Uwchraddio'r Grid
Pentir i Drawsfynydd

The Great Grid Upgrade
Pentir to Trawsfynydd



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Prosiect i Atgyfnerthu'r cysylltiad rhwng Pentir a Thrawsfynydd

Pentir to Trawsfynydd Reinforcement Project

Environmental Statement, Volume 3: Bryncir Works
November 2025

nationalgrid

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Executive Summary

Background

Introduction

i. This document (Volume 3 – Bryncir) forms part of the Environmental Statement which accompanies applications by National Grid Electricity Transmission plc to construct and operate developments which comprise parts of the Pentir to Trawsfynydd Reinforcement Project (the 'Project'). Volume 3 focuses on the works at Bryncir. It provides an assessment of likely significant effects that could arise from the decommissioning of elements of the existing equipment and the construction and operation (including maintenance) of new infrastructure forming this aspect of the Project.

Bryncir Location

ii. The proposed works would be on a series of open fields on the eastern side of the existing 400 kilovolt (kV) overhead line, approximately 1.4 kilometres (km) south of Bryncir and 1.4 kilometres (km) west of Garndolbenmaen, North West Wales, in the administrative boundary of Gwynedd Council ('Bryncir works site') (see **Figure 3.2.1**). The Bryncir works site is on relatively flat ground with a slight slope to the west and is characterised by pastoral fields with an area of marshy grassland to the south-west. Agricultural Land Classification data identifies the Bryncir works site as a mix of Grade 3b, Grade 4 and Grade 5. The existing Pentir – Trawsfynydd overhead line and an existing 132 kV overhead line owned by Scottish Power Energy Networks (SPEN) (the 'DB connection route') runs through the Bryncir works site. The Llystyn Isaf candidate Wildlife site (cWS), Afon Dwyfach cWS, Tyddyn-y-Felin cWS and Rhwnddwyryd cWS all partially fall in the Bryncir works site, with several others in the wider area.

Bryncir Works

iii. The Bryncir works site covers an area approximately 20 hectares (ha); however, the permanent Bryncir Substation compound would cover approximately 4 ha, with the substation covering approximately 1 ha.

iv. Works would include the construction of a new 400 kV substation including a permanent access road; a new section of 132 kV underground cable; installation of two fibre-optic cables, one from Tower 4ZC068 via an underground route and one directly from replacement Tower 4ZC067, will provide reliable communication for the substation; the relocation of Tower 4ZC067 80 m north-west of its current position; realignment of the DB connection route to connect into the new substation and decommissioning and removal of the redundant section; permanent diversion of the Dolbenmaen No 18 footpath; a new landowner track; and installation of a small kiosk to provide low voltage electricity to the substation.

v. Construction of the Bryncir Substation would include the installation of a super grid transformer, support and electrical equipment, ancillary buildings, an access road and security fencing. The relocated Tower 4ZC067 would be built with excavation, concrete foundations, steel assembly, and stringing of overhead conductors, followed by dismantling the existing tower. The DB connection route includes the installation of a 132 kV underground cables and overhead lines via trenching and pole erection. The

redundant section of the DB connection route will be dismantled and the ground fully reinstatement. Dolbenmaen No 18 footpath where it intersects the Bryncir works site will be temporarily closed during construction and permanently diverted during operation. To allow the landowner access across field boundaries south of the proposed Bryncir Substation, a hardcore track extending an existing track will be provided to the south-west of the proposed Bryncir Substation.

vi. Construction activities would take place between 7.00 am – 7.00 pm over an 18 – 20-month period, anticipated to be between Quarter 1 2026 – Quarter 3 2027. During the construction phase, the access into the Bryncir works site will be from the A487 in the north, the access track will be made permanent and the design of which shall be suited for the passage of an abnormal (AIL) load i.e. super grid transformer. A range of vehicle types will be required at each construction phase including 4x4 vehicles, towed trailers, small ground survey plant, heavy goods vehicles, concrete truck mixers, plant deliveries and an AIL for the transformer delivery. The proposed works will require two construction compounds, the main compound will be immediately north to north-east of the proposed Bryncir Substation and will contain site offices and welfare facilities, storage and laydown areas and car parking. The secondary compound will be west of the main site entrance, immediately south of the A487 and will be used for the earthworks phase.

vii. During operation the Bryncir Substation would typically be unmanned, maintenance works would be undertaken every three years and visual checks would be undertaken on a monthly basis.

Alternatives

viii. In accordance with the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017, design alternatives have been considered for the proposed works.

ix. In 2012, NGET evaluated 12 potential locations for the proposed Bryncir Substation, ultimately shortlisting three options: Northern, Central, and Southern. Each option proposed access from the A487 and positioning the substation parallel to the existing 400 kV line, with overhead lines connecting via gantries. The Northern option was located north of Bryncir, the Central to the west of Bryncir, and the Southern 1.4 km south of Bryncir and west of Garndolbenmaen. Although not favoured from a landscape and noise perspective, the Southern site emerged as the preferred choice due to its advantages in ecology and cultural heritage, and it received public and Natural Resources Wales (NRW) support during the 2012 consultation period.

x. Two broad indicative routes were considered for the new 132 kV supply to the existing DB connection route. Route A, approximately 550 m in length, would head directly west from the proposed Bryncir Substation crossing agricultural fields and crossing the B4411 and Afon Dwyfach before connecting into the DB connection route 132 kV overhead line. Route B, approximately 880 m in length, would head south-west from the proposed Bryncir Substation, crossing agricultural fields to the B4411 before turning west to cross it and the Afon Dwyfach and then continuing west to connect to the existing DB connection route 132 kV overhead line. Three options were considered for both Route A and B: 132 kV underground cables with HDD used to cross the B4411 and Afon Dwyfach; 132 kV overhead line; and combining 132 kV underground cables and 132 kV overhead line. Route A, option 3 (combining 132 kV underground cables and 132 kV overhead line) was preferred as it was cost effective whilst having less effect on agricultural land and avoided the Tyddyn-y-Felin cLWS.

Key Findings of the Environmental Impact Assessment

Landscape and Visual Amenity

xi. The Study Area for Landscape and Visual Amenity encompasses land within a 3 km radius of the Bryncir works site. The Bryncir works site is not covered by any statutory landscape designations, however part of the Study Area falls with Eryri National Park which is 1.1 km east of the Bryncir works site at its closest point. The Bryncir works site is relatively flat with a slight slope to the west, the Study Area is gently undulating. Settlement in the Study Area comprises scattered farms and individual properties. Public Right of Way (PRoW) Dolbenmaen No 18 footpath passes through the centre of the Bryncir works site.

xii. The proposed works would introduce some new elements into the landscape, creating the potential for significant landscape and visual effects. The effects from the following activities could occur simultaneously or in isolation: vegetation clearance, utility diversions, temporary compounds, construction activities, temporary access tracks, low level lighting and new infrastructure. During operation, the proposed works has the potential to create landscape or visual effects due to the introduction of new infrastructure.

xiii. Embedded mitigation measures include minimising the extent of the proposed works, incorporation of new and additional planting such as hedgerows and trees, optimising zones with construction compounds, reinstating land used temporarily, confining lighting to locations where safety if a priority, minimise the use of tall equipment, design permanent structures i.e. overhead line poles in a way that minimises their visual impact and minimise construction duration.

xiv. No significant effects have been identified for landscape receptors during construction or operational phases. During construction receptors at viewpoints 1 and 2 would experience significant effects on visual amenity due to the introduction of construction activities. At operation year 1 (winter) significant effects would remain at viewpoints 1 and 2, close to the proposed works and with limited intervening vegetation. At operation year 15 (summer) impacts would reduce to non significant levels as a result of the established boundary planting. No significant effects have been identified for receptors at the remaining representative viewpoints, for all assessment phases.

Ecology and Nature Conservation

xv. The Study Area or Zone of Influence for the proposed works was defined to assess potential ecological risks from direct and indirect impacts. The Zone of Influence considers the nature of the proposed works, nearby land use, habitats, watercourses, species behaviours, and duration of effects. It incorporates designated sites, sensitive habitats, and protected and notable species within varying distances from the Bryncir works site, considering professional good practice and guidance. A desk study was carried out to identify sites designated for nature conservation and records of protected or notable habitats and species (important ecology features) and Invasive Non-Native Species (INNS) that are relevant to the Bryncir works site. The desk study also identified the status of water bodies covered by the Water Framework Directive (WFD) to identify those likely to be impacted from an ecological perspective. Cofnod, the local biological records centre, was contacted in June 2023 to gain information on pre-existing ecological data (i.e. locations of locally designated sites, HoPI, ancient woodland and existing records of protected and notable species, and INNS within 2 km of the Bryncir works site). A series of field surveys have been undertaken including an extended Phase 1 habitat survey, targeted habitat survey, aquatic scoping surveys,

hedgerow, aquatic macrophyte, aquatic macroinvertebrate, bats (ground level tree, potential roost features, roost, foraging and commuting), badger, riparian mammals and INNS surveys.

xvi. The Bryncir works site comprises various types of woodland, scrub, grassland, hedgerows, buildings and running water. There are five international statutory sites for nature conservation (Special Areas of Conservation, Special Protection Areas and Ramsar sites) within 10 km of the Bryncir works site. Nine other statutory designated sites (Site of Special Scientific Interest, National Nature Reserve and Local Nature Reserves) are present within 5 km of the Bryncir works site. There are 39 non-statutory sites designated for nature conservation within 2 km of the Bryncir works site, four of which are partially in the Bryncir works site. There are six areas of ancient semi-natural woodland, one site of restored ancient woodland and one site of ancient woodland of unknown category within 2 km of the Bryncir works site. Habitats of Principal Importance identified within 1 km of the Bryncir works site include purple moor grass and rush pastures, lowland heathland, lowland dry acid grassland, lowland fen and reedbed, lowland meadow, open mosaic habitat, traditional orchards, hedgerows, rivers and deciduous woodland. The following protected and notable species were identified within 2 km of the Bryncir works site: terrestrial invertebrates, aquatic macroinvertebrates (river skater only), fish, breeding birds, bats, badger, otter, hedgehog, brown hare, reptiles, flora and INNS.

xvii. The proposed works have the potential to affect ecology and nature conservation through habitat loss (temporary and permanent), disturbance (light, noise, vibration and human activity), habitat degradation, species mortality and spread of INNS during construction. During operation, no effects are anticipated. However, should maintenance works be intrusive and require refurbishment or replacement the sources of potential effects include species mortality, disturbance (light, noise, vibration and human activity) and spread of INNS. Embedded mitigation measures have been integrated into the proposed works to minimise potential ecological impacts from construction and operation. The proposed works have been designed to avoid impacts on designated sites and key habitats, with buffers applied to woodlands, hedgerows, trees, and watercourses. The Construction Environmental Management Plan will outline measures to address construction dust, pollution, water quality, light and noise. Vegetation clearance would be carried out in advance of the construction works commencing and would avoid the besting bird period, precautionary working methods will be adhered to in areas of habitat suitable for reptiles, common amphibians and common mammals. Sensitive habitats, such as the non-statutory sites in the Bryncir works site will be protected though the use of appropriate temporary ground protection trackway or matting, to limit damage. Lighting during construction will be minimal and comply with best practice guidelines to prevent disturbance to wildlife. Pre-construction surveys will ensure the latest data on protected species and INNS are used to inform mitigation measures, including wildlife protection and reasonable avoidance measures for badgers, otters and bats.

xviii. Additional mitigation for marsh fritillary butterfly, roosting bats and migratory fish are required to minimise any potential residual adverse effects. With the implementation of suitable embedded mitigation and additional mitigation the assessment has concluded that the construction and operation of the proposed works are unlikely to result in significant adverse effects to identified species, habitats and designated sites.

Historic Environment

xix. Two Study Areas were used for the Historic Environment assessment: a Study Area of 3 km from the Bryncir works site has been defined for designated historic assets and a 500 m Study Area for non-designated heritage assets. The settings of designated assets of the highest value (i.e. World Heritage Sites, scheduled monuments, Grade I and II* listed buildings, registered parks and gardens, conservation areas containing a number of assets of the highest value and registered historic landscapes) will be considered, up to 3 km from the Bryncir works site, this will be guided by the proposed works ZTV prepared as part of **Chapter 4: Landscape and Visual Amenity**.

xx. Most historic assets were scoped out of further assessment in the baseline study (**Volume 8, Appendix 3.6.A: Historic Environment Desk-based Assessment**) however, the proposed works could result in physical impacts or impacts on the setting of eight scheduled monuments, one Grade II listed building and nine non-designated historic assets.

xxi. The potential construction impacts associated with the proposed works include temporary short-term impacts to assets as a result of change to their setting, permanent impacts to assets as a result of change to their setting and permanent physical impacts to below ground archaeological remains.

xxii. While no significant effects have been identified on potential below ground archaeological remains, ground-breaking works will impact a non-designated historic asset of unknown date, the route of an old road (PRN 62128) from Garn Dolbenmaen. The potential additional mitigation measures include a programme of archaeological investigation, recording and reporting would not minimise the physical impact, as the archaeological evidence would still be removed, but would compensate for their loss by preserving them by record. No significant effects have been identified on the setting of designated historic assets during the construction or operation of the proposed works. Considerations of size, materials, distribution, lighting and screening in the final designs will ensure that impact on the setting of designated historic assets will be kept to a minimum.

Geology, Hydrogeology, Land Use and Agriculture (Soils)

xxiii. The Study Area comprises the Bryncir works site plus a 250 m and 500 m buffer extending to 1 km for water abstractions.

xxiv. The Study Area is underlain with Glaciofluvial Sheet Deposits, Alluvium, Peat and Till Superficial deposits and Llanbedrog Volcanic Group, Dwyfach Formation and Cwm Eigiau Formation Bedrock. There are no faults or linear features in the Study Area. There is one historic borehole log in the Bryncir works site. Ground stability classifies most of the Bryncir works site as stable, with some landslide, running sand and compressibility hazards. The Study Area sits on neutral and acid pastures and is in a Geological Landscape classed as outstanding. Under grass, the soils have a long grazing season. Free drainage reduces the risk of soil damage from grazing animals or farm machinery. A site survey of soils was carried out on 7 December 2016 for the previous application for the Bryncir Substation submitted in 2017. Although the survey extent does not coincide completely with the proposed works, Grade 3b, 4 and 5 agricultural land was identified, providing confidence that no best and most versatile land is present in the Study Area. There are no sites designated for geodiversity interest in the Study Area. A small section at the south-western most extent of the Bryncir works site falls within a Mineral Safeguarding Area (MSA) for sand and gravel. There is an area of surface ground workings including gravel pits, brit pits (detailed as ceased

gravel pits), refuse heals and a disused tip 15 m west of the Bryncir works site. There are other isolated areas in the Study Area (approximately 170 m west and 170 m south-west of the Bryncir works site) that are 'cuttings' and an area 125 m north of the Bryncir works site mapped as a 'pond'. There is a small area of underground workings approximately 15 m west of the Bryncir works site for 'Unspecified Melin' (dated 1913). In the Study Area there are three private water supplies, one commercial/industrial and two residential. There are two waste exemptions in the Study Area, one for the deposit of waste from dredging of inland water and another for spreading waste on agricultural land to confer benefit. There are no source protection zones, groundwater abstractions, historic landfill sites, sources of ground gas or licensed discharges in the Study Area.

xxv. The proposed works have the potential to cause geological and hydrological impacts. Construction activities have the potential to result in the loss or damage on the identified geological receptors i.e. bedrock. The Bryncir works site is predominantly within areas of low potential for ground instability, except for areas of Alluvium and Peat in the west where compressibility and uneven settlement hazards are likely present and also running sand conditions may be present. Temporary impacts on the sand and gravel MSA includes impediment of the MSA in the Bryncir works site. Construction activities could affect groundwater flow, quality, and levels, and create contamination risks from accidental spills, leaks, and the disturbance of existing contaminants. There is also a risk of importing potentially contaminated materials, exposing workers to harmful substances and temporary or permanent loss of soil resources. During maintenance works there is the potential for contamination of shallow groundwater from accidental leaks and spills, or plant breakdown. Other temporary impacts may also result from the use and storage of materials and substances (e.g. concrete, fuel, oils and soil) which have the potential to be mobilised to ground or controlled waters directly or within run-off. Maintenance workers could still be exposed to residual contamination, gases or vapours during excavations or in confined spaces.

xxvi. Mitigation measures including a Construction Environmental Management Plan, appropriate intrusive ground investigations of selected areas of the Bryncir works site, an inspection and discovery strategy, re-use of excavated materials onsite, soil and groundwater pollution control mitigation and a more detailed hydrogeological assessment should dewatering be required. Following the implementation of mitigation measures, no significant impacts on Geology, Hydrogeology, Land Use and Agriculture are anticipated.

Water Quality, Resources and Flood Risk

xxvii. The Study Area for the effects of the proposed works consists of the Bryncir works site and the immediate surrounding environs within 1 km of the Bryncir works site.

xxviii. There are one Main River, the Afon Dwyfach, in the Bryncir works site and the second, the Afon Dwyfor, in the Study Area. There are multiple unnamed ordinary watercourses in the Study Area which are tributaries of the Afon Dwyfach and the Afon Dwyfor. The Bryncir works site overlies freely draining, slightly acid loamy soils. There are four private water supplies, one licensed abstraction and six consented discharges in the Study Area. There is one water dependant designated site in the Study Area, the Llystyn Isaf SSSI is located approximately 320 m upstream of the Bryncir works site. The only permanent above ground infrastructure in Flood Zone 3 is an H pole to the west of the Afon Dwyfach, however there are several areas including the proposed Bryncir Substation at risk of flooding from surface water and small watercourses.

xxix. The potential Water Quality, Resources and Flood Risk effects during the construction phase includes: deterioration in the water quality of surface water bodies via generation

of sediment laden run-off from working areas and discharge of dewatered groundwater from excavations; potential effects on hydromorphology and flow regime of surface water bodies as a result of increased runoff, dewatering of excavations and sediment inputs from working areas; deterioration in the water quality of surface and groundwater bodies affected by disturbance of contaminated land, or accidental spillage of pollutants (e.g. fuel or oil); deterioration in water quality due to permitted discharges from construction (e.g. treated sewage effluent from welfare facilities) and impacts to groundwater levels for dewatering activities and the effects on underground infrastructure. During operation, effects include potential for accidental contamination entering watercourses associated with spillage or leakage of fuels, lubricants or other chemicals and changes to surface water flood risk due to changes in flow pathways and runoff rates resulting from changed ground levels and creation of new impermeable surfaces for permanent above ground infrastructure.

xxx. Mitigation measures including an Environmental Management Plan, Flood Evacuation Plan, Pollution Prevention Plan and a Pollution Incident Response Plan will be produced. In additional construction works will take place during periods of normal to low flow conditions to avoid conveyance-related flood risk effects. Following the implementation of mitigation measures, no significant impacts on Water Quality, Resources and Flood Risk are anticipated.

Traffic and Transport

xxxi. Several roads on the local and strategic highway network could be used by traffic associated with the proposed works and could be subject to increases in traffic. The roads identified cover likely routes to the Bryncir works site from the Strategic Road Network (SRN) and from local and regional population centres between a 30–45-minute drive time of the Bryncir works site. This is the likely catchment area for construction traffic. The roads in the Study Area included the A487 north of the B4411, the A487 east of the B4411 and the B4411 south of the A487. Automatic Traffic Counts (ATCs) have been carried out at specific locations on the roads above which, collectively, form the Study Area.

xxxii. The roads in the Study Area form part of the SRN, local highway network and unclassified roads. One footpath runs through the Bryncir works site and a second footpath slightly encourages into the northern extent of the Bryncir works site. One additional footpath and NCR 8 are in the Study Area. The Study Area is served by two bus routes, the closest rail station Criccieth located 7.1 km south of the Bryncir works site. Between 2016 – 2022, there were nine collisions in the Study Area, one fatal, three serious and five slight. The ATCs were carried out at three locations between 26 September – 02 October 2024 concluded the 24-hour annual average daily traffic was 16,510, 632 of which were heavy duty vehicles.

xxxiii. The potential construction impacts associated with the proposed works include severance of communities, driver delay, non-motorised user amenity, fear and intimidation, road safety and accidents, total traffic increase, heavy goods vehicles (HGVs) increase. No operational effects are anticipated as operational traffic levels are expected to be no different from the baseline.

xxxiv. Embedded mitigation measures include establishing appropriate access points to facilitate vehicle movements, bell mouth junctions would be designed in accordance with relevant standards, swept path analysis would be carried out for abnormal indivisible loads (AILs) and HGVs, AILs and HGVs would follow designated routes, internal routes would be unitised where practicable to avoid using the existing road network, traffic management would be employed where construction vehicles need to

interact with the public road network, implementing a Delivery Management System to control deliveries, construction staff would be directed to take the most direct route to the proposed works, car sharing would be encouraged and a specialised haulage service would be employed to facilitated movement of the transformer via AIL.

xxxv. Based on the outcome of the assessments, no significant adverse effects are anticipated at any of the assessed links. Traffic levels are expected to increase only minimally, and none of the links will experience increases substantial enough to result in significant impacts.

Air Quality and Emissions

xxxvi. An area of 10 km from the Bryncir works site has been considered with respect to published baseline information on existing air quality. Specific Study Areas were used to assess dust emissions generated during construction activities: dust emissions from construction activities include amenity or human health receptors in 250 m of the construction site and 50 m of the construction route; and ecological receptors in 50 m of the site or construction route, up to 250 m from the Bryncir works site entrance.

xxxvii. The Tyddyn y Felin, Afon Dwyfach, Rhwnddwyryd and Llystyn Isaf cWSs all partially fall in the Bryncir works site which would be sensitive to the impacts of dust settling either directly or indirectly through increased stresses on the plants. There are multiple residential receptors, a public house, three PRoWs (two in the Bryncir works site) and NCR 8 within 250 m of Bryncir works site.

xxxviii. The source of potential Air Quality an Emissions effects during the construction phase includes construction dust emissions and site plant emissions. Dust emissions are assessed using Institute of Air Quality Management guidelines. Earthworks, construction activities and trackout are all classed as having a large emission dust magnitude whilst demolition is classed as having a medium dust emission magnitude. The area surrounding the Bryncir works site is predominantly rural with several human health and nature conservation receptors. It is deemed to have low sensitivity to dust soiling, human health and nature conservation impacts. Overall, this results in Low risks of amenity impacts, health and ecological impacts occurring. The impact of operational emissions has been scoped out of this assessment.

xxxix. A series of mitigation measures recommended by the Institute of Air Quality Management would be adopted during construction. Regular site visits would be conducted to monitor compliance with the Construction Environmental Management Plan. Dust mitigation will be implemented on the Bryncir works site throughout the works, and the residual effects are anticipated to be negligible and not significant.

Noise and Vibration

xl. The Study Area has been defined as 300 m from the Bryncir works for construction noise site and 100 m for construction vibration. Baseline monitoring surveys were undertaken at three locations to establish the ambient noise levels. There are eight sensitive receptors in the Study Area which were all are defined as of medium sensitivity to noise.

xli. There are six key phases of construction works that may result in potential adverse noise and vibration effects including preliminary works, enabling works, underground cable installation, overhead line installation, landscaping works for reinstatement and demobilisation. It is predicted that the day-time construction noise levels would be highest during the enabling works and landscaping works for reinstatement. Noise levels from construction activities are all expected to result in negligible impacts on a

medium sensitivity receptors (not significant) with the exception of one receptor which has the potential to experience noise level of 66 dB LAeq,T (equivalent continuous sound level) during the landscaping works for reinstatement phase, representing a minor adverse and not significant impact. The highest levels of ground-borne vibration are likely to be generated from the use of vibratory rollers, surface plant such as cranes, compressors and generators may also cause some ground-borne vibration. No significant impacts are anticipated as a result of vibration.

xlii. For the operational noise assessment, a worst-case rating noise level of 24 dB LAr,Tr was predicted externally at sensitive receptors. This is approximately equivalent to the measure background sound level at night and is a very low level of noise that would not cause disturbance. Operational noise effects are not significant.

xliii. Measures to control noise as defined in Annex B of BS 5228-1 and measures to control vibration as defined in Section 8 of BS 5228-2 will be adopted where reasonably practicable. These measures will be implemented during the construction works and secured through the Construction Environmental Management Plan. The assessment does not identify any significant residual noise and vibration effects.

Socio-Economics

xliv. Various Study Areas were used for the Socio-Economics assessment: a 60-minute drive area (Principal Economic Impact Area) which applies to employment generation, skills and training and gross value added; a 30-minute and 60-minute drive area for temporary accommodation services; up to 500 m radius from the Bryncir works site for PRoW and agricultural land holdings, residential properties, business premises, visitor attractions and development land; and a 1 km radius from the Bryncir works site for community facilities.

xlv. The baseline outlines the population, economy and local resources in the various Study Areas. The Principal Economic Impact Area had a population of 315,251 in 2021, with 25.6% of the population aged over 65. Employment rates in the Principal Economic Impact Area has a smaller proportion of economically active individuals. Employment by industry is similar to Gwynedd and Wales, the largest industries include human health and social activities; wholesale and retail trade; and repair of motor vehicles and motorcycles. Gwynedd is relatively less deprived on average compared to Wales. Accommodation capacity in a 30-minute and 60-minute drive of the Bryncir works site is sufficient, although it varies seasonally. There are two PRoW in the Bryncir works site, one passes through the centre of the Bryncir works site and the second only marginally falls within the boundary. There are a further 10 PRoW within 500 m. There is one community facility within 1 km; two visitor attractions, four business premises and several residential properties within 500 m of the Bryncir works site. There are four landowners and one tenant in the Bryncir works site. There are no open space or development land in 500 m of the Bryncir works site.

xlvi. During construction, the proposed works will support, on average, 16 total net jobs per day. Of those, four jobs will be expected to be taken-up by residents in the Study Area. The Great Grid Partnership partners are committed to creating opportunities for training, education and apprenticeships to support the UL energy sector, therefore there will be a beneficial impact on the local workforce relating to training and skills uplift. The proposed works will generate approximately £1,280,000 to the national economy, of which approximately £320,000 would likely be in the Study Area. During peak workforce employment and typical seasonal occupancy levels, 100% of the construction workforce could be accommodated within a 30 and 60-minute drive time of the Bryncir works site. The Dolbenmaen No 18 footpath would be temporarily closed, requiring users to use

the B4411 and 487 as alternatives. Temporary land take would be required from the four landowners and the tenant farming the landholdings in the Bryncir works site. During operation, Dolbenmaen No 18 footpath would be diverted around the proposed Bryncir Substation which would increase the length of the PRoW by approximately 90 m. One landowner will be affected by permanent land take as acquisition of land is required for the proposed Bryncir Substation.

xlvii. No additional mitigation or enhancement measures are required, due to no significant adverse effects associated with Socio-Economics being identified. No likely significant residual effects of the proposed works on Socio-Economics receptors are found.

Climate Change

xlviii. The Study Area for the greenhouse gas (GHG) assessment includes direct greenhouse gas emissions (arising through works on the Bryncir works site) and indirect greenhouse gas emissions (occurring outside the Bryncir works site). The Climate Change Risk Assessment Study Area encompasses the temporary and completed works that make up the proposed works. The In-combination Climate Change Impact Assessment is determined by the other topic assessments.

xlix. The greenhouse gas (GHG) assessment uses the current condition of the Bryncir works site, which consists of the carbon stock and sources of greenhouse gas emissions as the baseline. Greenhouse gas emissions are reported in line with the life cycle stages (pre-construction, product, construction process and operation). It is estimated the 90% of all emissions from the proposed work will arise from the pre-product, product and construction process stages. Based on a qualitative assessment, the impact of greenhouse gas emissions associated with the proposed works is minor adverse and not significant. No additional mitigation is required.

l. The GHG assessment is consistent with the ruling of the UK Supreme Court in the case of Finch v Surrey County Council. That ruling requires that planning authorities take account of the indirect as well as the direct environmental effects of a proposed development. The qualitative GHG assessment for the proposed works includes all relevant direct and indirect environmental impacts.

li. The Climate Change Risk Assessment considers how resilient the proposed works and surrounding environment are to current and project climate hazards. The climate risks were assessed as moderate, unlikely, or rare. While the event is possible, its occurrence is infrequent, with some evidence suggesting a potential shift from business as usual. The likelihood of the event is estimated to be between 0% and 50%. The consequence of climate change impacts was identified as insignificant and minor in terms of their impact on the proposed works. Risks identified during the construction and operation phases are not significant and no specific mitigation measures are required.

lii. It is not anticipated there will be any In-combination Climate Change Impacts on the receptors in the surrounding environments, and this has been scoped out of the climate assessment.

Materials and Waste

liii. Assessment of Materials and Waste effects have been scoped out of this volume of the ES as the proposed works are not anticipated to have significant impacts on Materials and Waste.

In-Combination Effects

liv. In-combination effects occur where a single receptor is affected by more than one type of effect arising from different aspects of the proposed works. In-combination effects are not assessed in this Volume, an assessment of the potential in-combination effects is carried out at a Project level and is discussed in **Volume 7: The Project and Cumulative Effects**.

Cumulative Effects

lv. Cumulative effects occur when two or more planned developments have an effect on the same receptor leading to an increase in the effect, and possibly an effect of greater significance. A 2 km buffer from the Bryncir works site has been implemented to assess the cumulative effects.

lvi. There are no other developments within 2 km of the Bryncir works sire, however, a full assessment of the potential cumulative effects is carried out at a Project level and is discussed in **Volume 7: The Project and Cumulative Effects**.

1. Introduction

1.1 Introduction

1.1.1 Volume 3 (this document) forms part of the Environmental Statement (ES), which accompanies applications by National Grid Electricity Transmission plc (NGET) to construct and operate developments which comprise parts of the Pentir to Trawsfynydd Reinforcement Project (the 'Project').

1.1.2 This volume focuses on works at Bryncir. It provides an assessment of likely effects that could arise from the construction and operation (including maintenance) of this aspect of the Project. A description of the Bryncir works is provided in **Chapter 2: Bryncir Works**.

1.2 Previous Work

Bryncir Substation Planning Permission

1.2.1 Planning permission for the Bryncir Substation was originally granted in 2017 and had a life of five years. In 2022, planning permission was approved to extend the period for starting the work for a further five years, provided a start on site was made before 07 March 2028.

1.2.2 The Project requires an amended design for the proposed Bryncir Substation and a new planning permission is needed.

North Wales Connection

1.2.3 The North Wales Connection (NWC) project, which proposed replacement conductors on part of the existing overhead line, replacement of the Glaslyn Cables and a new 400/132 kV substation (Bryncir Substation) south of the existing Tower 4ZC067, was cancelled after planning permission was granted. Findings of this project have been referenced in this document where appropriate.

1.3 Structure of the Volume

1.3.1 This volume is structured as follows:

- **Chapter 1: Introduction.**
- **Chapter 2: Bryncir Works.**
- **Chapter 3: Assessment of Alternatives.**
- **Chapter 4: Landscape and Visual Amenity.**
- **Chapter 5: Ecology and Nature Conservation.**
- **Chapter 6: Historic Environment.**
- **Chapter 7: Geology, Hydrogeology, Land Use and Agriculture (Soils).**
- **Chapter 8: Water Quality, Resources and Flood Risk.**

- **Chapter 9: Traffic and Transport.**
- **Chapter 10: Air Quality and Emissions.**
- **Chapter 11: Noise and Vibration.**
- **Chapter 12: Socio-Economics.**
- **Chapter 13: Climate Change.**
- **Chapter 14: Materials and Waste.**
- **Chapter 15: In-combination Effects.**
- **Chapter 16: Cumulative Effects.**

1.4 Figures and Appendices

1.4.1 All figures noted in this volume are in an appendix attached to this volume. All other supporting documents are compiled in Volume 8: Appendices.

1.4.2 The figure numbering system is as follows: Volume number, chapter number then 1, 2, 3 etc. For example, Figure 3.1.1.

1.4.3 The appendix numbering system is as follows: Volume number, chapter number, then A, B, C etc. For example, **Appendix 3.1.A**. All figures associated with a given appendix will follow the same system, followed by the figure number, for example, a figure to Appendix 3.1.A would be Figure 3.1.A.1, 2, 3 etc.

2. Bryncir Works

2.1 Introduction

2.1.1 This chapter provides a description of the works required at the Bryncir section of the Project (the 'proposed works'), the location and the construction (including decommissioning of existing infrastructure) and operation (including maintenance) details.

2.2 Bryncir Location

2.2.1 The proposed works would be on a series of open fields on the eastern side of the existing 400 kV overhead line, approximately 1.4 kilometres (km) south of Bryncir and 1.4 km west of Garndolbenmaen, North West Wales, in the administrative boundary of Gwynedd Council. The location of the proposed works is illustrated on **Figure 3.2.1,** ('the Bryncir works site'). The approximate centre of the Bryncir works site is Grid Reference SH485430.

2.2.2 The Bryncir works site is on relatively flat ground with a slight slope to the west. The north-eastern extent of the Bryncir works site, near the A487, lies at approximately 103 m Above Ordnance Datum (AOD) and it drops to 95 m AOD towards its southern extent. Moving east the Bryncir works site elevation continues to drop to approximately 80 m AOD on the western side of the Afon Dwyfach. Moving north of this location, the elevation increases to approximately 87 m AOD.

2.2.3 The Bryncir works site is characterised by pastoral fields with an area of marshy grassland to the south-west. The Bryncir works site is surrounded by a mix of field boundary types, being predominantly dry stone wall and post and wire fences, but with overgrown hedgerows and scattered hedgerow trees along the southern boundary and along the north-eastern boundary. Managed hedgerows line the southern boundary of the A487 as it faces the proposed works site. The Bryncir works site is on land which the Agricultural Land Classification (ALC) data identifies as a mix of Grade 3b (moderate quality), Grade 4 (poor quality) and Grade 5 (very poor quality) (Ref 2.1).

2.2.4 The existing Pentir – Trawsfynydd 400 kV overhead line runs along the western edge of the Bryncir works site and the pylons are visible from many views in the vicinity of the site and from elevated areas, including from the Eryri (Snowdonia) National Park to the north-east. A Public Right of Way (PRoW) Footpath 18 Dolbenmaen, currently runs through the Bryncir works site and will need to be permanently diverted to facilitate the proposed Bryncir Substation.

2.2.5 An existing 132 kV overhead line owned by SP Energy Networks (SPEN) ('the DB connection route') runs north to south through the western extent of the Bryncir works site, west of the Afon Dwyfach (see **Figure 3.2.2**). The DB connection route is approximately 600 m west of the proposed Bryncir Substation. The DB connection route runs south – south-west from Tower 4ZC070. The DB connection route is fed from downleads from Tower 4ZC070, which drop to a steel support. The DB connection route

then runs for approximately 1.2 km before turning further west at another steel support and continuing. The DB connection route between the two steel towers is suspended from six wooden H-poles supporting three conductors in flat formation.

2.2.6 The Llystyn Isaf candidate Wildlife Site (cWS), Afon Dwyfach cWS, Tyddyn-y-Felin cWS and Rhwnddwyryd cWSall partially fall in the Bryncir works site, with several others in the wider area. There is purple moor grass and rush pasture, lowland heath and lowland dry acid grassland in the Bryncir works site.

2.2.7 The Bryncir works site will be accessed from the north via the A487, which runs in a broadly east-west orientation. The B4411 runs in a broadly north-south orientation approximately 400 m to the west of the Bryncir works site and a local road passes approximately 875 m to the east, connecting the A487 to the B4411.

2.2.8 The Bryncir works site intersects one Public Right of Way (PRoW): the Dolbenmaen No 18 footpath (Ref 2.2). A small part of a second PRoW, Dolbenmaen No 17 footpath, falls in the Bryncir works site at the north-eastern extent. National Cycle Route (NCR) 8 runs to the west of the Bryncir works site (Ref 2.3).

2.2.9 There are a number of isolated properties in the vicinity of the Bryncir works site; a small group is close to the junction of the B4411 and the A487, approximately 500 m north-west of the Bryncir works site.

2.3 Bryncir Works Description

2.3.1 The Bryncir works site shown on **Figure 3.2.2** covers an area approximately 20 hectares (ha). However, the permanent Bryncir Substation compound would occupy approximately 4 ha, with the substation covering approximately 1 ha.

2.3.2 The proposed works are summarised below:

- New 400 kV substation, including a permanent access road.
- New section of 132 kV underground cable.
- Two fibre-optic cables, one from Tower 4ZC068 via an underground route and one directly from replacement Tower 4ZC067, will provide reliable communication for the substation.
- Relocation of existing Tower 4ZC067 approximately 82 m north-west of its current position.
- Realignment of the DB connection route and decommissioning and removal of a redundant section.
- Permanent diversion of the Dolbenmaen No 18 footpath.
- New landowner access track.
- Installation of a small kiosk to provide low voltage electricity to the substation.

2.3.3 The proposed works are described in more detail below.

400 kV Substation Compound

2.3.4 A secure compound will be required to accommodate the single electrical transformer that would 'step down' the 400 kV voltage of the Pentir –Trawsfynydd circuit to a voltage of 132 kV, ready for connection to DB connection route.

2.3.5 The compound footprint dimensions are approximately 100 m x 150 m and it will be surfaced with stone chippings. Under normal operating conditions the substation will be remotely monitored (unmanned). Visual checks would be undertaken on a monthly inspection visit to the substation compound. Whilst external lighting will be installed at the substation for emergency work during hours of darkness, the substation will not normally be lit.

2.3.6 The principal components of the proposed Bryncir Substation are shown on **Figure 3.2.2** and the equipment to be installed at the proposed Bryncir Substation comprises:

- Super Grid Transformer (one x 400/132 kV) – required to change line voltage to a higher or lower level and regulate the voltage, housed in a noise enclosure.
- Ancillary Buildings – a small single storey amenities building approximately 38 m long and 5 m high, with a small single storey building housing the main control systems.
- Busbars and Air Insulated Switch Gear (AIS) (one x 400 kV and one x 132 kV) – busbars are similar in appearance to scaffolding poles and carry electrical power around the substation to various equipment.
- Earth Switches (six x 400 kV and three x 132 kV) – an earth switch enables safe maintenance of the substation equipment.
- Disconnectors (four x 400 kV and one x 132 kV) – a disconnector provides an electrical break between the circuits.
- Circuit Breakers (two x 400 kV and one x 132 kV) – a circuit breaker provides a high-speed method of isolating circuit components in the event of a fault on the transmission or distribution networks.
- Cable Sealing Ends (x three) – used where high voltage underground cable joins onto an overhead line or busbar.
- Current Transformers (x twelve) – converts system current to levels which can be safely measured by control and protection equipment. They are positioned so that no part of the network is left unmonitored by protection systems.
- Settlement Metering (x three) – provides a measurement of the power transferred from NGET (400 kV) to SPEN (132 kV) at Bryncir Substation.
- Diesel Generator – provides standby low voltage alternating current (LVAC) supplies in event of a power failure.
- Gantry – a structure, up to 10.5 m in height, which supports electrical conductors as they transition from an overhead line tower to busbars and equipment within a substation.
- LVAC Transformer – site electrical 230 voltage supplies.

- Surge Arresters (three x 400 kV and three x 132 kV) – a surge arrester provides a path to earth when triggered by an abnormal voltage condition (e.g. lightning strike) to protect key equipment.
- Voltage Transformers (three x 400 kV and three x 132 kV) – converts system voltage to levels which can be safely measured by control and protection.
- Water Tank – water source for firefighting.
- Oil Interceptor – separates water from contaminants such as oil, grease and sediment.
- Access Road – access to the Bryncir works site would be from the A487 using an upgraded existing access track located opposite Bryn-yr-efail-uchaf, before following field boundaries to the substation compound. The permanent access road would be approximately 410 m long with a maximum width of 6 m and would have a tarmacadam surface with crossing points to enable landowner access across the road.
- Security Fencing – 2.4 m high galvanised steel palisade fencing with an electric fence backing of 3.4 m height from ground level.

Drainage

2.3.7 Foul water generated from the new control building will be stored in a cess tank or similar which will be emptied via a tanker.

2.3.8 Surface water will drain via pipes and swales into an attenuation basin. The discharge from the attenuation basin will be to the existing ditch running south of the proposed Bryncir Substation location. The attenuation basin will be approximately 1.5 ha with a 3 m wide grass strip around the basin for access.

2.3.9 Rainwater from transformer bunds will be pumped into a Class 1 Full Retention Oil Separator, before entering the surface water network. Penstocks will be provided to allow discharge from the system to be shut off in emergencies or for sampling.

Landscape

2.3.10 The construction compounds will be reinstated to existing habitat.

2.3.11 The clawdd along the A487 will be reconstructed behind the visibility splay with native species hedgerow and stock proof fencing. The eastern side of the access road will consist of a combination of species-rich hedgerow, clawdd, willow trees and species-rich meadow. The western side of the access road will include a strip of species rich grassland with stock proof fencing.

2.3.12 An area adjacent to the western substation boundary will be returned to species rich meadow.

Fibre Optic Route

2.3.13 The fibre optic is required to ensure reliable communication for the substation. One cable will come off existing Tower 4ZC068 and be laid in a duct underground along field boundaries to the substation access road, where it will run in a duct to the substation.

2.3.14 Another Fibre optic will come off the replacement Tower 4ZC067 straight into the substation.

Tower 4ZC067

2.3.15 To provide a 400 kV supply to the proposed Bryncir Substation, the existing Tower 4ZC067 will be dismantled and a replacement tower constructed 'in line' approximately 82 m in a northly direction from its current position. The new tower will be of a similar design although taller at up to 58 m as compared to the existing tower at approximately 49.5 m. Downleads approximately 30 m long will be required from the new tower into a gantry within the proposed Bryncir Substation.

DB Connection Route

2.3.16 The DB connection route will connect the proposed Bryncir Substation using part underground cables and part overhead line. As the DB connection route leaves the proposed Bryncir Substation to the east, the first part would be underground cables crossing beneath the 400 kV double circuit Pentir to Trawsfynydd overhead line. The underground cables would then turn north passing through two fields before turning west to meet a terminal structure described below. The underground section would be approximately 600 m long. The 132 kV underground cables would be installed in trefoil formation.

2.3.17 A 250 m section of overhead line section of the DB connection route would cross the B4411 and Afon Dwyfach. The transfer mode between underground cables and overhead line would be a terminal structure approximately 125 m east of the B4411 close to a field boundary. This would require support guys to maintain appropriate support and tension as the overhead line heads west across the road. This cable termination structure would be as close as possible to the corner of the field. A further wood pole support would be required between the terminal structure and its connection point to the existing DB connection route because of the length of span (approximately 144 m). This pole support would be an H pole approximately 15 m high.

2.3.18 The redundant part of the DB connection route, approximately 625 m in length, between the new connection and Tower 4ZC070 would be removed. There would be two secondary access points off a single track lane to the east of the B4411 that would provide access to the DB connection route on the eastern side of the Adon Dwyfach.

Footpath Diversion

2.3.19 PRoW Dolbenmaen No 18 footpath currently runs through the Bryncir works site and will need to be permanently diverted to facilitate the proposed Bryncir Substation. The footpath will be diverted initially along the proposed substation access track, then across a field to cross a field boundary via new kissing gates. The diversion would then follow the field boundaries to the east of the proposed Bryncir Substation before turning east following a route adjacent to the southern boundary of the substation. The field boundary would be crossed via a new ate. The footpath would then join the existing alignment of the footpath south-west of the proposed Bryncir Substation. The footpath would not be surfaced. The diverted footpath will be approximately 95 m longer than the current route.

Landowner Track

2.3.20 To allow the landowner access across field boundaries south of the proposed Bryncir Substation, a hardcore track extending an existing track will be provided to the south-west of the proposed Bryncir Substation. The track will be approximately 180 m long.

Kiosk

2.3.21 To provide a low voltage electricity supply to the substation, a small kiosk will be positioned on the proposed access road outside the substation compound. A layby would be provided on the access road opposite the kiosk for operative parking. A cable would run from the kiosk into the substation.

2.4 Construction

General Construction Information

2.4.1 During installation, the appointed Contractor would be required to operate under a detailed site-specific Construction Environmental Management Plan (CEMP). It would implement the mitigation measures identified in this ES and the outline CEMP (**Volume 8, Appendix 3.2.A: Outline Construction Environmental Management Plan**). The CEMP would set out a variety of control measures for managing the potential environmental effects of the proposed works including control and management of noise, dust, surface water runoff, waste and pollution control and set out responsibilities for the preparation and implementation of the plan.

Construction Waste and Spoil

2.4.2 Subject to geotechnical testing, excavated materials will be re-used on site wherever possible. There will be no permanent or temporary soil bunds. An Earthworks Material Management Plan will identify volumes of topsoil and sub-soil, materials to be re-used, and material which will need either importing or exporting off site. Where waste materials are to be disposed of off-site this will be at licensed waste disposal facilities in accordance with a Site Waste Management Plan.

Site Lighting

2.4.3 During construction, general low-level lighting for access will be required at the temporary construction compounds and task lighting required as needed for the general works.

Installation Activities

Fibre Optic Route

2.4.4 The underground fibre optic cable will be laid in a duct via an open cut trench. The method of trenching will be via mechanical excavator to a depth of 1.5 m, with subsoil and topsoil stored separately and used during backfill to reinstate the surface as existing. The approximate length of cable route is 280 m along the field boundaries and 150 m down the substation access road.

Tower 4ZC067

2.4.5 To facilitate the construction of new Tower 4ZC67, a new 4 m wide stone temporary haul road will be built around the northern perimeter of the new Bryncir Substation. The stone road will terminate on a 40 m x 40 m stone pad which will provide a working area immediately to the east of the new tower and provide a stable base for a large construction crane.

2.4.6 Vegetation clearance will include strimming of grassland and is planned over the 2027/2028 winter period.

2.4.7 To ensure site security, Heras type fencing will be installed around working areas.

2.4.8 The new tower foundation will be constructed at the same time as the proposed Bryncir Substation, currently spring 2027. The construction of the tower foundation will take approximately five weeks.

2.4.9 The assembly and erection of the new Tower 4ZC067 will take place in 2028, and this will include the downleads into Bryncir Substation and the removal of the existing Tower 4ZC067. This will be followed by the removal of the original tower foundation down to 1.5 m below ground level and reinstatement of the same area back to farming use.

2.4.10 Construction equipment required includes lorry low-loaders, 32 tonne excavator, flat - bed lorries and welfare vehicles. For the tower erection and dismantling equipment required will include: a heavy duty mobile crane and 360 telehandler. The reconductoring of the overhead line sections on each side of the new tower will require the use of scaffolding, winches, working platforms and other specialised items of equipment associated with the overhead line industry.

DB Connection Route

2.4.11 The existing DB route will connect to the proposed Bryncir Substation using part underground cables and part overhead line (see **Figure 3.2.2)**.

2.4.12 The cables will be installed in trefoil formation and turn north passing through two fields before turning west to meet the terminal structure. Access would be via a temporary haul road or steel trackway running alongside the cable route. The cables would be laid via an open cut trench of approximate section 1 m x 1 m. The method of trenching will be via mechanical excavator with subsoil and topsoil stored separately and used during backfill to reinstate the surface as existing. The approximate length of cable route is 600 m.

2.4.13 An 132 kV overhead line approximately 250 m long would cross the B4411 and the Afon Dwyfach, requiring a full road closure of the B4411 over two consecutive weekends. The installation would require the placement of small trestles along the route requiring walking access into the cWS. The method of installing the overhead line involves taking materials to each support site, assembling the support structure on the ground, excavating a trench approximately 1 m deep, 1 m wide and 4 m long, lifting the support structure into the trench and compacting and backfilling.

2.4.14 Detailed arrangements for the temporary minor road closure will be developed and secured through the Construction Traffic Management Plan (CTMP), which will set out how impacts on the local highway network will be managed and mitigated. The CTMP will be agreed with the relevant highway authority prior to construction

2.4.15 A minimum of two excavators and a 4x4 pick-up truck would be required to visit each support site for construction. Temporary access will be required along the route, with access points from the perimeter of the substation and the B4411. Aluminium trackway or ‘bog mats’ would be used to avoid or minimise ground disturbance from vehicles tracking to the working areas and around them as appropriate.

2.4.16 The connection to the existing DB connection route will require a new steel support structure. This would require excavation of pits for foundations and filling with concrete and the stub foundation on which the support would be constructed from sections delivered to the Bryncir works site.

Removal of Redundant Section of the Existing DB Connection Route

2.4.17 The removal of the redundant part of the existing DB connection route would involve removing the conductors between the new connection and Tower 4ZC070 and removing fittings from the wood H poles.

2.4.18 The wood H poles may be removed by excavation. Wood poles will be removed entirely. Steel supports typically are dismantled with foundations removed entirely or to a depth of 1 m. The vehicles anticipated at each working area are the same as those described in paragraph 2.4.10 for construction with similar means of avoiding or minimising damage to the ground surface.

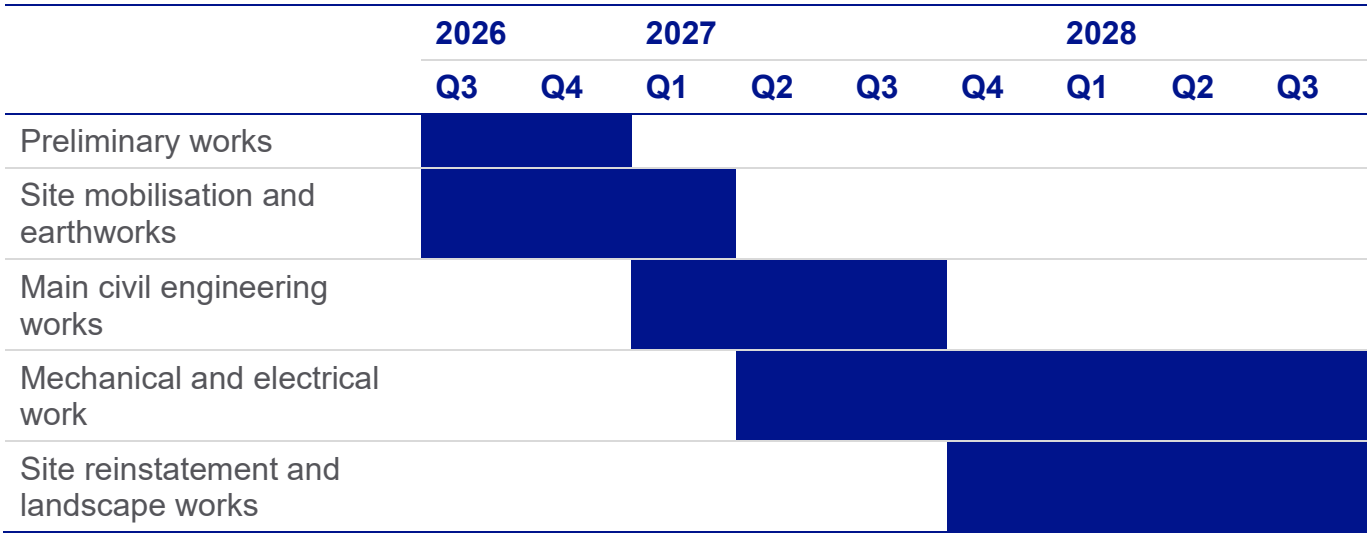
Dolbenmaen No 18 Footpath Diversion

2.4.19 During construction, the section of the Dolbenmaen No 18 footpath running through the Bryncir works site will be temporarily closed. Stiles and gates for the permanent footpath diversion would be installed during construction for proposed diverted footpath. The footpath including the diverted section will be reopened once operation commences.

Construction Programme

2.4.20 The proposed works are planned to be undertaken over a period of approximately 18 – 20 months from Q3 2026 to Q3 2028. Construction will occur in phases, which will include activities summarised below.

Table 2-1 – Construction Programme



- Preliminary works – further site investigation preconstruction surveys required to be undertaken in advance of construction. The existing consent requires an archaeological investigation to be undertaken which remains an anticipated requirement.
- Mobilising to site – this will include development of the site access, forming a temporary hardstanding just off A487. Short term temporary facilities including site offices, welfare, laydown and plant storage will be in place to enable the construction of the earthworks phase of activities. Liaison with Gwynedd Highways Authority will be required to agree the temporary closure of the Dolbenmaen No 18 footpath and Traffic Management requirements on A487.
- Vegetation Clearance and Earthworks – this will include: the diversion of services, de-vegetation and topsoil strip, landowner track construction, new bellmouth construction, access road construction, earthworks drainage, substation platform construction, hardstandings to main temporary site and laydown areas.
- Main civil engineering works – all reinforced concrete works (foundations, slabs etc), below ground earthing, drainage, ducts, troughs, permanent buildings (including services), boundary fence, internal roads, footpaths and car parking etc.
- Mechanical and electrical work – this will include all primary and secondary electrical plant and equipment and all Stage 1 and Stage 2 testing and commissioning.
- Site reinstatement and landscape works – this will include removal of site offices and temporary facilities, land reinstatement and landscape works.
- Fencing – temporary Heras fencing will be used for the substation and cable construction works.
- Lighting and CCTV – low level temporary external lighting will be in place to the site establishment compound and task lighting to specific activities during the works. Permanent external lighting is proposed, but only in use when the site is visited by NGET personnel i.e. hours of darkness.

- Noise – for general construction work the background noise level should not be exceeding 70 decibels (dB), or that greater from levels obtained from main A487 road. No exceedances in the 70 dB threshold are expected, see **Chapter 11: Noise and Vibration** for further details.

Construction Access

Site Access

2.4.21 Prior to the main construction works, access to the Bryncir works site will be required off the A487, in co-ordination with Gwynedd Highways Authority. Partial road closures at off-peak times are envisaged and would be agreed with Gwynedd Highways Authority as part of detailed design.

2.4.22 The Bryncir works site will be accessed from the north via a new access track from the A487. The design of which shall be suited for the passage of an abnormal (AIL) load i.e. super grid transformer. The access track will have crossing points to enable landowner access across the track.

Vehicle Movements

2.4.23 During construction a range of vehicles will be accessing the Bryncir works site. **Table 2-2** provides an indication of the number and type of vehicle movements at each phase of the proposed works.

Table 2-2 – Number and types of vehicles movements at each phase of the proposed works

Phase	Type	Frequency	Approximate duration
Preliminary works	4x4 vehicles, towed trailers, small ground survey plant	-	Two weeks
Site establishment and earthworks	Plant deliveries, heavy goods vehicles (HGV's)	-	Four months
Main civil engineering works	Plant deliveries, HGV's, concrete truck mixer	Up to 15 per day	10 months
Mechanical and electrical work	Plant deliveries, HGV's, AIL transformer delivery	Up to five per day	Eight months
Site reinstatement and landscape works	HGV's	Up to 15 per day	One month

Note – staff and visitor vehicles are not included in this table.

Construction Site Layout

2.4.24 Following pre-construction surveys, initial preparatory works would include earthworks activities including the construction of the access track, bell-mouth, substation platform, site compound and laydown areas.

2.4.25 Following detailed design, an Earthworks Material Management Plan would detail the volume of material that can be re-used (stockpiled on site), imported (clean stone etc) and exported off site.

2.4.26 Temporary fencing, comprising 2.4 m galvanised steel palisade, would be erected around the Bryncir works site and associated compounds early in the programme to secure the construction area and site security would be in place during non-working hours.

2.4.27 Foundations will be excavated at the substation site and supporting slabs for substation electrical equipment will be made. Ducts and troughs will be constructed to contain the electrical systems and an earth grid would be installed below the ground to create an 'earth mat' to make the compound electrically safe. Civil works will continue with the completion of roads, footpaths and buildings at the same time as the mechanical and electrical phase of the works starts with the installation of steel support structures and electrical equipment, including the delivery and installation of the super grid transformer.

2.4.28 Prior to the substation being brought into service, commissioning tests would be required to individual items of electrical plant (Stage 1 commissioning), culminating with testing the installed system as a whole. Following successful testing, the substation would be connected to the electricity transmission system.

2.4.29 The proposed works will require two compounds (**Figure 3.2.2**). The main compound will be immediately north to north-east of the proposed Bryncir Substation and will contain site offices and welfare facilities, storage and laydown areas and car parking. The secondary compound will be west of the main site entrance, immediately south of the A487 and will be used for the earthworks phase. Both compounds will be accessed via an access track from the A487.

2.4.30 The construction site will be securely fenced during the construction phase. During the construction phase there will be a requirement for temporary facilities including:

- Site offices including offices and meeting rooms.
- Staff welfare facilities including toilets, kitchen and mess room.
- Storage areas for construction vehicles, plant, equipment, materials and (where required) for storage of waste items to be removed.
- Appropriately bunded areas to be used for the storage of oils, other fuels and waste material, where required.

Staffing and Employment

2.4.31 The number of staff on the Bryncir works site would vary according to the construction phase and activities being undertaken; some activities may be run concurrently. It is anticipated that the following would be required for each phase of work:

- Preliminary works – two staff and four operatives.

- Site establishment and earthworks – four staff and 10 operatives.
- Main civil engineering works – eight staff and 24 operatives.
- Mechanical and electrical work – four staff and 10 operatives.
- Site reinstatement and landscape works – two staff and six operatives.

Hours of Working

2.4.32 Generally, construction activities will be undertaken during daytime periods only, from Monday to Friday 7.00 am – 7.00 pm (including an hour set up and hour shut down). No bank holiday or weekend working will be undertaken, unless agreed with the Local Planning Authority.

2.4.33 There may be some periods of extended or 24-hour working, for example oil filling of the transformer and installing the 132 kV overhead line over the B4411. However, this would be by agreement with the Local Planning Authority.

2.5 Operation

2.5.1 The substation would typically be unmanned. Maintenance of the substation would be undertaken approximately every three years, involving electrical isolation of equipment before any works are undertaken. Visual checks would be undertaken on a monthly inspection visit to the site. If the substation required refurbishment or replacement works, vehicles would be used to carry workers in and out of the site and suitable vehicles would be used to bring new materials and equipment to site and remove old equipment.

2.5.2 Permanent lighting will be installed but only used when the proposed Bryncir Substation is occupied.

2.5.3 The underground cables and overhead line will require maintenance and possibly replacement should a fault arise.

Electric and Magnetic Fields

2.5.4 All equipment that generates, distributes or uses electricity produces electric and magnetic fields (EMFs). An EMF report has been produced that sets out the technical specifications of the proposed works and how the proposed works would comply with EMF exposure guidelines. This report is in **Volume 8, Appendix 7.1.A: Electric and Magnetic Field Assessment.**

3. Assessment of Alternatives

3.1 Introduction

3.1.1 This chapter outlines the alternatives to the proposed works that have been considered by NGET.

3.2 Requirement for the Consideration of Alternatives

3.2.1 Part 5, 17 (3)(d) of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017 (the '2017 TCP EIA Regulations') (Ref 3.1) states that an ES should include;

"a description of the reasonable alternatives studied by the applicant or appellant, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the significant effects of the development on the environment." To accord with the 2017 TCP EIA Regulations (Ref 3.1), design alternatives considered for the proposed works are described below.

3.3 Design Alternatives

Bryncir Substation Siting Options

3.3.1 In 2012, NGET undertook a design and appraisal process which considered the development of the proposed Bryncir Substation. Twelve options were considered, however only three options (the Northern, Southern and Central options) were shortlisted. These three options were summarised in the Design and Access Statement for the original Bryncir Substation application (Ref 3.2).

3.3.2 The Northern Option would be north of Bryncir and access to the site would be from the A487. The substation would be parallel to the existing 400 kV line and the overhead line would connect from the eastern circuit with lines being brought down on to a gantry before entering the substation. The Southern Option substation site is 1.4 km south of Bryncir and 1.4 km west of Garndolbenmaen. Access to the site would be from the A487 utilising and upgrading an existing access point opposite Bryn-yr-efail-uchaf before following field boundaries to the 400 kV overhead line. The substation would be located parallel to the existing 400 kV line and the overhead line would connect from the eastern circuit with lines being brought down on to a gantry before entering the substation. The Central Option substation was to be sited to the west of Bryncir. Access to the site would be from the A487 crossing existing hardstanding and highway access points associated with the Bryncir Agricultural Market. The substation would be connected directed from the 400 kV line from a new pylon on to a gantry.

3.3.3 The Southern site was the favoured site from an ecological and cultural heritage perspective. This site was also preferred by the public during consultations held between 03 October – 21 December 2012 and by Natural Resources Wales (NRW). Although it was not favoured in terms of landscape and noise, it was concluded that

appropriate mitigation could be employed to enable this site to be an acceptable solution.

DB Connection Route Options

3.3.4 The section of the existing DB connection route between the connection to the new 132 kV supply and Tower 4ZC070 would be redundant and will be removed. This will require excavators and vehicles to run along the route to allow removal of 132 kV conductors, fittings and supports. This activity will be required for all options although the length of existing DB connection route to be removed would depend on the point of connection to the new 132 kV supply.

3.3.5 Two broad indicative routes were considered for the new 132 kV supply to the existing DB connection route. Route A would head approximately directly west from the proposed Bryncir Substation, crossing agricultural fields to the B4411 before crossing it and the Afon Dwyfach and continuing west to connect to the existing DB connection route 132 kV overhead line.

3.3.6 Route B would head approximately south-west from the proposed Bryncir Substation, crossing agricultural fields to the B4411 before turning west to cross it and the Afon Dwyfach and then continuing west to connect to the existing DB connection route 132 kV overhead line.

3.3.7 The indicative routes the lengths of options would depend on detailed routeing and design. The indicative Route A is approximately 550 m and indicative Route B is approximately 880 m. Although Route B is longer, it would avoid working in the Tyddyn-y-Felin cLWS habitat for the new 132 kV connection (assuming HDD would avoid any encroachment).

3.3.8 The use of open trenching of the 132 kV underground cables to cross the B4411 and the Afon Dwyfach was discounted because of disruption to the road, drainage and biodiversity interest of the river and land adjacent.

3.3.9 Three options were considered for both Route A and B:

- 132 kV underground cables with HDD used to cross the B4411 and Afon Dwyfach.
- 132 kV overhead line.
- Combining 132 kV underground cables and 132 kV overhead line.

3.3.10 **Table 3-1** summarises the options considered and the reasoning for the preferred option.

Table 3-1 – Connection options considered

Option	Description	Summary assessment
A1	The 132 kV underground cables beneath the 4ZC overhead line would continue as underground cables installed by open trenching to a point in the agricultural field east of the B4411. 132 kV underground cables would be installed beneath the B4411 and Afon Dwyfach by HDD and would come to the surface avoiding or minimising encroachment on Tyddyn-y-Felin cLWS habitat. The 132 kV	This option would avoid constraints on agricultural land and would minimise disturbance to Tyddyn-y-Felin cLWS habitat. However, it is not as cost-effective as A2 or A3.

Option	Description	Summary assessment
	underground cables would rise to a terminal structure from which conductors would connect to the existing DB connection route 132 kV overhead line.	
A2	The 132 kV underground cables beneath the 4ZC overhead line would rise to a terminal structure west of the 4ZC and continue west as an overhead line crossing the B4411 and the Afon Dwyfach and the cLWS land before turning south to connect to the existing DB connection route 132 kV overhead line.	This would be the most cost-effective option but would involve more supports on agricultural land than option A3 and possibly a support in the Tyddyn-y-Felin cLWS.
A3	The 132 kV underground cables beneath the 4ZC overhead line would continue north-west to a point close to the field boundary before rising to a terminal structure. The overhead line would run south-west with a support east of the B4411 and the road and the Afon Dwyfach would be crossed. A new steel gantry would be needed where the new section of line turns south to connect to the existing DB connection route 132 kV overhead line but this structure would not be in Tyddyn-y-Felin cLWS habitat.	This is preferred because it is cost-effective whilst having less effect on agricultural land and avoiding Tyddyn-y-Felin cLWS.
B1	The 132 kV underground cables beneath the 4ZC overhead line would continue south-west installed by open trenching to a point in the agricultural field south-west of the farmhouse and buildings and east of the B4411. 132 kV underground cables would be installed by HDD beneath the B4411 and Afon Dwyfach and would come to the surface avoiding cLWS habitat. The 132 kV underground cables would rise to a terminal structure from which conductors would connect to the existing DB connection route 132 kV overhead line.	This would be most likely to avoid adverse effects on the Tyddyn-y-Felin cLWS habitat but would be the least cost-effective of the options considered.
B2	The 132 kV underground cables beneath the 4ZC overhead line would rise to a terminal structure from which a new section of 132 kV overhead line would run a point in the agricultural field south-west of the farmhouse and buildings and east of the B4411. The 132 kV overhead line would continue across the B4411 and Afon Dwyfach and a new steel gantry would be needed where the new section of line turns south to connect to the existing DB	This would avoid adverse effects on the Tyddyn-y-Felin cLWS but would introduce more supports in agricultural land than A3 and would not be as cost-effective.

Option	Description	Summary assessment
	connection route 132 kV overhead line but this structure would not be in Tyddyn-y-Felin cLWS.	
B3	The 132 kV underground cables beneath the 4ZC overhead line would continue as underground cables installed by open trenching to a point in the agricultural field south-west of the farmhouse and buildings and east of the B4411. The underground cables would rise to a terminal structure from which a section of new 132 kV overhead line would cross the B4411 and the Afon Dwyfach. A new steel gantry would be needed where the new section of line turns south to connect to the existing DB connection route 132 kV overhead line but this structure would not be in Tyddyn-y-Felin cLWS.	This would avoid adverse effects on the Tyddyn-y-Felin cLWS and would introduce fewer supports on agricultural land than B2 but would not be as cost-effective as A3.