodated in this landscape if considered holistically with landform and landscape pattern.	There would continue to be a change to landscape character through the introduction on new industrial forms on this elevated ground. There is potential for residual visual effects from isolated residential properties, and nearby PRoW, however the potential for adverse effects from recreational users of Goytre Holiday Park and residents within the village of Goytre are limited. There are limited wider views of the site from the immediate surroundings, due to the fact the landform is relatively flat and elevated.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	residents of Goytre, Cwmafan, Port Talbot and isolated properties. The site itself is elevated above the surrounding landscape, however dense woodland to the west, south west and south of the site would restrict visibility from these directions, including from the Goytre Valley Holiday Park, the village of Goytre and the town of Port Talbot. To the north and east, the views of the site are unobstructed, particularly from the PRoW.		
Ecology	The boundaries of fields within Option 3 are delineated by hedgerows. There are no isolated trees are located within the site boundary. Habitats surrounding the site could have the potential for supporting commuting and foraging species, such as bats, breeding birds and reptiles, due to the woodland and grassland present. There are SINCs characterised by areas of semi-natural ancient woodland within 1km of the Site to the east, south east, south and south west. The closest of these SINCs to the site is located approximately 350m to the east. There are no other designated ecological sites within 1km of the site. No direct or indirect impacts on these designations are anticipated during the construction phase due to the distance and	Further ecological surveys would be required to confirm habitat extents and conditions and determine the presence/absence of protected or otherwise notable species. Measures would be provided to avoid entrapment of animals during construction. Habitat clearance would be programmed to avoid sensitive periods for fauna. Where practicable, construction phase lighting would be designed to reduce light spill on important light-sensitive important biodiversity features. An Ecological Clerk of Works (ECoW) would be present on site during key periods of the construction phase. The ECoW would be required to make certain	The construction of the proposed substation would result in the loss of hedgerow and woodland which may potentially support protected species (if present). There is potential for residual effects on protected species (if present) through direct loss of habitat. Species may be disturbed by increased light levels and noise levels during the construction period. There is potential for indirect construction impacts on ancient woodland, such as dust deposition, however measures to control dust and other pollutants during construction would be set out in a CEMP.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	physical separation from the proposed development. The site may also contain habitats listed under Section 7[7] of the Environment (Wales) Act 2016, which are of principal importance for maintaining and enhancing biodiversity in Wales.	that all committed mitigation measures are adhered to. Realignment of field drainage ditches where present may be required. This may require secondary consents (such as Land Drainage Consent) and may also have Water Framework Directive (WFD) implications. Paragraph 6.4 of the Planning Policy Wales states that the planning system must ensure development results in a net benefit for biodiversity and ecosystem resilience to enhance wellbeing. Biodiversity enhancements within and potentially outside the site would therefore likely be required to enable delivery of net benefit.	
Historic Environment	Option 3 is located approximately 450m north of Margam Mountain landscape of historic interest, marked on the Neath Port Talbot policies map. The next nearest heritage receptor is located approximately 1km south and is a scheduled ancient monument comprising the remains of an Iron Age hillfort named Pen-y-Castell located on the periphery of the town of Cwmafan.	A detailed landscape and visual impact assessment would include consideration of the impact of the proposed substation on any heritage assets or areas of Historic Landscape in the vicinity. In terms of archaeological impacts, a desk-based assessment would be required to provide a more detailed understanding. This may then need to be	Any anticipated direct archaeological impacts would be mitigated through advance excavation and recording ('preservation by record') and through the development of a Written Scheme of Investigation ('WSI'). Construction of the proposed development would not result in direct

[7] Section 7 Priority Habitats = those habitats listed in accordance with Section 7 of the Environment Wales (2016) Act as those habitats which are considered of key significance to sustain and improve biodiversity in relation to Wales. Note Section 7 habitats are described here as a result of comments from Neath Port Talbot Council (NPTC), Section 7 Habitats aren't specifically considered in the methodology of the siting study (Section 5).

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	There are several other Scheduled Monuments and Listed Buildings within the towns of Cwmafan and Port Talbot. However, these are all located further than 1km away from Option 3. At this distance it is considered that there would not be an unacceptable impact on any heritage receptors, due to the distance and landform providing appropriate screening. There are no Registered Battlefields, Registered Park and Gardens, World Heritage Sites or Heritage at Risk Areas within 2km of Option 3. The nearest Conversation Area is the Margam Park Conservation Area, which is located approximately 3.6km south of the site.	supplemented with intrusive investigations. Early consultation / engagement with Historic England and county archaeologist and heritage officer would be recommended. Adopting appropriate landscaping design to screen the proposed substation would be recommended.	impacts to any Scheduled Monuments or Listed Buildings within 1km of Option 3. There is the potential for impacts on the setting of the Pen-y-Castell scheduled ancient monument. However, minimal impacts are predicted due to shielding by hedges, trees and other vegetation.
Water, Geology and Soils	Option 3 is located on elevated ground, away from the Flwd Yylit river to the east. It is not located within either Flood Zones 2 or 3. Therefore there are no impacts associated with flood risk predicted.	Generic pollution control mitigation would be adopted through a Construction Environmental Management Plan (CEMP). A Flood Consequence Assessment and Drainage Strategy will be required.	No residual effects on hydrology and geology are anticipated. Any works within flood zones would require a Flood Risk Assessment. Consents / permits from the Environment Agency may be required. Early consultation / mitigation with the Environment Agency is recommended.
Noise	The closest noise receptor is a farm building situated about 280m north east of Option 3. The proposed development could cause noise and vibration impacts during the construction stages on noise sensitive receptors. These include residential properties together with	Construction noise effects are typically mitigated through standard control measures outlined in a CEMP and agreed with the local authority environmental health officer.	There is the potential for residual impacts on noise sensitive receptors as a result of an increase in noise and traffic along the local road network as a result of construction activities.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	potential effects on the PRoW in the vicinity of Option 3. During operation, the substation is unlikely to produce noise that is audible outside of the immediate site boundary. Therefore, no adverse impacts are predicted.	During operation, noise from the substation will adhere to requirements specified by the Local Authority in order to minimise noise break out from the facility.	It is assumed that standard construction control measures or Best Practical Means would be adhered to within a CEMP which would reduce construction noise effects. Ensuring the siting of the proposed substation is undertaken sensitively would ensure operational noise impacts are minimised e.g. through maximising separation distances / building proximity distances where possible between the proposed substation and sensitive receptors. It is expected that the impact on noise sensitive receptors will not be significant.
Agricultural Land Classification	The majority of the site is located within ALC Grade 5, meaning the land is very poor-quality agricultural land. The remainder of the site is within ALC Grade 4, meaning the land is poor-quality agricultural land.	Grades 4 and 5 land is ALC with severe limitations which significantly restrict the range of crops and/or the level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable.	Grade 4 and 5 land does not require strict protection. This will allow for the construction of the substation without significant concerns for future agricultural use.
Socio-economic			
Traffic and Transport	Option 3 is approximately 120m from a small single lane road / PRoW. However, this track is unlikely to be suitable for AILs. Alternative access will be difficult to achieve due to the topography of the site and surrounding area as well as distance to more suitable roads.	Sensitive hedge removal and re-planting for access road. Construction effects on road infrastructure is typically mitigated through standard control measures outlined in a CEMP or Construction Traffic Management Plan (‘CTMP’).	There are potential effects caused by traffic disturbance to local residences. However, based on the assumption that no regular HGV or notable load traffic will be required during operation this is not likely to be significant as it will be for the duration of construction only.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	There is the potential to directly affect roads, nearby residential and commercial properties as a result of increased traffic on the local road network during construction.		The diversions required may also impact of existing properties in the area - the diversion of traffic and pedestrians during construction may affect amenity.
Technical and Cost			
OHL	Option 3 is located approximately 80m east of the existing OHL.	Option 3 is considered to have low technical and cost implications resulting from OHL re-routing.	Option 3 is not anticipated to result in high technical and cost implications due to the proximity to the OHL.
Extension of existing substation	This option does not facilitate the extension of the existing Margam Substation, which results in greater environmental and economic impacts. Without the ability to leverage established infrastructure, this approach necessitates the construction of a new facility in a greenfield location.		Option 3 requires a newly built replacement substation – this is less suitable and more resource-intensive compared to extending the existing substation.
Margam Substation to Port Talbot	Option 3 is located further away from the proposed Port Talbot Substation, covering a distance of approximately 5km. Between Option 3 and the proposed Port Talbot substation location, a cable route is likely to be required to travel through several areas of high risk flood zone, dense vegetation, challenging topographical changes, an AQMA, Sites of Importance for Nature Conservation, strategic road networks (M4), Ancient Woodland and other built up areas such as the village of Margam and Taibach. This is therefore an environmentally challenged route between the two sites.		The greater distance from the Port Talbot Substation could reduce operational efficiency and increase the potential for land disturbance, as well as significant environmental impacts during construction.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	This increased distance may also hinder integration with existing electrical infrastructure, potentially impacting operational reliability. Additionally, longer cable connections are required, which can lead to higher construction costs and increased timelines for connection.		

7.6 Option 4

Figure 7.4 – Option 4 Site Location

Table 7.4 – Option 4 OAST

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Environment			
Landscape and Visual Amenity	Option 4 is located approximately 250m north east of the village of Coed Hirwaun, 1.2km from Caegawr Gypsy and Traveller Site, approximately 1.6km north of the village of Kenfig Hill and 2km east of the settlement of Eglwys Nunydd. Option 4 consists of agricultural land, with small to medium sized field bordered by boundary hedges and a small access track to the north east of the site. The site is located within a Special Landscape Area which covers the majority of land to the east of the M4. There are limited views to and from the surrounding area due to the relatively enclosed nature of the site. The landform of the site and surrounding area is also relatively flat, meaning there are no elevated views of the site from the immediate surrounding landscape. Desk-study and aerial review identified approximately 25 isolated residential and/or farm building properties within 1km of the site. The closest isolated property is a farm building located approximately 230m north east of the site.	There is an opportunity for hedgerow reinforcement and tree planting (including woodland copses to existing field boundaries) around the periphery of the substation to screen the development from local properties. However, extensive planting would be uncharacteristic of the local landscape. Planting should include a reasonably diverse mix of plants to afford screening all year round.	There would continue to be loss of existing landscape features (hedgerows and trees), and the development would introduce new built form in this relatively contained and well defined landscape character. There may be visual effects on nearby residents in Coed Hirwaun, and isolated properties and nearby PRoW. There are no elevated views of the site from the immediate surroundings, due to the fact the landform is relatively flat and not elevated. Wider visibility is therefore limited.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	The nearest publicly accessible point is the located to the south of the site. This PRoW connects the Heol-Y-glo road with the wider landscape and villages including Coed Hirwaun. Visual receptors would also include recreational users of the PRoW and residents from isolated properties. However, due to the landform and field boundary hedgerows, views of the site from these receptors are typically limited except to the immediate south of the site.		
Ecology	The boundaries of fields within Option 4 are delineated by strong hedgerows and small clusters of woodland. There are no isolated trees located within the site boundary and very few in the area immediately surrounding the site. Habitats surrounding the site could have the potential for supporting commuting and foraging species, such as bats, breeding birds and reptiles, due to the woodland and grassland present. There are a number of SINCs within 1km of the site including several areas of semi-natural ancient woodland and Margam Country Park. The closest SINCs are located between 140m – 250m to the north east, north west, south east and south west of the site. There are no other statutory designated ecological sites within 1km of the site.	Further surveys required for Phase 1 Habitat Survey. Measures would be provided to avoid entrapment of animals during construction. Habitat clearance would be programmed to avoid sensitive periods for fauna. Where practicable, construction phase lighting would be designed to reduce light spill on important light-sensitive important biodiversity features. An Ecological Clerk of Works (ECoW) would be present on site during key periods of the construction phase. The ECoW would be required to make certain that all committed mitigation measures are adhered to.	The construction of the proposed substation would result in the loss of hedgerow and woodland which may potentially support protected species (if present). There is potential for residual effects on protected species (if present) through direct loss of habitat. Species may be disturbed by increased light levels and noise levels during the construction period. There is potential for indirect construction impacts on ancient woodland, such as dust deposition, however measures to control dust and other pollutants during construction would be set out in a CEMP.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	No direct or indirect impacts on these designations are anticipated during the construction phase due to the distance and physical separation from the proposed development. The site may also contain habitats listed under Section 7[8] of the Environment (Wales) Act 2016, which are of principal importance for maintaining and enhancing biodiversity in Wales.	Realignment of field drainage ditches where present may be required. This may require secondary consents (such as Land Drainage Consent) and may also have Water Framework Directive (WFD) implications. Paragraph 6.4 of the Planning Policy Wales states that the planning system must ensure development results in a net benefit for biodiversity and ecosystem resilience to enhance wellbeing. Biodiversity enhancements in the form of boundary planting etc would therefore likely be required.	
Historic Environment	Option 4 is located approximately 690m south west of Margam Mountain landscape of historic interest, marked on the Neath Port Talbot policies map. The next nearest heritage receptor is located approximately 920m north east and is a grade II listed milepost located adjacent to the A48. There are several other Scheduled Monuments and Listed Buildings within the Margam Country Park. Margam Country Park is also a Historic Registered Park and Garden. However, these are all located further than 1km away from Option 4. At this distance it is considered that	A detailed landscape and visual impact assessment would include consideration of the impact of the proposed substation on any heritage assets or areas of Historic Landscape in the vicinity. In terms of archaeological impacts, a desk-based assessment would be required to provide a more detailed understanding. This may then need to be supplemented with intrusive investigations.	Any anticipated direct archaeological impacts would be mitigated through advance excavation and recording ('preservation by record') and through the development of a Written Scheme of Investigation ('WSI'). Construction of the proposed development would not result in direct impacts to any Scheduled Monuments or Listed Buildings within 1km of Option 4. There is the potential for impacts on the setting of the Margam Mountain

[8] Section 7 Priority Habitats = those habitats listed in accordance with Section 7 of the Environment Wales (2016) Act as those habitats which are considered of key significance to sustain and improve biodiversity in relation to Wales. Note Section 7 habitats are described here as a result of comments from Neath Port Talbot Council (NPTC), Section 7 Habitats aren't specifically considered in the methodology of the siting study (Section 5).

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	there would not be an unacceptable impact on any heritage receptors, due to the distance and landform providing appropriate screening. There are no Registered Battlefields, World Heritage Sites or Heritage at Risk Areas within 2km of Option 4. The nearest Conversation Area is the Margam Park Conservation Area, which is located approximately 2.3km north west of the site.	Early consultation / engagement with Historic England and county archaeologist and heritage officer would be recommended. Adopting appropriate landscaping design to screen the proposed substation would be recommended.	landscape of historic interest and Margam Country Park. However, minimal impacts are predicted due to shielding by hedges, trees and other vegetation.
Water, Geology and Soils	Option 4 is not located within either Flood Zones 2 or 3. Therefore there are no impacts associated with flood risk predicted.	Generic pollution control mitigation would be adopted through a Construction Environmental Management Plan (CEMP). A Flood Consequence Assessment and Drainage Strategy will be required.	No residual effects on hydrology and geology are anticipated. Any works within flood zones would require a Flood Risk Assessment. Consents / permits from the Environment Agency may be required. Early consultation / mitigation with the Environment Agency is recommended.
Noise	The nearest noise receptors include a number of residential and agricultural buildings, as well as the PRoW, all located within 1km from the Site. The proposed development could cause noise and vibration impacts during the construction stages on noise sensitive receptors. These include the residential properties together with potential effects on the PRoW in the vicinity of Option 4.	Construction noise effects are typically mitigated through standard control measures outlined in a CEMP and agreed with the local authority environmental health officer. During operation, noise from the substation will adhere to requirements specified by the Local Authority in order to minimise noise break out from the facility.	There is the potential for residual impacts on noise sensitive receptors as a result of an increase in noise and traffic along the local road network as a result of construction activities. It is assumed that standard construction control measures or Best Practical Means would be adhered to within a CEMP which would reduce construction noise effects.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	During operation, the substation is unlikely to produce noise that is audible outside of the immediate site boundary. Therefore, no adverse impacts are predicted.		Ensuring the siting of the proposed substation is undertaken sensitively would ensure operational noise impacts are minimised e.g. through maximising separation distances / building proximity distances where possible between the proposed substation and sensitive receptors. It is expected that the impact on noise sensitive receptors will not be significant.
Agricultural Land Classification	The majority of the site is located within ALC Grade 5, meaning the land is very poor-quality agricultural land. The remainder of the site is within ALC Grade 3b, meaning the land is moderate-quality agricultural land.	Grade 3b and 5 land is ALC with severe limitations which significantly restrict the range of crops and/or the level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable.	Grade 3b and 5 land does not require strict protection. This will allow for the construction of the substation without significant concerns for future agricultural use.
Socio-economic			
Traffic and Transport	A small access track leads into Option 4. However, this road is unlikely to be suitable for AILs and therefore alternative access will be required. Option 4 is also approximately 250m from a single lane residential access road (Llys Castell) in the village of Coed Hirwaun. Therefore, alternative access could be achieved from Llys Castell by providing a new access road of approximately 250m in length. However, access	Sensitive hedge removal and re-planting for access road. Construction effects on road infrastructure is typically mitigated through standard control measures outlined in a CEMP or Construction Traffic Management Plan (‘CTMP’).	There are potential effects caused by traffic disturbance to local residences. However, based on the assumption that no regular HGV or notable load traffic will be required during operation this is not likely to be significant as it will be for the duration of construction only. The diversions required may also impact of existing properties in the area - the diversion of traffic and pedestrians during construction may affect amenity.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	via this route would cross a PRoW to the south east of the site. There is the potential to directly affect roads, nearby residential and commercial properties as a result of increased traffic on the local road network during construction.		
Technical and Cost			
OHL	Option 4 is located approximately 1.2km north of the existing OHL that travels between Margam and Pyle.	Option 4 is considered to have high technical and cost implications resulting from OHL re-routing.	Option 4 is anticipated to result in high technical and cost implications due to the increased proximity to the OHL.
Extension of existing substation	This option does not facilitate the extension of the existing Margam Substation, which results in greater environmental and economic impacts. Without the ability to leverage established infrastructure, this approach necessitates the construction of a new facility in a greenfield location.		Option 3 requires a newly built replacement substation – this is less suitable and more resource-intensive compared to extending the existing substation.
Margam Substation to Port Talbot	Option 4 is located further away from the proposed Port Talbot Substation, covering a distance of approximately 5km. Between Option 4 and the proposed Port Talbot substation location, a cable route is likely to be required to travel through several areas of high risk flood zone, dense vegetation, Margam Country Park, SSSI (Margam Reservoir), Sites of Importance for Nature Conservation, strategic road networks (M4), Ancient Woodland and other built up areas such as the village of Coed		The greater distance from the Port Talbot Substation could reduce operational efficiency and increase the potential for land disturbance, as well as significant environmental impacts during construction.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	Hirwaun. This is therefore an environmentally challenged route between the two sites. This increased distance may also hinder integration with existing electrical infrastructure, potentially impacting operational reliability. Additionally, longer cable connections are required, which can lead to higher construction costs and increased timelines for connection.		

7.7 Option 7

Figure 7.5 – Option 7 Site Location

Table 7.5 – Option 7 OAST

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Environment			
Landscape and Visual Amenity	Option 7 is located approximately 500m east of the town of Port Talbot and approximately 420m from the village of Goytre. Option 7 consists of agricultural land and is bordered by boundary hedges. A windfarm is located on land adjacent to the site to the east and south east. An access road leads into the wind farm from the east. This option is located within an SLA which covers the majority of land to the east of the M4. There are several PRoWs surrounding Option 7, the closest of which is approximately 65m north of the site. The landform of the site itself is relatively flat, however the site is located on elevated ground above the village of Goytre and the town of Port Talbot. There will therefore be elevated views of the site from the surrounding landscape, particularly from the north and west. Desk-study and aerial review identified approximately four isolated residential and/or farm building properties within 1km of the site. The closest isolated farm building to the site is located approximately 210m north east. Visual receptors would also include recreational users of the PRoW, vehicle users of the M4	The use of landform and careful siting could provide effective screening and integration of the infrastructure. However, given the lack of vegetation and hedgerows it is considered extensive planting would be uncharacteristic on this elevated landform.	There would continue to be a change to landscape character through the introduction on new infrastructure on this elevated ground. There is potential for residual visual effects from isolated residential properties, and nearby PRoW, and Goytre village. There are limited wider views of the site from the immediate surroundings, due to the fact the landform is relatively flat and elevated.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	Motorway and Dyffryn Road and residents of isolated properties and those within the town of Port Talbot and village of Goytre.		
Ecology	The boundaries of fields within Option 7 are delineated by hedgerows. There are no isolated trees within the site and very few in the surrounding area which is very open. Habitats surrounding the site could have the potential for supporting commuting and foraging species, such as bats, breeding birds and reptiles, due to the woodland and grassland present. Option 7 is located 490m north east from the closest ecological site which is a SINC and area of ancient woodland. There are a number of SINCs and areas of ancient woodland within 1km of the site. No direct or indirect impacts on these designations are anticipated during the construction phase due to the distance and physical separation from the proposed development. The site may also contain habitats listed under Section 7[9] of the Environment (Wales) Act 2016, which are of principal importance for maintaining and enhancing biodiversity in Wales.	Further ecological surveys would be required to confirm habitat extents and conditions and determine the presence/absence of protected or otherwise notable species. Measures would be provided to avoid entrapment of animals during construction. Habitat clearance would be programmed to avoid sensitive periods for fauna. Where practicable, construction phase lighting would be designed to reduce light spill on important light-sensitive important biodiversity features. An Ecological Clerk of Works (ECoW) would be present on site during key periods of the construction phase. The ECoW would be required to make certain that all committed mitigation measures are adhered to.	The construction of the proposed substation would result in the loss of hedgerow and woodland which may potentially support protected species (if present). There is potential for residual effects on protected species (if present) through direct loss of habitat. Species may be disturbed by increased light levels and noise levels during the construction period. There is potential for indirect construction impacts on ancient woodland, such as dust deposition, however measures to control dust and other pollutants during construction would be set out in a CEMP.

[9] Section 7 Priority Habitats = those habitats listed in accordance with Section 7 of the Environment Wales (2016) Act as those habitats which are considered of key significance to sustain and improve biodiversity in relation to Wales. Note Section 7 habitats are described here as a result of comments from Neath Port Talbot Council (NPTC), Section 7 Habitats aren't specifically considered in the methodology of the siting study (Section 5).

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
		Realignment of field drainage ditches where present may be required. This may require secondary consents (such as Land Drainage Consent) and may also have Water Framework Directive (WFD) implications. Paragraph 6.4 of the Planning Policy Wales states that the planning system must ensure development results in a net benefit for biodiversity and ecosystem resilience to enhance wellbeing. Biodiversity enhancements within and potentially outside the site would therefore likely be required to enable delivery of net benefit.	
Historic Environment	Option 7 is located within Margam Mountain landscape of historic interest, marked on the Neath Port Talbot policies map. The site is also located approximately 635m north east of the nearest heritage receptor, which is a grade II listed milepost located adjacent to Margam Road. However, this heritage receptor is located on the opposite side of the M4 Motorway. The closest Scheduled Ancient Monument is located 810m south east and is named Ergyd Isaf Round Burrows. There are several Listed Buildings within the town of Port Talbot. However, these are all located further than 1km away from Option 7 and on the opposite side of the M4 Motorway.	A detailed landscape and visual impact assessment would include consideration of the impact of the proposed substation on any heritage assets or areas of Historic Landscape in the vicinity. In terms of archaeological impacts, a desk-based assessment would be required to provide a more detailed understanding. This may then need to be supplemented with intrusive investigations. Early consultation / engagement with Historic England and county archaeologist and heritage officer would be recommended.	Any anticipated direct archaeological impacts would be mitigated through advance excavation and recording (‘preservation by record’) and through the development of a Written Scheme of Investigation (‘WSI’). Construction of the proposed development would not result in direct impacts to any Scheduled Monuments or Listed Buildings within 1km of Option 7. There is the potential for impacts on the setting of the Margam Mountain landscape of historic interest. However, minimal impacts are predicted due to

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	At this distance it is considered that there would not be an unacceptable impact on any heritage receptors, due to the distance and landform providing appropriate screening. There are no Registered Battlefields, Registered Parks and Gardens, World Heritage Sites or Heritage at Risk Areas within 2km of Option 7. The nearest Conversation Area is the Margam Park Conservation Area, which is located approximately 2.5km south east of the site.	Adopting appropriate landscaping design to screen the proposed substation would be recommended.	shielding by hedges, trees and other vegetation.
Water, Geology and Soils	Option 7 is not located within either Flood Zones 2 or 3. Therefore there are no impacts associated with flood risk predicted.	Generic pollution control mitigation would be adopted through a Construction Environmental Management Plan (CEMP). A Flood Consequence Assessment and Drainage Strategy will be required.	No residual effects on hydrology and geology are anticipated. Any works within flood zones would require a Flood Risk Assessment. Consents / permits from the Environment Agency may be required. Early consultation / mitigation with the Environment Agency is recommended.
Noise	The nearest noise receptor is a farm building located approximate 210m north east of the site. There are a number of residential noise receptors within the town of Port Talbot and village of Goytre which are all within 1lm of the site. The proposed development could cause noise and vibration impacts during the construction stages on noise sensitive receptors. These include the residential properties together with	Construction noise effects are typically mitigated through standard control measures outlined in a CEMP and agreed with the local authority environmental health officer. During operation, noise from the substation will adhere to requirements specified by the Local Authority in order to minimise noise break out from the facility.	There is the potential for residual impacts on noise sensitive receptors as a result of an increase in noise and traffic along the local road network as a result of construction activities. It is assumed that standard construction control measures or Best Practical Means would be adhered to within a CEMP which would reduce construction noise effects.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	potential effects on the PRoW in the vicinity of Option 7. During operation, the substation is unlikely to produce noise that is audible outside of the immediate site boundary. Therefore, no adverse impacts are predicted.		Ensuring the siting of the proposed substation is undertaken sensitively would ensure operational noise impacts are minimised e.g. through maximising separation distances / building proximity distances where possible between the proposed substation and sensitive receptors. It is expected that the impact on noise sensitive receptors will not be significant.
Agricultural Land Classification	The site is located within ALC Grade 4, meaning the land is poor-quality agricultural land.	Grade 4 land is ALC with severe limitations which significantly restrict the range of crops and/or the level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable.	Grade 4 land does not require strict protection. This will allow for the construction of the substation without significant concerns for future agricultural use.
Socio-economic			
Traffic and Transport	Option 7 is approximately 240m northwest of a private access road to the adjacent wind farm. The next nearest publicly accessible road is small track off Dyffryn Road, approximately 330m north of the site, or Inkerman Row, approximately 450m west of the site. However, due to the surrounding topography, access via Dyffryn Road or Inkerman Road will be constrained.	Sensitive hedge removal and re-planting for access road. Construction effects on road infrastructure is typically mitigated through standard control measures outlined in a CEMP or Construction Traffic Management Plan (‘CTMP’).	There are potential effects caused by traffic disturbance to local residences. However, based on the assumption that no regular HGV or notable load traffic will be required during operation this is not likely to be significant as it will be for the duration of construction only. The diversions required may also impact of existing properties in the area - the diversion of traffic and pedestrians during construction may affect amenity.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
	In order to provide suitable access to the site, a new access road of approximately 240m in length will be required, forming an extension to the private access road to the windfarm. This would be subject to agreement with the windfarm operator. The PRoW surrounding Option 7 were noted to be unmaintained for access to these routes restricted by the landowner during the site visit. Therefore, construction of the substation at Option 7 is not likely to affect the usage of these routes as they are currently unmaintained or public access has been restricted. There is the potential to directly affect roads, nearby residential and commercial properties as a result of increased traffic on the local road network during construction.		
Technical and Cost			
OHL	Option 7 is located 580m west of the existing OHL.	Option 7 is considered to have low technical and cost implications resulting from OHL re-routing.	Option 7 is not anticipated to result in high technical and cost implications due to the proximity to the OHL.
Extension of existing substation	This option does not facilitate the extension of the existing Margam Substation, which results in greater environmental and economic impacts. Without the ability to leverage established infrastructure, this approach necessitates the construction of a new facility in a greenfield location.		Option 7 requires a newly built replacement substation – this is less suitable and more resource-intensive compared to extending the existing substation.

Subtopics	Main potential effects (adverse and beneficial)	Key mitigation requirement	Residual effects and implications
Margam Substation to Port Talbot	Option 7 is located further away from the proposed Port Talbot Substation, covering a distance of approximately 3.2km. Between Option 7 and the proposed Port Talbot substation location, a cable route is likely to be required to travel through several areas of high risk flood zone, dense vegetation, challenging topographical changes, an AQMA, Sites of Importance for Nature Conservation, strategic road networks (M4), Ancient Woodland and other built up areas such as the village of Margam and Taibach. This is therefore an environmentally challenged route between the two sites. This increased distance may also hinder integration with existing electrical infrastructure, potentially impacting operational reliability. Additionally, longer cable connections are required, which can lead to higher construction costs and increased timelines for connection.		The greater distance from the Port Talbot Substation could reduce operational efficiency and increase the potential for land disturbance, as well as significant environmental impacts during construction.

8 Summary of Shortlisted Sites

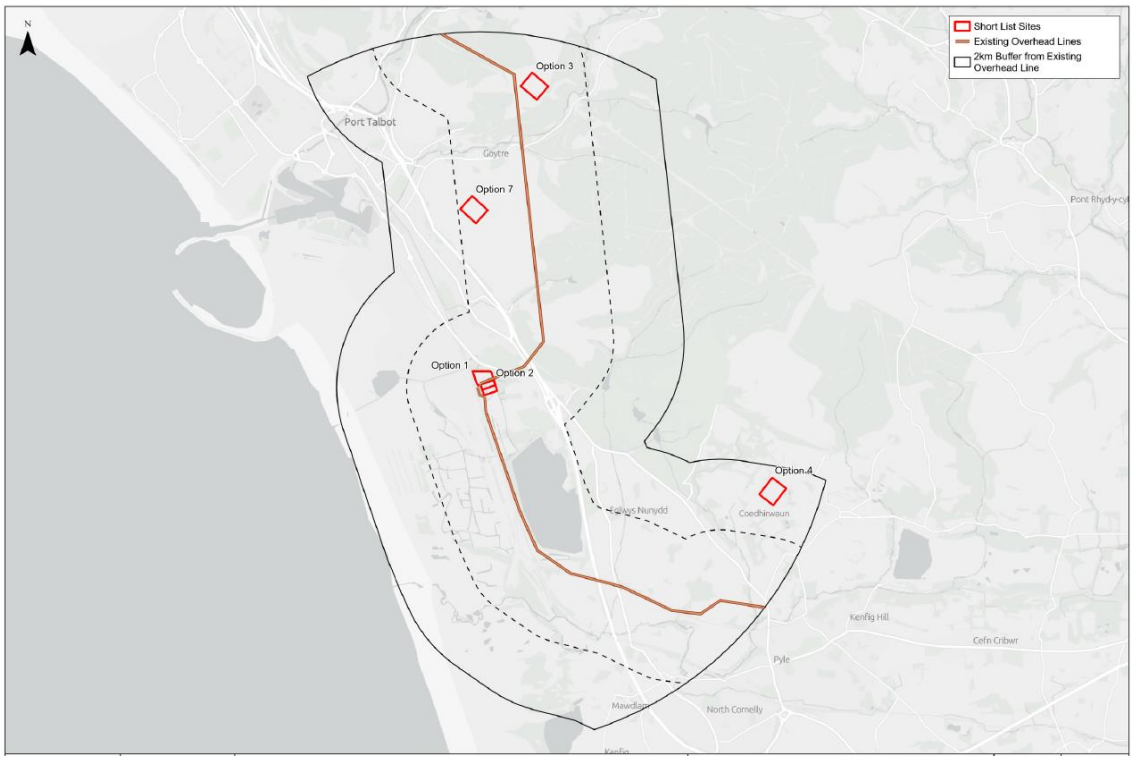
8.1 OAST Analysis

8.1.1 Following the identification of the 'Long List' sites, each site was examined using the criteria topics identified in **Table 2.1** in **Section 2**. This then allowed the sites to be compared against each other. Once the investigation was complete, each site was determined as either having beneficial attributes against other sites or as not showing any benefit over other sites, as shown in **Chapter 6.**

8.1.2 Based on the key assessment criteria, the appraisal of the 10 long list sites resulted in 5 of them being discounted from the Siting Study.

8.1.3 Options 1, 2, 3, 4 and 7 were taken forward as part of the 'Short List' for further analysis using Options Appraisal Summary Tables (OAST tables). **Figure 8.1** below shows the location of these 5 Sites in relation to the Siting Study Area.

Figure 8.1 – Short List Sites



8.1.4 The OAST tables examine environmental, socio economic and technical information related to the sites in further detail and how they might be affected by construction and operation of the substation. In accordance with Horlock Rule 1, consideration has been given to the likely environmental issues early on to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum.

8.1.5 A summary of the OAST for each Short List Site Option is provided below.

Option 1

8.1.6 Option 1 is located near the Margam substation and approximately 4 km from Port Talbot. It features a mix of grassland and vegetation within an industrial area, bordered by significant facilities including the Western Wood Energy Plant and TATA Steelworks. The site is within a Site of Importance for Nature Conservation. It is expected to have minimal visual and noise impacts on nearby residential areas, which are located across the A4241, and access will be via an existing maintenance road from the A48.

8.1.7 While it does not allow for the extension of the existing substation, its proximity to the proposed Port Talbot Substation means a shorter cable connection route is required, thereby reducing cost and subsequent environmental impact.

Option 2

8.1.8 Option 2 is located directly adjacent to the existing Margam Substation, which is across the railway from the Tata Steelworks. It features vegetation and border planting, with significant industrial facilities nearby, including the Western Wood Energy Plant and Margam Green Energy Plant. The landscape is heavily influenced by these industrial activities, resulting in minimal expected impact on the surrounding area, including residential neighbourhoods located across the A4241. The site is within a Site of Importance for Nature Conservation. Access will be via an existing maintenance road from the A48.

8.1.9 Option 2 allows for the extension of the existing substation and is strategically positioned near the proposed Port Talbot Substation, reducing the cable route length required.

Option 3

8.1.10 Option 3 is located approximately 1 km northeast of Goytre, 1.1 km southwest of Cwmafan, and 1.5 km northeast of Port Talbot. The site consists of agricultural land bordered by hedgerows and is situated within a Special Landscape Area. Nearby features include a solar farm, Goytre town football club, and Goytre Valley Holiday Park, all within 1 km. The nearest publicly accessible point is a PRoW about 120 meters north, connecting to Goytre and Port Talbot. While the site is elevated, dense woodland to the west and south limits views from those directions, with unobstructed views to the north and east. The site is approximately 450 meters from Margam Mountain and 1 km from the scheduled ancient monument Pen-y-Castell, with no significant impacts expected on heritage sites due to distance. The site is not in flood zones 2 or 3, and while construction may cause temporary noise impacts, operational noise is expected to be minimal. Access is challenging due to topography, and the site is primarily classified as poor-quality agricultural land (ALC Grade 4 and 5).

8.1.11 Option 3 does not facilitate the extension of the existing Margam Substation, requiring new construction and longer cable connections to the proposed Port Talbot Substation, which is about 5 km away, potentially increasing costs and environmental challenges. A cable connection construction swath of 30-60m wide would likely be 150-200% of this length (7.5-10km) in order to navigate the route around constrained areas such as the M4, Margam village etc). The cable route between Option 3 and the proposed Port Talbot Substation would therefore likely pass in the vicinity of the Site of Importance for Nature Conservation, as explained in Option 2, in order to connect into Margam Substation.

Option 4

8.1.12 Option 4 is located approximately 250 meters northeast of Coed Hirwaun, 1.2 km from the Caegawr Gypsy and Traveller Site, and 1.6 km north of Kenfig Hill. The site consists of agricultural land bordered by hedgerows and a small access track, situated within a Special Landscape Area. Due to its relatively flat terrain and enclosed nature, views to and from the site are limited. Approximately 25 isolated residential and farm buildings are within 1 km, with

the nearest being a farm building 230 meters away. The site is also near several Sites of Importance for Nature Conservation (SINCs). It is located about 690 meters from Margam Mountain and 920 meters from a grade II listed milepost, with no significant impacts expected on heritage sites due to distance. While construction may cause temporary noise impacts, operational noise is anticipated to be minimal. Access to the site is challenging, requiring potential new road construction, and the site is primarily classified as very poor-quality agricultural land (ALC Grade 5).

8.1.13 Option 4 does not facilitate the extension of the existing Margam Substation, necessitating new construction and longer cable connections to the proposed Port Talbot Substation, which is about 5 km away, potentially increasing costs and environmental challenges. A cable connection construction swath of 30-60m wide would likely be 150-200% of this length (7.5-10km) to navigate the route around constrained areas such as the M4, Coed Hirwaun village etc. The cable route between Option 4 and the proposed Port Talbot Substation would therefore likely pass close to or through Sites of Special Scientific Interest (SSSI) or in close proximity to the Reservoir. Option 4 would also likely pass in the vicinity of the Site of Importance for Nature Conservation, as explained in Option 2, in order to connect into Margam Substation. Additionally, Option 4 is approximately 2 km from any existing OHL, necessitating an additional connection route to the OHL.

Option 7

8.1.14 Option 7 is located approximately 500 meters east of Port Talbot and 420 meters from the village of Goytre. The site consists of agricultural land bordered by hedges and is situated within a Special Landscape Area. Nearby, there is a wind farm to the east and southeast, with several public rights of way (PRoWs) surrounding the area, the closest being about 65 meters north. The site is on elevated ground, providing views from the north and west. Approximately four isolated residential and farm buildings are within 1 km, with the nearest being about 210 meters northeast. The site is located near several Sites of Importance for Nature Conservation (SINCs) and areas of ancient woodland. It is also within the Margam Mountain landscape of historic interest, with heritage receptors located over 600 meters away, suggesting minimal impact on these sites. While construction may cause temporary noise impacts, operational noise is expected to be negligible. Access to the site will require a new road extension from the adjacent wind farm, and the site is classified as poor-quality agricultural land (ALC Grade 4). Option 7 does not facilitate the extension of the existing Margam Substation, necessitating new construction and longer cable connections to the proposed Port Talbot Substation, which is about 3.2 km away, potentially increasing costs and environmental challenges.

8.1.15 Option 7 does not facilitate the extension of the existing Margam Substation, necessitating new construction and longer cable connections to the proposed Port Talbot Substation, which is about 3 km away, potentially increasing costs and environmental challenges. A cable connection construction swath of 30-60m wide would likely be 150-200% of this length (4.5 - 6km) to navigate the route around constrained areas such as the M4, Margam village etc. The cable route between Option 3 and the proposed Port Talbot Substation would therefore likely pass in the vicinity of the Site of Importance for Nature Conservation, as explained in Option 2, in order to connect into Margam Substation.

9 Conclusions

9.1 Summary of Siting Study

9.1.1 The aim of this Siting Study is to identify a site that offers a preferred location for a new 275kV GIS substation that can be taken forward for optioneering of deliverability, detailed siting and design, external engagement and successfully through the consenting process.

9.2 Methodology Summary

9.2.1 Constraints data was incorporated into GIS and formed a basis for comparative analysis of siting options. Key principles as set out in the Horlock Rules and National Grid's '*Our Approach to Options Appraisal'* were used to identify an initial 10 Sites, which formed the 'long list'.

9.2.2 A desk-based study was then conducted on each site, following the methodology described in Section 6, to determine the existing conditions, benefits and limitations, as well a site visit during October 2024.

9.2.3 That analysis led to the identification of 5 'Short List' sites. The shortlisted sites were then assessed in detail to identify the optimum site, using the OAST analysis method.

9.3 Conclusion

9.3.1 5 potential sites were identified and evaluated using the OAST analysis method. The OAST tables within **Chapter 7** set out the assessment of the Short List sites against a number of technical and environmental criteria.

9.3.2 The OAST table analysis provided a robust framework for evaluating the potential sites for the proposed substation. Each site was assessed based on its strengths and weaknesses. This analysis determined the most suitable Site for the Proposed Development.

9.3.3 The Summary of Shortlisted Sites as provided above in **Chapter 8** was used to directly compare the Sites against each other, focusing on location, access required, screening and visual impacts, potential to support protected species (as well as location of and distance from protected ecological sites), heritage setting, flood risk, land use, proximity to noise sensitive receptors cost and technical complexity.

9.3.4 Based on this analysis, **Option 2** is recommended as the preferred site. This recommendation is subject to further detailed studies and consultation before a final decision is made.

9.4 Option 2

9.4.1 Option 2 is preferred over the other substation Options for several reasons:

- **Proximity to Existing Infrastructure**
  - Option 2 is located directly adjacent to the existing Margam Substation, allowing for easier integration with current electrical systems.
  - This proximity reduces the need for extensive new construction and minimizes environmental impacts associated with longer cable routes.
  - The ability to leverage existing infrastructure means lower overall construction costs compared to options that require building entirely new facilities in greenfield locations.

- The existing infrastructure allows for quicker development timelines, enabling the project to address energy demands more rapidly.

- Being close to the proposed Port Talbot Substation enhances operational reliability and efficiency. Shorter cable connections improve the overall reliability of the electrical supply.

- **Consideration of Environmental Impact**

  - It is acknowledged that due to the direct impacts on the SINC there is potential for residual effects on this non-statutory protected site and protected or notable species (if present) through direct loss of habitat. Species may be disturbed by increased light levels and noise levels during the construction period. However, the site is already within an industrial area, so the established industrial character of the region may mitigate potential lighting and noise impacts upon species.

    - It is important to note that all other options would still likely affect the Site of Importance for Nature Conservation (SINC) through the cable routing. Specifically, Options 1, 3, and 7 cannot avoid impacting this area due to their proximity and the necessary cable connections. Additionally, Option 4 would likely affect Sites of Special Scientific Interest (SSSI) or the Reservoir. While this study focuses on substation siting, we must not overlook the significant impacts of cable routing on these areas. There is therefore no option which can avoid direct or indirect impacts on statutory or non-statutory designated sites (either through the substation location or the necessary cable connections).

  - The established industrial character of the region helps mitigate potential noise impacts.

  - The established industrial landscape surrounding Option 2 helps to minimize visual impacts, making it less intrusive compared to other options that may be more visible from surrounding areas.

  - Being located in an already industrialised area may lead to greater community acceptance, as residents are more accustomed to industrial activities compared to options situated in more rural or residential settings.

- **Access and Traffic Considerations:** Access to Option 2 can be achieved via existing roads, minimizing the need for new access routes that could disrupt local traffic and communities. This is particularly important during the construction phase, where increased traffic could affect nearby residential and commercial properties. Additionally, the existing access routes will enable access during construction in to build the necessary cable routes and haul roads, reducing the overall impact on the environment and local infrastructure.

  - Other options, particularly 3, 7 and 4 would require extensive new road construction to facilitate the construction of any required cable routes. This includes creating new access roads to navigate challenging topography and constrained areas, such as the M4 and local villages. The construction of these new roads would not only increase costs but also lead to significant environmental and community impacts. The shorter cable connection required for Option 2, as discussed previously, further supports this by limiting the extent of new construction and associated disturbances.

- **Minimal Heritage Impact:** The distance from significant heritage sites and the natural landform provide adequate screening, ensuring that there will be minimal impact on historical and cultural assets in the area.

9.4.2 There are several reasons why the other options are not as favourable as Option 2:

- Options 3, 4, and 7 require new construction in greenfield locations, which complicates integration with existing electrical infrastructure. This can lead to higher costs and longer timelines for connection compared to Option 2, which leverages the existing Margam Substation.
- Options 3, 4, and 7 face access challenges due to their locations. For example, Option 4 requires new access roads that may disrupt local traffic and communities, while Option 7's access is constrained by topography, making it less practical for construction and operation.
- The need for longer cable connections and new infrastructure in Options 3, 4, and 7 can lead to higher construction costs. Longer cable connections are not only more expensive but also have a greater negative impact on the environment. In contrast, Option 2 benefits from its proximity to existing facilities, reducing overall expense and impact.
- Options 3, 4, and 7 are more likely to have visual and noise impacts on nearby residential areas. For instance, Option 3 is elevated and could be more visible from surrounding landscapes, while Options 4 and 7 are closer to residential properties, increasing the likelihood of noise disturbances during construction.
- Options 3, 4, and 7 may face greater opposition from local communities due to their locations in more rural or residential areas. Option 2, being in an industrial area, is likely to encounter less resistance from residents accustomed to industrial activities.

9.4.3 These factors collectively make Option 2 a more favourable choice, balancing technical feasibility, environmental constraints, and minimal disruption to the local community.

9.4.4 National Grid's '*Our Approach to Options Appraisal*'[10] reflects its statutory duties by underpinning a set of overarching principles which assist in decision making and help to achieve an appropriate balance between competing interests that must be taken into account in options appraisal. Options are considered to have an advantage if they can use or adapt existing infrastructure, or where National Grid can negotiate different commercial arrangements with its customers to achieve a need, rather than building new infrastructure. Options are also considered to have an advantage if they are shorter, compared with longer routes.

9.4.5 Options 1 and 2 both offer strategic locations in existing industrial areas with minimal environmental impacts, but Option 2 is preferred to Option 1 due to its direct adjacency to the existing Margam Substation, which enhances accessibility and allows for integration with current infrastructure, resulting in lower construction costs and quicker implementation.

9.5 Micro Siting

9.5.1 Micro siting is a design and planning process through which the specific location for the substation is determined during the detailed design stage.

9.5.2 It is considered that the preferred site (Option 2) can be micro sited to avoid or reduce effects associated with existing constraints during the detailed design stage. This will minimise any adverse effects as far as reasonably practicable.

[10] https://www.nationalgrid.com/uk/electricity-transmission/document/96531/download

Appendix A Horlock Rules

THE NATIONAL GRID COMPANY plc

NGC SUBSTATIONS AND THE ENVIRONMENT: GUIDELINES ON SITING AND DESIGN

Section 1 INTRODUCTION

1 The National Grid Company plc's (NGC's) policy statement on the environment recognises the importance of giving due regard to protecting and enhancing the environment and taking into account the environmental effects of the Company's actions. The Company has statutory duties in relation to preservation of amenity under Schedule 9 of the Electricity Act 1989, and has published a Schedule 9 Statement setting out the manner in which it proposes to meet these duties.

2 NGC has a statutory duty under the Act to develop and maintain an efficient, co-ordinated and economical transmission system of electricity for England and Wales. New transmission lines, new substations, sealing end compounds, line entries, additions and extensions to existing substations may be required to provide new connections for customers or reinforcement of the national grid system arising from changes in the demand for and generation of electricity.

3 This document explains the approach NGC takes towards such developments (Section II) and contains Guidelines (Section III) to assist those responsible for siting and designing substations to mitigate the environmental effects of such developments and so meet the Company's policy. The document complements the Company's Holford Rules guidelines on the routeing of high voltage transmission lines and when appropriate should be used in conjunction with them.

4 The guidelines are to be used by NGC staff, their consultants, and contractors in the siting and design of new substations and extensions to substations. They reflect the criteria the company requires its staff, consultants and contractors to satisfy.

5 As recognised in its Schedule 9 Statement NGC places importance on consultation with statutory planning and amenity bodies over its proposals for new developments. NGC believes that the availability of these guidelines will assist in such discussions by referring to the main considerations relevant to substation siting, and will thereby assist in achieving the most appropriate siting and design solutions.

Section II NGC'S APPROACH TO DESIGN AND SITING OF SUBSTATIONS

Approach to the Environment

6 NGC's environmental policy recognises the importance of giving due regard to protecting and enhancing the environment and taking into account the effect on the environment of all the Company's actions. Following the principle of integrating environmental considerations into all its activities, NGC seeks to keep known adverse effects on the environment to a reasonably practicable minimum and, in accordance with its duties under Schedule 9 of the Electricity Act, the Company gives due regard to the preservation of amenity and takes reasonable steps to mitigate the effects of its relevant proposals. To achieve these aims the Company therefore has to balance technical, economic and environmental considerations to reach reasonably practicable development proposals.

7 The guidelines (Section III) deal with the amenity issues associated with the siting and design of new substations and major extensions or major modifications to existing substations. They cover a range of key issues from the time options are initially considered to final design, including form, silhouette and colour of the entire development in relation to the surrounding area, and also related issues such as overhead line entries, since these are dominant features in any substation.

Environmental Report

8 In order to achieve these objectives, the environmental effects of new substations and extensions or modifications to existing substations will be assessed and where appropriate an environmental report prepared describing the effects and mitigative measures. Items to be considered are summarised in Appendix A.

Integrating Environmental Considerations into Power System Planning

9 The nature of transmission system planning is such that scheme proposals and options may go through various stages before it is finally decided to proceed with construction.

10 The purpose of each proposal for substation, sealing end compound or line entry development should be set out in a brief, and a range of system and siting options should be evaluated and documentated as part of the selection of the preferred solution. In each case the effects of the overall development on the environment should be assessed, prior to a commitment to a particular site or design.

11 When it is clear a project is likely to proceed, an assessment should be made of any additional skills required to deal effectively with the range of environmental, land use, planning and design issues. Consideration should also be given to consultation as soon as reasonably possible with appropriate statutory planning and amenity bodies.

Liaison with other Electricity Companies

12 NGC will encourage and recommend other parties such as power generators or regional electricity companies to adopt these guidelines when

working with NGC on proposals for substations, sealing end compounds or line entries.

Post Construction Review

13 Following completion of the project, a review should be undertaken to check that the necessary measures identified in the environmental report have been implemented.

Section III GUIDELINES

Overall System Options and Site Selection

1 In the development of system options including new substations, consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects in order to keep adverse effects to a reasonably practicable minimum.

Amenity, Cultural or Scientific Value of Sites

2 The siting of new NGC substations, sealing end compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections.

- ***Notes:***

  1 Internationally and nationally designated areas of highest amenity, cultural or scientific value are:

  National Parks;
  Areas of Outstanding Natural Beauty;
  Heritage Coasts;
  World Heritage Sites;
  Ramsar Sites;
  Sites of Special Scientific Interest;
  National Nature Reserves;
  Special Protection Areas;
  Special Areas of Conservation.

  2 Care should be taken in relation to all historic sites with statutory protection eg Ancient Monuments, Battlefields and Listed Buildings.

  3 Account should be taken of Government Planning Policy Guidance and established codes of practice.

  4 Account should be taken of any development plan policies relevant to the siting or design of substations.

3 Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas

should be protected as far as reasonably practicable.

Local Context, Land Use and Site Planning

4 The siting of substations, extensions and associated proposals should take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum.

- ***Notes:***

  1 *A preliminary study should be undertaken to identify the extent of land required to meet both operational and environmental needs.*
  2 *In some instances it may be possible to site a substation partially or fully enclosed by existing woodlands.*
  3 *Topographical information should be obtained at an early stage. In some cases a geotechnical survey may be required.*

5 The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum.

- ***Notes:***

  1 *Allow sufficient space for screening of views by mounding or planting.*
  2 *Consider appropriate noise attenuation measures where necessary.*
  3 *Use security measures which minimise visual intrusion from lighting.*
  4 *Consider appropriate on-site water pollution prevention measures.*
  5 *Consider adjoining uses and the amenity of local inhabitants.*

6 The land use effects of the proposal should be considered when planning the siting of substations or extensions.

- ***Notes:***

  1 *Issues for consideration include potential sterilisation of nationally important land, eg Grade 1 agricultural land and sites of nationally scarce minerals.*
  2 *Effects on land drainage.*

Design

7 In the design of new substations or line entries, early consideration should be given to the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum.

- ***Notes:***

  1 *With outdoor equipment, a preference should be given normally to a low profile design with low height structures and silhouettes*

appropriate to the background.

2 *Use lightweight narrow section materials for taller structures especially for gantries over about 6 metres in height.*

3 *Commission exterior design and colours appropriate to the surroundings.*

4 *Materials and colours for buildings, equipment and fencing should be chosen to harmonise with local surroundings.*

5 *Where possible avoid the use of prominent insulators by consideration of available colours appropriate to the background.*

6 *Where possible site buildings to act as visual screens for switchgear.*

7 *Ensure that the design of high voltage and low voltage substations is co-ordinated by early consultation between NGC and its customers.*

8 *Where there are particular technical or environmental constraints, it may be appropriate to consider the use of Gas Insulated Switchgear (GIS) equipment which occupies less space and is usually enclosed within a building.*

9 *Early consideration should be given to the routeing of utility service connections.*

8 Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation.

- ***Notes:***

1 *Assess the benefit of removing redundant substation equipment from existing sites where this would improve their appearance.*

9 The design of access roads, perimeter fencing, earthshaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings.

<u>Line Entries</u>

10 In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance.

11 The inter-relationship between towers and substation structures and background and foreground features should be studied to reduce the prominence of structures from main viewpoints. Where practicable the exposure of terminal towers on prominent ridges should be minimised by siting towers against a background of trees rather than open skylines.

END

APPENDIX A

NGC SUBSTATIONS – ENVIRONMENTAL REPORT

Introduction

All proposals for significant extensions of existing substations or for new substations and associated development should be the subject of an environmental appraisal and an environmental report should be produced. The project manager will be responsible for ensuring that an appropriate appraisal is undertaken and report prepared, with due regard to expert advice available to the team.

For a major development a scoping exercise should be undertaken with the contribution of appropriate skills to establish the range and depth of the appraisal. It will generally be appropriate at this stage to consider consultation with the local planning authority.

A clear distinction should be drawn between the preparation of an environmental report which will be undertaken in most cases and a full environmental statement (ES) which may on occasion be required under UK environmental assessment legislation, for example where the substation forms part of a major new power station for which an ES may be needed.

Recommended Content of Environmental Reports for Substations

Section 1

Information describing the project during construction, when operational and on de-commissioning including:-

1.1 Purpose and physical characteristics of the project, including details of access and transport arrangements and employment.

1.2 Land use requirements and other physical features of the project.

1.3 Operational features of the project and relevant measurements of emissions such as noise, vibration, light, heat and electric and magnetic fields.

1.4 Main alternative sites considered and reasons for final choice.

Section 2

Information describing the site and its environment including:-

2.1 Physical features such as

-Flora and fauna
-Soil: agricultural quality, geology
-Water courses including land drainage generally
-Climatic factors

-Historic heritage and archaeological sites
-Landscape and topography
-Local recreational uses
-Proximity of population and any other relevant environmental features.

2.2 The policy framework

The policy framework including all relevant statutory designations such as national nature reserves, sites of special scientific interest, national parks, areas of outstanding natural beauty, heritage coasts, special protection areas, special areas of conservation, regional parks, country parks, national forest parks, local nature reserves, areas affected by tree preservation orders, water protection zones, minerals protection zones, nitrate sensitive areas, conservation areas, listed buildings, scheduled ancient monuments, and designated areas of archaeological importance. It should also include references to Structure, Unitary and Local plan policies applying to the site and the surrounding area which are relevant to the proposed development as well as to any international designations.

Section 3

Assessment of effects on the surrounding area and landscape including:-

3.1 Visual effects, emissions during normal operation, noise, light, impact on local roads and transport.

3.2 Effects of the development on buildings, the architectural and historic heritage and archaeological features.

3.3 Loss of, and damage to flora, fauna and geology.

3.4 Land use/resource effects such as
- quality and quantity of agricultural land to be taken
- sterilisation of mineral resources and alternative uses of the site.

3.5 Changes to hydrographic characteristics.

3.6 Air and Climate

3.7 Indirect matters such as
- traffic (road, rail, air, water) related to the development,
- development associated with the project, eg new roads, sewers, power lines, pipelines, telecommunications etc.

Section 4

Mitigation measures

4.1 Where significant adverse effects are identified, a description of the measures to be taken to avoid, reduce or remedy those effects, eg

a) site planning;

b) technical measures eg equipment selection, recycling of waste or redundant parts, pollution control and treatment, containment (eg shielding of transformers and bunding)

c) aesthetic and ecological measures eg
   - mounding, design, colour, landscaping, tree planting
   - measures to preserve particular habitats or create alternative habitats
   - recording of archaeological sites
   - measures to safeguard historic buildings or sites.

END