



ESTUARIES

OFFSHORE WIND FARM

FIVE ESTUARIES OFFSHORE WIND FARM

10.20.6 TECHNICAL NOTE - HAUL ROADS BETWEEN BENTLEY ROAD AND THE ONSHORE SUBSTATION

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RELEVANT DOCUMENTS	
<u>APP-066</u>	6.1.4 Site Selection and Alternatives
<u>AS-042</u>	6.3.1 Onshore Project Description – Revision C
<u>REP2-029</u>	10.20.3 Technical note - Abnormal Indivisible Loads
<u>AS-046</u>	6.6.8.1 Traffic and Transport Baseline Report - Part 1 - Revision C
<u>AS-043</u>	6.3.8 Traffic and Transport - Revision C
<u>REP3-010</u>	6.6.1.1 Environmental Statement - Onshore Cable Route Obstacle Crossings Register - Revision B
<u>REP2-023</u>	9.22 Outline Landscape and Ecological Management Plan - Revision C
<u>REP1-042</u>	9.21 Code of Construction Practice - Revision B
<u>REP2-030</u>	10.20.4 Technical note - Onshore Civils and Electrical



1. INTRODUCTION

1.1.1 This technical note is submitted to provide further description of the haul roads between Bentley Road and the Onshore Substation (OnSS).

1.1.2 This note is produced by the Applicant, Five Estuaries Wind Farm Limited (“VE”) in response to Action Point 4 from Issue Specific Hearing 3 – Environmental Matters held on 29 and 30 October 2024.

“Submission of a Technical Note for the proposed haul road between Bentley Road and the onshore substation zone indicating:

a) all haul road routes that it is proposed would be used during the construction works;

b) the specification, including surfacing materials, for the haul road, including any variations in the specification to accommodate lighter construction vehicles or Abnormal Indivisible Load deliveries; and

c) the parts of the haul road that would be retained for the Proposed Development’s operational phase and the parts that would be removed following the completion of the construction works”.

1.1.3 There are three roads that have been discussed during the Issue Specific Hearing in this area. These are summarised in Table 1 below.

Table 1 Summary of the roads discussed in this Technical Note

ROAD	DESCRIPTION
Cable Route Temporary Haul Road (Bentley Road to Ardleigh road – Section 6)	This is the temporary haul road that is used to install the cables. There is a section of this road in each of the cable route sections along the cable route from the landfall compound to the substation.
Temporary Substation Access Haul Road	<p>This is the temporary haul road that is dedicated for the traffic related to onshore substation construction. This is needed to separate the traffic associated with the cable installation to avoid congestion and unacceptable HSE risk.</p> <p>This road was deemed necessary to remove the HGV & AIL traffic from the local road network as soon as possible after exiting the A120.</p> <p>The road has access points from Bentley Road and Ardleigh road as shown in the Street Works and Access Plans APP-013 sheet 14-17. The Access plans also show two roads in these sheets (i.e. two sets of arrows for each crossing within the cable route, whereas in sections towards the landfall there is only one set of arrows at each of the crossings except at CR-8A and CR-8B where two off route haul road options exist either side of the cable corridor).</p>



ROAD	DESCRIPTION
	<p>The location of the haul road results in this traffic being taken off the local road network before the Haywain pub and other businesses, and the village of Little Bromley, minimising the impacts on local community.</p> <p>The selection of the location for the Temporary Substation Access Haul Road is discussed in Site Selection and Alternatives APP-066 section 4.14.67-4.14.75.</p> <p>This road progresses within the cable working corridor towards Ardleigh Road. There will be a crossing point at Ardleigh Road where the traffic must cross and enter the onshore substation construction area.</p> <p>This is outlined in the Onshore Project Description AS-042. section 1.4.1. where it is stated “a dedicated haul road is incorporated to allow for construction traffic access to the onshore substation”. This is further described in section 1.5.29 “temporary substation access haul road running alongside the Onshore ECC. This temporary haul road will be constructed as enabling works and is expected to also be used by construction traffic associated with the North Falls and EACN substations”.</p>
Permanent NGET Access Road	<p>This is a proposed permanent road that is being developed by NGET for the EACN substation. This road is not part of the Five Estuaries DCO application and is not within the Order Limits.</p> <p>The Applicant is coordinating with NGET on the potential to use this road, should it be installed, to minimise impact on the local community during operation should access for large vehicles / components be needed.</p>



2. DESCRIPTION OF THE HAUL ROAD

2.1 LOCATION OF HAUL ROAD & DESCRIPTION

2.1.1 Both the Temporary Substation Access Haul Road and the Cable Route Temporary Haul Roads are situated within the corridor section of the Order Limits shown in Drawing numbers 1.8 and 1.9 in the Onshore Project Description [AS-042](#). These are copied below for convenience.

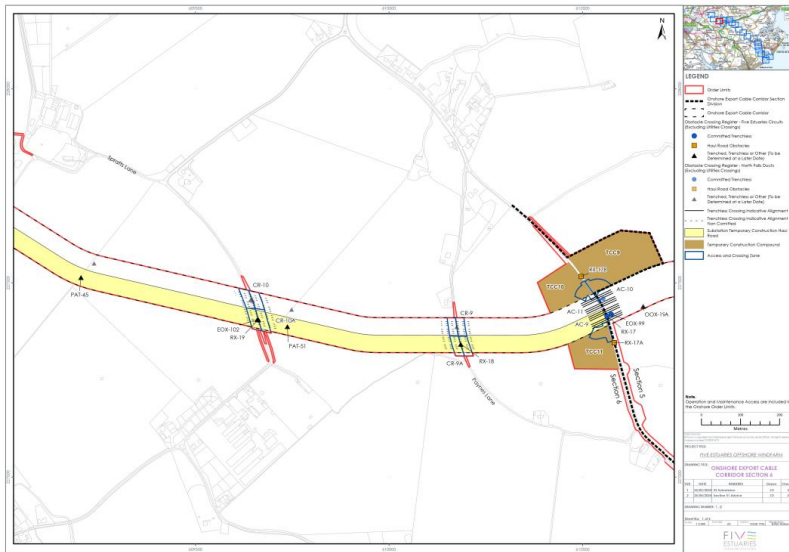


Figure 1 Plan showing Five Estuaries Export Cable Corridor containing part of the area for the Temporary Substation Access Haul Road (yellow) (continued on Fig. 2)

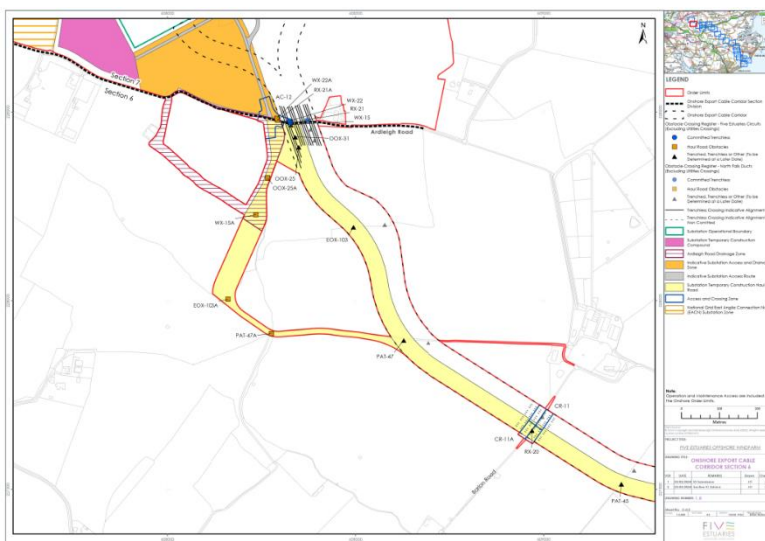
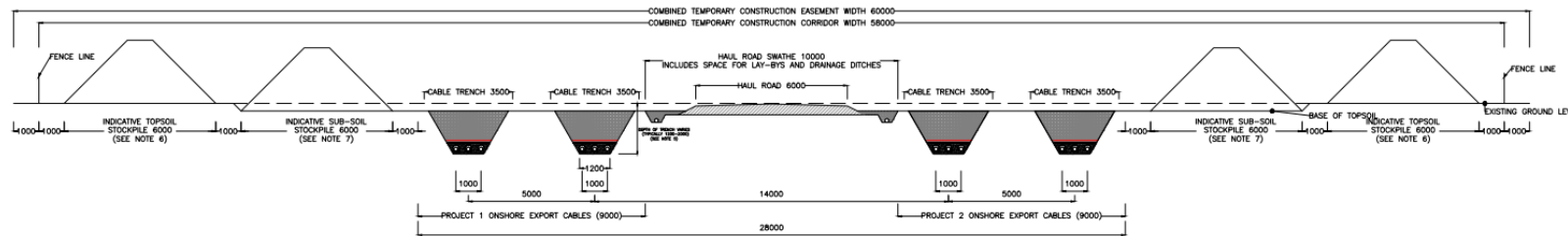


Figure 2 Plan showing Five Estuaries Export Cable containing part of the area for the Temporary Substation Access Haul Road (yellow) (continued from Fig.1)

2.1.2 Cross sections showing how the Cable Route Temporary Haul Road and the Temporary Substation Access Haul Road are configured in the corridor is shown in Figure 3.



SCHEMATIC OF COMBINED FIVE ESTUARIES AND NORTH FALLS OFFSHORE WIND FARMS. OPEN CUT SWATHE WIDTH ASSUMING SHARED HAUL ROAD BETWEEN PROJECTS



SCHEMATIC OF COMBINED FIVE ESTUARIES AND NORTH FALLS OFFSHORE WIND FARMS. OPEN CUT SWATHE WIDTH ASSUMING SHARED HAUL ROAD BETWEEN PROJECTS AND SEPARATE SUBSTATION CONSTRUCTION HAUL ROAD

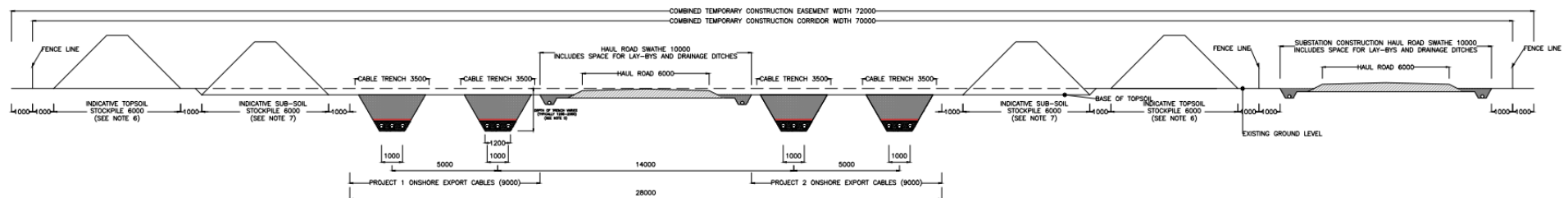


Figure 3 Cross section of cable corridor in the sections 1-5 with only the Temporary Export Cable Haul Road (above) and section 6 with the Cable Route Temporary Haul Roads and the Temporary Substation Access Haul Road (below)*

**Please note that this figure is consistent with the Figure 1.10 in the Onshore Project Description [APP-043](#) and shows the maximum swathe which is Scenario 1 where the Five Estuaries and North Falls ducts are installed at the same time.*



2.1.3 The location of the National Grid (“NGET”) Permanent NGET Access Road is shown in Figure 4 below taken from the Norwich to Tilbury recent consultation documentation. It should be noted that due to the NGET Norwich to Tilbury project being behind the Five Estuaries project in the consenting regime, the route may be subject to change.

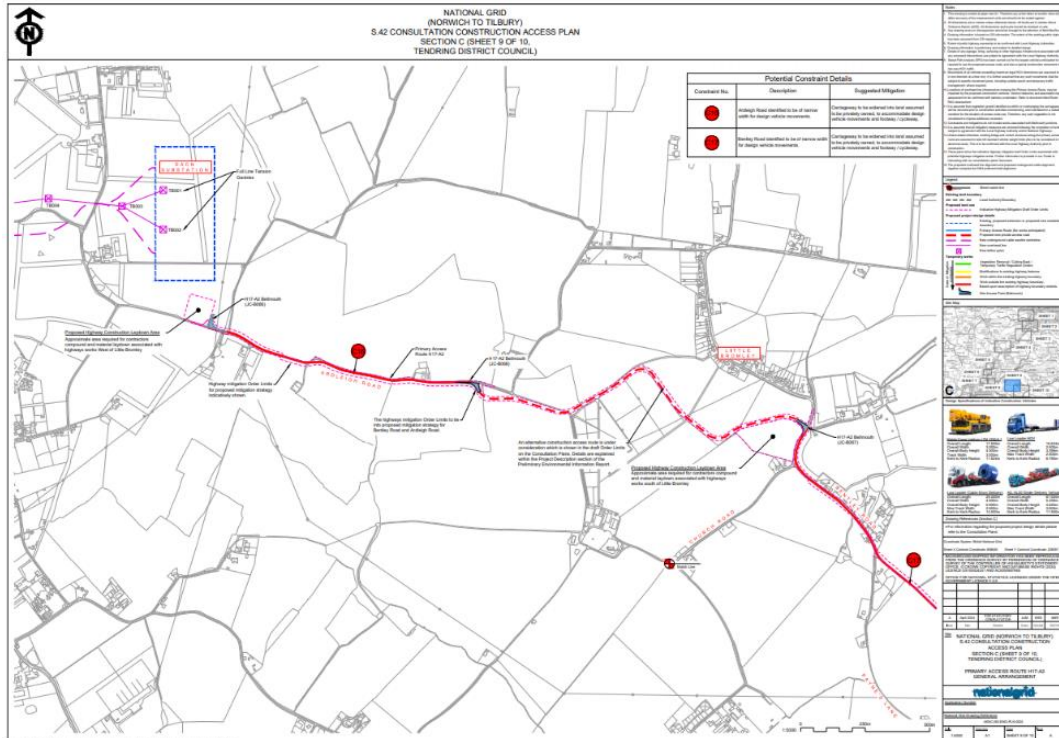


Figure 4 Location of the NGET Access Road (permanent) from the NGET 2024 Statutory Consultation (please note the exact route may not be final).

2.1.4 To aid in the understanding of how these roads are located, Figure 5 shows the general arrangement of the Permanent NGET Access Road and the Applicant’s Temporary Substation Access Haul Road options.

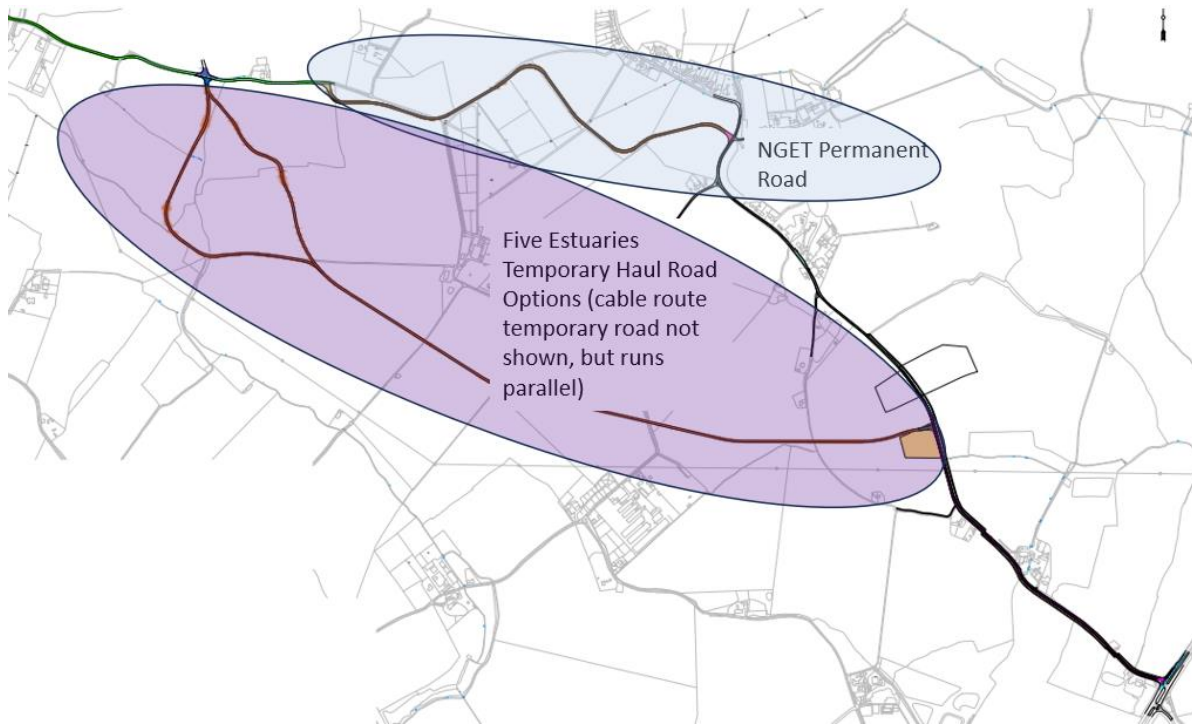


Figure 5 Sketch showing the location of the Temporary Substation Access Haul Road and the NGET Permanent Haul Road

The Permanent NGET Access Road is outside of the VE Order Limits and does not form part of the VE application.

2.2 TYPE OF ROAD/SURFACE MATERIAL OPTIONS

- 2.2.1 The description of the temporary haul roads is contained in the 6.3.1 Onshore Project Description – Revision C [\[AS-041\]](#) at paragraphs 1.4.32 to 1.4.35.
- 2.2.2 The options outlined are the use of:
- Protective matting
 - Temporary metal road
 - Permeable hardcore aggregate
 - Specialist trackway
- 2.2.3 It is noted that the final selection of road type will be made in detailed design as it is dependent on the ground conditions, vehicle requirements and any necessary protection for underground services.
- 2.2.4 For the EIA, permeable hardcore was considered the ‘maximum design scenario’ for all of the haul roads as with this option there is the highest number of vehicle movements and highest volume of imported materials.
- 2.2.5 Specifically for the Temporary Substation Access Haul Road, the Applicant has made allowance in the Onshore Project Description estimation of materials (Table 1.14 in [AS-042](#)) for this to be a hard topped road including drainage. This is different than the Cable Route Temporary Haul Road because it may be used by up to 3 projects. This additional allowance ensures the project has the flexibility to select the best option for this road to minimise the impacts such as noise and dust caused by HGVs running on non hard topped surfaces.
- 2.2.6 To aid in the understanding of typical haul road construction and further supplement the description provided in the Onshore Project Description [\[AS-041\]](#). [The Applicant provides the following description and examples of temporary haul road construction.](#)
- > Topsoil stripping
- 2.2.7 First the topsoil must be stripped. This will be done in liaison with landowners and tenants to seek to ensure live crops will not be present on the easement when entry is required. Topsoil will be stripped off within the demarcation line using excavators, and/or following behind by a bulldozer used to push the topsoil to the side of the corridor where it will be stacked in a tidy weatherproof stockpile as shown in Figure 6, being an example from a previous wind farm project.
- 2.2.8 The topsoil will be separated from the sub-soil to prevent mixing of soil horizons. Movement of topsoil between different fields or sections will be discouraged. Any additional archaeological mitigation (e.g. watching brief) required following the programme of archaeology in advance of construction (set out in the outline Written Scheme of Investigation - Onshore [APP-256]) will be implemented as required.



Figure 6 Example topsoil stripping for a wind farm project

> Temporary Haul Road Construction

2.2.9 There will be two separate temporary haul roads between Bentley Road and the Onshore Substation. The Cable Route Temporary Haul Road and the Temporary Substation Access Haul Road. The intended use of the two roads is different and hence the most suitable road type may differ.

2.2.10 The next step that may be undertaken is to install a geogrid/geotextile membrane. This layer is to control the infiltration of water, which if uncontrolled may deteriorate the subsoil below. After this layer, the next activity in the haul road construction will be “stone up”. A base layer of between 290mm and 420mm thick will be created using hardcore, MOT type 1 granular materials as a base material. 2.2.2 The hardcore will be delivered to stockpiles within the works areas and loaded into dumpers where the material is transported along the corridor for placing and grading using excavators. Where weather and ground conditions permit, the tipper wagons will reverse along the track and tip directly onto the required areas. This is shown in

2.2.11 Figure 7.



Figure 7 Example stone base being installed at previous wind farm

- 2.2.12 If needed, drainage swales will be constructed on one side of the haul roads with suitable embankments to avoid undermining the integrity of the haul roads.
- 2.2.13 On completion of the “stone-up” operation the haul road surfacing will be laid if required. The surfacing may consist of tarmacadam, reclaimed tarmacadam, stone or concrete or a combination of these. An example of a stone surfaced road is shown in Figure 8 & Figure 9 A typical finished tarmacadam surfaced haul road is shown below in Figure 10.



Figure 8 Example 1 of stone surfacing in construction from a previous wind farm project



Figure 9 Example 2 of stone surfacing in construction from a previous wind farm project



Figure 10 Typical tarmacadam surfacing of a road for an offshore wind farm

2.3 INTENDED USE

- 2.3.1 The Cable Route Temporary Haul Road will be used by plant equipment to excavate the trenches, lay the ducts, reinstate the trenches, transport the cable drums and joint bay equipment and materials, provide access for the cable pulling equipment and for the reinstatement. The use of the Cable Route Temporary Haul Road to access the Onshore substation site would be only in an emergency if it were safe to do so (i.e. if it was not being used for the installation of the ducts and cables).
- 2.3.2 The Temporary Substation Access Haul Road for will be used for the HGVs associated with the construction of the substation such as;
- > Deliveries for plant and to construct welfare facilities
 - > Earthworks
 - > Construction and installation of drainage and utilities
 - > Formation of the platform & roads
 - > Construction of the buildings
 - > Transportation & installation of the electrical equipment for the substations(s)
 - > Removal of waste
- 2.3.3 This road was deemed necessary during a design review having regard to the Construction Design Management regulations 2015 and the requirements to design out risk. Without two haul roads, the traffic for the onshore substation construction would be using the same road as the cable installation which would create activity clashes. This is the case even if the project is the sole user of both roads.
- 2.3.4 The Temporary Substation Access Haul Road will also be used to transport the special order AILs that are associated with the substation. The details of this equipment is provided in Table 1 of the AIL Technical Note [[REP2-029](#)].

2.3.5 In addition to HGVs and AILs, LGVs and construction workforce vehicles may also use the Temporary Substation Access Haul Road however they may also use an alternative route such as the NGET Permanent Access Haul Road if this is available. This flexibility has been considered within the Traffic and Transport Chapter [AS-043].

2.3.6 As indicated in the Onshore Project Description Five Estuaries are collaborating on the design and engineering works with North Falls. This is to ensure the projects can share the haul road in Scenario 1 and 2. The wind farm projects are also coordinating with NGET who may utilise the Temporary Substation Access Haul Road where they secure the necessary land rights to do so. The purpose of this collaboration and coordination is to reduce the construction impacts. The vehicles associated with North Falls and NGET projects are anticipated to be similar in nature to those for Five Estuaries.

2.4 MAXIMUM TRACKWAY PRESSURE/LOAD, TRACK WEIGHT MAX TO BE PROVIDED

2.4.1 A number of potential configurations for the largest AILs (the transformers) are set out in the AIL Technical Note REP2-029. These are summarised below in Table 2. Typical values for other objects for comparison are provided in Table 3.

2.4.2 It is again noted that only 2 movements of the heaviest AILs at the fully laden weight are required for Five Estuaries (as the 2 movements out will be unladen once the transformers have been delivered to the substation site).

Table 2 AIL Ground Pressures for transformers

AIL trailer Type	Ground bearing pressure [Ton (T)/m2]	Total Weight [Ton]
16 axle flat top trailer	4.83	326.0
20 axle girder frame trailer	4.99	404.0
24 axle girder frame trailer	4.28	423.42
24 axle girder frame trailer	4.17	484.4

Table 3 Typical values of ground pressures for various objects [1]

Object	Ground Pressure [Ton (T) /m2]
Hovercraft	0.071356
Human on snowshoes	0.356779
Rubber-tracked ATV	0.526504
Wheeled ATV	1.406728
Average human, flat shoes, two feet.	1.732926

Object	Ground Pressure [Ton (T) /m2]
Human male (130 kg, standing on one foot)	5.606524
M1 Abrams tank	10.49949
Adult horse (550 kg, 1250 lb)	17.23643
1993 Toyota 4Runner / Hilux Surf	17.32926
Bagger 288 excavation machine	17.43612
Passenger car	20.89704
Adult elephant	24.46483
Mountain bicycle	24.97452
Road racing bicycle	63.20082
Commercial semi truck/Lorry	80.83588
Stiletto heel	331.2946

2.4.3 It should be noted that the highest ground pressures are not associated with the heaviest AIL trailer option. This is because the contact area varies and AILs are designed to spread the ground pressure using a large number of tyres.

3. CONSIDERATION TO ROUTING ALTERNATIVES

3.1 TEMPORARY SUBSTATION ACCESS HAUL ROAD

- 3.1.1 The selection of the route of the dedicated Temporary Substation Access Haul Road is described in section 4.14.50 in the Site Selection and Alternative document [APP-066](#).

“West of Bentley Road there is provision for a separate haul road to allow substation construction access to the projects’ substations (see Substation Site Access below). Several options were considered and a decision was made over a series of workshops for the additional haul road to be located along the southern extents of the Onshore ECC. Routing north [of the corridor] would have encountered the following constraints:

- > Within 30 m of Paynes Cottage and Norman’s Farm; and*
- > Separate cable construction and substation accesses would not be achievable at Bentley Road.”*

3.2 OPERATIONAL ACCESS

- 3.2.1 During the operational phase there will be very limited number of vehicles accessing the onshore substation. This is described in the Baseline Report [AS-046](#) sections 174 -176.

“Upon completion of the construction works there will be a requirement for periodic visits to the OnSS to undertake routine checks and carry out maintenance. The OnSS is not however expected to be permanently manned. These movements would typically be made by light vehicles, cars, vans etc. however, occasional access may be required by HGVs to deliver larger components.

The VE transformers are designed not to require replacement during the lifetime of the VE and as such, operational access for AILs is not anticipated to be required

It is anticipated that NGET will construct a new permanent private access road suitable for AIL, HGV and LGV movements to the proposed EACN Substation. This new private access road is expected to be consented to and owned by NGET. The exact alignment of this is to be confirmed. Dependant on its location, personnel and AIL loads accessing the VE OnSS during the construction phase may, in addition to the public highway, utilise this new private NGET route if it is available. Alternatively, they will use the temporary haul road along the Onshore ECC.”

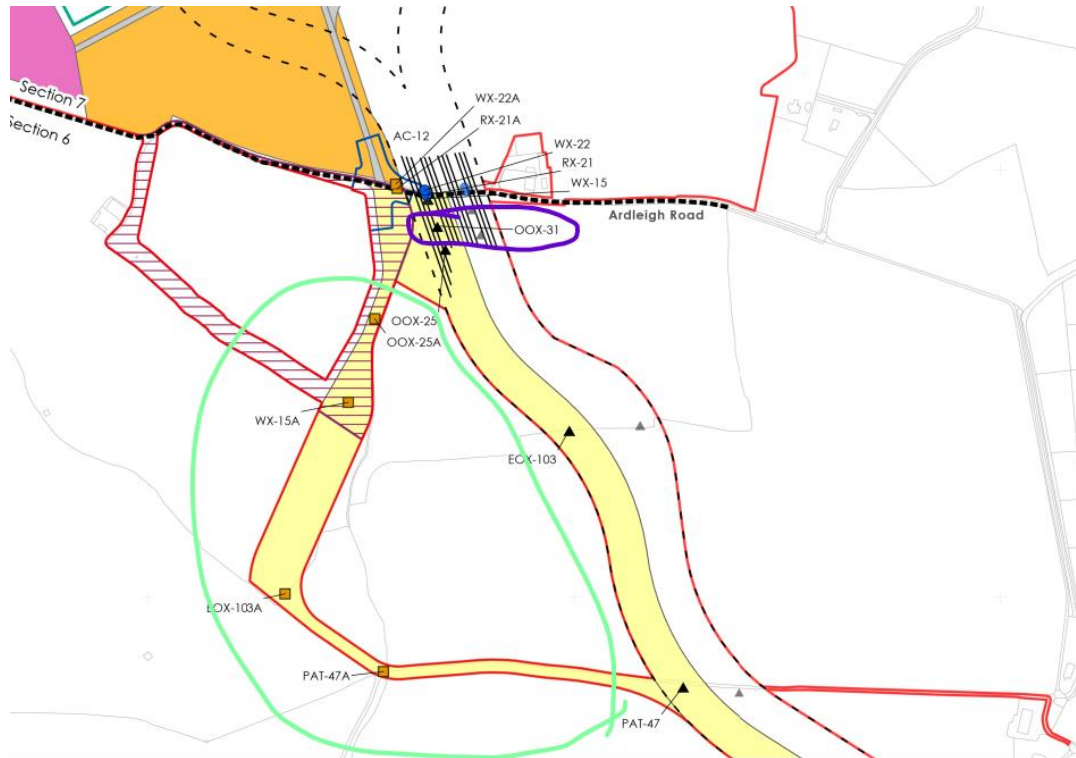
- 3.2.2 For the EIA, a worst case assumption has been made in the Traffic and Transport Assessment AS-043 section 8.4.48 & 8.4.49:

“8.4.48 OnSS – Weekly visits would be required by approximately two vehicles (approximately eight traffic movements per week). During two-week annual maintenance period this would increase to approximately four to eight traffic movements per day.

8.4.49 Unplanned maintenance activities may require vehicles similar to construction, but these would be extremely rare occurrences”.

3.3 ADDITIONAL OFFROUTE HAUL ROAD “LOOP”

3.3.1 The Examining Authority has asked for clarification on why Five Estuaries has included an additional “loop” for the Temporary Substation Access Haul Road. This is shown below circled in green.



3.3.2 The “loop” is a result of the obstacle OOX-31 circled in purple. This is detailed in the Obstacle Crossing Register [[REP3-010](#)].

3.3.3 The Obstacle OOX-31 has been classified as a “Lowland Meadow Habitat” a Section 41 habitat of principal importance, as set out in response to EO.1.1c in 10.22 Applicant’s Response to EXQ 1 [[REP2-039](#)]. The Applicant has therefore sought to retain the option to avoid this in accordance with the mitigation hierarchy. This loop is the alternative route that the Temporary Substation Access Haul Road would need to take to ensure the width of the working corridor is narrowed enough to avoid this meadow.

3.3.4 For clarity, only one substation haul road would be installed here either along the export cable corridor or following the route of the additional “loop”. The loop would only be used if the obstacle is confirmed as Lowland Meadow Habitat at the detailed design stage.

3.3.5 North Falls project has not classified this as a Lowland Meadow and hence they have not identified the need for an alternative route.

3.4 ALTERNATIVE ROUTE – WHY IS IT NOT USING FIELD MARGINS/HEADLANDS

3.4.1 Access options considered are described in Site Selection and Alternatives [APP-066](#). To supplement this, locating the temporary substation access along the cable route rather than along field margins is justified by:

- > Creating a second works area along field boundaries would create two separate works areas and an area in between these works where it would be difficult to use the land during construction.
- > Similarly to other utilities, onshore cable routes for wind farms do not track headlands / field margins as they can be farmed over, they must maintain minimum bend radii, they aim to be as direct as possible minimize temporary disruption and infrastructure costs.
- > The access must also be suitable for AILs. This means that the access must maintain suitable turning radii which presents challenges when sticking to margins and headlands. Having many multiple sharp turns would require the road to take significantly more land than a straighter line because of this.
- > Both the Temporary Substation Access Haul Road and the Temporary Export Cable Corridor Haul Road will be temporary and will be reinstated hence there is no permanent impact (unlike the Permanent NGET Access Road route which tracks the headland / field margins to a greater degree). Compensation will be paid for loss of use during construction.

4. CONSTRUCTION AND REINSTATEMENT

4.1 POTENTIAL SCENARIOS OF CONSTRUCTION INCLUDING WORST CASE

- 4.1.1 The timeline for EACN (the NGET substation) is to be operational “by 2031”. This will require the substation to be built in the preceding 2-3 years.
- 4.1.2 The worst case scenario in terms of maximum numbers of HGVs/day would occur if both North Falls and Five Estuaries are built at the same time as the NGET substation. This has been considered in the maximum traffic numbers included in the Traffic and Transport Assessment [AS-044](#).
- 4.1.3 If the projects are not built out at the same time but were sequential, then the maximum number of HGVs/day will decrease, however the duration of the impact would increase. This is not considered the worst case because the percentage increases of construction traffic above baseline traffic flows on the local and strategic highway networks included in the traffic and transport study area would be lower.

4.2 RESTORATION/REINSTATEMENT PROCESS AFTER CONSTRUCTION

- 4.2.1 The project must reinstate the land taken for both the substation and cable route temporary haul roads. This is described in the Onshore Project Description and also secured in the dDCO requirements, Outline Landscape and Ecological Management Plan [REP2-023](#), and the Construction Code of Practice [REP1-042](#).
- 4.2.2 The Construction Code of Practice [REP1-042](#) also details the measures to be included in the Soil Management Plan that is secured through a dDCO requirement, and the role of the Agricultural Liaison Officer during reinstatement.
- 4.2.3 To summarise the process the removal of the temporary haul roads, this is similar to the construction in reverse. Firstly any surface must be removed; whether this is trackway, aggregate or hard surface. Secondly an assessment of the sub soil must be made to determine whether decompaction is necessary as per the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites [2]. After the decompaction, the topsoil will be reinstated. The appropriate decompaction technique will depend largely on the characteristics of the soil, including clay content, soil moisture and the severity and depth of compaction. Examples of decompaction methods can include use of rippers mounted on a small tracked excavator where there is deeper compaction, mole ploughs. Or through the use of a subsoiler where the soil is not too heavily or deeply compacted. In some instances, compressed air injection can be used to decompact the soil profile.
- 4.2.4 Examples of reinstatement for the projects shown in Figure 6 to Figure 10 are shown below.



Figure 11 Example of previous project showing timelapse images after temporary road removal

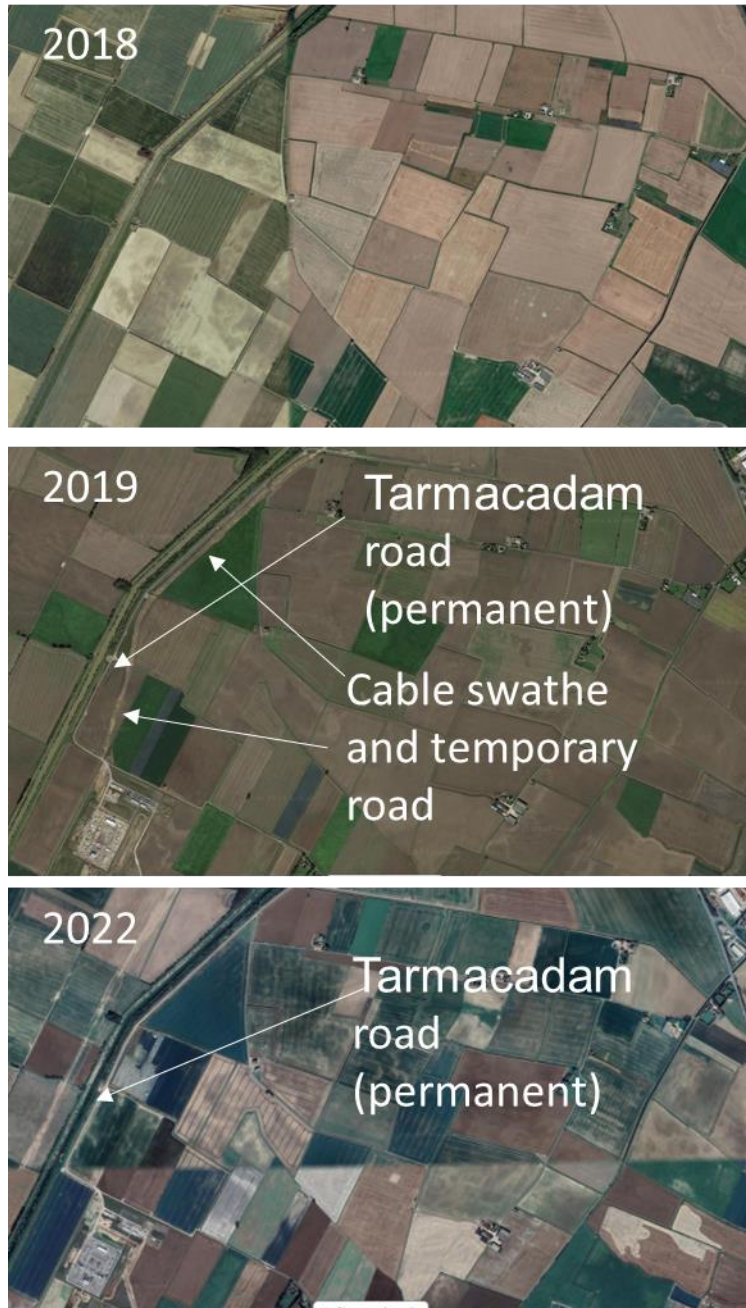


Figure 12 Example of previous project showing timelapse images after temporary road removal and permanent access tarmacadam road*

**please note that the only permanent access road Five Estuaries are proposing will be within the onshore substation site (Work No.15) to allow access from the public highway [Ardleigh Road]) to the substation.*

4.3 INTENDED TIMEFRAME THE HAUL ROADS WOULD BE IN SITU

4.3.1 A summary of the durations of activities associated with the haul roads is provided in **Error! Reference source not found..**

- 4.3.2 The estimate of 18-27 months duration for each section contained in Table 1.2 of the Onshore Project Description [AS-042](#) encompasses the duration the Cable Route Temporary Haul Road may be in place for.
- 4.3.3 The formation of the cable route temporary haul roads is expected to be one of the initial activities after the site enabling works . Based on the duration provided in the Technical note - Onshore Civils and Electrical [[REP2-030](#)] it can be concluded that the temporary road construction would occur in the first 1-2 months for each section.
- 4.3.4 As the roads would be needed for all the construction activities, they will be the final item to be reinstated, although some sections may be reinstated sooner if not required.
- 4.3.5 The Temporary Substation Access Haul Road would be required by Five Estuaries from the start and for the full duration of the onshore substation construction period.
- 4.3.6 If the build out follows Scenario 3, it is possible that the Temporary Substation Haul Road is installed, used and then removed by the first wind farm project, and then due to a large time gap this happens a second time for the second project.



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