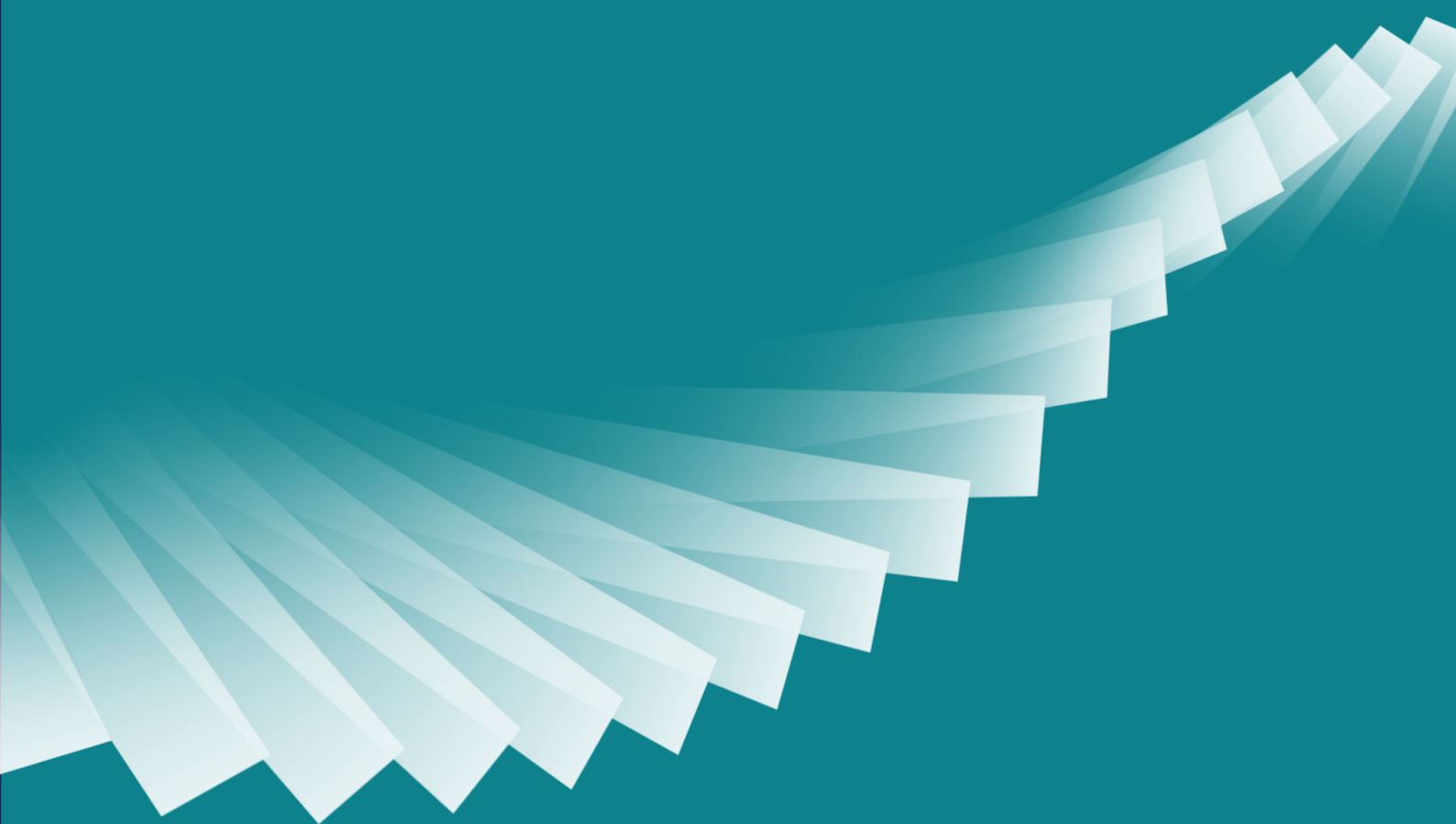




Bute Energy
Aberedw Energy Park

Environmental Statement

Chapter 3: Site Selection and Design Strategy



Chapter 3

Site Selection and Design Strategy

Introduction

3.1 This chapter provides details of the iterative approach that has been taken to designing the Proposed Development within the EIA process. It also outlines the site selection process undertaken by the Applicant in identifying the Site as a suitable location for an energy park. The chapter therefore considers the 'reasonable alternatives' that were considered by the Applicant in designing the Proposed Development, as required by the EIA Regulations.

3.2 Details of how and why the turbine layout and associated infrastructure have been modified during the iterative EIA / design process are provided in this chapter to explain how the Proposed Development described in **Chapter 4: Development Description** was designed.

3.3 At the time of EIA Scoping, the Proposed Development included an 18-turbine layout with a maximum tip height of up to 200 m. Following a series of design workshops and additional iterative design activities, the layout of the Proposed Development has been revised, but remains an 18-turbine layout with a maximum tip height of up to 200 m.

3.4 During the design process, it was determined that new areas outside the Site boundary considered at EIA Scoping should be used for some of the project components including the substation, cable routes, borrow pits and temporary construction compound. The reason for locating these components outside the Site boundary indicated at EIA Scoping was to reduce potential environmental effects and impacts to common land. In addition, the access route from the public highway was designed and confirmed. The access and the additional project components outlined above are now included in the Proposed Development, resulting in an amendment to the Site boundary from that indicated at EIA Scoping. The revised Site boundary has been evaluated for potential effects, with the principles set out in the Scoping Report and Scoping Direction applied to the additional land and receptors. The methodology of assessment

and the type of effects to be considered and (if necessary) reported in the EIA, remain appropriate and relevant for the Proposed Development.

3.5 This chapter should be read with reference to the **Design and Access Statement** and **Green Infrastructure Statement**, which are provided in support of the DNS application for the Proposed Development.

3.6 This chapter is supported by the following figures contained in **Volume 2**:

- **Figure 3.1: Open Access Land and Pre-Assessed Area for Wind Energy**
- **Figure 3.2: Turbine Layout Evolution**

The Site and Surrounding Area

3.7 The Site is located entirely within the local authority area of Powys County Council (PCC), in mid Wales, and is located approximately 3 km east of Builth Wells, 1.5 km north of Aberedw, and 1 km south of Hundred House. The Site covers an area of approximately 1,320 hectares (ha) and consists of largely of undulating upland, which is open moor common land, with small areas of scrub woodland within the lower elevations of the Site and a small number of access tracks. Areas of ancient woodland are located within and around the Site, with the majority being classed as ancient semi-natural woodland. These again are present at lower elevations within the Site. There are small discrete patches of peat at the margins of Cwmblaenerw Brook and British Geological Survey (BGS) mapped peat at the centre of the Site, however in all instances these are less than 30 cm in depth and therefore in accordance with the Soil Survey of England and Wales definition of peat, no peat is present on Site.

3.8 The Site is generally defined by Aberedw Hill, with a high terrain (451 m AOD) with steep escarpments and valleys on all sides. The River Wye Valley is located to the west of the Site. The Site is located between the A481 (to the north of the Site) and the B4567 (to the west of the Site, adjacent to the River Wye).

3.9 The River Wye (Upper Wye) Site of Special Scientific Interest (SSSI) and the River Wye Special Area of Conservation (SAC) are located approximately 50 m west of the Site at their closest point to the Site and approximately 750 m to the nearest proposed infrastructure. The River Wye (Tributaries) SSSI is located 230 m east of the Site at its closest point. This flows into

the River Wye (Upper Wye) SSSI. Various watercourses within the Site drain into the River Wye SAC. The River Wye SAC and both SSSIs are designated for the presence of Annex I habitats (watercourses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation) and Annex II species; including White-clawed crayfish, Fish and Otters. The Upper Wye SSSI is also designated for the presence of Daubenton and Lesser Horseshoe Bats. Additionally, the Llandeilo, Rhulen and Llanbedr Hills SSSI is located approximately 1.5 km south of the Site. This is designated for ecological purposes mainly due to the presence of a range of moorland vegetation but also is an area of high ornithological interest.

3.10 Bannau Brycheiniog National Park (BBNP) is located approximately 15 km south-east of the Site. The Shropshire Hills National Landscape is approximately 26 km to the north-east of the Site. The Middle Wye Valley Registered Historic Landscape (RHL) is located approximately 10.5 km south-east of the Site, the Middle Usk Valley: Brecon and Llangorse RHL is located approximately 17 km south of the Site and the Elan Valley RHL is approximately 17 km north-west of the Site. There are no Nationally Designated Landscapes, Registered Historic Landscapes, or Local Landscape Designations within the Site.

3.11 Scheduled Monuments are present within the Site itself and within 5 km. These include but are not limited to Colwyn Castle, a medieval castle located to the north of the Site, which was built over the remains of a Roman Fort, and the Aberedw Hill Deserted Rural Settlement, located within the Site, which is from the medieval/post-medieval period. Around the vicinity of the Site there are isolated Grade II Listed Buildings (the majority are located to the north, south and west of the Site).

3.12 The majority of the Site lies on an area of Open Access Registered Common Land (Aberedw Hill), providing public access and over which there are registered rights of common. In addition, there are several Public Rights of Way (PRoWs) that cross the Site and an unsurfaced unclassified road (UUCR). These PRoW and UUCR provide recreational opportunities across the Site in addition to the common land access rights. Many of the PRoWs and the UUCR connect the Site to the surrounding area, this is shown on **Figure 3.1**. There are no long-distance, National Trails or National Cycle Network (NCN) routes within the Site. The closest Long-Distance Trail (the Wye Valley Walk) is approximately 1 km west of the Site.

Site Selection and Feasibility

3.13 The Applicant's process and approach to selecting and approving sites for renewable energy development involves ensuring early assessment of potential capacity for energy generation in balance with environmental and technical constraints, relevant policy and project deliverability in line with the urgency of reaching 2030 and 2035 renewable energy and 2050 net zero targets for Wales, as well as the UK Government's Clean Power by 2030 target. Early selection of the Site for wind energy was primarily driven by the following criteria:

- A desk-based assessment to identify land suitable for development using Geographical Information System (GIS) by mapping technical and environmental constraints. These constraints included but were not limited to:
 - Nationally designated landscapes such as National Parks and National Landscapes;
 - Cultural heritage designations such as World Heritage Sites, Scheduled Monuments, Listed Buildings, Conservation Areas and Registered Battlefields;
 - Application of the mitigation hierarchy, seeking firstly to avoid effects on ecological designations such as SSSI, Special Protection Areas (SPA), SAC, Historic Gardens, Ancient Woodland, Peatland and Local Nature Reserves (LNR);
 - Terrain was reviewed to ensure that gradients supported the placement of a wind turbine and laydown areas;
 - Wind resource of the area was considered using publicly available wind data sources to assess wind speed and commercial viability;
 - Proximity to nearby residential properties; and,
 - Aviation constraints including licenced aerodromes and visibility to military and civilian RADARs.
- Alignment with planning and renewable energy policy that forms part of the Development Plan. This included avoiding areas designated as unsuitable for large-scale wind energy development such as National Parks and National Landscapes.
- Access to the Site from the Port of Entry of turbine components to each of the turbine locations.

- Ground conditions for building of turbine foundations, access track and cable installation.
- Ability for extant land use to be maintained as much as possible alongside the simultaneous operation of wind turbines, such as upland grazing land.

3.14 The Proposed Development will connect to the national electricity network. Aberedw Energy Park Ltd holds a grid connection agreement with Green GEN Cymru (GGC), an Independent Distribution Network Operator (IDNO), for capacity on their proposed Green GEN Towy Usk project¹. The connection point to GGC's network will be located at the Proposed Development's substation. It is important to note that this grid connection infrastructure does not form part of the Proposed Development and will be addressed through a separate planning application.

Site characteristics

3.15 Key characteristics of the Site that make it suitable for an energy park comprising wind turbines include the following:

- The Site has an excellent wind resource.
- There are no significant environmental constraints or effects.
- The Site is available for wind energy development: the requisite land agreements are in place and there are no other conflicting land uses on the Site.
- There are no planning policies which, in principle, preclude wind energy development at the Site.
- The Site has suitable ground conditions for turbine foundations, access tracks and other infrastructure.
- The Site is accessible for construction traffic and turbine deliveries from the trunk road network.
- A grid connection has been agreed which will enable export of the electricity generated.

¹ Green Gen Towy-Usk: <https://www.greengentowyusk.com/index.php?contentid=27>

The Design Strategy

3.16 The design strategy for the Proposed Development has aimed to provide the best balance between energy yield and minimising effects on the local and wider environment. It has sought to create a layout that relates sympathetically to the landform and scale of the Site and surrounding area, and that is well-composed from key views.

3.17 Energy yield is an important consideration for wind farm design in environmental terms, because the chief environmental benefit of the development – mitigation of climate change via low carbon, renewable energy generation – can only be maximised by realising the energy generation potential of the Site to the greatest feasible extent while taking all other design considerations into account. Where a site is generally suitable for development, it is therefore important to avoid, to the extent commensurate with other constraints and effects, the ‘opportunity cost’ of failing to deliver the site’s fullest renewable energy generation potential.

3.18 Planning Policy Wales (PPW)¹² makes detailed reference to the step wise approach as the means of demonstrating the steps which have been taken towards securing a net benefit for biodiversity. This includes addressing all the attributes identified under the diversity, extent, condition, connectivity and adaptability (DECCA) framework. Whilst PPW¹² came into effect after the Site had been selected, the design process has followed the mitigation hierarchy approach and therefore it is considered that the approach to the site selection and design of the Proposed Development has included application of the step wise approach.

3.19 Further information on how the design of the Proposed Development has complied with the step wise approach is provided in the **Green Infrastructure Statement** which has been submitted to accompany the DNS application.

3.20 While balancing the need to maximise the energy generation potential of the Site, the following environmental objectives were considered:

- To use the latest wind turbine technology, consisting of more efficient and larger turbines whilst demonstrating the Proposed Development will not result in unacceptable adverse effects, as described in Policy 18 of Future Wales: The National Plan 2040 (2021).
- To ensure that turbines respond to the scale of the underlying landscape and operational, consented and proposed turbines in the surrounding context.

- To develop a turbine layout that minimises adverse effects upon historic assets and their settings, including scheduled monuments, listed buildings and non-designated but locally important historic assets.
- To develop a layout that avoids isolated outlying turbines and minimises stacking (as far as onsite constraints allow) and achieves a well-composed design overall.
- To explore and identify an aviation lighting scheme, which both satisfies the requirements of aviation policy and minimises the visual effects of such lighting as far as possible.
- Limiting noise at nearby properties to acceptable levels in accordance with established guidance.
- Minimising interactions with ecologically sensitive habitats to the greatest feasible extent: in particular, 'Section 7' habitats and Groundwater Dependent Terrestrial Ecosystems (GWDTEs).
- Protecting the Site's hydrological regime, and the Site's surroundings, with particular focus on the site setting, within the catchment of the River Wye/Afon Gwy SAC.
- Taking account for the potential for effects on all bird species of conservation concern at and around the Site.
- Taking account of the potential for effects upon bats.
- Taking account of historic assets and their settings, including Scheduled Monuments, listed buildings and non-designated but locally important historic assets.
- To make use of existing access tracks as far as possible, minimising the necessity for new excavations.
- To keep overall new track length to a minimum, reducing stone requirements and associated potential environmental effects.
- To build health and safety aspects into track design from as early a stage as possible, including avoiding slopes that are too steep for turbine deliveries, access and creating clear definitions between turbine working areas and access tracks.
- Avoiding fixed telecoms links where possible.

- To explore opportunities within and in the vicinity of the Site to restore and enhance biodiversity, ultimately securing net benefits for biodiversity.
- Limiting infrastructure on common land and minimising land take overall as far as possible across the Site.
- Minimising effects on the existing access and recreation opportunities provided by the PRoW and UUCR within the Site.
- Exploring opportunities within the Site to provide greater access and recreational opportunities.
- To develop a layout that fulfils the above objectives whilst minimising or avoiding other environmental, social and technical constraints as far as possible.

Project Design Evolution and Alternatives

3.21 The design strategy and objectives outlined above have been taken into account as the design of the Proposed Development has evolved. This design process involved multiple workshops with technical team members to address potential constraints associated with one or more of the turbines or elements of the associated infrastructure. Feedback from the relevant technical stakeholders as appropriate to the design process and comments received through consultation were given due regard during the evolution of the project design.

3.22 The infrastructure required was designed and arranged in such a way as to avoid the identified onsite constraints to the greatest feasible extent. The design process for infrastructure continued post-Scoping and has evolved as part of the iterative EIA process, and in accordance with changes to turbine locations. Project components including the locations of crane hardstandings, borrow pits, the substation, cable routes, tracks and temporary construction compounds were assessed for their potential effects and compliance with the above objectives throughout this process.

3.23 Several layout iterations were identified and appraised before the turbine layout was finalised (See **Figure 3.2**). These are described in four 'key groups' below.

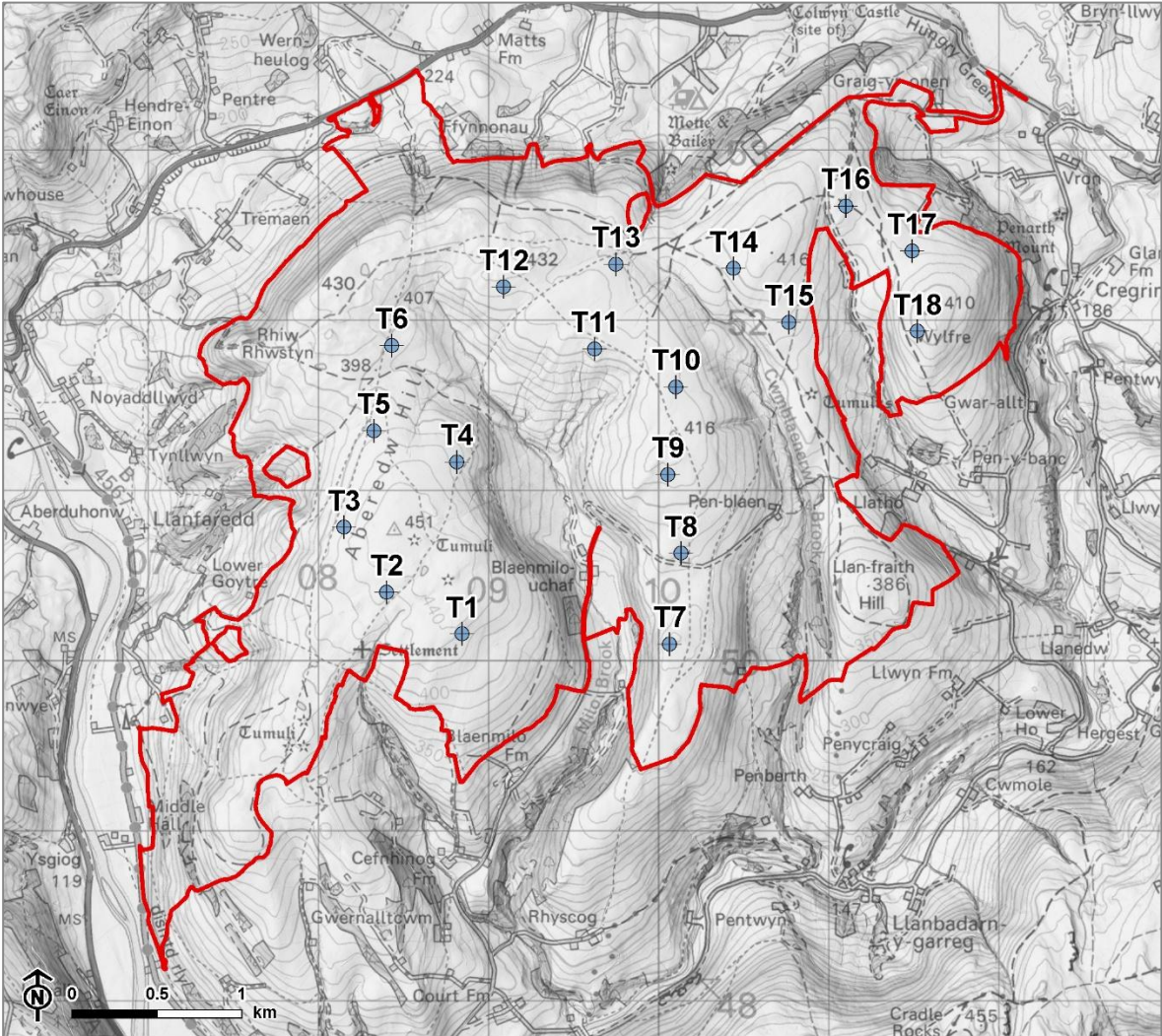
Layout 1: Scoping

3.24 A range of technical and environmental studies were commissioned by the Applicant to inform the identification of potential constraints and opportunities for development of an energy park at the Site. These studies / surveys included:

- Extended Phase 1 habitat and National Vegetation Classification (NVC) survey, bat activity surveys and great crested newts (GCN) (eDNA);
- A full 24 months of ornithology surveys;
- A desk-based noise contour map;
- An initial abnormal load survey and access review;
- A heritage desk-based assessment;
- An initial aviation risk assessment; and
- A desktop landscape and visual impact review.

3.25 The resultant layout (Layout 1) for the Proposed Development comprised 18 turbines with a maximum blade tip height of 200 m. This layout was included in the Scoping Report (see **Inset 3.1**).

Inset 3.1: Scoping Layout



- Application boundary
- Turbine

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3.26 Layout 1 was intended as a scenario which would allow a maximum potential EIA scope to be defined and for consultee comments to be received on the maximum potential effects from a wind farm development at the Site. This layout was based largely on technical and operational efficiency criteria (wind yield) but also considered other known high-level constraints, including those relating to landscape and visual, ecology, ornithology, noise and historic environment.

Layout 2

3.27 This stage of the design took place following the submission of the Scoping Report and non-statutory public consultation in 2023. A full project team design workshop was held in February 2024, which refined the initial Scoping layout (Layout 1) using a combination of desk-based data and data collected from on-going field surveys. This workshop focused on the turbines and provided initial recommendations for access tracks. The following constraints were considered against Layout 1 to achieve Layout 2 (see **Inset 3.2**):

■ Landscape and Visual

- Where possible, increasing distance of turbines from the steeper slopes within the Site, including the slope to the north-east of the Site.
- Where possible, avoiding lone turbines or stacking of turbines.
- Where possible, provide opportunity for visual screening within the landscape.

■ Residential Visual Amenity

- Limiting proximity to the majority of residential properties located within 1 km of the Site and seeking to avoid turbines appearing overly prominent or giving rise to potentially ‘overbearing’ effects on residential visual amenity, resulted in some turbines being moved.

■ Ecology

- Consideration of proximity to ponds identified as having potential for GCN.
- Minimising interactions with ecologically sensitive habitats to the greatest feasible extent: in particular, ‘Section 7’ habitats, in accordance with ‘Step 2 Minimise’ of the step wise approach set out in PPW12.

■ Ornithology

- Buffers were applied due to the presence of breeding Schedule 1 species located within the Site, including a 300 m buffer for red kite and a 500 m buffer for goshawk.

■ Water Resources

- A 50 m separation distance between turbines and watercourses/waterbodies as a watercourse pollution prevention measure or consideration of specific mitigation techniques to avoid impacts to watercourses within the 50 m buffer.

■ Historic Environment

- Avoidance of direct impacts to Scheduled Monuments plus a 50 m buffer.
- Avoidance of non-designated historic assets as indicated in the relevant Historic Environment Records (HER).
- Maintaining sight lines between Scheduled Monuments, where possible.

■ Noise

- Consideration of a 40 decibel (dB) noise limit at residential properties and consideration of their financial involvement.

■ Site Topography

- Where possible, increasing distance of turbines from the steeper slopes within the Site, including the slope edge along the western boundary of the Site, to minimise the need for cut and fill and complex engineering solutions for turbine foundations.
- Consideration of where tracks may be more complex to construct due to site topography.

■ Common Land

- Consideration of the common land boundaries and the potential to reduce land take.

■ Energy Yield

- To achieve separation distances between turbines that will allow optimal performance for each of them as far as possible (including the mitigation of wake effects).

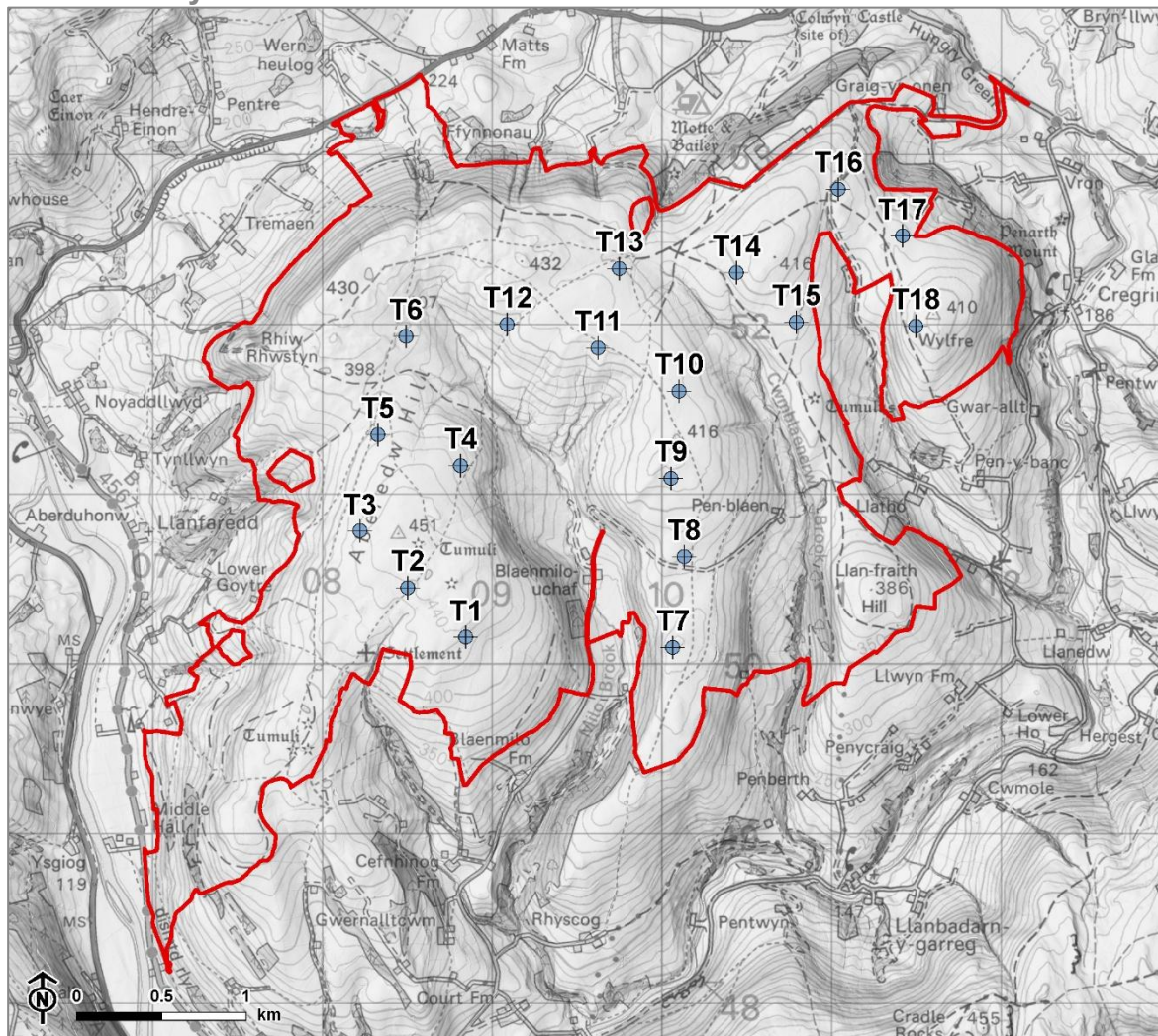
Summary of Changes made to previous Layout and Outcome

3.28 No changes were made to T1, T4, T5, T7, T8, T9, T10, T13 and T14, as no issues were raised by the technical specialists or any comments made during the non-statutory consultation.

3.29 Additional amendments to the Scoping layout (Layout 1) to create Layout 2 included the following:

- T2 moved 110 m north-east away from the edge of a plateau on the western flanks of Aberedw Hill from a landscape and visual perspective. This aimed to address concerns raised by non-statutory consultees regarding views from the surrounding area. The track from T2 to T3 also moved further north-east to accommodate this turbine relocation.
- T3 moved 70 m east, away from the break of edge of the slope on the western flanks of Aberedw Hill from a landscape and visual perspective. This aimed to address concerns raised by non-statutory consultees regarding views from the surrounding area. The Track at T3 also moved further east.
- T6 moved 50 m east outside of the Section 7 Upland Heathland Priority Habitat. The track from T5 to T6 also moved east away from the Priority Habitat.
- T11 moved 30 m north, 16 m outside of a watercourse buffer.
- T12 moved 195 m south, to increase the distance of this turbine from a residential property. This aimed to address concerns raised during the non-statutory consultation regarding impacts on views from the surrounding area.
- T15 moved 38 m north-east, along with the access track.
- T16 moved 140 m north-west. The access track between T14 and T16 was reoriented to reduce impingement on the watercourse buffer and GCN pond to the south.
- T17 moved 135 m north-west from Penarth, off common land.
- T18 moved 60 m north behind the hill to the east.

Inset 3.2: Layout 2

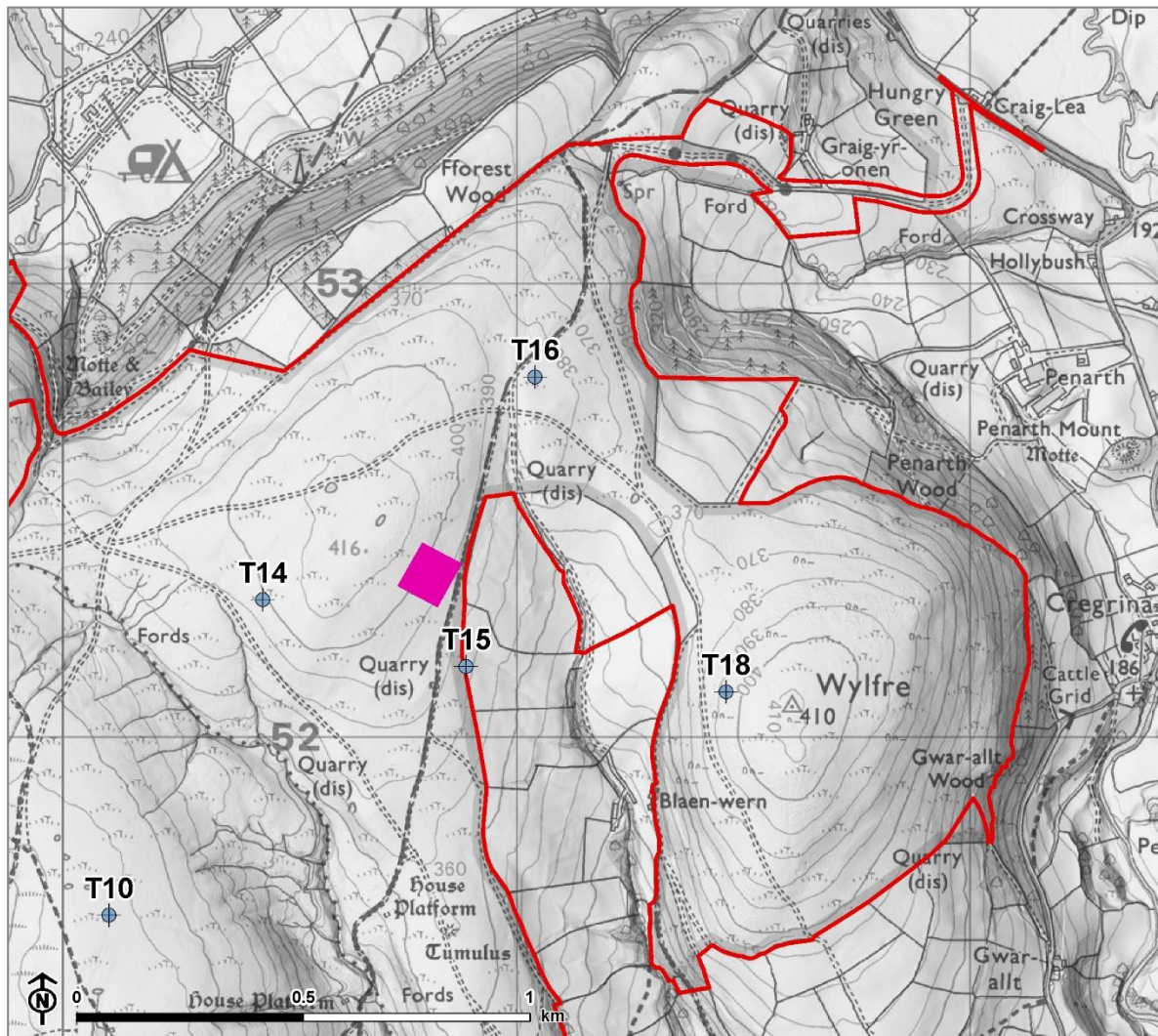


- Application boundary
- ⊕ Turbine

Alternatives Considered

3.30 A further layout involving the removal of T17 was considered at this stage (see **Inset 3.3**). The movements of T15 approximately 210 m north-east, and T18 approximately 175 m south were also considered to reduce the number of turbines within common land. However, this layout was not progressed due to the potential impact on the Cwmblaenern Enclosed Long Hut Scheduled Monument.

Inset 3.3: Removal of T17 and Movement of T15 and T18



- Application boundary
- ⬮ Turbine
- Cwmblaenern Enclosed Long Hut Scheduled Monument

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Layout 3

3.31 A further design workshop was held in April 2024 to review Layout 2. This workshop identified that further field surveys and analysis were required prior to the turbine layout being finalised. This included ecology, historic environment surveys and noise monitoring. All relevant surveys and assessments were completed in April and May 2024 as follows:

- Historic Environment

- A site visit was undertaken to visit the proposed turbine locations to understand the potential impact of these on the Scheduled Monuments within the Site.

- Protected Species

- A GCN survey was carried out to determine whether ponds within the Site are suitable for GCN.

- NVC surveys

- An NVC walkover was carried out to confirm the condition of the Site as per the previous NVC carried out by ITP Energised in 2020.

- Noise

- Noise surveys were carried from mid-April 2024. This involved installing noise monitoring equipment at noise-sensitive residential locations within the vicinity of the Site to monitor current background noise levels.

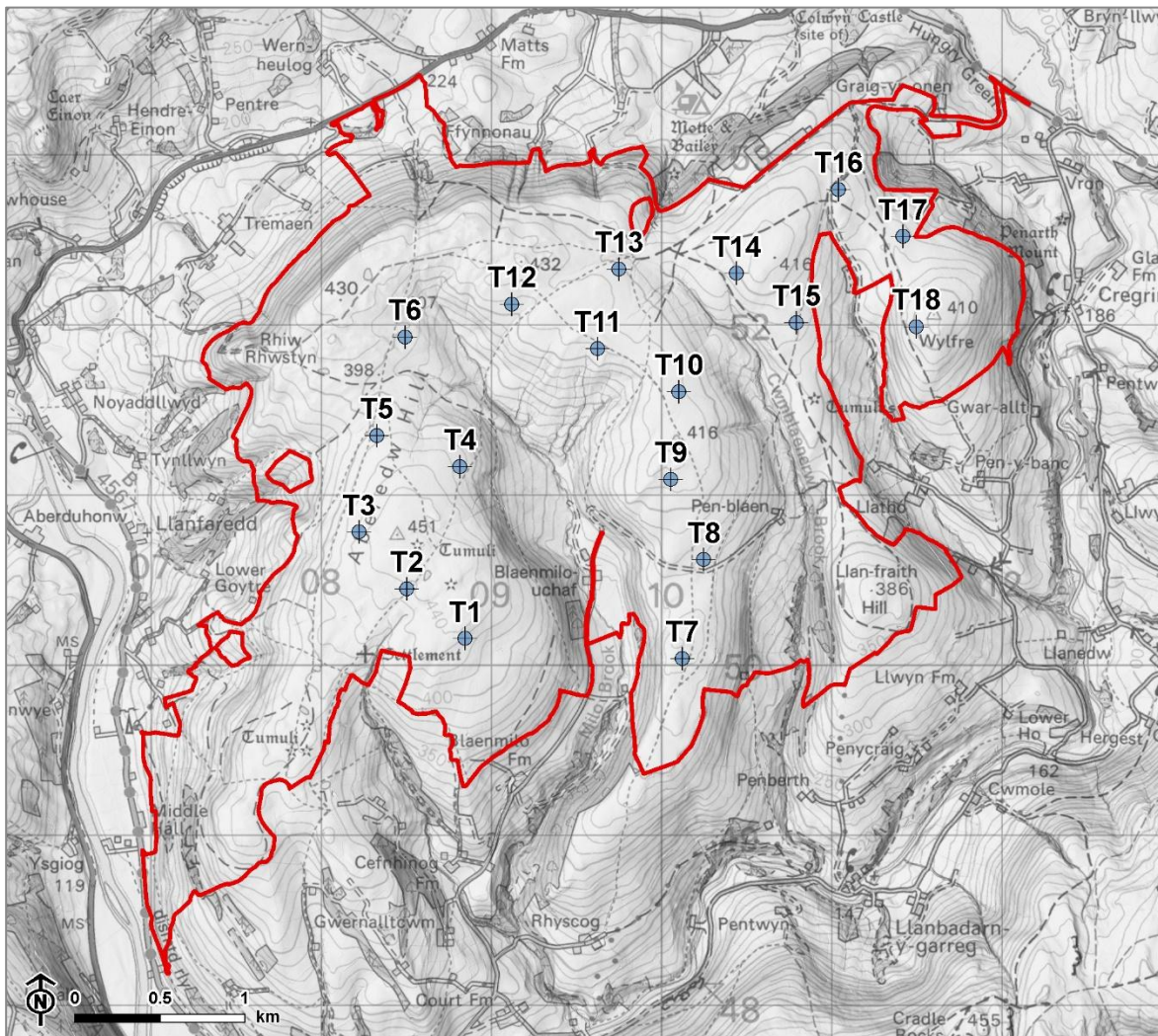
3.32 Following the completion of the above surveys and assessments, a further design workshop was held in June 2024 to discuss how the layout should be amended. Layout 3 is shown in **Inset 3.4**.

Summary of changes to the previous layout and outcome

- No changes were made to T1, T2, T3, T4, T5, T9, T10, T11, T16, T17 and T18.
- T6 moved 80 m north to avoid the hardstanding being constructed over a pond.
- T7 was moved 80 m south-east to increase the distance from a residential property.
- T8 was moved 120 m east to increase the distance from a residential property.

- The access track linking T16 with T13 and T14 was adjusted to remove any intersection with a watercourse buffer and to increase the distance between any tracks and a pond with known GCN presence, following GCN surveys carried out in April 2023.
- T12 was moved 120 m north to avoid being positioned on a minor watercourse and steep slope.
- T15 and its hardstanding moved 40 m north-west.
- The T17 hardstanding was reorientated clockwise and the track connecting to T16 was realigned to avoid a potential GCN pond.
- The track between T11 and T10 was realigned to avoid a pond.
- The track between T4 and T1 was moved 30 m south-west to avoid impacting a pond.
- The track between T5 and T6 has been moved up to 120 m west to avoid impacting a pond.

Inset 3.4: Layout 3



- Application boundary
- + Turbine

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Layout 4

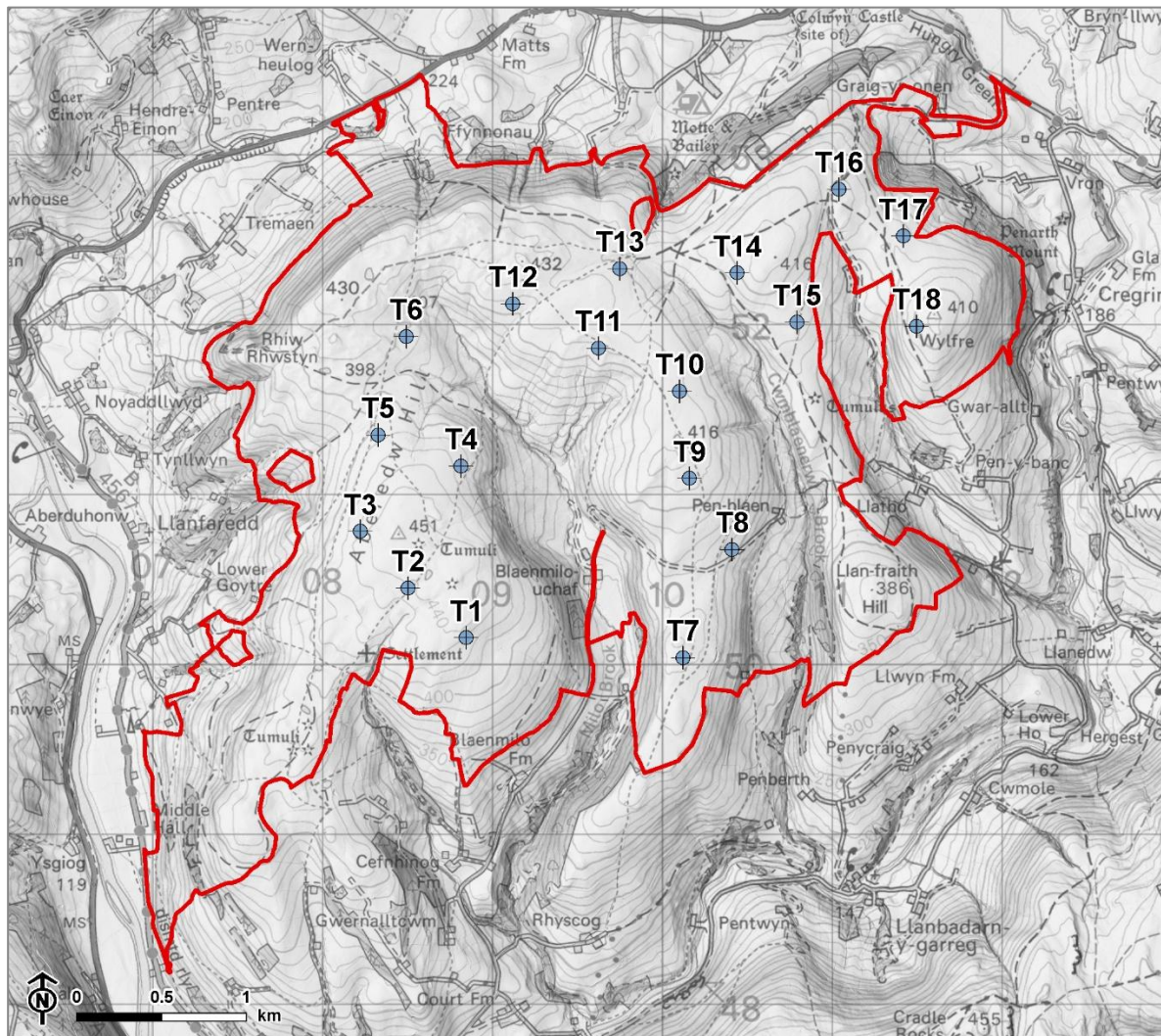
3.33 A meeting was held in December 2024 to discuss the deregistering of common land within the Site and the subsequent replacement land required. Based on Layout 3, a significant amount of common land would be impacted and subsequently more replacement land required. In order to minimise impacts on the common, the design team tested moving T7 and T8 off the common and adjusting the tracks between T1 and T2 and their hardstandings.

3.34 A subsequent meeting was held in January 2025, where it was decided that, due to the amount of earthworks required, T7 should remain in its previous position but the track and hardstanding should be reorientated. T8 however was moved 178 m north-east off the common. T9 was also moved 105 m east to allow for a straighter track between T10 and T9.

3.35 A final design meeting was held in February 2025 to confirm the final turbine proposals and review the infrastructure layout in order to reduce the common land requirement. Whilst the X and Y co-ordinates of the turbines remained the same, all turbine platforms were revised to reduce the amount of earthworks required, the most significant of which was T17, which was raised by 5 m. This resulted in changes to the elevation of all turbines, which has been accounted for within the Zone of Theoretical Visibility (ZTV) mapping (see **Figures 5.3a-5.5b**).

3.36 The final turbine layout is shown in **Inset 3.5** below.

Inset 3.5: Final Turbine Layout



- Application boundary
- Turbine

Summary of changes to the previous layout and outcome

- No changes were made to T2, T3, T4, T5, T6, T7, T10, T11, T16, T17 and T18.
- T8 was moved 170 m east, off common land.
- The tracks between T7 and T8 was realigned to reflect the new position of T8.
- The orientation of the tracks between T1 and T2 were revised to reduce the amount of earthworks.
- T9 was moved 105 m east and its hardstanding reorientated northwards.
- The track between T8 and T9 was realigned to reflect the new position of both T8 and T9.
- The T10 hardstanding was orientated southwards in order to reduce the track length to T9, whilst still avoiding ponds located to the north.
- The T11 hardstandings was straightened to align with T10 and rotated north-west. The track between T11 and T10 was also realigned to avoid a watercourse buffer and priority habitat.
- The turbine elevations all increased (but no change in X and Y co-ordinates) to reduce the amount of cut and fill required for the turbine hardstandings, thereby reducing the land take required.
- The Site boundary was updated to incorporate the final Site infrastructure (see **Section 3.7** below).

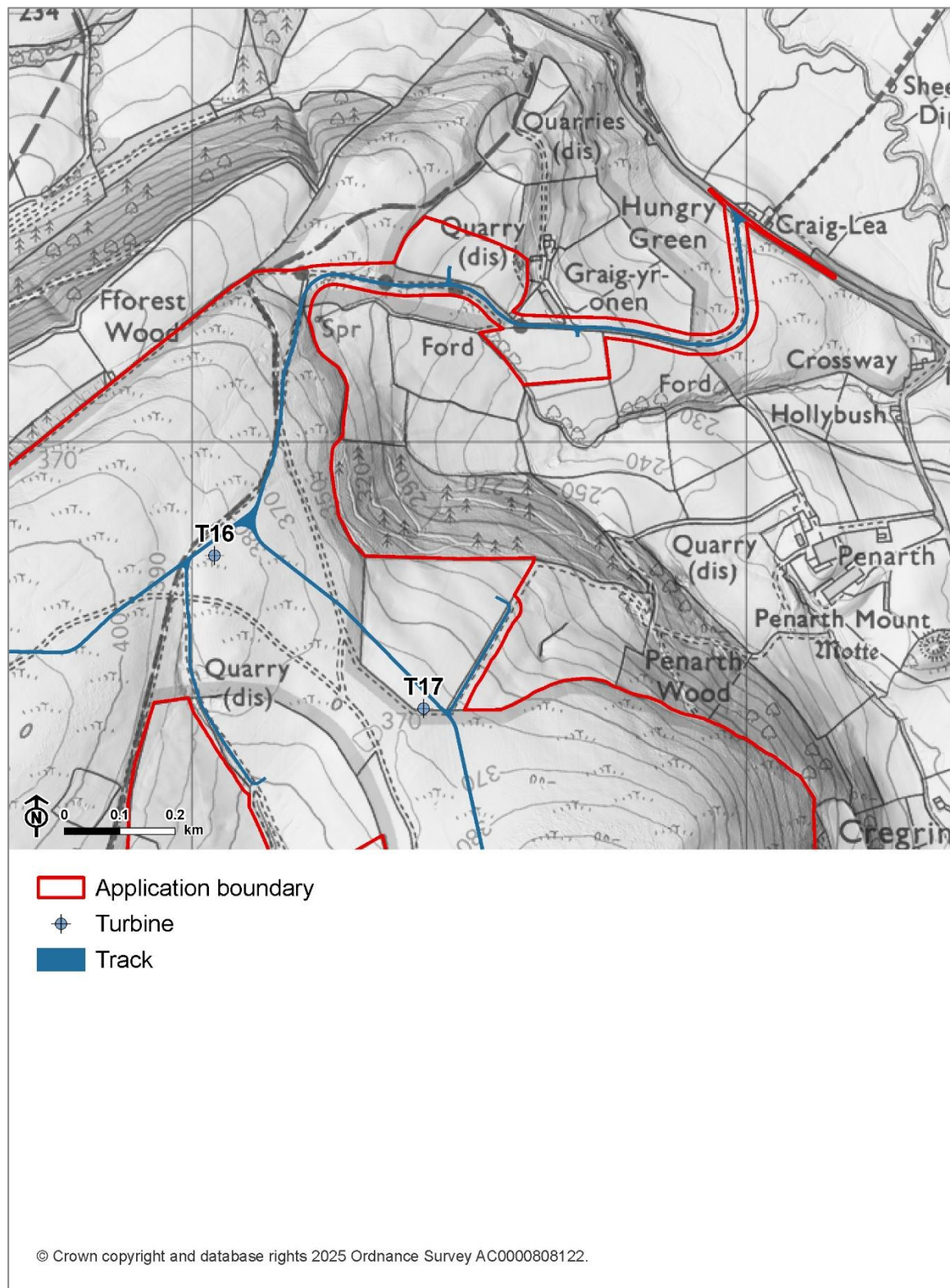
Infrastructure Site Selection

Site Access

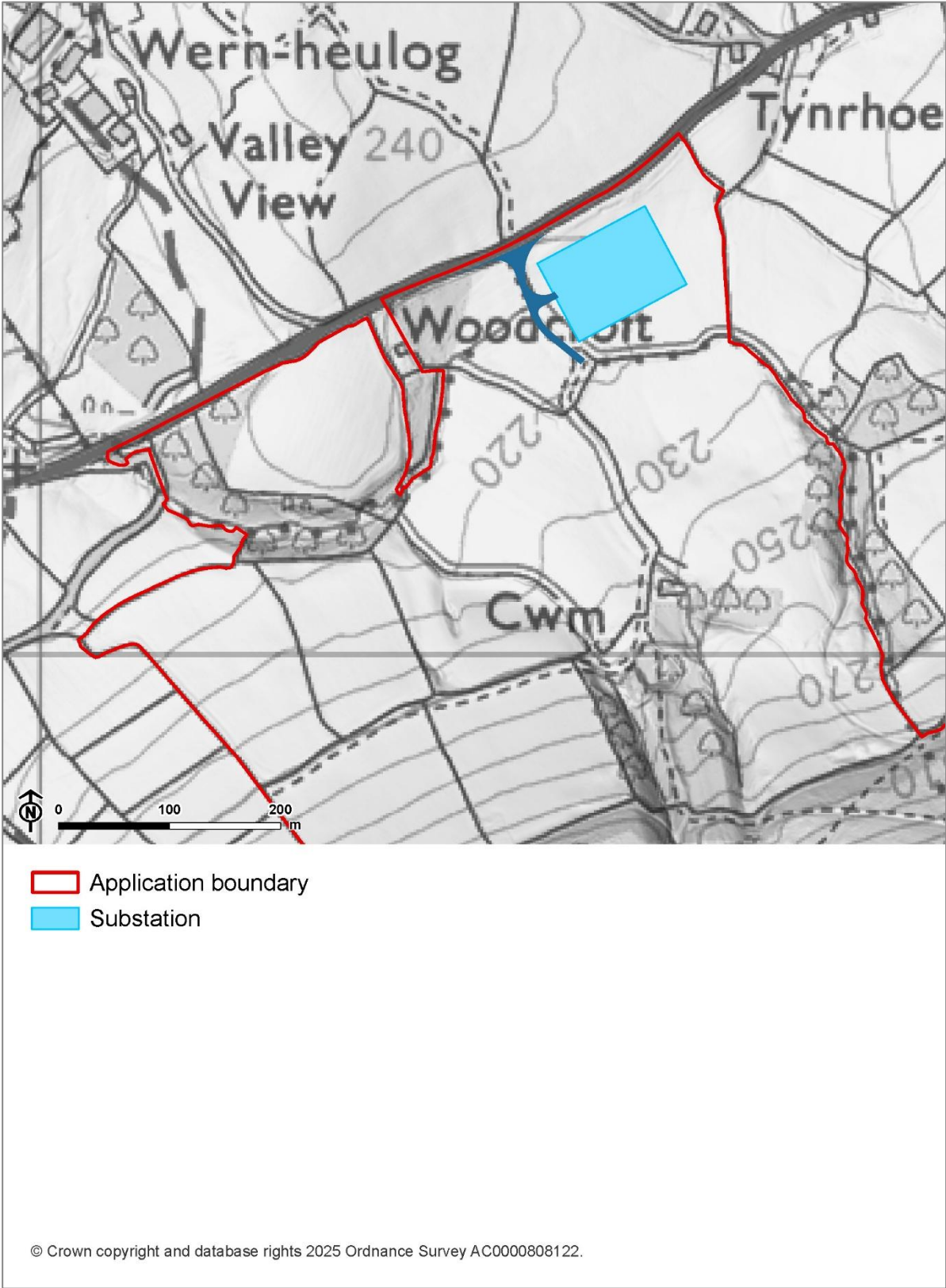
3.37 The primary access to the Site was designed in January 2025, once the final turbine layout was finalised. The design objectives of the access track were to provide a connection to the public highway whilst limiting the amount of track required on common land and to utilise any existing access tracks where possible, in order to minimise the need for new excavations. As such, the proposed access track was designed to follow the existing track that leads off the C1336, in the north-eastern part of the Site, near Hundred House (see **Inset 3.6**). The existing

access point and existing access track will need upgrading in order to safely accommodate the delivery of turbine components and all construction materials. Once the location of the substation was determined (see Substation section below), it was determined that a separate access will be required for the onsite substation, in the north of the Site. This will be a widened access and new track directly off the A481, utilising an existing agricultural access/egress point (see **Inset 3.7**).

Inset 3.6: Primary Site Access



Inset 3.7: Substation Access



Substation

3.38 As set out above, Aberedw Energy Park Ltd holds a grid connection agreement with GGC for capacity on their proposed Green GEN Towy-Usk project. In accordance with the public consultation to date, the route of this lies to the north of Aberedw Hill, meaning that the Proposed Development will need to connect to this project at a location on the northern side of Aberedw Hill. The Proposed Development requires an onsite substation, a connection from which is then made to the GGC substation. Accordingly, options which were considered for the onsite substation location focused on areas to the north of the Site.

3.39 The following design objectives for substation options were identified:

Landscape and Visual Amenity:

- Where possible, provide capacity for visual screening within the landscape, primarily through topography given it will not be appropriate to introduce screening with vegetation in these areas of the Site;
- Avoid locations likely to result in significant landscape / visual effects such as locations on steep terrain which will result in significant earthworks; and
- To retain historic field boundaries such as hedgerows.

Ecology

- Protection and enhancement of existing protected habitats and species.

Historic Environment

- Consideration of effects to designated heritage assets including scheduled monuments, listed buildings and non-designated assets.

Water and Soil Resources and Peat

- Avoid placement of any infrastructure within 100 m of GWDTEs where feasible;
- Consideration of Phase 1 peat survey results; and
- A 50 m separation distance between infrastructure and water courses/water bodies where feasible.

3.40 Initial options for locating substations were identified by project engineers, in consideration of topographical and engineering requirements, primarily aiming to reduce the amount of cut and fill that will be required to create a flat platform of the correct size (approximately 100 m by 125 m) to accommodate the electrical equipment and ancillary development.

3.41 Locations considered included the plateau of Aberedw Hill, but these were not pursued to limit impacts on common land. Three location options for the substation have been identified and are shown in **Inset 3.8**, with commentary provided on each option below.

■ Option 1

- Option 1 (SS1) would require substantial earthworks which would be visible from the surrounding area including the A481 and properties to the north. The site would allow hedgerows to remain largely intact (aside from the vehicular access) but would result in the loss of two large trees. The Arboricultural survey undertaken concluded that these were mature oak trees approximately 17-19 m tall and were in good condition. This option would also require construction within close proximity to a mature group of trees, which are identified as ancient semi natural woodland on the Ancient Woodland Inventory dataset from Welsh government² and it is important to note that the earthworks for this option would intersect the root protection area of these trees. In light of the above considerations, option 1 was dismissed due to the amount of earthworks required and loss of the loss of two large mature oak trees,

■ Option 2

- Option 2 (SS2) avoids the loss of trees and allows the majority of hedgerows to remain intact. Approximately 30 m of hedgerow would be removed to provide the access into this option. This option will likely lead to the loss of a relatively newly created pond which has been identified as containing GCN (shown on **Inset 3.8**).

■ Option 3

² https://datamap.gov.wales/layers/inspire-nrw:NRW_ANCIENT_WOODLAND_INVENTORY_2021

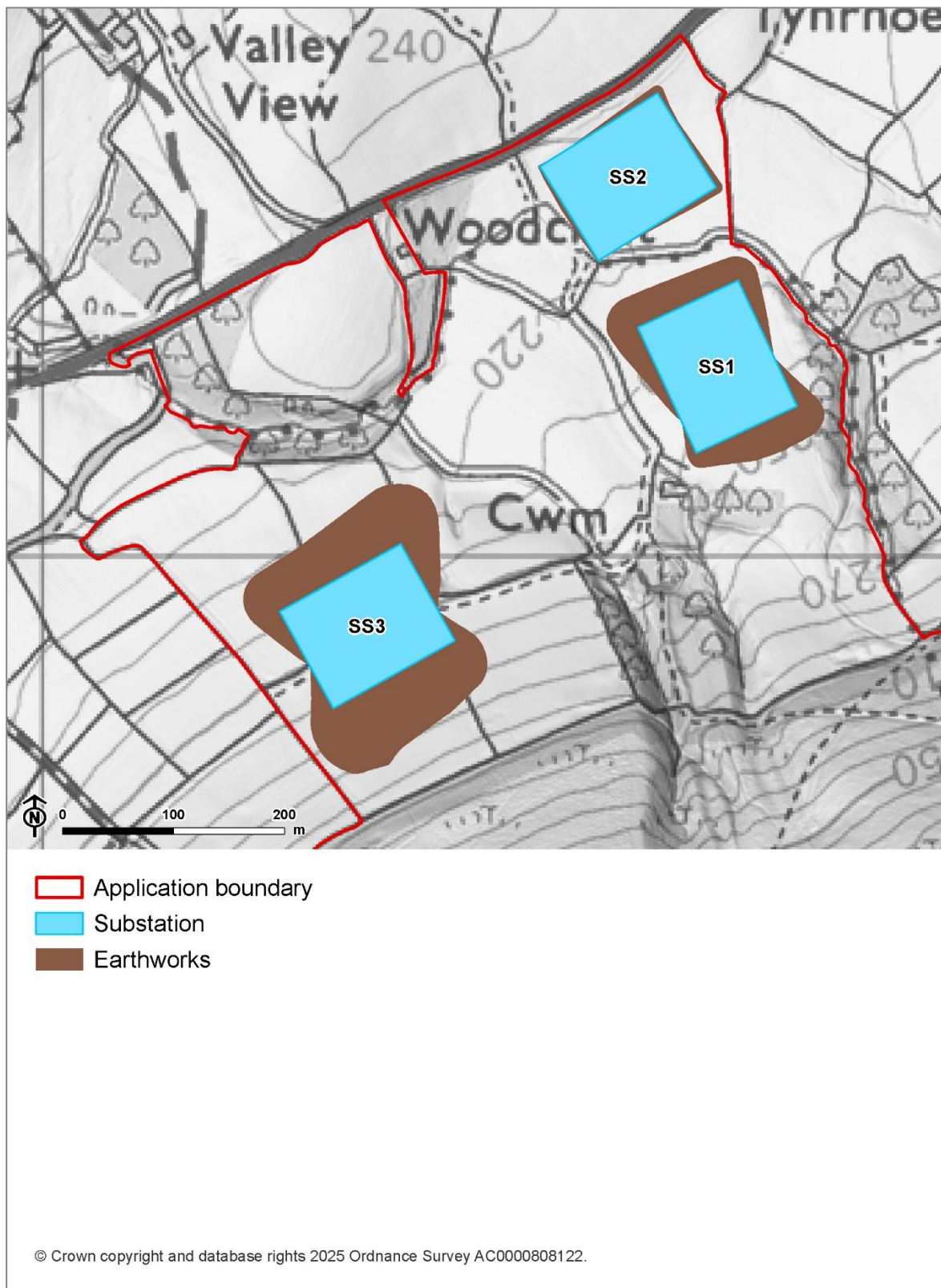
- Option 3 (SS3) requires significant earthworks which would be prominent in views from the A481 and properties to the north of the Site. It would also straddle two fields, resulting in the loss of approximately 110 m of hedgerow, and be unsympathetic to the historic field pattern. Access to this location by the large components required for the substation was considered likely to affect trees on the route from the A481 to the substation. In light of the above considerations, option 3 was dismissed due to the significant loss of hedgerow and potential visual and landscape effects.

3.42 Further consideration was given to options 1 and 2, given that they both result in some loss of habitat and effects to environmental receptors. After deliberation, it was concluded that option 2 would be preferable because whilst it has the potential to affect GCN, it is considered that the mitigation for this impact is likely to be more straightforward and deliverable in a shorter timeframe, compared to the establishment of planting to replace the loss of two mature trees and impacts to ancient semi natural woodland. Mitigation for the loss of the pond is set out in **Chapter 7 Ecology (non-avian)** and involves the establishment of two new ponds. Regarding the hedgerow loss for the access to option 2, it was considered likely that a similar amount of hedgerow would be lost in constructing the access for option 1 (given the site is bounded on all sides by hedgerow and the size of the equipment is the same). Option 1 is also higher up the hill and therefore likely to result in greater landscape / visual effects.

3.43 After selecting option 2 as the final substation location, the overall size of the substation platform was reduced to 110 m x 80 m (**Inset 3.7**).

3.44 The visual and noise effects of the substation design were also considered. Due to concerns about the effects arising from an open-to-the air design, it has been designed so that the infrastructure is enclosed within a series of buildings. These will be designed to be similar in appearance to agricultural buildings. The enclosed design also provides noise attenuation. The layout and elevations of the substation are shown in **Figure 4.6a** and **4.6b** respectively.

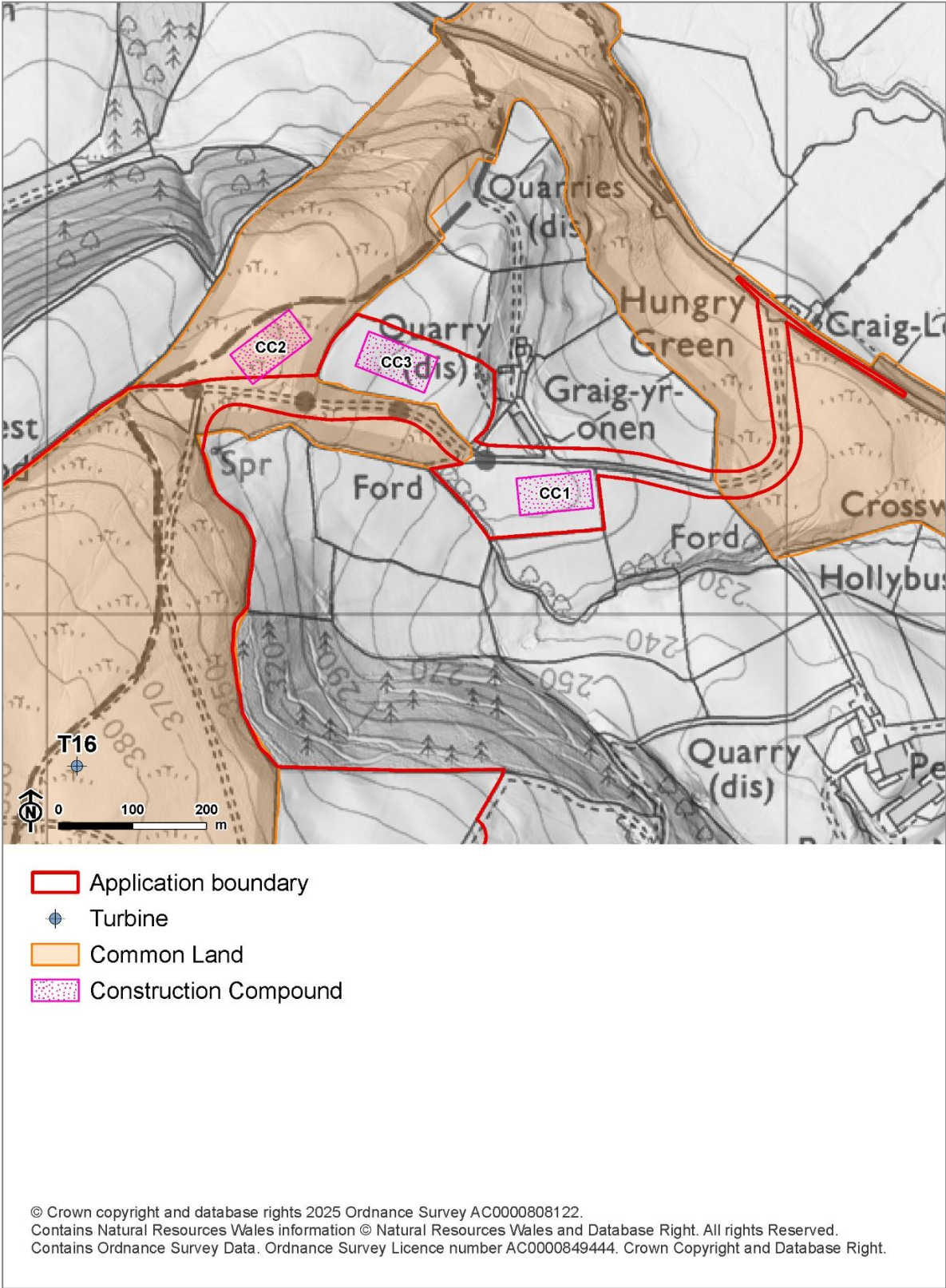
Inset 3.8: Substation Options



Temporary Construction Compound

3.45 Following the meeting with the design team in January 2025, three potential locations for the temporary construction compound were identified within the eastern part of the Site. For operational reasons, these need to be located near to the entrance to the Site (**Inset 3.9**). The most westerly, construction compound (compound 3) was discounted due to its location on common land (shown in the orange shaded area in **Inset 3.9**). Construction compounds 1 and 2 have both been assessed within this ES, however, only one will be required for the construction of the Proposed Development. These are temporary compounds that will be in place for the duration of the construction phase and be reinstated for operation of the Proposed Development.

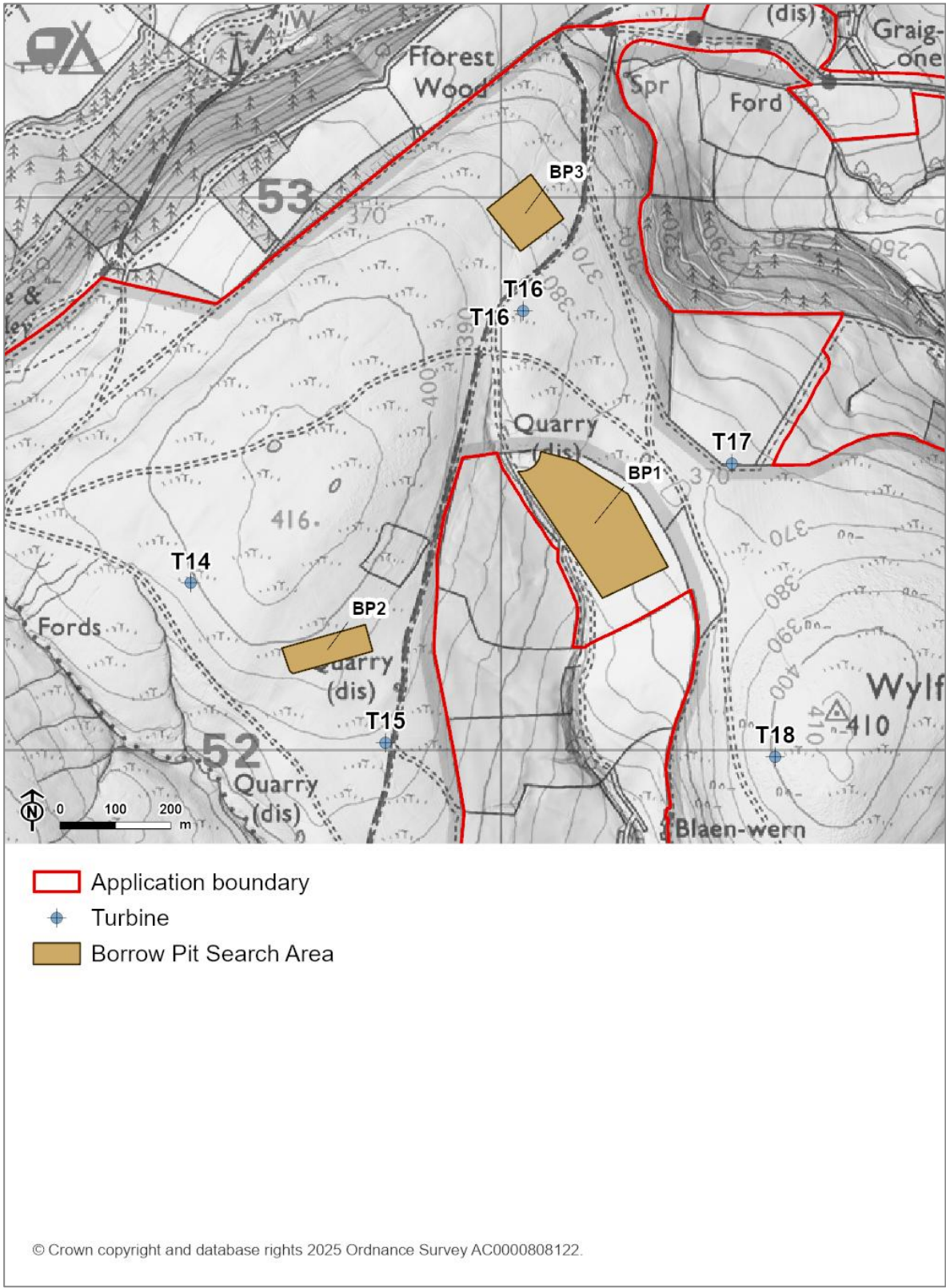
Inset 3.9: Construction Compound Options



Borrow Pits

3.46 Based on the same key design and environmental considerations for the turbines, three initial borrow pit locations (see **Inset 3.10**) were identified and assessed by the technical specialists. Borrow Pit 2 was discounted due to its proximity to the Cwmblaenerw Enclosed Long Hut Scheduled Monument, as well as being located on common land. Borrow Pit 3 was also discounted for its location on common land.

Inset 3.10: Intial Borrow Pit Locations



3.47 In November 2024, alternative borrow pit locations were explored as the materials required could not be derived from the previously identified borrow pits (see **Inset 3.11**).

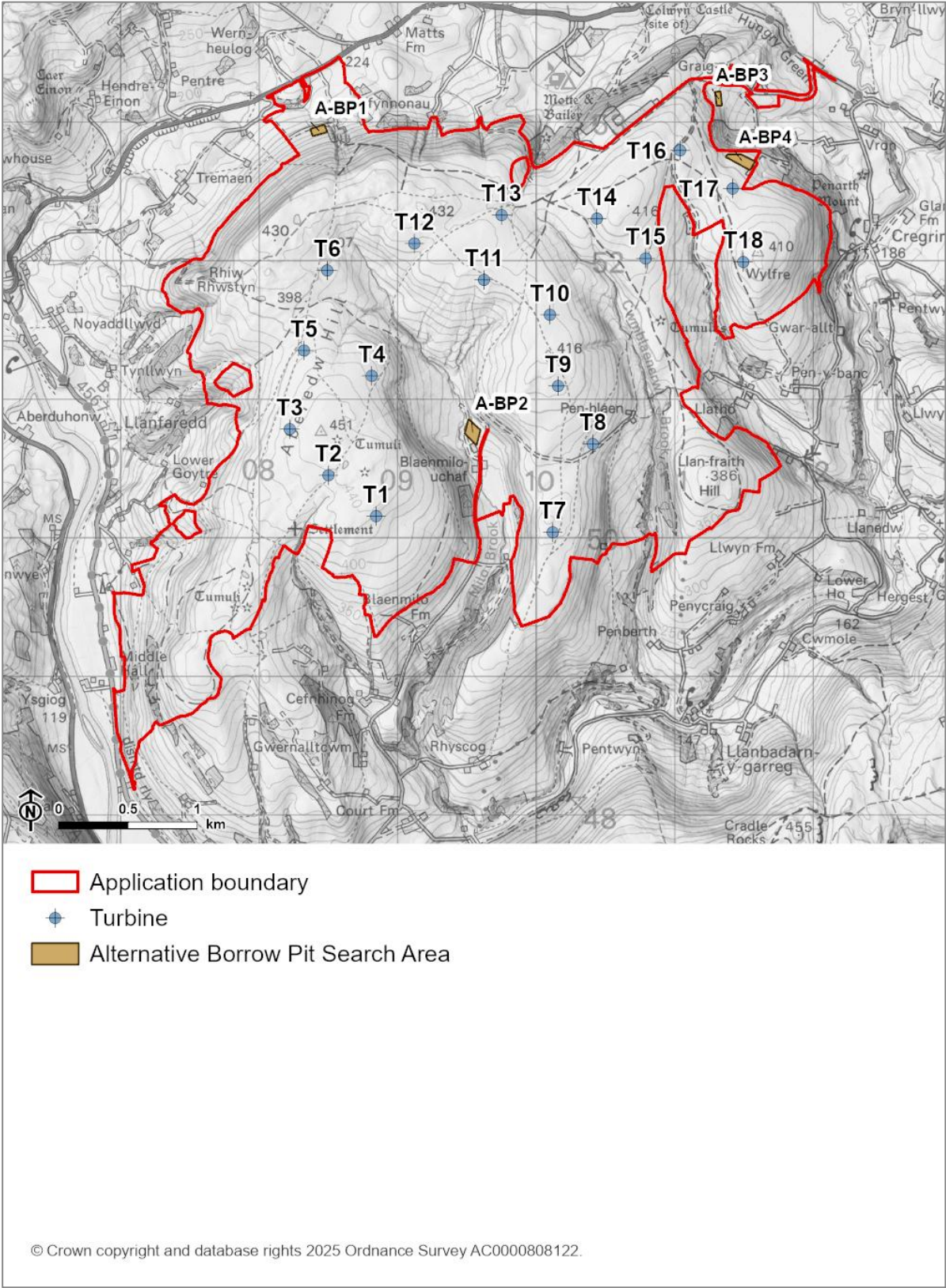
3.48 Alternative Borrow Pit 1 was discounted due to its visibility from the north of the Site, including properties along the A481 and in the village of Llansantffraed-in-Elwel, as well as potential concerns regarding mass movement and instability on a steep slope.

3.49 Alternative Borrow Pit 2 was discounted due its position on a steep valley side in close proximity to the property named Upper Blaenmilo.

3.50 Alternative Borrow Pit 3 was discounted due to its close proximity to a watercourse (less than 20 m) and its position on a steep valley slope and its visibility across the River Edw valley and towards nearby properties.

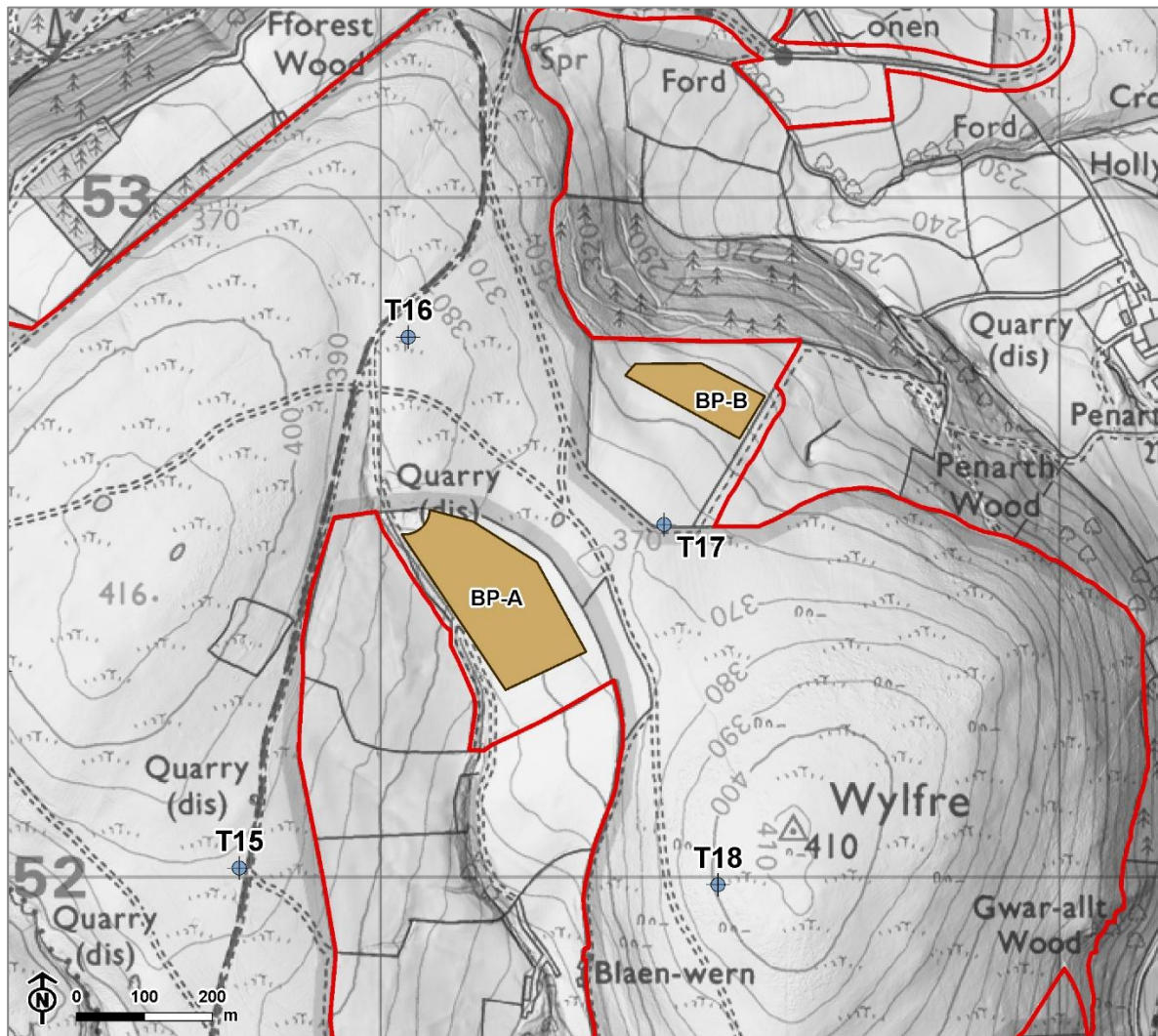
3.51 Alternative Borrow Pit 4 was selected for taking forward for assessment.

Inset 3.11: Alternative Borrow Pit Locations



3.52 Following the meeting with the design team in January 2025, two final borrow pit locations were appraised and selected, Borrow Pits A and B. Borrow Pit B was amended slightly to ensure that it retained a 15m distance from trees identified as semi natural ancient woodland located to the north and other existing isolated trees (not in woodland) to the west. (**Inset 3.12**).

Inset 3.12: Final Borrow Pit Locations



- Application boundary
- + Turbine
- Borrow Pit Search Area

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Cable Route

3.53 During the process of identifying a substation location, the design of the electrical cable connection between the turbines and the substation was also considered.

3.54 The engineering requirements of the cable routes were defined in collaboration with the Applicant's electrical engineers. From these discussions, the construction requirements were defined as follows:

- The cables can be installed either by being laid within a trench using cut and cover method, or by being ploughed directly into the ground using a cable ploughing machine. In order to provide suitable flexibility for the construction of the Proposed Development, both installation options were taken forward for consideration in the ES. Where the trench-laid installation method is used the maximum width of the trench would be 10 m. There is an additional 5 m requirement either side of the installation trench for vehicle movements and working area (3 m in width) and also for temporary turf / soil storage during construction (2 m in width). The total width of the installation corridor using trench installation is therefore 20 m.

3.55 Once the installation techniques were defined, a site assessment was undertaken to assess the feasibility of installation throughout the Proposed Development. As is typically the case with energy parks, cables will be laid alongside the access tracks. The tracks have already been designed to minimise effects on the environment as set out earlier in this chapter, therefore the cable routes benefit from the design considerations applied to the tracks.

3.56 Given the location of the substation, it is necessary for the cables to depart the tracks and travel down the northern side of Aberedw Hill. Following installation feasibility assessment, which considered gradient and surface cover, potential cable routes leading down from the energy park tracks to the substation were identified. These were defined on the following basis:

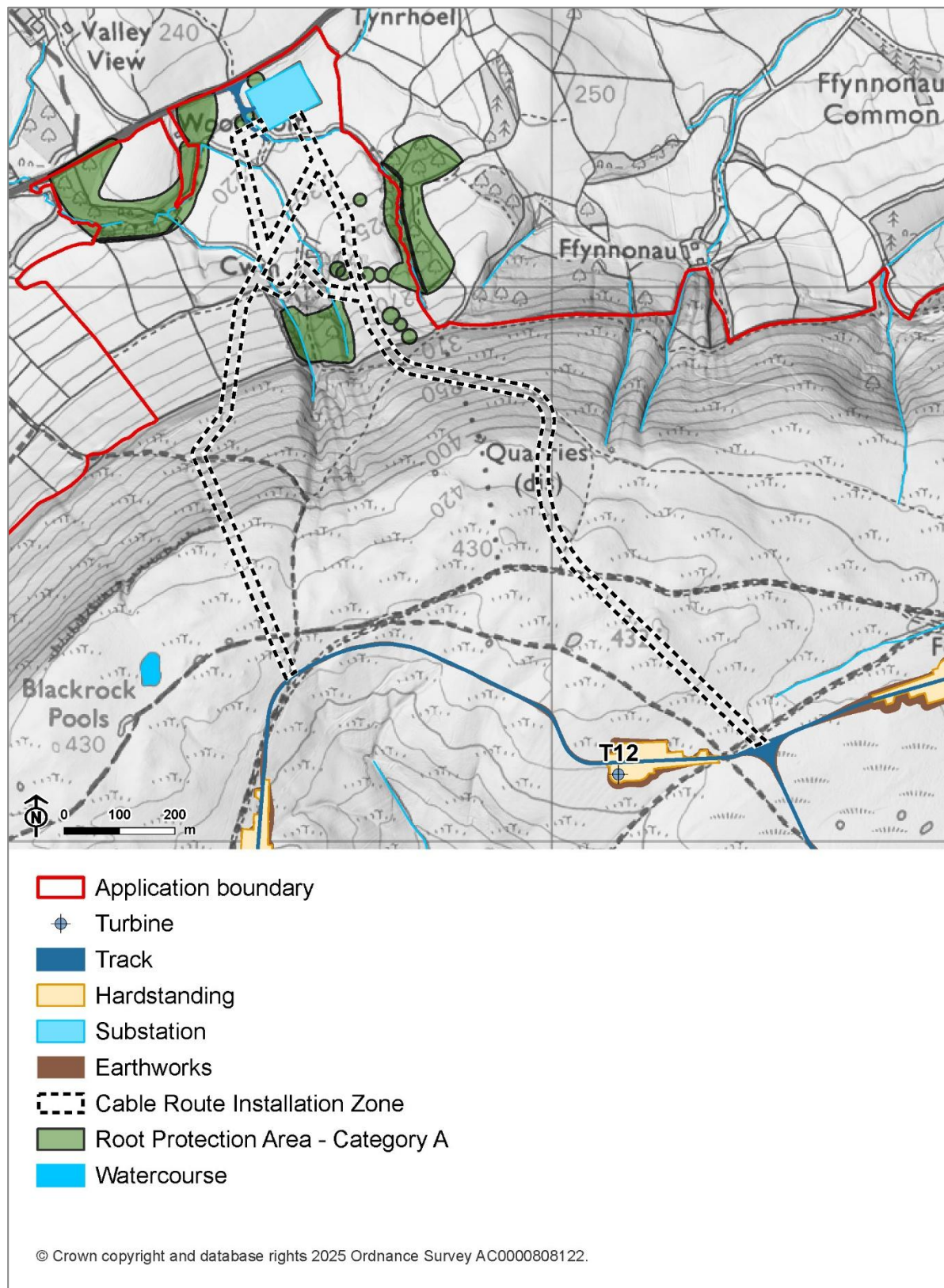
- To avoid the loss of priority habitats;
- To avoid loss of trees, or incursion into root protection areas if possible – this focussed on safeguarding trees identified as category A by arboricultural assessment in line with BS 5837:2012, as a priority over trees categorised as B, C or U;

- To avoid designated historic assets or those which are non-designated and included in the relevant Historic Environment Record (HER); and
- To reduce disruption to watercourses.

3.57 As a result of the design process, two main corridors were identified, travelling down the northern side of Aberedw Hill and connecting into the onsite substation. These are each wide enough to accommodate the full number of cables required to accommodate the electricity generated from the Proposed Development and as such, only one of these routes may eventually be required. Following this, additional optional routes were identified to provide flexibility for installation, allowing cables to utilise part of one route and then move into the other, should ground conditions warrant this. These optional routes also provide for the cables to enter the substation on either its southern or western side, to accommodate ground conditions and / or detailed design of the substation equipment. Once these additional optional routes were confirmed, a cable installation zone was defined, which includes all the cable route options away from the tracks. These are shown in **Inset 3.13**. The identified routes minimise environmental effects by avoiding significant intersection with priority habitat, root protection areas of category A trees and watercourses. The eastern-most cable route passes through a groundwater dependant terrestrial ecosystem, however, measures to restore this area are specified in **Chapter 9: Hydrology, hydrogeology and geology**.

3.58 Following the confirmation of the final design, the red line boundary was updated to ensure all land take required to construct and operate the Proposed Development was included.

Inset 3.13: Cable Route



Design Outcome

3.59 The final design for the Proposed Development is shown in **Figures 4.1a-4.1e**.

3.60 The inherent nature of wind turbines as tall, modern structures means that the form of the Proposed Development as a whole is important, and a clear design strategy is necessary. The overall aim of the design strategy was to create an energy park with a cohesive design that is sympathetic in form and scale to the surrounding landscape context, whilst achieving an appropriate balance between maximising renewable energy yield and minimising other environmental and technical effects.

3.61 The design of the Proposed Development has evolved over multiple iterations to achieve the best feasible balance of maximising renewable and low carbon energy generation benefits and minimising other environmental effects. It is considered that the final design presents the optimum design scenario in this respect. **Chapter 4** sets out in detail the Proposed Development. Assessment of environmental effects is presented in the technical assessments in **Chapters 5-11** of this ES. The overall planning balance is provided in the **Planning Statement** which has been submitted with the DNS application.