



Clachaig Glen Wind Farm

Environmental Impact Assessment Report

Volume 2a

Main Report

Chapter 3: Project Description

3. Project Description

3.1 Introduction

- 3.1.1 This chapter of the Environmental Impact Assessment Report (EIAR) details the project parameters for the proposed Clachaig Glen Wind Farm, battery storage and associated infrastructure (the '**Proposed Development**'). The technical studies conducted for the Environmental Impact Assessment (EIA) (reported in Chapters 7 to 18 of this EIAR) are based on these parameters. The physical aspects of the Proposed Development are detailed for its construction, operation and decommissioning phases. Committed mitigation measures, including environmental management and measures embedded into the design of the Proposed Development, are also outlined.
- 3.1.2 The Design Statement, a separate document which accompanies the Section 36 Application, provides detail on the evolution of the design. The need for the Proposed Development is established through the separate Planning Statement.
- 3.1.3 Throughout this chapter, reference is made to the Consented Development, which is detailed in Chapter 1 of this EIAR: Introduction. The Consented Development is the 47.6 megawatt (MW) wind farm which gained consent on the Development Site in 2019 and which the Proposed Development would replace. The Consented Development comprises 14 wind turbines: 13 with a blade tip height of up to 126.5m (and hub height of up to 80m); one with a blade tip height of up to 115.5m (and hub height of up to 69m); and associated infrastructure (see Figure 1.2: Consented Development (EIAR Volume 2b)).

3.2 Site Description

- 3.2.1 The Development Site is shown on Figure 1.1: Site Boundary Plan (EIAR Volume 2b) and covers an area of 12.47 square kilometres (km²) or 1,247 hectares (ha). The Proposed Development is centred at National Grid Reference (NGR) (172190, 641550) and is located approximately 20 kilometres (km) to the North of Campbeltown, 1.8km north east of the small hamlet of Muasdale and 3.7km south east of Tayinloan on the western coast of the Kintyre Peninsula.
- 3.2.2 The A83 from Tarbert to Campbeltown, which passes through Muasdale, runs in a north-south direction approximately 1km to the west of the Development Site. Site access can be gained from the A83 turning east onto existing forest roads to the south of Muasdale and also at Killean. The latter road at Killean is an existing access track used for forestry movements in the Carradale area, the delivery of infrastructure and periodic maintenance for the Deucheran Hill Wind Farm and was the approved access for the Consented Development. The use of this access track from the A83 at Killean remains part of the Development Site for the Proposed Development, with no other track being proposed for access. There are no public roads within the Development Site; however, there are a number of private forestry roads.
- 3.2.3 There are a number of properties located within 3km of the Development Site, including several isolated properties located adjacent to the west of the A83 associated with the small settlements of Muasdale,

Beacharr and Glenbarr. The closest properties are North and South Beachmore, Crubasdale, Low Clachaig, High Clachaig, Aronod, the Garvalt building plot¹ and Arnicle.

- 3.2.4 The nearest residential property to a proposed turbine location is High Clachaig, which is located approximately 1.2km from the closest turbine (T14; see Section 3.3 below). It should be noted that under the Consented Development, the residential property of High Clachaig was located approximately 850m from Turbine T12. Turbine T12 is one of the two turbines which have been removed in the Proposed Development (the other being T09; see Paragraph 3.3.2), resulting in an increased distance between residential properties and turbine locations.
- 3.2.5 The majority of the Development Site is dedicated to commercial timber (sitka spruce) production owned by Forestry and Land Scotland (FLS). The sitka spruce is in various stages of growth across the Development Site with operations currently ongoing throughout. FLS are planning to redesign the forest within the Development Site (and the wider Carradale Forest) as per the updated Carradale Land Management Plan (FLS, *unpublished*), which is expected to be submitted to the Perth and Argyll Conservancy for approval in 2022. As part of this plan, FLS are seeking to create a more diverse forest, including deciduous planting and areas for peatland restoration (see Chapter 17 of this EIAR: Forestry).
- 3.2.6 The higher land along the eastern boundary of the Development Site is not dedicated to commercial timber production. This high land comprises Cruach na Naich (344m above ordnance datum (AOD)) to the north east of the Development Site and its neighbour to its immediate south, Cruach Mhic an t-Saoir (364m AOD), with a high ridge of land extending southwards to an unnamed summit (334m AOD) to the south east of the Development Site.
- 3.2.7 These upland areas to the east of the Development Site are dominated by common heather, blaeberry, grass species and smaller areas of scrub, including goat willow and bracken. This is an area of high annual rainfall, as evidenced by the blanket peats and peaty topsoils which are apparent in some undisturbed open ground areas. Flatter areas on the highest ground within this area thus support relatively wet blanket peats, with associated mire vegetation. Forms of wet heath occur on the more steeply sloping valley sides, where peat would be expected to be shallower.
- 3.2.8 Higher land continues from the unnamed summit in the east of the Development Site into the south of the Development Site, although this land to the south is used for commercial timber production unlike the eastern ridge.
- 3.2.9 Ground surface elevations elsewhere in the Development Site are generally between 180 to 230m AOD, although do descend to a low point of 110m AOD in the west of the site to a valley hosting Clachaig Water (and where many minor watercourses which converge). Clachaig Water drains westward and, outside of the Development Site, eventually meets the sea. The Development Site also contains three small lochs to the east and south: Loch na Creige, Loch Mor and Dubh Loch. Loch na Naich is located outside of the Development Site to the immediate north.

¹ The Garvalt building plot was granted planning consent in January 2021 for demolition and replacement of a residential dwelling (Argyll and Bute planning reference: 20/01859/PP).

- 3.2.10 The Kintyre Way Long Distance Route follows the access track for the Proposed Development until it is approximately 560m to the north of the Development Site, where the Kintyre Way then heads eastwards and the access track for the Proposed Development, southwards. At its closest point, the Kintyre Way passes approximately 230m from the north eastern point of the Development Site.
- 3.2.11 The higher areas of the Development Site offer views to the west, across to the Isle of Jura, which extend to the National Scenic Area to the north of the Island.

3.3 The Proposed Development

Summary of Key Development Characteristics

- 3.3.1 Table 3-1 provides a summary of the key characteristics of the Proposed Development, which are each described in more detail in the remainder of Section 3.3.

Wind Turbines

- 3.3.2 The Proposed Development will comprise up to 12 turbines as illustrated in Figure 1.3: Site Location Plan (EIAR Volume 2b). The grid references for each turbine location are set out in Table 3-2. In order to provide consistency when discussing and comparing variations to the differing turbine layouts, the turbine numbering established for the Consented Development has been retained for the Proposed Development, with turbines T9 and T12 being the two turbines removed.
- 3.3.3 Whilst the proposed turbine locations have been identified through the EIA and wind farm design process, the final position of the turbines may be subject to further minor deviation to accommodate unforeseen ground conditions determined as part of detailed pre-construction ground investigations. A micro-siting tolerance of 50m for turbine locations forms part of the Section 36 Application and this has been considered in the context of all the assessments presented in this EIAR.
- 3.3.4 Of the 12 wind turbines proposed, two different heights are proposed. Seven of the wind turbines are described as 'Turbine Type 1' and the remaining five as 'Turbine Type 2' within Table 3-2 below.
- 3.3.5 The maximum dimensions of Turbine Types 1 and 2 are set out in Table 3-3 and Table 3-4 respectively. Whilst no specific wind turbine model can currently be built to all of these maximum specifications, basing the EIA on these maximum dimensions provides a flexibility to the design and recognises the rapid advancement of technology in the wind energy sector, in addition to the average length of time between application submission and wind farm construction. This then ensures that the impacts of the final development are fully assessed within the EIA using the 'Rochdale Envelope' approach², through which an assessment of a flexible design is based on a worst-case approach, and where there are clearly defined parameters to ensure a robust assessment of the likely significant effects.

² The 'Rochdale Envelope' arises from two cases: R. v Rochdale MBC ex parte Milne (No. 1) and R. v Rochdale MBC ex parte Tew [1999] and R. v Rochdale MBC ex parte Milne (No. 2) [2000]

Table 3-1 Key Characteristics of the Proposed Development

Project Component	Relevant Figures (EIAR Volume 2b)	Description
Wind Turbines	<ul style="list-style-type: none"> 1.3: Site Location Plan, 3.1a - 3.1d: Indicative Turbine Model... 	<ul style="list-style-type: none"> Total number: 12 (see Table 3-2 'Turbine Location Coordinates' for grid references), Total generating capacity: Over 50 MW (with total generation of Proposed Development (i.e. wind turbines and battery storage) having a currently expected capacity of 90 MW, but less than 100 MW), Turbine height (to blade tip): 7 turbines max. 185m; 5 turbines max. 200m, Rotor diameter: max. 155m, Each turbine will have a 50m micro-siting tolerance, and Aviation lighting: 8 turbines will require visible-red and 8 will require infra-red hub mounted obstruction lights (9 turbines lit in total).
Wind Turbine Foundations	<ul style="list-style-type: none"> 1.3: Site Location Plan, 3.2: Indicative Turbine Foundation. 	<ul style="list-style-type: none"> Total number: 12, Area of each turbine foundation: 22m diameter (380m²), Foundation depth: cannot be confirmed until after the ground investigation is completed (to be undertaken post-consent), and Each turbine foundation will have a 50m micro-siting tolerance.
Turbine Crane Pads	<ul style="list-style-type: none"> 1.3: Site Location Plan, 3.3: Indicative Crane Pad. 	<ul style="list-style-type: none"> 1 main crane pad and 3 assembly crane pads per turbine, Dimensions per main crane pad: 40m x 35m (1962.5m²), Dimensions of assembly crane pads per turbine: 114m², 171m² and 203m², Each crane pad will have a 50m micro-siting tolerance.
Permanent Anemometer Mast	<ul style="list-style-type: none"> 1.3: Site Location Plan, 3.4 Indicative Met Mast. 	<ul style="list-style-type: none"> Total number: 1 (location centred on National Grid Reference (NGR) 171362, 641837), 50m micro-siting allowance, Description: Up to 110m high permanent wind monitoring mast (steel lattice structure), Foundation: Approximately 20m², and Crane hardstanding: Approximately 20m x 20m.

Project Component	Relevant Figures (EIAR Volume 2b)	Description
Control Building and Substation Compound	<ul style="list-style-type: none"> 1.3: Site Location Plan, 3.5: Substation Compound. 	<ul style="list-style-type: none"> Total number: 1, 100m micro-siting allowance, Compound dimensions: 100m x 50m (footprint: 5,000m²), Control building height: Up to 5.5m, and Maximum height of substation: Up to 10m.
Temporary Construction Compound	<ul style="list-style-type: none"> 1.3: Site Location Plan, 3.6: Typical Construction Compound and Battery Storage Facility. 	<ul style="list-style-type: none"> Total number: 1, 100m micro-siting allowance, Description: Approximate dimensions 135m x 75m, giving a compound area of 10,125m², and Temporary use as construction compound, to be used to house battery storage thereafter.
Battery Storage	<ul style="list-style-type: none"> 1.3: Site Location Plan, 3.6: Typical Construction Compound and Battery Storage Facility. 	<ul style="list-style-type: none"> Total capacity: Expected upper capacity of 30MW (with total generation of Proposed Development (i.e. wind turbines and battery storage) having a currently expected capacity of 90 MW, but less than 100 MW), Battery storage, to be installed in part of the construction compound (approximate area of 75m x 60m) on completion of the vast majority of the construction works, and 27 containers not exceeding 2.6m high
Site Access Track	<ul style="list-style-type: none"> 1.4: Site Access Leading to Main Development Site, 1.5 Site Access and Turning Circle, 3.7: Indicative Access Track, 3.8: Indicative Floating Access Track. 	<ul style="list-style-type: none"> A83 to main Development Site length: 6km upgraded existing, Main Development Site length: 11km (8.9km new track; 2.1km upgraded existing track), Running width: 5m (wider at bends), and New access tracks will have a 100m micro-siting tolerance due to forested conditions preventing detailed ground investigations until nearer construction.

Project Component	Relevant Figures (EIAR Volume 2b)	Description
Passing Places	<ul style="list-style-type: none"> 1.3: Site Location Plan. 	<ul style="list-style-type: none"> Total number between A83 and main Development Site: 12, Total number within main Development Site: 7, Description: 65m x 6m wide (adjacent to the upgraded / new access track), Location of passing places within main Development Site shown on Figure 1.3: Site Location Plan (EIAR Volume 2b) used as a guide for principal contractor, who will ensure safe visibility in final placement and design, and Up to 12 cross places may also be required for forestry operations to continue during the construction works for the Proposed Development, these will be designed as small passing places and their location will be confirmed prior to construction.
Watercourse and Culvert Crossings	<ul style="list-style-type: none"> 1.3: Site Location Plan. 	<ul style="list-style-type: none"> 6 watercourse crossing points as follows: <ul style="list-style-type: none"> 4 new crossings, and Alterations to 2 existing crossings See Table 3-5 'Watercourse Crossings' and Appendix 11.1: Watercourse Crossing Strategy (EIAR Volume 3) for further details
Small Temporary Quarries ('Borrow Pits')	<ul style="list-style-type: none"> 1.3: Site Location Plan. 	<ul style="list-style-type: none"> Total number: Up to 6 (see Table 3-6 for details), Description: Temporary quarries (borrow pits) with short tracks to link them to the main access track, and Each quarry will have a 100m micro-siting tolerance.
Underground Cabling	<ul style="list-style-type: none"> 3.9: Indicative Underground Cabling. 	<ul style="list-style-type: none"> Cable trenches 1.5 to 3m width and 0.9m to 1.5m depth, and Cables will be installed along site access tracks, as far as practicable. The approximate length of cabling required is 10km.
Forestry	<ul style="list-style-type: none"> 17.5: Baseline Restock Species Composition, 17.6: Proposed Felling Plan. 	<ul style="list-style-type: none"> Area to be felled for Proposed Development and peatland restoration: 102.32ha, Total restock, including 56.2 ha of peatland restoration: 83.73 ha, and See Chapter 17 of this EIAR for further detail.

Table 3-2 Turbine Location Coordinates*

Turbine Ref. No.	Eastings	Northings	Turbine Type
T1	172042	643025	1
T2	173055	642867	1
T3	171741	642693	1
T4	171316	642438	1
T5	172701	642602	1
T6	171789	642110	1
T7	172417	642250	2
T8	171178	642039	1
T10	170883	641708	2
T11	171426	641475	2
T13	172149	641498	2
T14	171113	641187	2

* (Note turbine numbering has kept that of the Consented Development for ease of reference)

Table 3-3 Turbine Type 1

Attribute	Maximum Dimensions	Example Turbine Models
Tip height	185m	Nordex N149
Hub height	112m	Vestas V136
Rotor diameter	155m	Siemens Gamesa SG155

Table 3-4 Turbine Type 2

Attribute	Maximum Dimensions	Example Turbine Models
Tip height	200m	Vestas V136 & V150, Enercon E-136 EP5
Hub height	132m	Enercon E-136 EP5, Vestas V136
Rotor diameter	155m	Siemens Gamesa SG155

3.3.6 Each turbine will comprise a tapered tubular steel tower and nacelle, containing the generator and associated equipment, which are attached to a hub and rotor assembly including three turbine blades. The turbines will be finished in a semi-matt grey colour. Figures 3.1a to 3.1d (EIAR Volume 2b) provide

an illustration of indicative turbine models using the maximum dimensions of Type 1 and Type 2 turbines established in Table 3-3 and Table 3-4. They illustrate either maximum rotor diameter and tip height dimensions (Figures 3.1a and 3.1c) or maximum tip and hub height dimensions (Figures 3.1b and 3.1d).

- 3.3.7 Through the use of larger rotors and taller wind turbines for the Proposed Development in comparison to the Consented Development, it is noted that the output for some individual turbines for the Proposed Development are expected to increase by 100% when measuring the gigawatt hours produced, and overall the project could save almost double the amount of CO₂ than the Consented Development.

Wind Turbine Foundations

- 3.3.8 The wind turbines of the Proposed Development will either be constructed on reinforced concrete foundations established on bedrock (following excavation), or on micro-piles, depending on localised ground conditions.
- 3.3.9 The turbine foundations will have a surface footprint of approximately 22m diameter. The exact specification of the turbine foundations will be subject to detailed design following award of consent for the Proposed Development, yet will be constructed within the 50m micro-siting tolerance.
- 3.3.10 The requirement for (and depth of) piled foundations cannot be confirmed until after the ground investigation is completed (to be undertaken post-consent and pre-construction). Figure 3.2 (EIAR Volume 2b) provides an illustration of an indicative turbine foundation design.
- 3.3.11 At each turbine location, a transformer will be required. The transformers will be located outside and immediately adjacent to the turbines. For the purposes of the EIA, a worst-case scenario has been assumed that a transformer with a footprint of 5m x 3m and a height of 3m will be located adjacent to each turbine.

Turbine Crane Pads

- 3.3.12 Each turbine location requires a main area of hardstanding approximately 40m x 35m (1,963m²) to be installed adjacent to the turbine foundation, as well as three smaller assembly crane pads which vary in size (114m², 171m² and 203m²). The crane pads will have a 50m micro-siting tolerance. An indicative crane pad illustration is provided through Figure 3.3 (EIAR Volume 2b).
- 3.3.13 These crane pads are required to accommodate the cranes which will be used to erect the turbines. They provide a stable base on which to locate the turbine components and installation equipment during the construction phase. They will also be used for maintenance throughout the lifespan of the wind farm. The crane pads will be made up of a layer of geo-textile or geo-synthetic material overlain with compacted aggregate material.
- 3.3.14 Following any granting of consent for the Proposed Development, the exact dimensions and specification of the crane pads within the parameters set out above will be subject to detailed design, which will be influenced by the selection of a turbine model and more detailed site investigations, and as a result the crane pads have a 50m micro-siting tolerance.

- 3.3.15 The crane pads will be left in-situ following construction to facilitate servicing and maintenance of the turbines during the operation of the Proposed Development and for use during decommissioning.

Permanent Anemometer Mast

- 3.3.16 A permanent anemometer mast will be installed within the Development Site, as shown on Figure 1.3: Site Location Plan (EIAR Volume 2b). The mast will be erected to assist with the performance monitoring of the wind turbines and to collect meteorological data.
- 3.3.17 The mast will be up to 110m high and comprise a steel lattice structure, with monitoring and recording equipment attached. The mast will be constructed on a reinforced concrete foundation in order to ensure that it withstands severe weather. Figure 3.4 (EIAR Volume 2b) provides an indicative illustration of the anemometer mast. It will be serviced by a short access road leading from the main access track, as detailed on Figure 1.3: Site Location Plan (EIAR Volume 2b).

Control Building and Substation Compound

- 3.3.18 A control building and substation compound will be constructed on the Development Site, as shown on Figure 1.3: Site Location Plan (EIAR Volume 2b).
- 3.3.19 The control building and substation compound will accommodate high voltage switchgear, plant and equipment as well as Supervisory Control and Data Acquisition (SCADA) plant and equipment, which will allow local control of the Proposed Development. The footprint of the control building and substation compound will be approximately 100m x 50m (5,000m²), as illustrated through Figure 3.5 (EIAR Volume 2b). Exact dimensions are to be confirmed following detailed design.
- 3.3.20 The substation compound may need to include a static synchronous compensator (STATCOM) to regulate the voltage of the electricity leaving the Development Site and entering the grid network. The driver for the need for a STATCOM is the final choice of turbine, therefore it has been assumed one is required to ensure the worst-case scenario is assessed. The dimensions of the STATCOM are 7m (l) x 5m (w) x 3.5m (h), with 2m clearance in all directions.
- 3.3.21 The buildings and compound have been sited to reduce visual impact, whilst being a safe operating distance from the wind turbines. Nevertheless, the design of the control building and substation compound will be subject to detailed design following award of consent; however, the buildings will be developed to integrate with their surroundings and will be sympathetic to the forest setting.

Temporary Construction Compound

- 3.3.22 During the construction period there will be a requirement for a number of temporary construction facilities including:
- Site offices,
 - Staff welfare facilities including toilets, kitchen and a mess room,
 - Storage and laydown areas for construction vehicles, plant, equipment and other materials,

- Appropriately bunded areas to be used for the storage of oils and other fuels, and
- Potential aggregate recycling and concrete batching facilities.

- 3.3.23 The temporary construction compound will be constructed at the beginning of the construction period. Its location is shown on Figure 1.3: Site Location Plan (EIAR Volume 2b) This will accommodate the facilities described above, as well as sufficient parking space for the appointed contractor's workforce, deliveries and visitors. Figure 3.6 (EIAR Volume 2b) provides an illustration of a typical construction compound. The temporary compound will be made up of a layer of geo-textile or geo-synthetic material overlain with compacted aggregate material.
- 3.3.24 Areas of the compound which are considered to present an increased pollution risk, such as fuelling or oil storage areas, shall be bunded and site drainage directed towards an isolated holding tank for treatment and disposal. Drainage from low pollution risk areas, such as site offices, will be directed towards a settlement pond. Foul effluent generated from temporary toilet facilities will be collected in a sealed underground tank (cesspit) which will be emptied regularly.
- 3.3.25 The exact make up, layout and dimensions of the temporary compound within the specified maximum parameters will be finalised following award of consent and appointment of a Contractor. Due to the remote nature of the Proposed Development, a generator may be used as the power source for the temporary construction compound.
- 3.3.26 The compound will be contained within a secure fenced compound. Temporary palisade fencing or similar will be located around the compound to provide security. At night, and during periods of darkness, directional security lighting to minimise light spillage will be used, where necessary.
- 3.3.27 Near the end of the construction period, the construction compound will be converted for use as a battery storage facility (see below).

Battery Storage

- 3.3.28 A battery storage facility with an expected upper capacity of 30MW forms part of the Proposed Development alongside the wind farm. Battery storage facilities are increasingly playing an important part in the UK energy network in providing grid stabilisation services. When connected to a wind farm such as the Proposed Development, they allow wind turbines to generate electricity in periods of high wind but low demand (when wind farms may otherwise be depowered); and provide electricity when this scenario reverses (lower wind speeds but higher electricity demand). Battery storage technologies are rapidly advancing and are seen as a necessary component in the energy network to reach net zero targets (National Grid, 2021).
- 3.3.29 The battery storage facility for the Proposed Development is to be installed in part of the construction compound on completion of the vast majority of the construction works. It will comprise 27 containers not exceeding 2.6m high. The maximum dimensions of the facility will be 75m (l) x 60m (w) and it will be surrounded by a 2.5m high security fence. Figure 3.6 (EIAR Volume 2b) illustrates the indicative layout of the battery storage facility.

- 3.3.30 The containers' location within the construction compound (near the completion of the construction of the remainder of the Proposed Development) is advantageous as this area will already be established as suitable for equipment and tree felling completed. Additional land take will therefore not be required for the facility and the surrounding forestry is also not scheduled in the updated Carradale Land Management Plan (FLS, *unpublished*) for felling until 2041 to 'post-2045', providing some screening of the battery facility.

Site Access Track

Permanent Site Access from A83 to Main Development Site

- 3.3.31 Due to the ongoing commercial forestry activities within the Development Site there is a well-established existing forest road leading from the Killean Estate junction with the A83 to the Proposed Development. It is proposed that this access road is used to provide sole, permanent access to the main Development Site. The road follows the existing Cross-Kintyre Timber haul route to the east, and then turns south to the Development Site entrance (see Figure 1.4, EIAR Volume 2b).
- 3.3.32 The existing access road between the A83 and main Development Site is approximately 6km long and 5m wide (although width is variable). Much of the route is already used for access to the neighbouring Deucheran Hill Wind Farm (also operated by RWE) and it was the approved access for the Consented Development. In order to facilitate the delivery of larger turbines, it is not anticipated that the road will need to be widened, however over-run and over-sail areas will be required that will necessitate either ground clearance or pruning (see Chapter 14 of this EIAR: Traffic, Transport and Access, and Figure 1.5: Site Access and Turning Circle; EIAR Volume 2b, for further information).
- 3.3.33 An area averaging 15m either side of the existing access road between the A83 and main Development Site (30m total) is included within the Development Site boundary, with a wider area included at the junction with the A83 and for the first 1km of road due to site conditions (Figure 1.4, EIAR Volume 2b). Vegetation clearance within this corridor will be kept to the minimum required to reduce tree loss and impacts on views from the A83 and surrounding area as much as possible. This and the precise access road layout will be confirmed following detailed design to be undertaken post-consent.
- 3.3.34 The Development Site boundary additionally includes a temporary turbine laydown area to the west of the A83 (see Figure 1.5: Site Access and Turning Circle; EIAR Volume 2b). This is approximately 130m in length and has a maximum width of 60m. It will be only be utilised for the delivery of the turbine components, after which the land will be partially reinstated to allow livestock farming to continue within this zone.
- 3.3.35 A second temporary turbine laydown area within the main Development Site is proposed to allow turbine components to be moved from the laydown area near the A83 to an area closer to their final installed locations (see Figure 1.3: Site Location Plan; EIAR Volume 2b). Any forestry within this second laydown area will be cleared prior to construction, however the laydown area has been located within an area of forestry which FLS (*unpublished*) proposes to fell between 2022 and 2025 to minimise impacts on the plantation forestry. Once the wind farm has been installed, this laydown area can be re-stocked as planned by FLS (see Chapter 17 of this EIAR: Forestry).

Access Track Layout

- 3.3.36 Within the main Development Site, approximately 11km of access tracks will be utilised to provide permanent access to turbine locations, crane pads and other associated infrastructure as required. Approximately 8.9km of this will consist of new access tracks, with the remainder (2.1km) comprising upgraded existing FLS tracks. The new and upgraded access tracks will be 5m wide (wider at bends). For comparison, the width of the existing forestry tracks is approximately 4m (although this is variable).
- 3.3.37 The proposed access track layout for the Proposed Development is illustrated on Figure 1.3: Site Location Plan (EIAR Volume 2b). The layout has been largely influenced by ground conditions, topography and the results of the archaeology surveys. It has been designed to make best use of existing and future planned FLS forest roads; minimising the need to form new tracks and thus reducing the overall footprint of the Proposed Development.
- 3.3.38 A 100m micro-siting tolerance is required for new access tracks to build in contingency for unforeseen ground conditions and accommodate the detailed design. This is especially required for the Proposed Development as detailed survey work at this present time cannot be conducted due to the presence of the existing forestry, which limits both access and visibility.
- 3.3.39 The proposed access tracks will be largely constructed of cut tracks which would involve the removal of topsoil and excavation to a suitable base on which the access track will be constructed using crushed and compacted rock, which is proposed to be sourced from small temporary quarries onsite (see Paragraphs 3.3.51 to 3.3.54). Geo-synthetic or geo-textile material may also be used to provide greater load bearing capacity where required. Figure 3.7 (EIAR Volume 2b) provides an illustration of typical track formation on overburden soil and on rock, as well as a typical cross section of track construction.
- 3.3.40 As new access tracks have been routed to avoid, as much as possible, areas of deeper peat, the need for floated road construction has been minimised. However, within areas of peat with a depth > 2m, floated road construction will be adopted Figure 3.9 (EIAR Volume 2b) provides an illustration of an indicative floating access track. The need for this will be kept to a minimum and is further explored in Chapter 11 of this EIAR: Geology, Hydrology and Hydrogeology.
- 3.3.41 Pre-construction drainage will be installed, including interception drains and settlement lagoons, to ensure natural drainage pathways are preserved as closely as possible and not mixed with construction drainage. Swales will be created during access road construction, as well as regular cross drains to collect construction drainage and route it through the settlement lagoons before discharging to natural ground. Swales and interception ditches will generally be shallow to avoid altering the natural ground water pathways or lower the natural water table. The running surface of the Development Site's access tracks will be gently cambered (or cross-falled) and provide some permeability in order to prevent the build-up of large volumes of water. Further information on this can be found in Chapter 11 of this EIAR: Geology, Hydrology and Hydrogeology.
- 3.3.42 The detailed drainage design will be developed following award of planning consent and the design will comply with current good practice guidance. As such, for the purposes of the EIA, it can be assumed that the drainage system will be based on Sustainable Urban Drainage (SUDS) principles and will be

developed in accordance with the Water Environment (Controlled Activities) (Scotland) Regulations 2011, as amended (known as 'CAR Regulations').

- 3.3.43 Following completion of construction, tracks will be retained for maintenance access and used for forest management. The land adjacent to the access tracks (15m on either side), which will initially be cleared prior to construction to allow for the ground conditions survey as part of detailed design, and also to allow for construction, will be reinstated in line with the updated Carradale Land Management Plan (FLS, *unpublished*).

Passing Places

- 3.3.44 Up to twelve passing places may be required along the forest road from the A83 to the main Development Site. These are anticipated to have a length of 65m and width of 6m. Their positioning and size will be determined by the principal contractor following more detailed site investigation prior to construction and following confirmation of the vehicle types used for delivery between the two laydown areas (see Paragraphs 3.3.34 and 3.3.35). The widening of the existing track and the creation of new passing places is expected to benefit the Kintyre Way, which currently has very few passing places.
- 3.3.45 Seven passing places are proposed along the new / upgraded access track within the main Development Site. These will have a length of 65m and width of 6m. Site vehicles will also be able to use some crane pads as passing places. The indicative passing places have been identified within Figure 1.3: Site Location Plan (EIAR Volume 2b), however these locations are a guide and their final position will be determined by the principal contractor in consultation with FLS who will ensure visibility at junctions and around bends, as well as planned forestry operations within the site.
- 3.3.46 Up to 12 cross places may also be required for forestry operations to continue during the construction works for the Proposed Development, these will be designed as small passing places and their location will be confirmed prior to construction.

Watercourse and Culvert Crossings

- 3.3.47 The layout of the Development Site's access tracks has been designed to minimise the number of watercourse crossings required. A total of six crossings are required (see Table 3-5 and Figure 1.3: Site Location Plan; EIAR Volume 2b), of which four would be new crossings.
- 3.3.48 All watercourse crossings will be designed in accordance with the latest good practice guidance, including Engineering in the Water Environment Good Practice Guide: River Crossing: Second Edition (Scottish Environment Protection Agency (SEPA), 2010) and River Crossings and Migratory Fish: Design Guidance (Scottish Executive, 2000).
- 3.3.49 All crossings will be designed to accommodate 1 in 200-year peak flows (including climate change allowance) in order to reduce the risk of flooding. The exact specifications of the watercourse crossings will be subject to detailed design post-consent. The final watercourse crossing designs will be compliant with the SEPA Guidelines and agreed with FLS.

3.3.50 Further details on the watercourse crossings are included in Chapter 11 of this EIAR: Geology, Hydrology and Hydrogeology and Appendix 11.1: Watercourse Crossing Strategy (EIAR Volume 3).

Table 3-5 Watercourse Crossings

Watercourse	Eastings	Northings	New or Existing	Proposed Crossing Type
NWC 01	172476	642295	New	Closed Pipe Culvert
NWC 02	172252	642224	New	Closed Pipe Culvert
NWC 03	171584	641386	New	Closed Pipe Culvert
NWC 04	172114	641416	New	Closed Pipe Culvert
EWC 01	172255	642269	Existing	Closed Pipe Culvert
EWC 02	171261	641554	Existing	Single Span Bridge

Small Temporary Quarries ('Borrow Pits')

3.3.51 Approximately 82,754 m³ of stone will be required for the construction of the Proposed Development.

3.3.52 For the purposes of the traffic and transport assessment (see Chapter 14 of this EIAR: Traffic, Transport and Access), a worst-case scenario is assumed whereby all aggregate material required for construction is brought to site. However, in order to minimise the volume of material imported to site, it is anticipated that up to six small temporary quarries (or 'borrow pits') can be built within the Development Site.

3.3.53 The proposed locations of the six small temporary quarries are shown on Figure 1.3: Site Location Plan (EIAR Volume 2b) and details of each of the temporary quarries are provided in Table 3-6. Their location has been selected to avoid areas of deep peat; nevertheless, the exact design of the small temporary quarries will be subject to detailed ground investigation and design following award of consent for the Proposed Development. A 100m micro-siting tolerance has been applied to allow for unforeseen ground conditions given the present of forestry at the site and the restrictions this places on being able to fully assess all planned infrastructure until this is felled.

Table 3-6 Small Temporary Quarries

Name	Eastings	Northings	Length (m)	Width (m)	Depth (m)	Estimated Potential* Volumes (m ³)
BP01	173140	643291	100	50	2.5	12,448
BP02	172847	642678	110	65	2	17,764
BP03	172507	642439	242	65	2	31,978
BP04	172057	642206	125	55	2.5	17,035
BP05	171565	641112	150	60	2.5	17,163
BP06	172169	642874	225	82	2.5	46,345

- 3.3.54 Table 3-6 demonstrates that potentially up to 142,732 m³ of stone could be obtained from temporary quarries (depending on the quality of stone obtained), which is more stone than the 82,754 m³ estimated to be required for the Proposed Development. Imported stone would be required at an early stage in the project to facilitate a construction compound and an access track to a temporary quarry prior to material being available from the Development Site. Aside from this, the temporary quarries could potentially provide all stone for the Proposed Development.
- 3.3.55 Following completion of construction activities, five of the small temporary quarries would be reinstated using excess spoil generated during the works. One of the borrow pits is currently used by FLS and it is likely that they will continue this use following construction of the Proposed Development.

Underground Cabling

- 3.3.56 Underground electrical cables will connect the turbines to the substation which in turn will be connected to the electricity transmission / distribution network. The underground cables will be laid in trenches approximately 1.5m to 3m in width and 0.9m to 1.5mm in depth (exact dimensions are to be confirmed following detailed design), broadly following the upgraded / new access tracks as much as possible in order to reduce the footprint of the Proposed Development. Manholes and small jointing bays will be installed at regular locations to provide access for maintenance activities. The cable trenches will be backfilled with a combination of cement bound sand (CBS) and excavated material, and the ground surface reinstated. An indicative underground cable trench cross section is illustrated in Figure 3.9 (EIAR Volume 2b).
- 3.3.57 As per FLS specifications, the position of the underground cables will be marked with permanent posts (2m tall, white) to ensure the safety of future forest operations. Up to 12 permanent crossing points for forestry machinery will be provided over the underground cables at appropriate access points as agreed with FLS.

Grid Connection

- 3.3.58 A connection to the electricity transmission and distribution system will be required. This does not form part of the Proposed Development and is not the subject of the current Section 36 Application to which this EIAR relates. This will be developed by Scottish Hydro Electric Transmission Limited and Scottish Hydro Electric Power Distribution plc, as the transmission and distribution network operators respectively. The connecting substation is presently the Carradale Substation to the east of the Development Site. It is anticipated this will be the subject of a separate consideration under the relevant EIA Regulations in the context of the consenting process for the connection. There is an expectation that this connection will be via an underground cable which will not require consent and that it would follow a similar route to the Deucheran Hill overhead line as there is already a linear clearance of trees along that route; however, the final configuration and route is the decision of the network operator, so no commitment can be made through this Section 36 Application.

Forestry

- 3.3.59 The Development Site comprises a mix of open ground (blanket peats and peaty topsoils) and productive forestry operation areas, therefore the Proposed Development will necessitate some tree felling and clearance of these forested areas. The vast majority of the Development Site is on the National Forest Estate and so is managed by FLS, who are in the process of developing the Carradale Land Management Plan, which includes the Development Site. This Plan was originally published for consultation in 2020, however it has since been altered, with the updated plan due to be consulted on in 2022.
- 3.3.60 The Applicant has worked closely with FLS throughout the design process for the Proposed Development, which has resulted in the development being supported within the updated Carradale Land Management Plan (FLS, *unpublished*), see Chapter 17 of this EIAR: Forestry; as well as the Design Statement. The Applicant and FLS will cooperate over works, such as FLS using the new roads built as part of the Proposed Development for their future forestry operations.
- 3.3.61 The forest contains a range of woodland types; however, is mainly comprised of Sitka spruce and Sitka spruce / lodgepole pine. The forest is now into the production phase, with ongoing felling and restocking programmes. Chapter 17 of this EIAR: Forestry, considers how the Proposed Development will affect the updated Carradale Land Management Plan. The wider FLS felling operations, restocking and aftercare do not form part of the Proposed Development.
- 3.3.62 The total area of forestry felled for the Proposed Development has been calculated as being 102.32 ha, with a restocking area proposed of 83.73 ha, which includes 56.2 ha of peatland restoration. With the Proposed Development including this area of peatland restoration, no compensatory planting is considered necessary as this is considered far more desirable ecologically than the restock of forestry. This is in line with Scotland's National Peatland Plan (SNH, 2015) and also with the Scottish Government's (2019) Control of Woodland Removal Policy, which recognises the restoration of peatland as acceptable criteria for both removing woodland and as an alternative to compensatory planting. It should be noted that as the Carradale Land Management Plan (FLS, *unpublished*) is still undergoing development and is yet to be consented, the felling assumptions, area of proposed peatland restoration and compensatory planting calculations may have to be revised at a later date, which the Applicant is committed to doing.

3.4 Embedded Mitigation

- 3.4.1 A summary of the mitigation embedded into the design of the Proposed Development is summarised in Table 3-7.

Table 3-7 Mitigation Embedded into the Design of the Proposed Development

Discipline (EIAR Chapter No.)	Embedded Mitigation
General	<p>Viewshed analysis used to select site based on a number of factors, including minimal visual impact (see Design Statement for further detail).</p> <hr/> <p>Wind farm layout balanced economics, contribution to renewable energy generation targets and environmental effects.</p> <hr/> <p>Avoidance of internationally and nationally designated areas.</p>
Landscape and Visual (7)	<p>Wind farm layout designed based on the landscape and visual effects on the wider area, residential property and in particular, those viewpoints considered sensitive by NatureScot and Argyll and Bute Council through previous consultations.</p> <hr/> <p>Use of 2.1 km of existing forestry track network within the main Development Site, reducing the creation of new tracks and removal of landscape features.</p> <hr/> <p>Use specialist transport vehicles to minimise loss of trees at the access junction with the A83, and reinstate planting and trees that require to be removed to avoid long term impacts.</p> <hr/> <p>Track material to be locally won, where practical, and a similar appearance to that of existing forestry tracks.</p> <hr/> <p>Drainage infrastructure located and aligned with natural landforms.</p> <hr/> <p>Five of six borrow pits to be reinstated and re-vegetated.</p> <hr/> <p>Restocking of forestry around the substation and battery storage compounds.</p>
Noise (8)	<p>The potential for operational noise effects to occur has influenced the design process, reducing the number of proposed turbines from an initial potential maximum of 58 to the Consented Development of 14 turbines, to the Proposed Development of 12 turbines.</p> <hr/> <p>The closest noise sensitive receptors to the Proposed Development, and therefore those most exposed to the Proposed Development noise impacts, are High Clachaig to the west-south-west and The Braids to the north-north-west (the latter is currently uninhabited and planning permission for restoration has lapsed). The proposed turbine locations in the west have been removed as the design has evolved, which has reduced noise impacts on these noise sensitive receptors (see Design Statement for further detail).</p>

Discipline**(EIAR Chapter No.)****Embedded Mitigation**

Ecology (9)	<p>The Development Site was selected as it is not ecologically designated and, being largely plantation forestry, was considered unlikely to be of high ecological value.</p> <hr/> <p>Bat collision risk mitigation is embedded into the design and comprises appropriately-sized key-holing of turbines in forestry (100m key-holing, which is more than the precautionary 84m key-hole sizes required for the Proposed Development).</p> <hr/> <p>The overall number of turbines has reduced from 58 to 12.</p> <hr/> <p>The number of turbines in the north-western area of open moorland in the Development Site has reduced from six to two (with a third partly extending into the area). The remaining turbines and associated infrastructure are located in areas of existing forestry, rather than open blanket bog and other moorland. This includes Turbine 13, which has been moved into forestry after being previously located in an area of intact blanket bog on deep peat in a larger forest clearing.</p> <hr/> <p>Existing access track has been used where possible to reduce impact of Proposed Development. Where necessary due to the presence of peat, floating tracks will be constructed in accordance with best practice, whereby peat will be left <i>in situ</i> under the track providing hydrological connectivity between blanket bog on either side</p> <hr/> <p>A proposed borrow pit that was located on a low open hilltop supporting intact blanket bog towards the south east of the main Development Site, has been removed, with all borrow pits now located either in forestry or outwith areas of deep peat.</p>
Ornithology (10)	<p>The majority of turbines and associated infrastructure are located in areas of commercial plantation forestry, rather than open moorland habitats. Areas of commercial plantation are of relatively low value to bird species, and, at the Development Site, are inhabited by common and widespread passerines.</p> <hr/> <p>In accordance with the above, the position of Turbine 13 has changed from a location which was previously in a relatively large open clearing in the plantation forest. The habitat at this location was a mix of intact and degraded blanket bog. By moving Turbine 13 into the plantation habitat, the loss of this sensitive habitat, and the potential effects on moorland birds, has been minimised.</p> <hr/> <p>The access track to the main Development Site utilises an existing large track for forestry vehicles and vehicles travelling to another wind farm (Deucheran Hill). A large part of the principal access track through the main Development Site also utilises for much of its length the existing forest track.</p> <hr/> <p>A proposed borrow pit which was located on an open hilltop at Cnoc na Seilg, to the south-east of Turbine 14, has been dropped because of the presence of a black grouse lek at this location, as well as blanket bog.</p>

Discipline**(EIAR Chapter No.)****Embedded Mitigation**

	Use of existing access tracks where possible in order to minimise new access tracks and water crossings.
	Avoidance of Groundwater Dependent Terrestrial Ecosystems where possible (see Appendix 11.2 (EIAR Volume 3)).
Geology, Hydrology and Hydrogeology (11)	Optimising the design of the Proposed Development infrastructure to reduce the land take.
	No infrastructure located within areas of peat with a depth > 2m where possible (where it is not possible for new road infrastructure to avoid this, floating roads will be constructed).
	50m watercourse buffer observed, with the exception of watercourse crossings.
	SEPA private water supply buffers observed.
Cultural Heritage (12)	Cultural heritage features have been avoided where possible when siting the Proposed Development's components, including the turbines, associated infrastructure and access tracks.
	The walkover survey on 30 June 2021 found that there would be possible impacts on an area of shielings (29-34) resulting from the proposed access track near the south of the Development Site. This part of the track was moved to avoid impacting the shielings.
	The impact of the Proposed Development on the wider setting of assets has also been a key consideration during the iterative design process, with the design being altered to reduce setting impacts where possible.
Socio-economics, Recreation and Tourism (13)	The initial wind farm site selection across the Scottish National Forest Estate in Argyll and Bute was partly aided through viewshed analysis and considered a range of technical, environmental, planning and commercial factors. These included proximity to all residential properties (including hotels and holiday accommodation), recreational routes (including core paths, footpaths, and cycleways), and tourist attractions.
	Various iterations of the turbine layout were also considered as part of the design process, with visual considerations (including recreation and tourism receptors) factors guiding design.
Traffic, Transport and Access (14)	Swept path analysis and detailed modelling to accommodate turbine delivery has led to the widening of the access track leading from the A83 to the main Development Site and the addition of a temporary turbine laydown area on the western side of the A83.
	The use of on-site temporary quarries is likely to reduce the amount of HGV traffic for construction of the Proposed Development by up to 75% compared to importing 100% of stone requirements from elsewhere.

Discipline <i>(EIA Chapter No.)</i>	Embedded Mitigation
Infrastructure and Telecommunications (15)	A reduction in the number of turbines and the refined alignment of the final design to minimise potential significant effects on environmental receptors has resulted in a reduction in potential effects of the Proposed Development on electromagnetic interference and other infrastructure.
Aviation Safeguarding (16)	Eight turbines are proposed to have visible-red and eight infra-red hub mounted obstruction lights (9 turbines lit in total) in order to safeguard aviation.
Forestry (17)	The future Carradale Land Management Plan has been produced alongside the design of the Proposed Development, with the Applicant and FLS working in partnership together to produce plans which are suitable to both parties and the future of the forestry estate in this region. This has minimised the area of forestry being felled for the Proposed Development, as most of the construction area falls within areas planned to be felled prior to construction by FLS and part of the updated Carradale Land Management Plan (FLS, <i>unpublished</i>).
Shadow Flicker (18)	The evolution of the design of the Proposed Development has resulted in a significant reduction in the number of turbines proposed from those originally considered at the Development Site (see Design Statement). This has resulted in a reduction in the number of properties potentially affected by shadow flicker.

3.5 Construction Phase

Construction Programme and Phasing

- 3.5.1 The construction of the Proposed Development is planned to be undertaken over a period of 12 to 18 months, subject to award of consent and subsequent award of construction contracts. For the purposes of the EIA it is assumed that the construction programme will begin in 2023/4 to marry with the present grid connection contract RWE have for the Development Site, although this may change depending upon a number of factors and the grid network operators' own project specific programming.
- 3.5.2 Pre-construction and construction activities will include those shown in Table 3-8 and take place during the indicative construction programme outlined in Table 3-9. It should be noted that a number of activities will be undertaken simultaneously and that some felling will be undertaken prior to the main construction period, these are listed Table 3-8.

Table 3-8 Pre-construction and Construction Activities

Activity	Process
Pre-construction investigations and forestry removal	Further site investigation and pre-construction surveys following the felling of some trees required to inform the detailed design and construction management. Felling of some trees to facilitate some early works.
Creation of small temporary quarries	Opening up of small temporary quarries.
Creation and upgrade of site access	Upgrade of the Development Site access at the Killean Estate junction with the A83 (see Figure 1.3: Site Location Plan, EIAR Volume 2b).
Formation of temporary construction compound	Establishment of all temporary facilities including site offices, welfare facilities, lay down and storage areas, development of electricity and water supplies and erection of site signage, security fencing or hoarding as required.
Upgrade and formation of site access tracks	Extraction and processing of aggregate for the construction of new and upgraded site access tracks, junctions and passing places.
Forestry removal	Removal and/or key-hole felling of trees to create areas for wind turbines, site access tracks and other associated infrastructure. FLS will limit those activities that have to be undertaken continuously and will minimise temporary works.
Construction of control building and substation compound	Construction of buildings and compound to house specialist electrical and control equipment.
Construction of crane pad hardstandings	Formation of crane pads adjacent to each turbine location.
Excavations for turbine foundations	Excavations of turbine foundations by mechanical plant.
Construction of turbine foundations	Construction of turbine foundations will involve a combination of concrete and steel.
Underground cable laying	Installation of underground cabling between turbine locations and the control building and substation compound.
Turbine and battery storage delivery and erection	Delivery of all turbine components to site and erection of turbines. Typically, turbine erection will take 3-5 days per turbine. Battery storage facility to be constructed once turbines erected.
Commissioning and site reinstatement	Testing and commissioning of turbines and electrical equipment as well as site reinstatement including removal of temporary facilities.
Peatland restoration	Restoration of areas of degraded peatland following the felling of all remaining trees within that zone as part of the FLS Land Management Plan commitments.

Table 3-9 Indicative Construction Programme

Activity	Month																		
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Pre-Construction Investigations and necessary forestry removal	■																		
Creation of small temporary quarries		■																	
Creation and upgrade of site access		■																	
Formation of temporary construction compound		■																	
Upgrade and formation of site access tracks		■	■	■	■	■	■												
Forestry Removal		■	■	■	■	■	■												
Construction of substation and control building				■	■														
Construction of hardstandings/ crane pads				■	■	■	■	■	■	■									
Excavations for turbine foundations				■	■	■	■	■	■	■									
Construction of turbine foundations				■	■	■	■	■	■	■									
Underground cable laying											■	■							

Activity	Month																			
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Turbine delivery battery storage and erection																				
Commissioning and site reinstatement																				
Peatland restoration (time estimated as dependent on FLS felling)																				
Ongoing forestry operations																				

Construction Access

- 3.5.3 During the construction period, a range of vehicles will access the Development Site, including flatbed trucks, Heavy Goods Vehicles (HGVs), construction plant (such as excavators, bull dozers, concrete wagons and cranes), and cars and vans associated with construction staff movement. It is proposed that construction vehicles will enter the Development Site via the Killean Estate junction with the A83 (see Paragraphs 3.3.31 to 3.3.34).
- 3.5.4 Abnormal loads delivering turbine components to site will access the Development Site via the upgraded junction and turning area on the A83. The delivery route for abnormal loads from Campbeltown Harbour will be via the A83, which provides access from the south.
- 3.5.5 Further details of the route options and construction traffic movements for the Proposed Development are outlined in Chapter 14 of this EIAR: Traffic, Transport and Access. The route has been developed in consultation with Argyll and Bute Council. Each turbine will require approximately twelve deliveries to the Development Site. The components will be stored at each turbine crane pad area until they are lifted into position. In some infrequent instances, turbine components may be required to be stored in the laydown/ turning area adjacent to the A83, in order to comply with police escorts or if weather conditions stop their continued onward travel.
- 3.5.6 A Traffic Management Plan (TMP) will be developed in consultation with Argyll and Bute Council following award of consent. This will set out all traffic management procedures including programming, vehicles movements on and offsite, stacking areas and diversions. The TMP will be developed in consultation with FLS in order to ensure that it takes account of planned felling, harvesting or re-planting within the forest and any vehicle movements associated with these activities.

Hours of Working

- 3.5.7 For the purposes of the EIA, construction activities have been assumed to take place between the core hours of 07:00 - 19:00 Monday to Friday and 08:30 to 17:00 on Saturdays. Generally, there will be no works undertaken on Sundays or public holidays. However, some works, such as the delivery of turbine components and the use of concrete wagons, may occur outwith the core working hours in order to reduce disturbance on the public road network or to ensure the continuous pour of concrete for structural integrity. Any construction work outside of the core hours would be an exception and subject to approval from Argyll and Bute Council.

Site Environmental Management

- 3.5.8 During construction, the appointed contractor will be required to operate under a detailed site-specific Construction Environmental Management Plan (CEMP). The CEMP will implement all of the committed mitigation measures identified within this EIAR. The CEMP will set out a variety of control measures for managing the potential environmental effects of construction works, including control and management of noise, dust, surface water runoff, waste and pollution control. The CEMP will draw upon wind farm and general construction good practice, considering the guidance contained within, but not limited to, the documents listed in Table 3-10.

Table 3-10 CEMP Guidance Documents

Guidance Reference	Document
CIRIA Document C741	Environmental Good Practice on Site Guide (fourth edition) CIRIA (2015)
Scottish Renewables, SNH, SEPA & FCS	Good Practice During Wind Farm Construction, Version 4 (2019)
Guidance for Pollution Prevention (GPP) 1	Understanding Your Environmental Responsibilities – Good Environmental Practices (Northern Ireland Environment Agency (NIEA), Scottish Environment Protection Agency (SEPA) & Environment Agency, 2020)
GPP 2	Above Ground Oil Storage Tanks (NIEA, SEPA & Environment Agency, (2018a)
Planning Practice Guide (PPG) 3	Use and Design of Oil Separators in Surface Water Drainage Systems (NIEA, SEPA & Environment Agency, 2006)
GPP 4	Treatment and disposal of wastewater where there is no connection to the public foul sewer (NIEA, SEPA & Environment Agency, 2017)
GPP 5	Works and Maintenance in or Near Water (NIEA, SEPA & Environment Agency, 2018b)
PPG 6	Working at Construction and Demolition Sites (NIEA, SEPA & Environment Agency, 2012)
PPG 7	Safe storage - The safe operation of refuelling facilities (NIEA, SEPA & Environment Agency (2011)
GPP 8	Safe Storage and Disposal of Used Oils (NIEA, SEPA & Environment Agency, 2017a)
GPP 21	Pollution Incident Response Planning (NIEA, SEPA & Environment Agency, 2017b)
GPP 22	Dealing with Spills (NIEA, SEPA & Environment Agency) (2018c)
CAR, GBRs	Control Activities Regulations, General Bindings Rules (SEPA, 2011)

Dust Management

3.5.9 The following air quality mitigation measures reflect what is expected to be included in the CEMP, considering good practice guidance:

- No bonfires on site,
- Plan site layout by locating dust producing activities away from sensitive receptors,
- Regular cleaning of site entrances,
- Damping down of inter-turbine haul roads during prolonged dry periods,

- Provision of wheel washing facilities at the wind farm site entrance to prevent mud from construction operations being transported on to adjacent roads,
- Restriction of vehicle speeds on haul roads and other un-surfaced areas of Development Site,
- All vehicles to switch off their engines when not in use (i.e. no idling vehicles),
- Ensure that dusty materials are stored, handled and transported appropriately,
- Minimise dust generation activities on windy and dry days,
- Appropriate dust monitoring on site to inform site management of the success of dust control measures, and
- Any vehicles carrying stone will have dust covers over their containers.

Construction Waste Management

- 3.5.10 All excavated materials will be re-used on site wherever possible, provided the material is suitable (from an engineering as well as environmental perspective) for a required and predetermined end use as part of the construction and reinstatement on site.
- 3.5.11 Where waste materials are to be disposed of off-site, this will be done at licensed waste disposal facilities and in accordance with a Construction Resource Management Plan (CRMP), which will be prepared prior to the commencement of the construction works.

Construction Staffing

- 3.5.12 The number of construction staff present on site will vary according to the construction programme and activities being undertaken. Staffing levels will generally decrease as construction is progressed through to the commissioning phase. During the construction period, the contractor will employ an Environmental Clerk of Works (ECoW) who will input into the preparation and implementation of the CEMP; ensuring that committed mitigation measures identified in this EIAR are appropriately implemented. The ECoW will be supported by environmental specialists such as ecologists as and when required.

Health and Safety (CDM Regulations)

- 3.5.13 Health and Safety during construction will fall under the Construction (Design and Management) (CDM) Regulations 2015. A Construction Phase Health and Safety Plan will be prepared following award of consent.
- 3.5.14 Suitable signage will be erected at the entrance to the Development Site and the junction of the A83 in order to highlight that construction activities are being undertaken, provide directions and health and safety information. During the construction phase, access to areas of active construction would be restricted for health and safety purposes other than for planned forestry activities proposed by FLS.

Site Restoration and Commissioning

- 3.5.15 At the end of the construction period all temporary facilities will be removed. The disturbed parts of the Development Site will be reinstated and excavated / disturbed material that does not have a genuine and suitable identified reuse will be classified as waste material. This waste material will be managed and disposed of in accordance with the relevant legislation, including: Environmental Protection Act 1990, as amended; Landfill (Scotland) Regulations 2003, as amended; and the Waste Management Licensing (Scotland) Regulations 2011, as amended.
- 3.5.16 Access tracks and crane pads will be left in-situ for use during the operational phase of the Proposed Development and to facilitate decommissioning.
- 3.5.17 A period of commissioning and testing will be undertaken prior to full operational start up. This comprises a full system check and unlocking the turbine blades during suitable wind conditions to monitor the blade movement and electricity generation, to verify the Proposed Development is operating adequately.

3.6 Operational Phase

Operational Lifetime

- 3.6.1 The operational lifetime of the Proposed Development will be 35 years. A time period of approximately 12 months (up to a maximum of 18 months) will be required for any tree felling and subsequent construction and, following the 35-year operational period, a maximum of 12 months is expected to be required for decommissioning. The decommissioning will (subject to planning conditions and agreement with Argyll and Bute Council) likely involve the removal of the turbines and all above ground infrastructure of the wind farm, except for roads which will be used as forest tracks thereafter for maintenance of the forest and any peatland restoration implemented either by the developer or FLS as part of the Land Management Plan.
- 3.6.2 The Proposed Development has a 35-year operational lifetime, after which time it is assumed for the purposes of this EIA that it would be decommissioned. During operation, activities onsite will be limited to routine maintenance and servicing of the wind turbines and other associated infrastructure as required. This could include planned maintenance and repairs as well as emergency repairs.
- 3.6.3 A SCADA system will be installed to gather information from each of the turbines about their performance and highlight faults with the equipment. The SCADA system also enables the turbines to be controlled remotely.
- 3.6.4 Once operational, a small number of staff will visit the Development Site to undertake inspections or maintenance activities.

Forestry Operations

- 3.6.5 The Proposed Development has been designed to ensure that normal forest operations can be practiced throughout the lifetime of the Proposed Development and that it complies with the Scottish Government's Policy on Woodland Removal. Details of the updated Carradale Land Management Plan (FLS, *unpublished*) are provided in Chapter 17 of this EIAR: Forestry.

Carbon Reduction

- 3.6.6 Carbon balance calculations for the Proposed Development have been undertaken in accordance with the Scottish Government guidance and these are reported in Chapter 11 of this EIAR: Hydrology, Hydrogeology and Geology and especially Appendix 11.4: Carbon Balance Assessment (EIAR Volume 3).
- 3.6.7 The carbon balance calculations found that the Proposed Development could result in a relative saving of just over 3.1 million tonnes of carbon dioxide equivalent emissions over its lifetime (35 years) if a fossil fuel mix of electricity generation were used as the counterfactual.
- 3.6.8 It is expected to take 1.8 years (5.14% of the design life) for the carbon lost during wind farm construction (including through turbine manufacture, construction of foundations and excavation of peat) to be 'paid back' by the carbon saved through generating electricity from a renewable energy resource.
- 3.6.9 It is important to note that the carbon balance calculations do not account for a replanting regime, the 56.2 ha of peatland restoration proposed or the battery storage facility due to limitations with the calculator and in order to produce a robust result.

Site Environmental Management

- 3.6.10 Activity onsite will be limited during the operational period; however, the requirements of the CEMP (including control measures with respect to dust, surface water runoff, waste and pollution control) will remain in place for the life of the wind farm and thus will cover the duration of any maintenance works required.
- 3.6.11 Once operational, the Proposed Development will be operated under the requirements of the Applicant's internal Environmental Management Systems (EMS).

Health and Safety (Weather Conditions)

- 3.6.12 The selected wind turbines will be designed to withstand extreme weather conditions, these design functions are listed in Table 3-11.

Table 3-11 Turbine Health and Safety Design Functions

Weather Condition	Turbine Design Functions
Extreme Wind Speeds	All of the wind turbines will be fitted with sensors that will automatically shut down the turbines during periods where wind speeds exceed safe operating limits. This will prevent excessive wear and damage to the gear box.
Lighting Strike	In the event that a wind turbine is struck by lightning, the turbine will safely conduct the electricity into the earth.
Ice Throw	To ensure that visitors to the Development Site are aware of the risk of ice throw during periods of cold weather, warning notices will be installed at the Development Site access points.

3.7 Decommissioning

3.7.1 It is assumed for the purposes of this EIA that at the end of its 35-year operational life the Proposed Development will be decommissioned. Decommissioning will be undertaken in accordance with good practice available at the time. It has been assumed for the purposes of this EIAR that this will involve the removal of all above ground infrastructure except for site access tracks:

- The battery storage facility will be dismantled and removed,
- Turbines will be dismantled and removed from site,
- The top 1m of the turbine foundations will be dismantled and removed,
- It is assumed that crane pads will be left in-situ. The area will be then reinstated by covering it with imported topsoil and with appropriate seed mix, and
- The control building and substation compound will be dismantled and removed.

3.7.2 Site access tracks and cabling will be left in-situ as it is considered more environmentally damaging to remove them. The roads themselves will also allow FLS to manage the commercial forestry and planned peatland restoration during and after the life of the wind farm and therefore will avoid the need for new roads to be built after the decommissioning of the wind farm.

3.7.3 Decommissioning of the Proposed Development will require a temporary compound. The compound may be in the same location as the temporary construction compound once the battery storage area is dismantled and removed; however, the location will be confirmed at the time following consultation with Argyll and Bute Council and the Energy Consents Units.

3.7.4 On completion of the decommissioning works, all temporary facilities will be removed, and areas of excavation / disturbed ground will be reinstated in line with the Forestry Land Management Plan in place at the time.

- 3.7.5 Decommissioning will be carried out in accordance with a decommissioning plan prepared by the wind farm operator and agreed with the relevant authorities at least six months in advance of decommissioning.

3.8 References

- CIRIA (2015) C741: Environmental Good Practice on Site Guide (fourth edition).
- Environment and Heritage Services (EHS), SEPA & Environment Agency (2006) PPG 3 - Use and Design of Oil Separators in Surface Water Drainage Systems.
- EHS, SEPA & Environment Agency (2017) GPP 4 - Treatment and Disposal of Wastewater where there is no Connection to the Public Foul Sewer.
- Forestry and Land Scotland (*unpublished*) *Updated Carradale Land Management Plan* (title yet to be determined).
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- NIEA, SEPA & Environment Agency (2012) PPG 6 - Working at Construction and Demolition Sites.
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- NIEA, SEPA & Environment Agency (2017b) GPP 21 - Pollution Incident Response Planning.
- NIEA, SEPA & Environment Agency (2018a) GPP 2 - Above Ground Oil Storage Tanks.
- NIEA, Department of Agriculture, Environment and Rural Affairs, SEPA & Environment Agency (2018b) GPP 5 - Works and Maintenance in or Near Water.
- NIEA, Department of Agriculture, Environment and Rural Affairs SEPA & Environment Agency (2018c) GPP 22 - Dealing with Spills.
- NIEA, SEPA & Environment Agency (2020) GPP 1 - Understanding Your Environmental Responsibilities – Good Environmental Practices.
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- Scottish Renewables, Scottish Natural Heritage (SNH), SEPA and FCS (2015) Good Practice During Windfarm Construction.
- SNH (2015) Scotland's National Peatland Plan.
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RWE

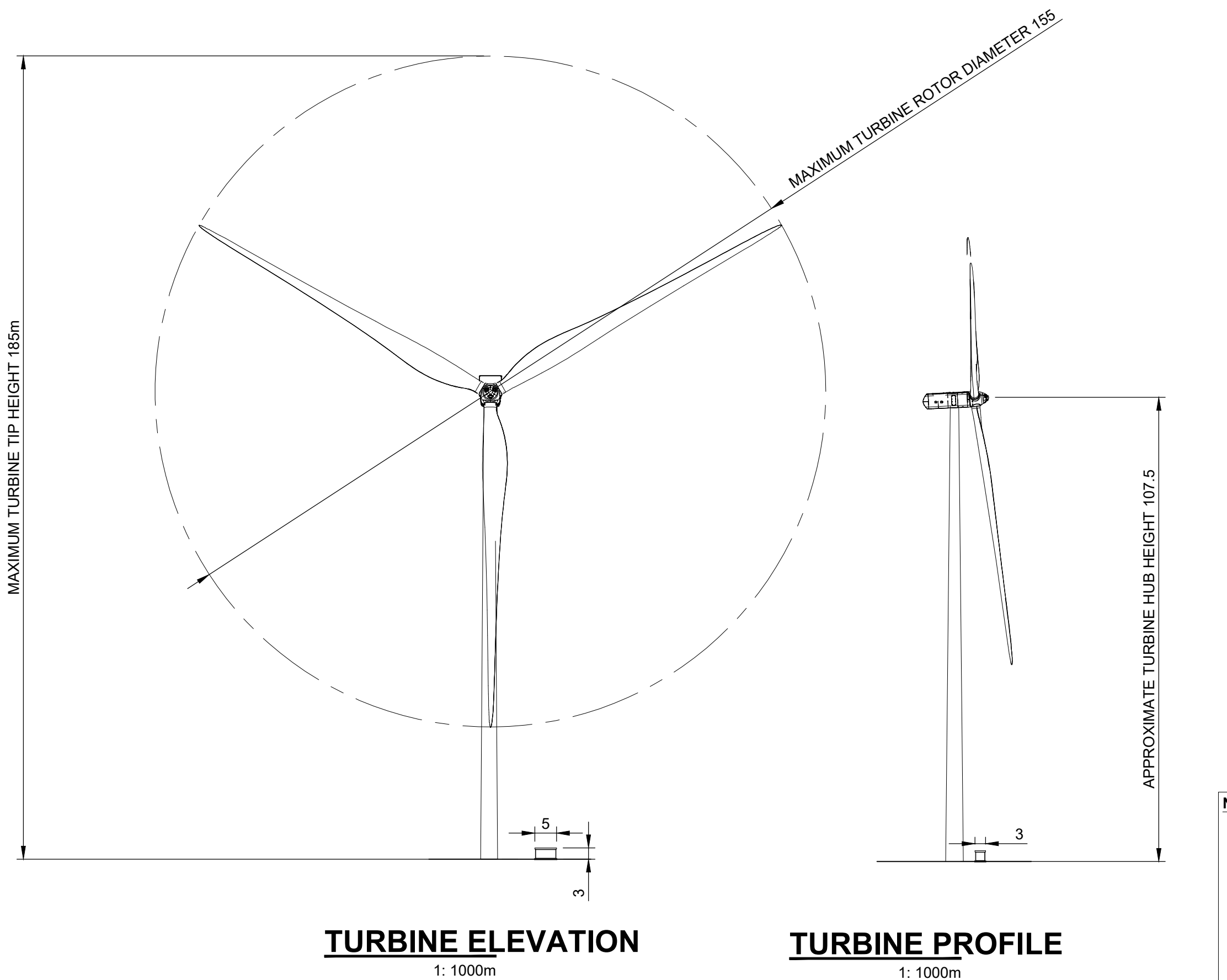
Clachaig Glen Wind Farm

Environmental Impact Assessment Report

Volume 2b

EIAR Figures

**Figures: 3.1a; 3.1b; 3.1c; 3.1d;
3.2; 3.3; 3.4; 3.5; 3.6; 3.7; 3.8;
3.9**



- NOTES**
1. MAXIMUM TIP HEIGHT BASED ON NORDEX N149 TURBINE.
 2. TURBINE DIMENSIONS ARE INDICATIVE AND SHOW MAXIMUM TIP HEIGHT AND ROTOR DIAMETER OF PROPOSED DEVELOPMENT.
 3. FOR MAXIMUM HUB HEIGHT OF PROPOSED DEVELOPMENT, PLEASE SEE FIGURE 3.1b.
 4. DIMENSIONS ARE IN METERS (m), UNLESS STATED OTHERWISE.

Client: **RWE**

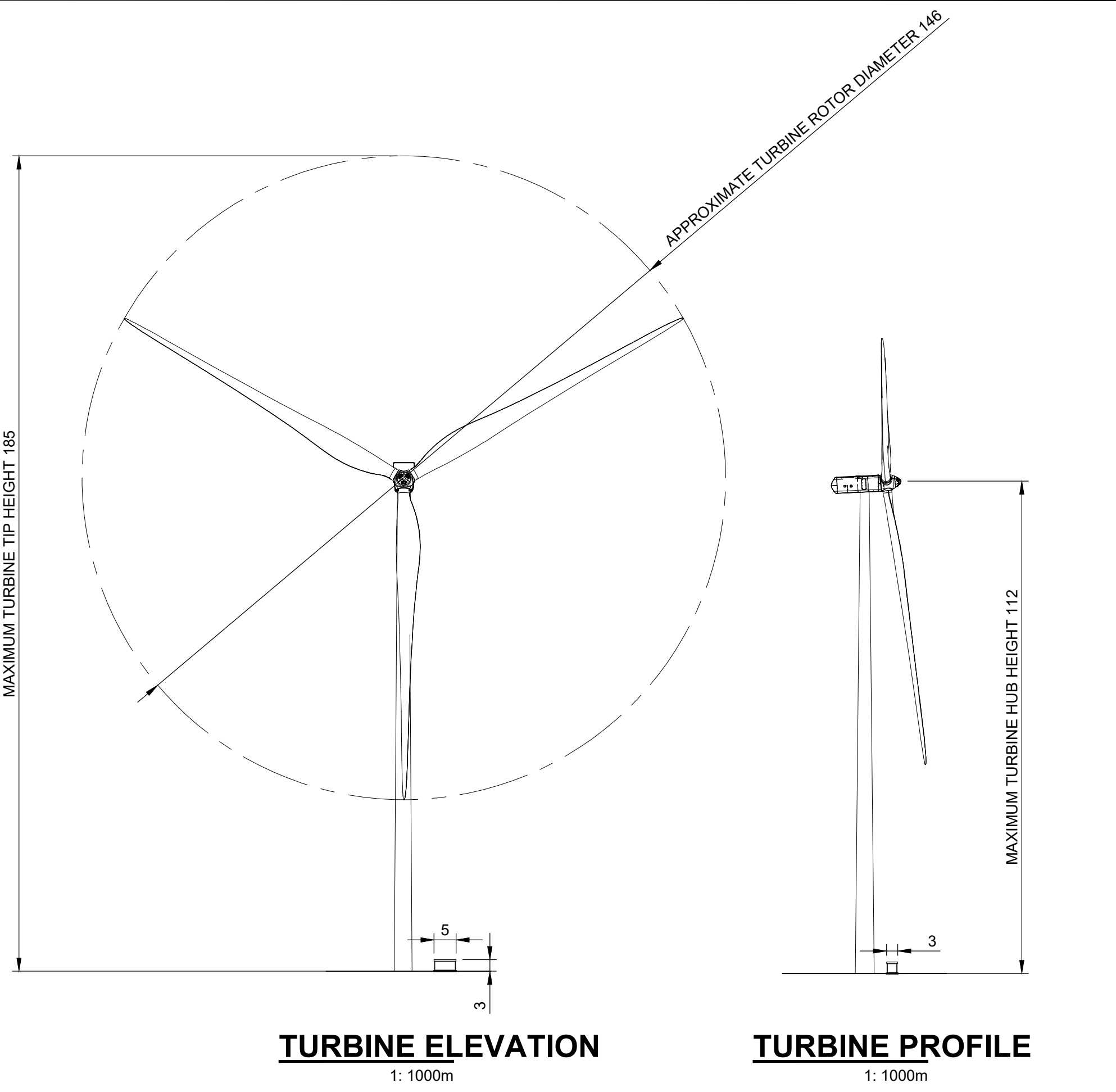
Project: CLACHAIG GLEN WIND FARM ENVIRONMENTAL IMPACT ASSESSMENT

Title: **FIGURE 3.1a**
INDICATIVE TURBINE MODEL TYPE 1
MAXIMUM TIP HEIGHT AND ROTOR DIAMETER

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www.aecom.com

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Verified: DL	Approved: SW
Date: DECEMBER 2021	Scale: VARIES
Drawing Number: CG_020222_EIA3.1a_v2	



- NOTES**
1. MAXIMUM TIP HEIGHT BASED ON NORDEX N149 TURBINE.
 2. TURBINE DIMENSIONS ARE INDICATIVE AND SHOWN MAXIMUM TIP AND HUB HEIGHT OF PROPOSED DEVELOPMENT.
 3. FOR MAXIMUM ROTOR DIAMETER OF PROPOSED DEVELOPMENT, PLEASE SEE FIGURE 3.1a.
 4. DIMENSIONS ARE IN METERS (m), UNLESS OTHERWISE STATED

Client: **RWE**

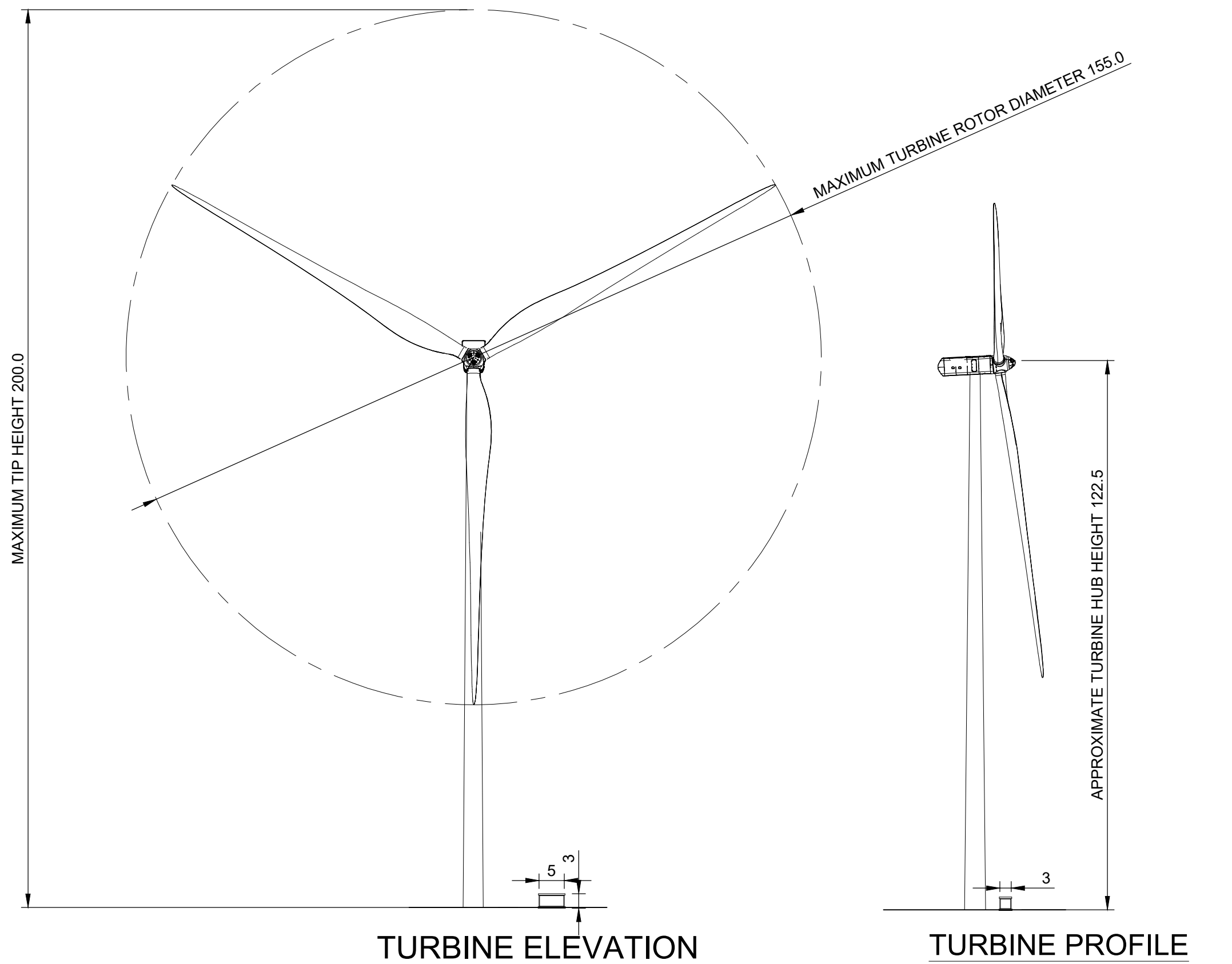
Project: CLACHAIG GLEN WIND FARM ENVIRONMENTAL IMPACT ASSESSMENT

Title: FIGURE 3.1b
INDICATIVE TURBINE MODEL TYPE 1
MAXIMUM TIP HEIGHT AND HUB HEIGHT

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1 TANFIELD
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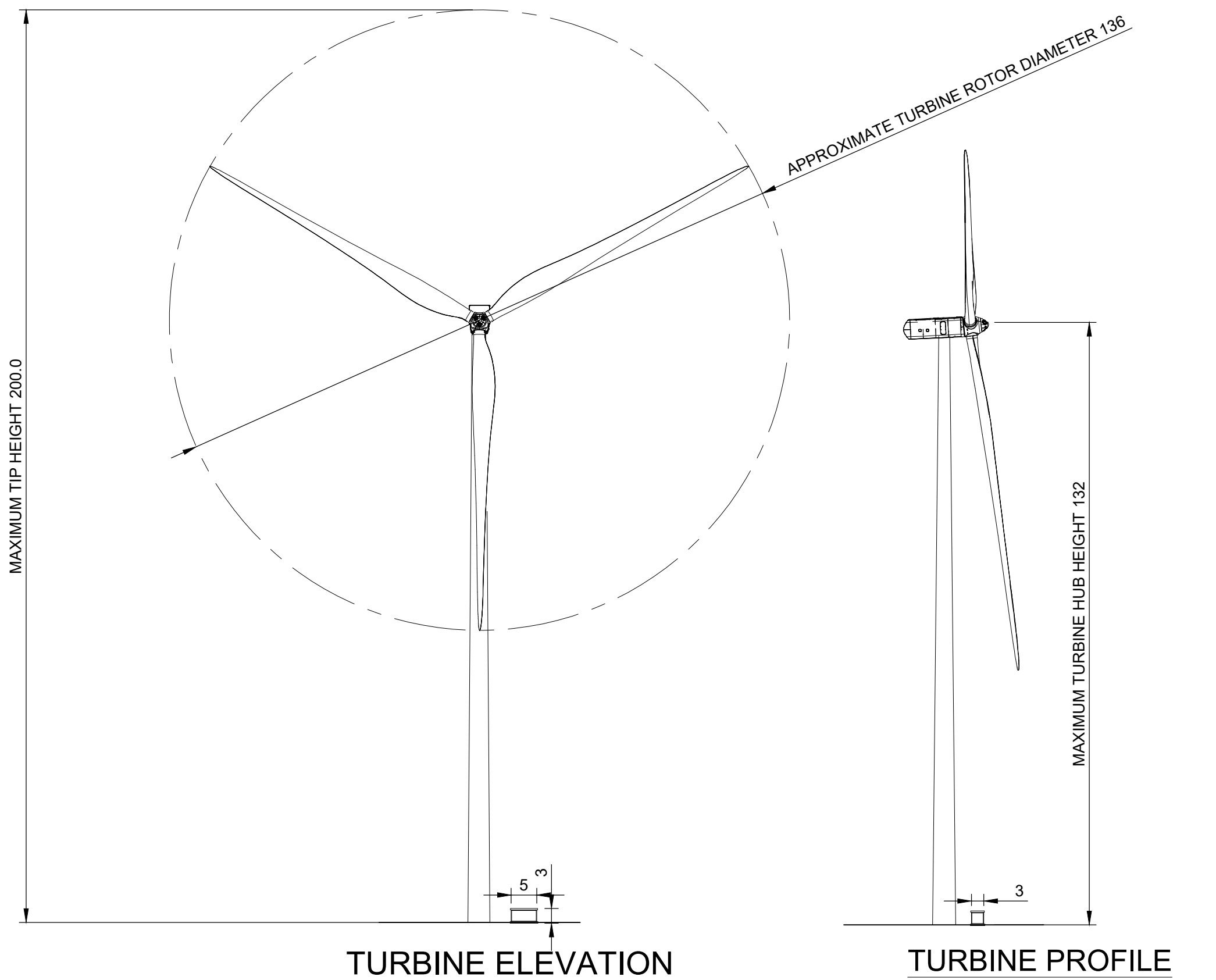
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Date: DECEMBER 2021	Scale: VARIES
Drawing Number: CG_020222_EIA3.1b_v2	



- NOTES**
1. MAXIMUM TIP HEIGHT BASED ON VESTAS V136 TURBINE.
 2. TURBINE DIMENSIONS ARE INDICATIVE AND SHOW MAXIMUM TIP AND ROTOR DIAMETER OF PROPOSED DEVELOPMENT.
 3. FOR MAXIMUM HUB HEIGHT OF PROPOSED DEVELOPMENT, PLEASE SEE FIGURE 3.1d.
 4. DIMENSIONS ARE IN METERS (m), UNLESS STATED OTHERWISE.

Client: RWE	Title: FIGURE 3.1c INDICATIVE TURBINE MODEL TYPE 2: MAXIMUM TIP HEIGHT AND ROTOR DIAMETER	AECOM AECOM 1 TANFIELD EDINBURGH, EH3 5DA	Drawn: AC Checked: SL Verified: DL Approved: SW
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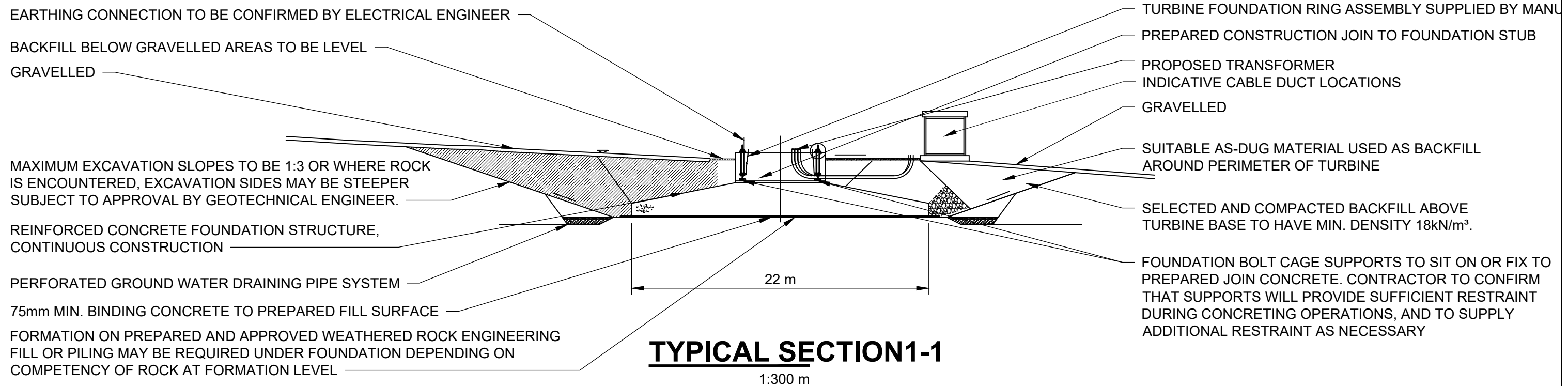
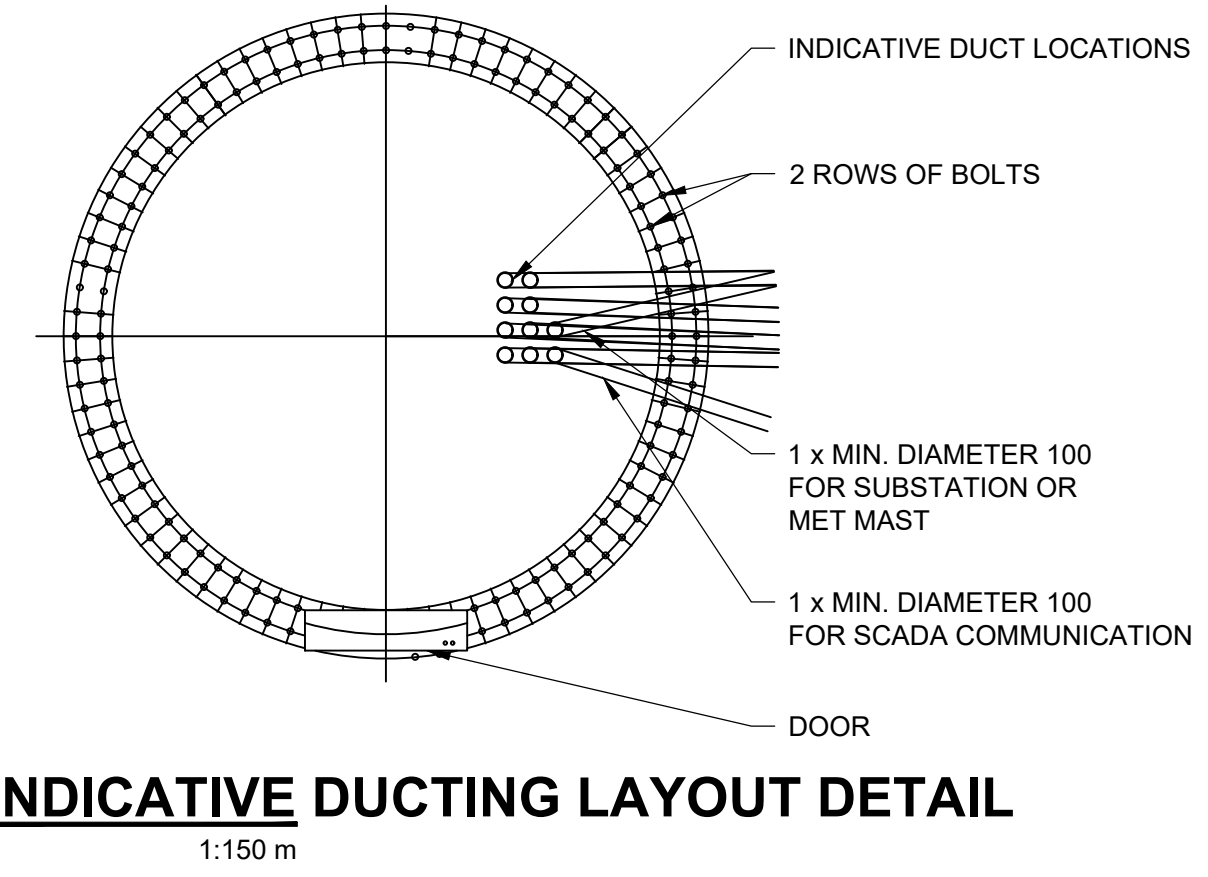
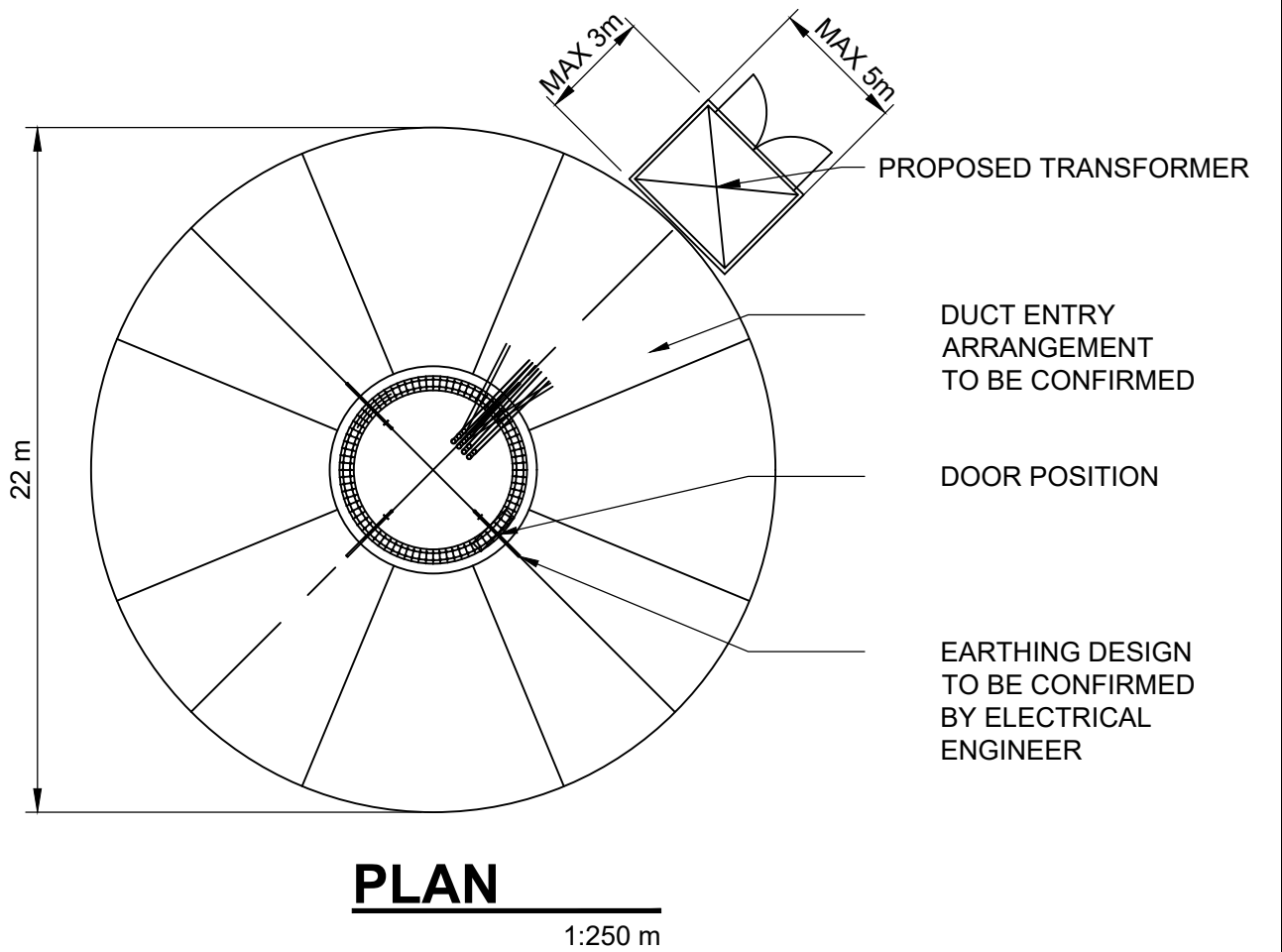
- NOTES**
1. MAXIMUM TIP HEIGHT BASED ON VESTAS V136 TURBINE.
 2. TURBINE DIMENSIONS ARE INDICATIVE AND SHOW MAXIMUM TIP AND HUB HEIGHT OF PROPOSED DEVELOPMENT.
 3. FOR MAXIMUM ROTOR DIAMETER OF PROPOSED DEVELOPMENT, PLEASE SEE FIGURE 3.1c.
 4. DIMENSIONS ARE IN METERS (m), UNLESS STATED OTHERWISE.

Client:	RWE
Project:	CLACHAIG GLEN WIND FARM ENVIRONMENTAL IMPACT ASSESSMENT

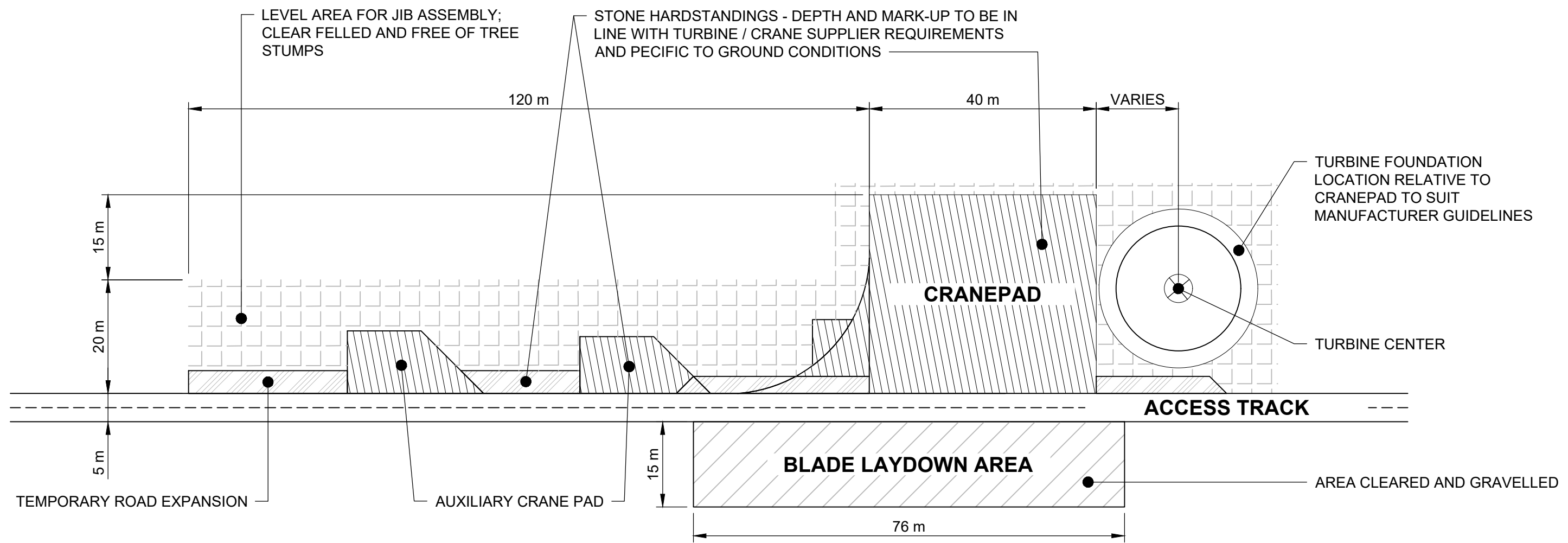
Title:	FIGURE 3.1d INDICATIVE TURBINE MODEL TYPE 2: MAXIMUM TIP AND HUB HEIGHT
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Date: DECEMBER 2021	Scale: 1:1000
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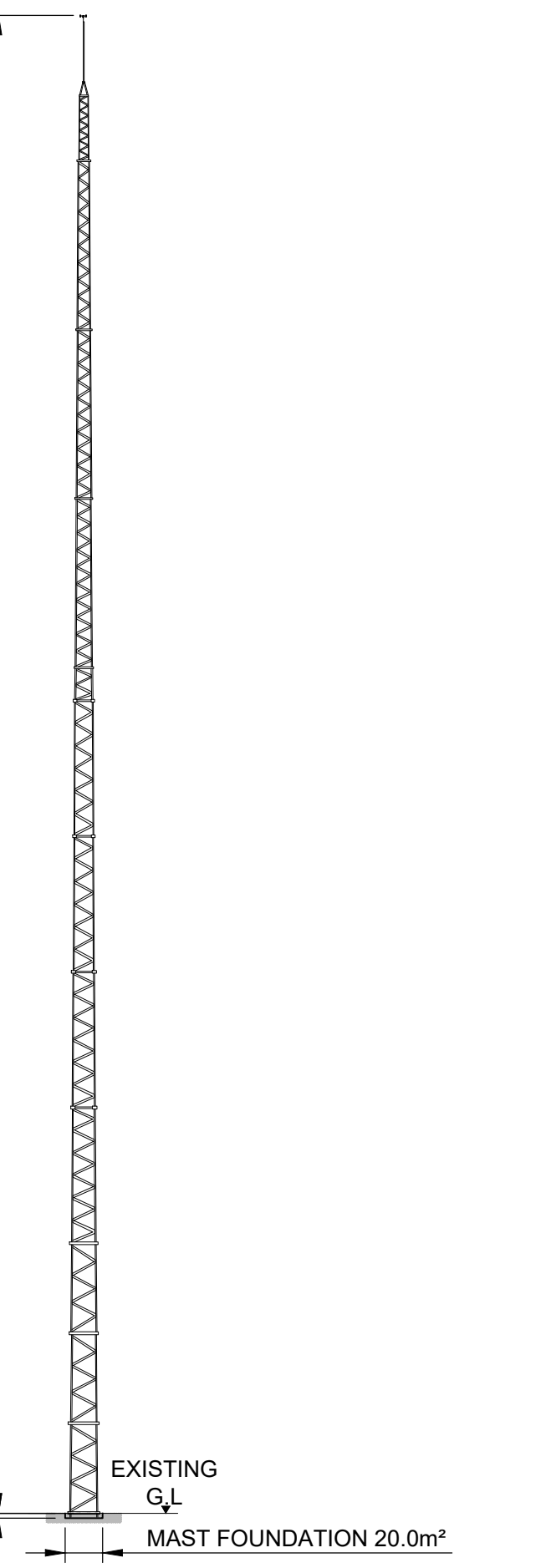


Client: RWE	Title: FIGURE 3.2 INDICATIVE TURBINE FOUNDATION	AECOM AECOM 1 TANFIELD EDINBURGH, EH3 5DA	Tel: +44 (0) 131 301 8600 Fax: +44 (0) 131 301 8699 www.aecom.com	Drawn: SL	Checked: AC
				Verified: DL	Approved: SW
Project: CLACHAIG GLEN WIND FARM ENVIRONMENTAL IMPACT ASSESSMENT				Date: JANUARY 2022	Scale: VARIOUS
				Drawing Number: CG_020222_EIA3.2_v2	



CRANEPAD GENERAL ARRANGEMENT
1:700 m

Client: RWE	Title: FIGURE 3.3 INDICATIVE CRANEPAD	 AECOM 1 TANFIELD EDINBURGH, EH3 5DA	Drawn: SL	Checked: AC
			Verified: DL	Approved: SW
Project: CLACHAIG GLEN WIND FARM ENVIRONMENTAL IMPACT ASSESSMENT		Tel: +44 (0) 131 301 8600 Fax: +44 (0) 131 301 8699 www.aecom.com	Date: DECEMBER 2021	Scale: VARIOUS
			Drawing Number: CG_020222_EIA3.3_v2	



- NOTES**
1. DRAWING SUBJECT TO MODIFICATION ACCORDING TO TURBINE HUB HEIGHT.
 2. COLOR: GALVANIZED STEEL.
 3. ALL DIMENSIONS IN METERS (m) UNLESS OTHERWISE STATED

Client: **RWE**

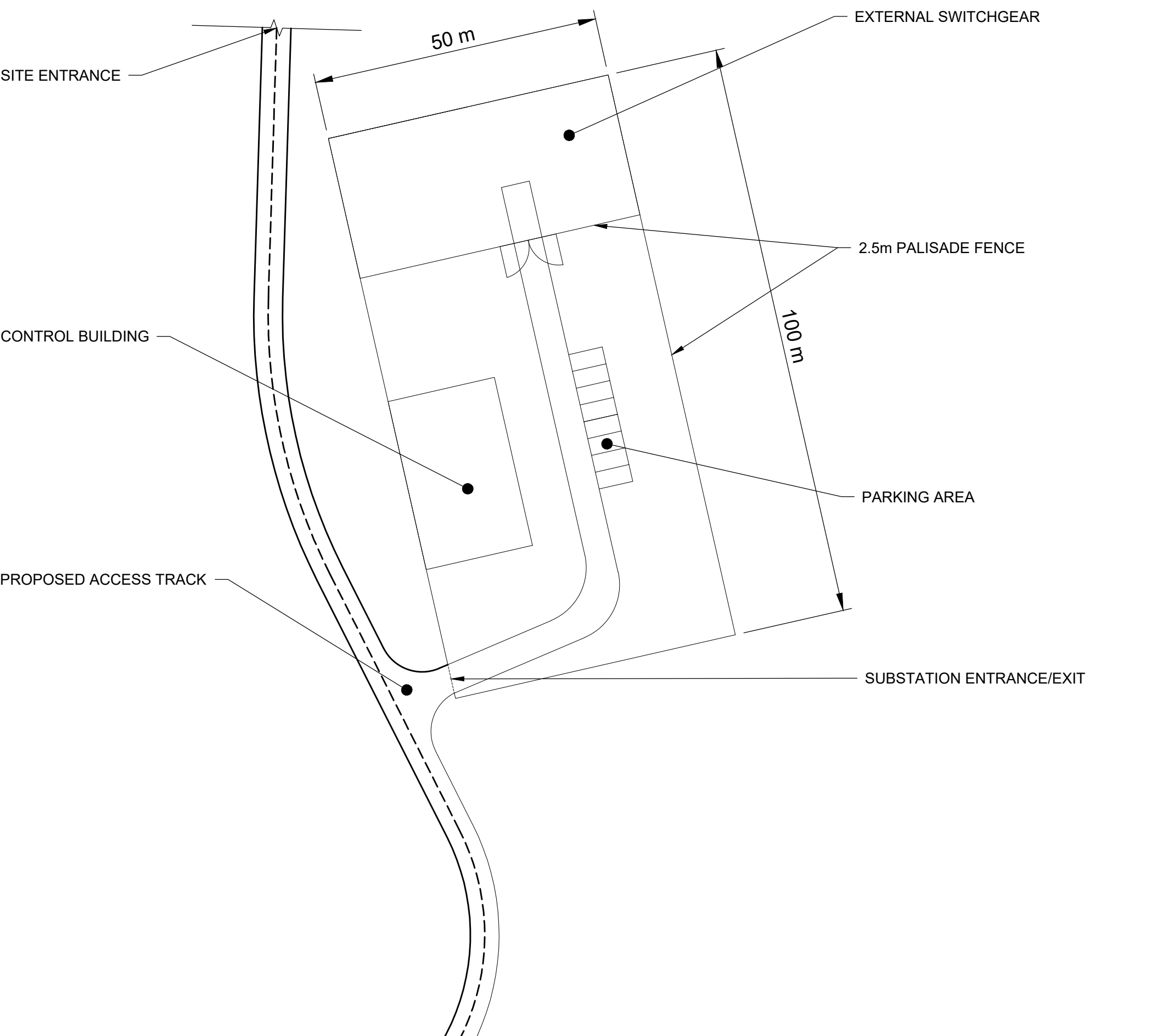
Project: CLACHAIG GLEN WIND FARM ENVIRONMENTAL IMPACT ASSESSMENT

Title: **FIGURE 3.4 INDICATIVE MET MAST**

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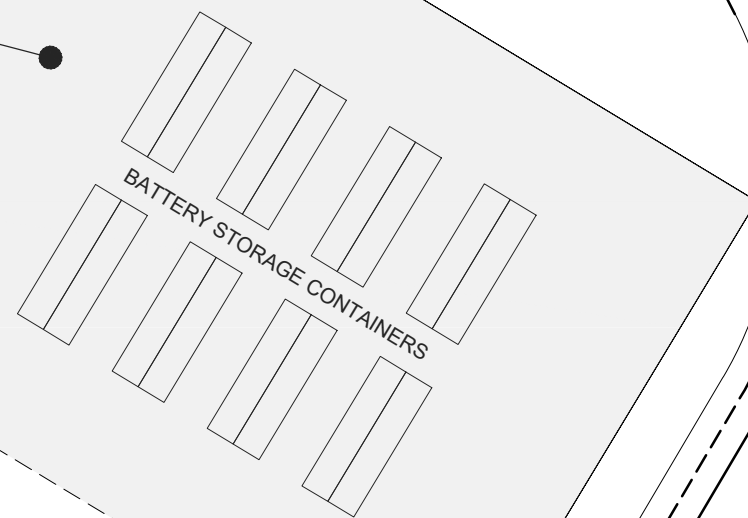
Client: RWE	Title: FIGURE 3.5 SUBSTATION COMPOUND	AECOM AECOM 1 TANFIELD EDINBURGH, EH3 5DA	Drawn: AC Verified: DL Date: DECEMBER 2021 Drawing Number: CG_020222_EIA3.5_v2	Checked: SL Approved: SW Scale: 1:750
Project: CLACHAIG GLEN WIND FARM ENVIRONMENTAL IMPACT ASSESSMENT	Tel: +44 (0) 131 301 8600 Fax: +44 (0) 131 301 8699 www.aecom.com		Drawing Number: CG_020222_EIA3.5_v2	

APPROXIMATELY 75 X 60 m TO BE LEFT BEHIND POST CONSTRUCTION FOR INSTALLATION OF BATTERY STORAGE AREA,

PORTABLE ACCOMMODATION AREA CONSTAINING SITE OFFICES, WELFARE FACILITIES, PORTALOOS, OIL STORAGE WITH BUNDING AND WATER TANK/BOWSER

2.5m SECURITY FENCE

AREA FOR LAYDOWN OF MATERIALS AND STORAGE OF CONSTRUCTION VEHICLES, FILTRATION TANK, WASTE MANAGEMENT AND CAR PARKING



TEMPORARY CONSTRUCTION COMPOUND ENTRANCE/EXIT

PROPOSED ACCESS TRACK

135 m

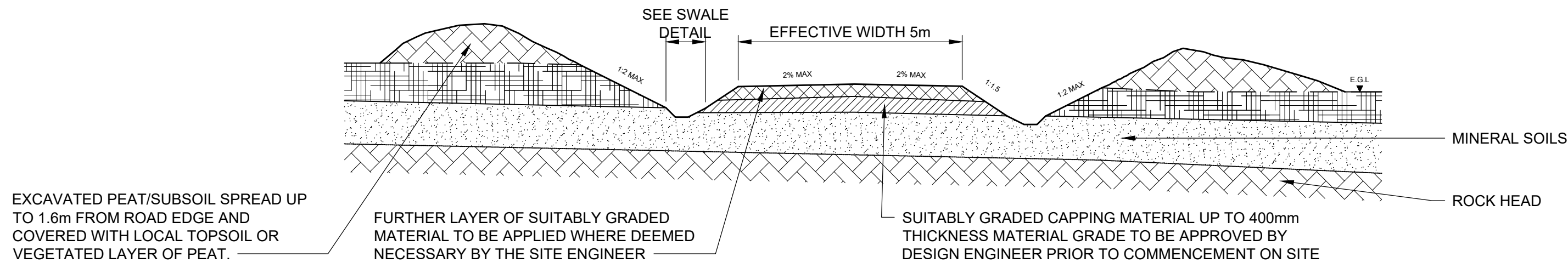
75 m

Client:	RWE
Project:	CLACHAIG GLEN WIND FARM ENVIRONMENTAL IMPACT ASSESSMENT

Title:	FIGURE 3.6 TYPICAL CONSTRUCTION COMPOUND AND BATTERY STORAGE FACILITY
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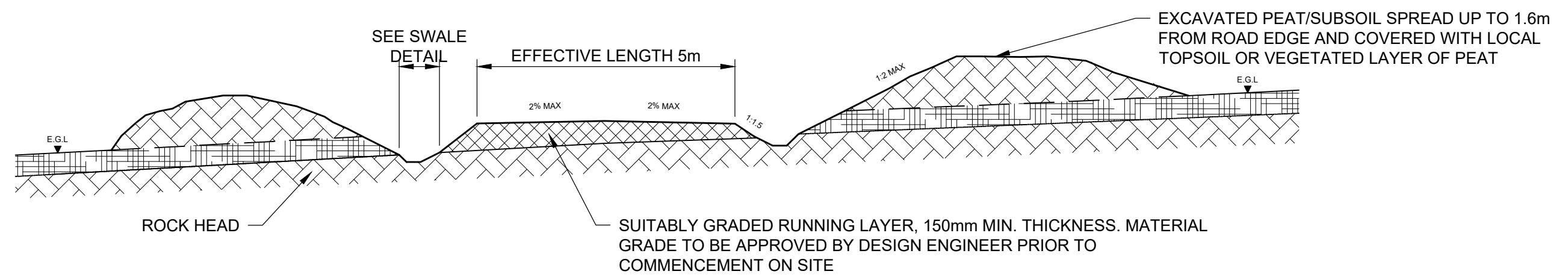
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Verified: DL	Approved: SW
Date: DECEMBER 2021	Scale: 1:750
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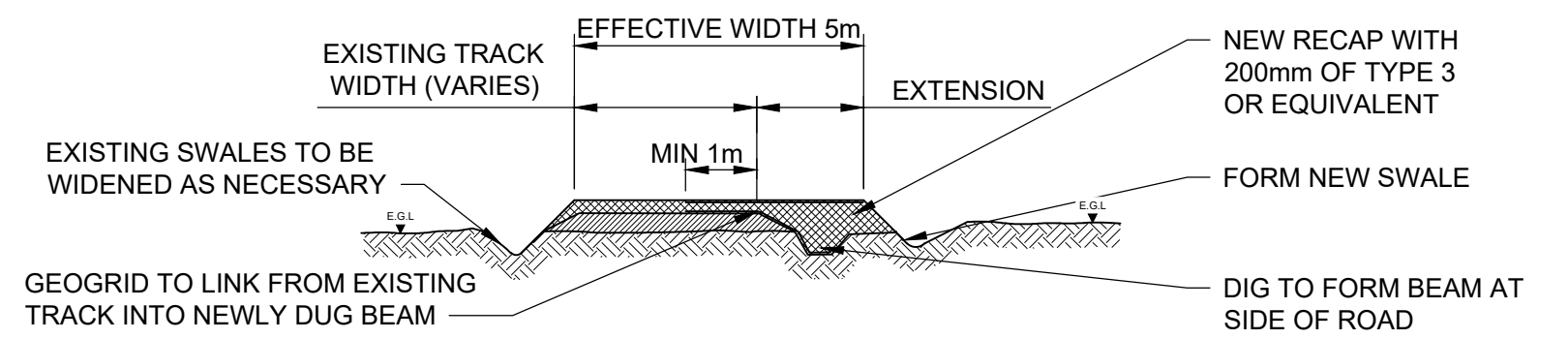
TYPICAL TRACK FORMATION ON OVERBURDEN SOIL

1:100m



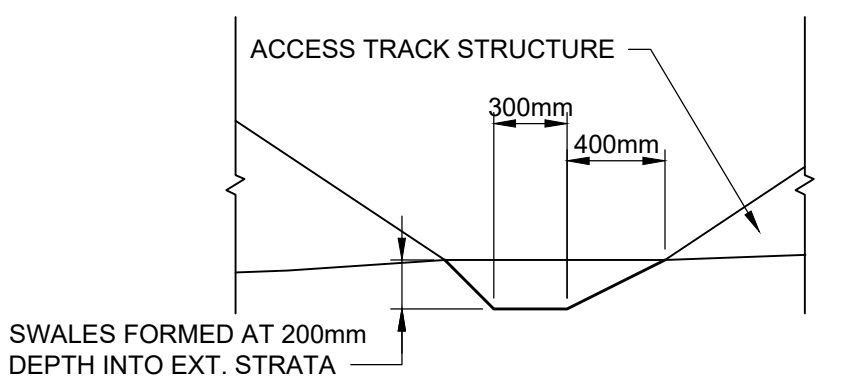
TYPICAL TRACK FORMATION ON ROCK

1: 100m



TYPICAL CROSS-SECTION OF TRACK CONSTRUCTION: TRACK WIDENING

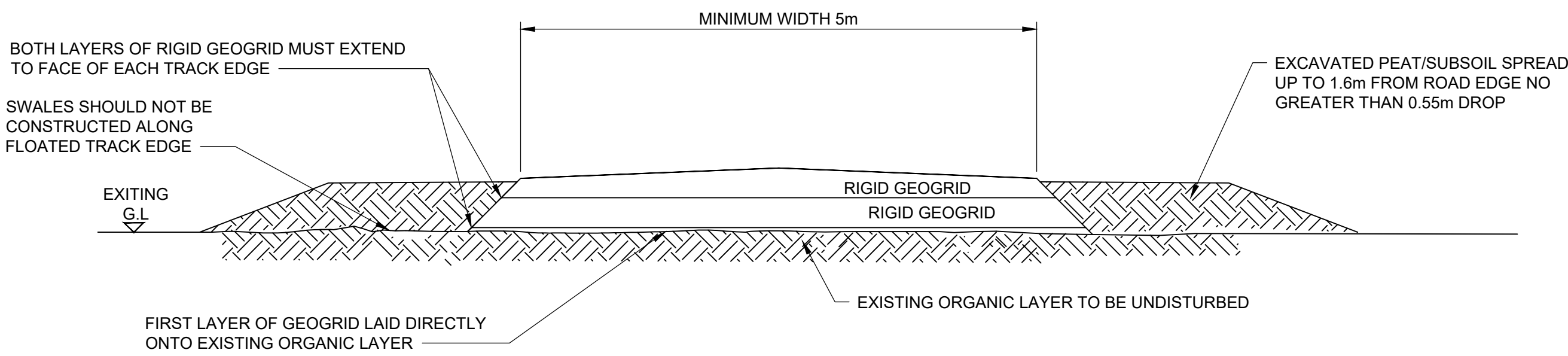
1: 125m



TYPICAL SWALE CROSS SECTION

1:30m

Client: RWE	Title: FIGURE 3.7 INDICATIVE ACCESS TRACK	AECOM AECOM 1 TANFIELD EDINBURGH, EH3 5DA	Drawn: AC	Checked: SL
			Verified: DL	Approved: SW
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			Fax: +44 (0) 131 301 8699 www.aecom.com	Scale: VARIES
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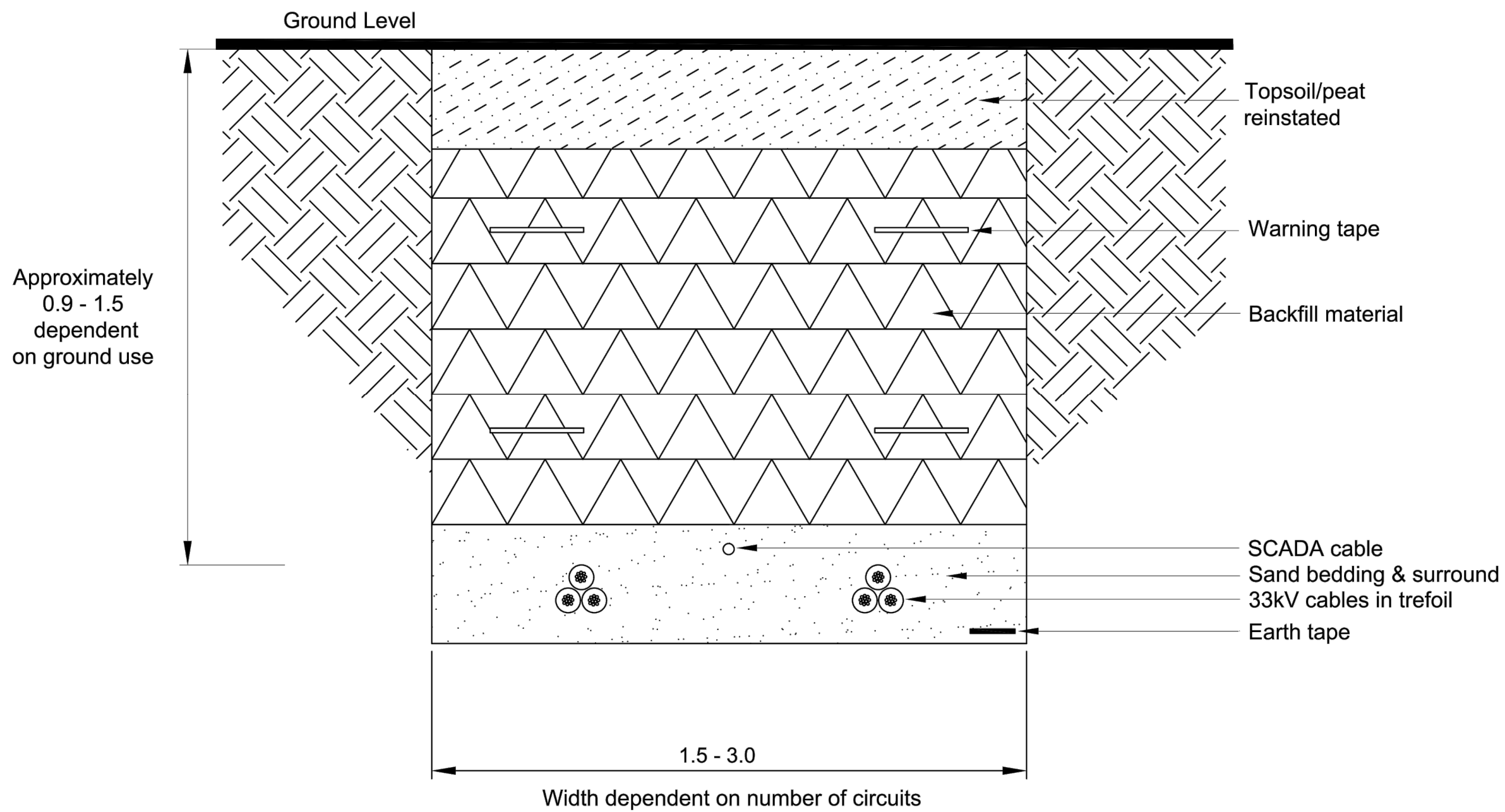


TYPICAL CROSS-SECTION OF FLOATED ROAD FORMATION

1: 50m

NOTES
 BEARING CAPACITY OF ALL TRACKS AND CRANEPADS MUST BE PROVEN BY AN APPROVED TESTING METHOD ON THE FINISHED STRUCTURE AT INTERVALS TO BE AGREED WITH THE ENGINEER ON SITE.

Client: 	Title: FIGURE 3.8 INDICATIVE FLOATING ACCESS TRACK	 AECOM 1 TANFIELD EDINBURGH, EH3 5DA	Tel: +44 (0) 131 301 8600 Fax: +44 (0) 131 301 8699 www.aecom.com	Drawn: AC Verified: DL Date: DECEMBER 2021 Drawing Number: CG_020222_EIA3.8_v2	Checked: SL Approved: SW Scale: VARIES
Project: CLACHAIG GLEN WIND FARM ENVIRONMENTAL IMPACT ASSESSMENT					



Client: RWE	Title: FIGURE 3.9 INDICATIVE UNDERGROUND CABLING	 AECOM 1 TANFIELD EDINBURGH, EH3 5DA	Drawn: SL	Checked: AC
			Verified: DL	Approved: SW
Project: CLACHAIG GLEN WIND FARM ENVIRONMENTAL IMPACT ASSESSMENT		Tel: +44 (0) 131 301 8600 Fax: +44 (0) 131 301 8699 www.aecom.com	Date: DECEMBER 2021	Scale: -
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