TECHNICAL NOTE

Job Name: Margam Port Talbot National Grid Electricity Transmission (NGET) Upgrade Works

Job No: 331201497

Date: 30th July 2025

Prepared By: Caroline Dinnage (Stantec UK)

Subject: **Carbon Emissions Technical Note**

1. Introduction

1.1. This Technical Note provides information on the likely sources of carbon and greenhouse gas (GHG) emissions resulting from the proposed extension of an existing electricity substation (the 'Proposed Development') at Margam, Port Talbot (the 'Site'), alongside mitigation required to reduce these emissions. The Planning Application includes both the Site Boundary and a description of the Proposed Development.

2. Methodology

2.1. This note has been informed by Publicly Available Standard (PAS) 2080: 2023 Carbon Management in Infrastructure[1] methodology to identify carbon emissions from the construction, operation and decommissioning stages of the Proposed Development.

2.2. Legislation and policy of relevance to this note includes:

- Climate Change Act 2008 and 2050 Target Amendment Order 2019;
- Environment (Wales) Act 2016;
- Carbon Budget Orders (Wales) 2016, 2021 and 2026;
- Planning Policy Wales 2024;
- the Net Zero Strategic Plan 2022; and
- Neath Port Talbot Policy County Borough Council Local Development Plan (2011-2026): SP 1 Climate Change.

2.3. A high-level review of the Site, surrounding area and associated activities has been undertaken to identify the baseline conditions. The Preliminary Ecological Report (Stantec, 2025), the Preliminary Hydrogeological Impact Assessment Report (Envireau Water, 2025), and the Peat Management Plan (WRC, 2025), which have been submitted with the planning application, have been used to inform this review.

3. Baseline Conditions

3.1. The Site compromises wetland habitats, marshy grassland, scrub and plantation woodland. The vegetation has potential for carbon sequestration.

[1] PAS 2080:2023 Carbon Management in Infrastructure | BSI

3.2. Peat deposits are present within the Site, with available information indicating no surface exposures of peat. Peat is found at depths between 0.2 m below ground level (BGL) and 3 m BGL. The thickest deposit contains only pockets of peat. Given that the peat deposits are below ground surface and no active or peat-forming vegetation species were identified in the Phase 1 habitat survey for the Site, the Peat Management Plan prepared by WRC, considers the peat not to be actively sequestering carbon. It is, however, a carbon store.

3.3. There are existing GHG emissions associated with the existing substation, including from operational energy to run the facility, transport of staff to Site and from any maintenance activities such as the replacement of materials.

4. Potential Effects

Construction

4.1. The Proposed Development will emit GHG emissions as a result of enabling works and construction activities. This includes embodied carbon from the purchase of materials, fuel use from equipment and site generators, transport of materials and staff to Site, waste generation, water use, soil disturbance, vegetation clearance and land use change.

4.2. Steel, pre-cast concrete piles, concrete and mortar, insulation materials, plastics and metals such as aluminium will be required and are anticipated to contribute substantially to the Proposed Development's emissions due to the carbon intensive nature of their production.

4.3. While peat will be left undisturbed and *in situ* wherever possible, it is anticipated that a limited amount of peat will be excavated as a result of construction works and piling. This will lead to the release of carbon stored within peat deposits, particularly if it is exposed to oxygen or dries out. The Peat Management Plan (WRC, 2025) sets out management measures to reduce the risk of this occurring. Techniques such as Displacement Auger (DAP) piling and precast driven piles will be used to help minimise soil excavation and associated ground disturbance, and to substantially reduce the impact to and removal of below surface peat.

4.4. Where excavation is required, protocols set out in a Peat Management Plan will be implemented. This includes short storage times and water sprays to minimise drying. All excavated peat will be reburied in suitable locations within the Site.

4.5. The Proposed Development has been designed to allow the retention of existing vegetation wherever possible. This will help to minimise carbon emissions from vegetation clearance.

4.6. A Construction Environmental Management Plan (CEMP) (LOR, 2025) has been submitted with the planning application. This document includes measures covering transport, materials, waste and air quality during construction. Measures that will reduce GHG emissions during construction include, for example, no unnecessary idling of engines, maintenance of plant equipment to check they are operating optimally and efficient use of materials to reduce waste. The measures included in the CEMP contribute to the mitigation of GHG emissions by reducing fuel and energy consumption and waste generation during construction, thereby leading to a lower carbon footprint.

4.7. A Construction Logistic Plan (CLP) (Select Logistics, 2025) has been prepared and submitted with the planning application and sets out the routing plans for working and deliveries, scheduling and timing of deliveries, and logistics plans. This will help to improve the efficiencies of vehicle movements during construction and in turn, reduce GHG emissions associated with construction traffic.

4.8. A Waste Management Plan (LOR, 2025) has also been produced for the Proposed Development and this, alongside the CEMP, sets benchmarks to achieve a 100% diversion from landfill for non-hazardous waste and 80% recycled waste. This will be achieved through measures such as offsite manufacturing to allow for a more controlled construction environment on Site, the re-use of excavated materials arising from open cut trenchworks and provision of staff training and clear communication of required construction practices to reduce and manage waste. The reduction of waste generation and the use of recycling facilities over landfill reduce downstream GHG emissions associated with the construction of the Proposed Development.

4.9. To manage GHG emissions during construction, Laing O'Rourke have prepared a Carbon Management Plan (CMP) on behalf of the Applicant following PAS 2080 principles. It provides a mechanism for establishing the Proposed Developments carbon footprint, setting carbon reduction targets and identifying carbon reduction opportunities in line with the carbon reduction hierarchy (avoid, switch, improve).

4.10. The CMP forms part of the Applicant's internal sustainability reporting rather than the planning application and is an ongoing process that will be revised as the Proposed Development progresses through design and into construction. This means that a number of carbon reduction opportunities require further development and specifics of, for example, availability of supply, may not be available to secure at the planning application stage, however, the Applicant is committed to achieving requirements set by their Environmental Action Plan[2] and ISO certifications.

4.11. The following measures have been identified in the CMP to be taken forward to reduce carbon emissions during construction of the Proposed Development:

- Commitment to procure low carbon concrete only. This is defined by the Institute of Civil Engineers (ICE) Low Carbon Concrete Group (LCCG) benchmark rating 3;
- Wherever possible, hydrotreated vegetable oil (HVO) will be used as an alternative to diesel fuel;
- Utilisation of construction techniques and alternative methods that reduce impact and minimize disruption to the land to reduce carbon emissions from soil disturbance.
- Zero non-hazardous waste to landfill by minimizing waste, segregating recyclables, partnering with recycling facilities, and diverting non-recyclable waste to sustainable disposal methods.
- Implement an energy monitoring system and Energy Action Plans to implement measures to reduce consumption and improve efficiency;
- Utilisation of high recycled content of steel and aggregate to reduce embodied carbon;
- Retain soils on site wherever possible for reburial or reuse in bund and landscaping, which is secured through the Waste Management Plan (LOR, 2025) and Peat Management Plan (WRC, 2025) submitted with the planning application. This will reduce the need for processing waste and the requirement for purchasing new material, as well as transport associated with those activities.
- Collaboration, engagement and training with the supply chain. Carbon requirements have been integrated into the Procurement Strategy for the Proposed Development and subcontractor documentation so that carbon reduction will continue to be considered throughout design and construction.

[2] https://www.nationalgrid.com/electricity-transmission/document/155131/download
[3] https://www.lccg.uk/home/current-activities/lccg-market-benchmark

Operation

4.12. During operation, GHG emissions are anticipated to arise as a result of energy use for lighting, heating and cooling, waste generation and water use from the staff amenity space on Site, as well as from staff commuting to Site. These emissions will only occur when the Proposed Development is manned when routine maintenance is required

4.13. Operational energy use will also be required for general operation of the substation from which indirect emissions will arise. There will also be electricity loss due to transmission. The design of the Proposed Development includes the use of high-quality conductors (e.g. copper and aluminium) that are more resistant along with regular maintenance will help to increase efficiency and thereby reduce carbon emissions associated with this.

4.14. In addition, a sulfur hexafluoride (SF6) free pipework will be installed as the main plant is installed, allowing sequential charging of the gas-insulated switchgear (GIS). The use of SF6 free gas removes the need to use SF6 itself, which has a very high global warming potential. This greatly reduces operational carbon emissions compared to standard GIS substation design.

4.15. Carbon emissions will result from maintenance of infrastructure and components across the design life of the Proposed Development. This is due to the purchase of materials and electricity or fuel use for any equipment requirements.

4.16. A back-up diesel generator system will also be installed, located in the north-west corner of the GIS compound. This generator will be used in the event of an electricity supply outage including circumstances of an overhead line being down, trees on the line or planned outages. When in use, direct GHG emissions will be emitted as a result of burning fossil fuels on Site.

4.17. Green infrastructure can provide a form of carbon sequestration on the Site, reducing the level of CO_2 within the atmosphere. The Proposed Development includes provision for planting within the Site. The Landscape and Habitat Strategy Plan, Landscape and Habitat Detailed Design and the Landscape and Habitat Management Plan (Stantec, 2025), which have been submitted with the planning application, include consideration of the maintenance / management measures associated with onsite ecological networks and features that are to be retained, enhanced and created within the Proposed Development. This will help to enable maturation of existing retained and proposed planting which would sequester carbon on Site.

4.18. The Proposed Development will provide 33kV connection to the adjacent Tata Steel site. This would enable the operation of new electrical arc furnaces proposed at the Tata Steel site to be used for steel production. This would help both to reduce reliance of imports of steel and to transition the UK steel production away from fossil fuel blast furnaces. Electrification of industry is an important step to reduce national emissions in line with 2050 net zero targets and is supported by the UK Governments Industrial Decarbonisation Strategy[4]. As the NGET decarbonises, this will further reduce emissions associated with the use of electrical arc furnaces at Port Talbot. The Proposed Development therefore has an indirect, downstream beneficial effect that supports the decarbonisation of steel production and the Wales 2050 net zero target.

Decommissioning

4.19. Carbon emissions can also be expected to arise from decommissioning activities. These include fuel use for machinery, the transport, processing and management of waste, and staff commuting to Site.

Whole Life Carbon Emissions

4 https://assets.publishing.service.gov.uk/media/6051cd04e90e07527f645f1e/Industrial_Decarbonisation_Strategy_March_2021.pdf

4.20. The Whole Life Carbon Assessment prepared by Baker Hicks (2025) identified that the Proposed Development would result in 10,330 tCO_2e across construction, operation and decommissioning.

5. Conclusion

5.1. This technical note has set out the key sources of direct and indirect carbon emissions anticipated to arise as a result of the Proposed Development.

5.2. Several mitigation measures are embedded into the design which includes appropriate piling techniques to minimise ground disturbance and reduce the volume of excavated peat. A Carbon Management Plan will be implemented to continually report, monitor and manage activities during construction which will aid in reducing emissions across several elements such as embodied carbon, transport and fuel use.

5.3. Overall, the Proposed Development is considered to support the Wales 2050 net zero target due to it enabling the electrification of Tata Steel arc furnaces.

DOCUMENT ISSUE RECORD

Job Number	Rev	Date	Prepared	Reviewed (Discipline Lead)	Approved (Project Director)
331201497	DRAFT	09/01/2025	Caroline Dinnage, Principal Environmental Planner	Kiri Heal, Senior Associate	Kevin Herman
331201497	Final	23/06/2025	CD	CD	MR

T: +44 1173 327 840 E: bristolqueensquare@stantec.com