

**RWE Renewables UK Dogger Bank
South (West) Limited**

**RWE Renewables UK Dogger Bank
South (East) Limited**

**Dogger Bank South Offshore
Wind Farms**

**Appendix 4-3 Onshore Substation Zone
Constraints**

Document Date: June 2025

Document Reference: 7.4.4.3

Revision Number: 01

Classification: Unrestricted

Company:	RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited	Asset:	Development		
Project:	Dogger Bank South Offshore Wind Farms	Sub Project/Package	Consents		
Document Title or Description:	Appendix 4-3 Onshore Substation Zone Constraints				
Document Number:	004300144-01	Contractor Reference Number:	PC2340-RHD-ZZ-ZZ-AX-Z-0127		
<p><i>COPYRIGHT © RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited, 2025. All rights reserved.</i></p> <p><i>This document is supplied on and subject to the terms and conditions of the Contractual Agreement relating to this work, under which this document has been supplied, in particular:</i></p> <p>LIABILITY</p> <p><i>In preparation of this document RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited has made reasonable efforts to ensure that the content is accurate, up to date and complete for the purpose for which it was contracted. RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited makes no warranty as to the accuracy or completeness of material supplied by the client or their agent.</i></p> <p><i>Other than any liability on RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited detailed in the contracts between the parties for this work RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited shall have no liability for any loss, damage, injury, claim, expense, cost or other consequence arising as a result of use or reliance upon any information contained in or omitted from this document.</i></p> <p><i>Any persons intending to use this document should satisfy themselves as to its applicability for their intended purpose.</i></p> <p><i>The user of this document has the obligation to employ safe working practices for any activities referred to and to adopt specific practices appropriate to local conditions.</i></p>					
Rev No.	Date	Status/Reason for Issue	Author	Checked by	Approved by
01	June 2025	Submission at Deadline 7	RHDHV	RWE	RWE

Contents

1	Introduction	4
2	Onshore Substation Zones	4
2.1	Onshore Substation Zone 2	4
2.2	Onshore Substation Zone 8	5
2.3	Onshore Substation Zone 3	6
2.4	Onshore Substation Zone 7	6
2.5	Onshore Substation Zone 9	8
2.6	Onshore Substation Zone 6	9
2.7	Onshore Substation Zone 5	10
2.8	Onshore Substation Zone 1	11
2.9	Onshore Substation Zone 4	12
3	Horlock Rules	13

1 Introduction

1. As detailed in **Volume 7, Chapter 1 Introduction (application ref: 7.1)**, Chapter 4 has been updated to incorporate the changes to the Projects Design Parameters resulting from **Project Change Request 1 - Offshore & Intertidal Works (document reference 10.49)**, **Project Change Request 2 – Onshore Substation Zone (document reference 10.53)** and the incorporation of any associated responses and corrections provided on Site Selection throughout the Examination process. Following review of the changes, this additional appendix has been included to capture this information within Chapter 4 Site selection and Assessment of Alternatives (application ref: 7.4). This appendix provides further context on how the Horlock Rules have been taken into consideration as part of the selection the preferred option (provided in **The Applicants Response to ExAQ1 [REP3-027]**), and a full list of constraints associated with each of the Onshore Substation Zones (provided in **The Applicants Response to in ExAQ2s [REP5-036]**).

2 Onshore Substation Zones

2. This appendix has been prepared to outline the range of different constraints identified for each Onshore Substation Zone which fed into the site selection decision-making process. The Onshore Substation Zones have been listed below in order of when they were discounted in the process, as presented within **Volume 7, Chapter 4 Site Selection and Assessment of Alternatives (application ref: 7.4)**.

2.1 Onshore Substation Zone 2

3. Based on known information at the time, the constraints associated with the Onshore Substation Zone 2 are as follows:
 - No direct road access, the nearest road access would be from the A1079 to the north but new access from this road would face strong opposition from ERYC. New access from the A164 would be unlikely to be permitted and access would need to consider the use of an existing route which would also require a new access. Project would likely be required to coordinate and agree to share access with the Hornsea 4 project rather than take new access off the A1079.
 - Areas of steeper slopes with Onshore Substation Zone at < 1 in 50 to >1 in 30 topography and therefore construction may require some earthworks with extent of earthworks dependant on final substation location.
 - Wind turbine located within Substation Zone limiting space available for substation footprints.
 - The Onshore Substation Zone identified to only be able to accommodate a single HVDC footprint.

- Cable route options connecting to this Substation Zone limited by existing constraints including INEOS high pressure ethylene pipeline and requirement to route past the original proposed National Grid connection point from cable routes from the west.
 - The Onshore Substation Zone location is within a Source Protection Zone (SPZ) 1.
 - The site is immediately adjacent to three sides of Poplar Farm which is likely to experience close proximity views of the site, as well as a number of further properties within 250m. The site wraps around the west, east and south sides of Poplar Farm. There are a number of further surrounding farms and properties including Jillywood Farm to the north-east and Burn Park to the south within 250m, and Wanlass Farm to the south-east within 500m.
 - Two footpaths cross the site connecting Poplar Farm, Burn Park and Jillywood Lane, and a further footpath follows a small section of the northern site boundary.
 - Moderate to high potential for significant archaeology associated with prehistoric sites nearby.
4. Substation Zone 2 was discounted at the long list stage of the project based on the constraints noted above as this was much less preferable to all the options retained at that time. Further project information has since become available which further confirms unsuitability of this Substation Zone:
- Significant extent of Substation Zone is within area of a solar farm planning application
 - Northern Gas Networks High Pressure Gas Main routes through the south of the substation zone limiting space available
 - National Grid proposed Birkhill Wood Substation is located in the east of this zone.

2.2 Onshore Substation Zone 8

5. Based on known information at the time, the constraints associated with the Onshore Substation Zone 8 are as follows:
- Confined nature of the site limits space for micro-siting of footprints and other required infrastructure
 - Topography across majority of Substation Zone has slopes steeper shallower than 1 in 50, area steeper than 1 in 30 in the south.
 - Local roads unlikely to be suitable for construction traffic or AIL deliveries and significant length of permanent access road required.
 - Engineering constraints associated with the onward routeing crossing Hornsea 4 and major gas mains and requirement to route past the Proposed National Grid connection point from cable routes doubling the number of crossings of these other assets
 - Minor areas of Flood Zone 2 and 3 recorded on the boundaries of the Substation Zone.
 - Identified as Moderate Risk on Zetica UXO Risk Map
 - There are close proximity views of the site from surrounding properties and the public right of way that follows part of the site boundary, and there is limited space for landscape mitigation.

- Significant access constraints have been identified that would potentially impact upon the size of transformers that could be accepted. In addition, there would likely be a requirement for widening of Park Lane and construction traffic would be required to route through the community of Cottingham where there are high concentrations of sensitive receptors.
6. Substation Zone 8 was discounted at the long list stage of the project based on the steep southern boundary of the site reducing available space for siting of footprint. The multiple crossings required of the Hornsea 4 project and high-pressure gas main were also considered a significant factor in discounting this substation option.

2.3 Onshore Substation Zone 3

7. Based on known information at the time, the constraints associated with the Onshore Substation Zone 3 are as follows:
- Entire extent of Substation Zone 3 within extent of solar farm planning application
 - Topography within Onshore Substation Zone 3 generally slopes shallower than 1 in 50 with minor area of steeper slopes within Onshore Substation Zone at >1 in 30 and therefore construction may require some earthworks with extent of earthworks dependant on final substation location
 - Area of Flood Zone 2 and 3 in the northwest
 - Significant access constraints have been identified.
 - Potential direct effects on ancient woodland, also potential direct effects upon UKHPI and local designations, and potential indirect effects upon International designations which require further assessment. HRA required in relation to functionally-linked land.
8. Substation Zone 3 was discounted at the short list stage of the project based on the site being within the extents of a solar farm planning application meaning it was no longer a viable option. This application is now approved (Land South of Creyke Beck Substation, Solar Farm 21/02335/STPLF).

2.4 Onshore Substation Zone 7

9. Based on known information at the time, the constraints associated with the Onshore Substation Zone 7 are as follows:
- Topography across significant areas of Substation Zone has slopes steeper than 1 in 30 with some areas shallower than 1 in 50 and therefore construction has potential to require significant earthworks to form substation platforms and drainage depending on final location within the zone.
 - The topography across significant areas of Substation Zone 7 has slopes steeper than 1 in 30, with some areas shallower than 1 in 50, and therefore construction has potential to require significant earthworks to form substation platforms and drainage. This is illustrated in Plate 1. The increased earthworks requirements would have impacts on level of construction works required and requirements

for import of additional material or export of surplus materials which would require additional traffic movements.



Plate 1 Slope Gradients

- Engineering constraints associated with the onward routing crossing Hornsea 4, Jocks Lodge and solar farm planning application.
 - The onward cable routing to National Grid from Onshore Substation Zone 7 would have to cross the Hornsea 4 onshore cable route. Due to the arrangement of High Voltage Alternating Current (HVAC) cables (up to 8 ducts in trefoil) this is a significant number of additional, larger trenchless bores compared to a simpler High Voltage Direct Current (HVDC)- HVDC crossing. These cable crossings need to consider the combined thermal and field effects of a large number of High Voltage (HV) cables, requiring complex modelling of the interactions (which requires a high level of electrical and cable design detail not currently available). The design may result in increases to cables size, spacing, trenchless crossing depth or other similar measures to avoid the risk of de-rating multiple transmission cables. It is preferential to avoid additional complex crossings, if possible, as these result in additional risks, prolonged construction times on site, the associated impacts and increased corridor width and materials requirements in the crossing location to meet the additional design criteria.
- Areas of alluvium recorded within the substation zone.
- The site is located within the Yorkshire Wolds Important Landscape Area and is located to the east of the village of Walkington.
 - Onshore Substation Zone 7 is located within an elevated position and has a relatively open nature with a lack of surrounding woodland or screening options. Onshore Substation Zone 7 would make the Onshore Converter Stations themselves more prominent in the surrounding landscape. there were other receptors associated with Onshore Substation Zone 7 such as close proximity views from residential properties on the B1230 and along Coppleflat Lane to the west, including Rectory Farm. There are also open close proximity views from Bentley Hall, located less than 100m from the site to the south-west and close proximity views from the Bentley 20 recreational route which wraps around the site to the south and west. There are likely to be some partial views from

properties on the eastern edge of Walkington. Onshore Substation Zone 7 is also within immediate proximity to a Scheduled Sanctuary Limit Stone.

- Properties within close proximity to the option.

10. Substation Zone 7 was primarily discounted at the short list stage of the project based on the site being an elevated location. This is a generally flat site with a higher elevation within the northern part of the site. There is a relatively open nature of the site and the lack of surrounding woodland or screening options. The site would make the substations themselves more prominent in the surrounding landscape and being within the Yorkshire Wolds Important Landscape Character Area.

2.5 Onshore Substation Zone 9

11. Based on known information at the time, the constraints associated with the Onshore Substation Zone 9 are as follows

- Farm buildings recorded within Substation Zone
- Topography across majority of Substation Zone has slopes steeper shallower than 1 in 50, minor areas steeper than 1 in 30
- Access from A1174 potentially difficult to achieve due to existing residential buildings.
- Flood Zone 2 and 3 along northern boundary
- Engineering constraints associated with the onward routeing crossing A1079 and railway line
- Alluvium recorded in the north of the substation zone
- In an area of high archaeological potential. Heritage setting considerations. Options for undertaking archaeological evaluation and mitigation works.

12. Substation Zone 9 was discounted at the short list stage of the project based on the proximity to the settlement of Woodmansey from which there would be limited options mitigation and screening from the Substation Zone. The onward route to the national grid connection is significantly constrained by the requirement for crossing of the railway line compared to all other substation options. The crossing of the railway line is higher risk for the onward connection compared to crossing on the main section of the route as the onward connection requires more and larger ducts to be installed beneath the railway line with higher chance of settlement affecting the railway line.

13. It should be noted that Substation Zone 9 would only generally be a favourable substation zone if one of the eastern cable route options to access the area between Beverley and Hull were taken forward. These eastern routes have been discounted by the Project as outlined within Volume 7, **Chapter 4 Site Selection and Assessment of Alternatives (application ref: 7.4)** and therefore any cable route to Substation Zone 9 would need to route past the proposed National Grid connection point on route to Substation Zone 9 and require an additional railway crossing (3 railway crossings in total compared to all other substation options).

2.6 Onshore Substation Zone 6

14. Based on known information at the time, the constraints associated with the Onshore Substation Zone 6 are as follows:

- Topography across significant areas of Substation Zone has slopes steeper than 1 in 30 with some areas shallower than 1 in 50 and therefore construction has potential to require significant earthworks to form substation platforms and drainage depending on final location within the zone.
- This site sits at a slightly higher elevation. Within the lowest point of the site, a farm track and public right of way pass through connecting Copplesflat Lane to the east with Park Lane to the west. Open views are available from the farm track and public right of way that pass through the site. Views from the recreational assets at the lake. There would be only partially screened views from the Beverley 20 recreational route as well as views from receptors of Walkington.
- This is a generally flat site with a higher elevation within the northern part of the site. Due to the relatively open nature of the site and the lack of surrounding woodland, landscape mitigation would be required to provide screening. The site offers sufficient space for landscape mitigation, particularly if the site was located centrally within the southern half of the site.
- When zone reduced to remove areas of very steep slopes in the north the zone could only accommodate single HVDC project.
- Overhead utilities lines present within more developable areas of this zone and may require diversion.
- Engineering constraints associated with the onward routeing crossing Hornsea 4, Jocks Lodge and solar farm planning application.
- Within immediate proximity to the Scheduled Jacobean Garden, Scheduled Moated Site, Grade II Listed Building and Grade II Registered Park and Garden of Risby Hall and Park. Within 2km of Walkington Conservation Area and Skidby Conservation Area and associated Listed Buildings.
- Moderate to high potential for features and finds associated with nearby medieval and later Scheduled Monuments.
- The site is contained by woodland, it is still relatively high in the landscape and visible. The area is also less developed than in other zones.
- Landowner feedback taken into account at the time was Onshore Substation Zone 6 was not favourable compared to other alternatives in the site selection process.

15. Substation Zone 6 was discounted at the short list stage of the project based on the site having a much higher potential for significant landscape, visual and settings impacts in comparison to Substation Zones 1 and 4 due to comprising a relatively prominent area of high ground and being a relatively small size only allowing for a single HVDC footprint. The Zone is within immediate proximity to the Scheduled Jacobean Garden, Scheduled Moated Site, Grade II Listed Building and Grade II Registered Park and Garden of Risby Hall and Park and within 2km of Walkington Conservation Area and Skidby Conservation Area and associated Listed Buildings with high potential for direct visibility and alteration to setting. In addition, there is also high potential for unknown archaeology to be present.

2.7 Onshore Substation Zone 5

16. Based on known information at the time, the constraints associated with the Onshore Substation Zone 5 are as follows:
- Topography across significant areas of Substation Zone has slopes steeper than 1 in 30 with some areas shallower than 1 in 50 and therefore construction has potential to require significant earthworks to form substation platforms and drainage depending on final location within the zone.
 - Overhead utilities lines present within more developable areas of this zone and may require diversion.
 - Northern Gas Networks high pressure gas main recorded in the southeast.
 - Engineering constraints associated with the onward routeing crossing Hornsea 4, Jocks Lodge and solar farm planning application
 - Within immediate proximity to the Scheduled Jacobean Garden, Grade II Listed Building and Grade II Registered Park and Garden of Risby Hall. Within 1km of the Scheduled Moated site at Risby Park, Skidby Conservation Area and associated Listed Buildings and Skidby Grade II* Listed Mill and associated Listed Building. High potential for direct visibility and alteration to setting.
 - The site is located within the Yorkshire Wolds Important Landscape Area
 - Close proximity views from Park Farm within 250m to the north, and Wilson Hill Farm within 500m to the south are likely. Views from properties on the northern edge of Skidby are also likely. Views will also be available from the two sections of the Beverley 20 walking route that pass through the site.
 - Potential for significant landscape and visual impacts due to relatively prominent area of high ground.
 - High potential for unknown archaeology to be present.

17. Substation Zone 5 was discounted at the short list stage of the project based on the site having a much higher potential for significant landscape, visual and settings impacts in comparison to Substation Zones 1 and 4 due to comprising a relatively prominent area of high ground and proximity to sensitive designations. The Zone is within immediate proximity to the Scheduled Jacobean Garden, Scheduled Moated Site, Grade II Listed Building and Grade II Registered Park and Garden of Risby Hall and Park and within 2km of Walkington Conservation Area and Skidby Conservation Area and associated Listed Buildings with high potential for direct visibility and alteration to setting. In addition, there is also high potential for unknown archaeology to be present.

2.8 Onshore Substation Zone 1

18. Based on known information at the time, the constraints associated with the Onshore Substation Zone 1 are as follows:
 - At PEIR stage Substation Zone 1 was identified as being suitable for a single HVDC footprint only
 - Proposed solar farms in the south and east of the substation zone
 - National Gas Transmission High Pressure Gas Main in the west of the substation zone
 - Areas of Flood Zone 2 and 3 in the north and centre of the substation zone
 - Area of alluvium in the north of the substation zone
 - Watercourse in the north of the substation zone
 - Substation zone crossed by 33kV overhead powerlines and diversions would be required
 - Areas of steeper slopes with Onshore Substation Zone at < 1 in 50 to >1 in 30 topography and therefore construction may require some earthworks with extent of earthworks dependant on final substation location
 - Linear geological feature identified in the east of the zone marking former coastline
 - Engineering constraints associated with onward routeing including crossings of proposed solar farm, A1079 dual carriageway and INEOS ethylene pipeline
 - Access route identified for this footprint option at PEIR would require AILs to cross over National Gas Transmission High Pressure Gas Main
19. Onshore Substation Zone 1 was presented during the Section 47 Consultation and the Preliminary Environmental Information (PEIR) stages to accommodate the option for maintaining HVAC technology option. A number of scenarios were presented at PEIR for both HVAC and HVDC solutions split across Zone 1 and Zone 4, however Zone 1 alone could not accommodate two onshore converter stations whereas Zone 4 could accommodate two HVDC Onshore Converter Stations. As documented in **Volume 7, Chapter 4 Site Selection and Assessment of Alternatives (application ref: 7.4)** the option for HVAC technology was removed from the Projects design envelope following PEIR consultation.

20. The remaining substation options were re-appraised (two HVDC converter stations in Substation Zone 4 (co-located), or one HVDC converter station in Substation Zone 1 and one HVDC converter station in Substation Zone 4), and an assessment undertaken to determine whether a co-located or split HVDC substation design was the better solution from an environmental, engineering and technical perspective. It was determined that the co-located substation option was more suitable when compared to a split design. This was primarily due to the following:
- Having two HVDC converter station construction sites would be less favourable from a health and safety management perspective;
 - Substation Zone 1 was considered less favourable than Zone 4 due to presence of 33kV overhead power lines, geological risk from a linear feature traversing the eastern part of the Substation Zone 1 footprint, crossing of the National Gas Transmission (NGT) High Pressure Gas Main, areas of poor ground associated with alluvium to the north of the Zone and small areas at risk of surface water flooding within the north of the Substation Zone 1 footprint;
 - A co-located option was the overall preference across all environmental topic areas; and
 - A split substation design was the least favourable from a construction costs and land rights perspective.
21. As such, it was decided to remove Onshore Substation Zone 1 from the site selection process and proceed with a co-located substation design within Onshore Substation Zone 4.

2.9 Onshore Substation Zone 4

22. Based on known information at the time, the constraints associated with Onshore Substation Zone 4 are as follows:
- INEOS ethylene pipeline within the south of Onshore Substation Zone;
 - Onshore Substation Zone lies within a Local Important Character Area
 - Areas of steeper slopes with Onshore Substation Zone at < 1 in 50 to > 1 in 30 topography and therefore construction may require some earthworks with extent of earthworks dependant on final substation location.
 - Engineering constraints associated with the onward routeing crossing Jocks Lodge and solar farm planning application
 - Access constraints from A1079 and A164 dependant on final design of Jocks Lodge.
 - Caravan park to north and village to south, but opportunity for mitigation screening
 - Heritage assets recorded within Substation Zone 4.
23. However, on balance it was considered the preferred Onshore Substation Zone due to:
- Having opportunities for a single site for both Onshore Converter Stations;

- Avoids some of the most sensitive landscape and visual receptors in the surrounding areas;
- Is located in a relatively flat landscape, with some existing landscape structure in place and with few landscape features which could be lost to development.
- It is considered that the landscape of the chosen site is capable of accommodating large scale development.
- The site avoids the candidate Yorkshire Wolds AONB to the north;
- The site avoids large numbers of residential receptors located at Beverley in the north-east.
- The construction of the Projects on the site would not obstruct view of Beverley Minster, a key feature on the skyline, in views from the A1079.
- Zone 4 offers the benefit of a single site for both Onshore Converter Stations ensuring a co-ordinated approach to the projects and keeps potential impacts localised to a single area, rather than being more widely spread across two separate locations.

3 Horlock Rules

24. The Horlock Rules considering National Policy Statement (NPS) EN-5 have been considered in **Volume 7, Chapter 4 Site Selection and Consideration of Alternatives (application ref: 7.4)**.
25. To identify the most appropriate location to site the Onshore Converter Stations, National Grid's Guidelines on Substation Siting and Design, The Horlock Rules, have been taken into consideration. These guidelines document National Grid's best practice for the consideration of relevant constraints associated with the siting of substations. The Horlock Rules have been considered as part of the development of the Onshore Converter Stations and this is outlined within **Table 4-3- 1** below.

Table 4-3- 1 Consideration of the Horlock Rules in the Development of the Onshore Converter Stations

National Grid's Approach to Design and Siting of Substations (Overall System Options and Site Selection)	Dogger Bank South Onshore Converter Station Considerations
<p>In the development of system options including new substations, consideration must be given to environmental issues from the earliest stage to balance the technical benefits and capital cost requirements for new developments against the consequential environmental effects, in order to keep adverse effects to a reasonably practicable minimum.</p>	<p>Environmental constraints and opportunities have been considered throughout the development phase of the projects, alongside technical and engineering considerations. These are reported within Volume 7, Chapter 4 Site Selection and Consideration of Alternatives (application ref: 7.4).</p>
Amenity, Cultural or Scientific Value of Sites	
<p>The siting of new National Grid Company substations, sealing end compounds and line entries should as far as reasonably practicable seek to avoid altogether internationally and nationally designated areas of the highest amenity, cultural or scientific value by the overall planning of the system connections.</p>	<p>Internationally and nationally designated sites have been avoided, and the Onshore Substation Zone is not located within a:</p> <ul style="list-style-type: none"> • National Park; • AONB; • Heritage Coast; • World Heritage Site; • Ramsar Site; • SSSI; • National Nature Reserve; • SPA; and/or • SAC.

National Grid's Approach to Design and Siting of Substations (Overall System Options and Site Selection)	Dogger Bank South Onshore Converter Station Considerations
	<p>The Onshore Converter Stations would be located within the Yorkshire Wolds Important Landscape Area (ILA). The presence of the ILA designation is taken into account in the assessments presented in Chapter 23 Landscape and Visual Impact Assessment [APP-192].</p> <p>Consideration has also been given to historic sites with statutory protection. See Volume 7, Chapter 22 Onshore Archaeology and Cultural Heritage (application ref: 7.22).</p>
Local Context, Land Use and Site Planning	
<p>Areas of local amenity value, important existing habitats and landscape features including ancient woodland, historic hedgerows, surface and ground water sources and nature conservation areas should be protected as far as reasonably practicable.</p>	<p>Areas of local amenity value, important existing habitats and landscape features, surface and ground water sources have been protected as far as reasonably practical as outlined in Volume 7, Chapter 4 Site Selection and Consideration of Alternatives (application ref: 7.4) and the following ES chapters:</p> <ul style="list-style-type: none"> • Volume 7, Chapter 23 Landscape and Visual Impact Assessment (application ref: 7.23). • Volume 7, Chapter 18 Terrestrial Ecology and Ornithology (application ref: 7.18). • Volume 7, Chapter 20 Flood Risk and Hydrology (application ref: 7.20) <p>As outlined in the Outline Landscape Management Plan (OLMP) (Volume 8, application reference 8.11) Bentley Moor Wood ancient woodland and Local Wildlife Site (LWS), would be maintained and enhanced as part of the Projects to assist in securing the long term health of the ancient woodland, which would have benefits</p>

National Grid's Approach to Design and Siting of Substations (Overall System Options and Site Selection)	Dogger Bank South Onshore Converter Station Considerations
	<p>for local biodiversity, for the landscape, and for visual screening of the proposed Onshore Converter Stations.</p> <p>As outlined in the OLMP (Volume 8, application reference 8.11) consideration has been given to integrating new landscape structure planting with existing woodland plantations at Johnson's Pit, Eleven Acre Plantation and Bentley Moor Wood ancient woodland, to utilise existing screening.</p>
<p>The siting of substations, extensions and associated proposals should take advantage of the screening provided by land form and existing features and the potential use of site layout and levels to keep intrusion into surrounding areas to a reasonably practicable minimum.</p>	<p>As outlined in Chapter 23 Landscape and Visual Impact Assessment [APP-192], a single site for both Onshore Converter Stations was selected which avoided some of the most sensitive landscape and visual receptors. The chosen site is located in a relatively flat landscape, with some existing landscape structure in place, and with few landscape features which could be lost to development. It is considered that the landscape of the chosen site is capable of accommodating large scale development. The site avoids the candidate Yorkshire Wolds AONB to the north, and large numbers of residential receptors located at Beverley in the north-east. In addition, the construction of the Projects on the site would not obstruct view of Beverley Minster, a key feature on the skyline, in views from the A1079.</p> <p>Selection of a single site for both Onshore Converter Stations ensures that effects on landscape and visual receptors are localised to a single area, rather than being more widely spread across two separate locations.</p>
<p>The proposals should keep the visual, noise and other environmental effects to a reasonably practicable minimum.</p>	<p>Visual, noise and other environmental effects have been minimised as far as possible through the site selection process as outlined in Volume 7, Chapter 4 Site Selection and Consideration of Alternatives (application ref: 7.4). For example, consideration was given to the use of existing screening and locating away from built up and</p>

National Grid's Approach to Design and Siting of Substations (Overall System Options and Site Selection)	Dogger Bank South Onshore Converter Station Considerations
	residential areas. See Volume 7, Chapter 23 Landscape and Visual Impact Assessment (application ref: 7.23) and Volume 7, Chapter 25 Noise and Vibration (application ref: 7.25) of the ES.
The land use effects of the proposal should be considered when planning the siting of substations or extensions.	The effects on land use have been considered as part of the site selection process. The impacts on land use are considered within Volume 7, Chapter 21 Land Use (application ref: 7.21) .
Design	
In the design of new substations or line entries, early consideration should be given to the options available for terminal towers, equipment, buildings and ancillary development appropriate to individual locations, seeking to keep effects to a reasonably practicable minimum.	As outlined in Chapter 23 Landscape and Visual Impact Assessment [APP-192] , a single site for both Onshore Converter Stations was selected which avoided some of the most sensitive landscape and visual receptors. Landscape and visual impact will be minimised by avoiding the use of tall structures and buildings wherever possible. The Onshore Converter Stations will be subject to detailed design post consent. The DAS sets out the design principles that would be applied to the detail design of the Projects. This would ensure that a sense of place is considered and integrated throughout the design process and adverse environmental effects are mitigated where possible.
Space should be used effectively to limit the area required for development consistent with appropriate mitigation measures and to minimise the adverse effects on existing land use and rights of way, whilst also having regard to future extension of the substation.	All parameters for the Projects described in Volume 7, Chapter 5 Project Description (application ref: 7.5) such as Onshore Converter Station dimensions and working widths, are the smallest that can reasonably be defined at the time of DCO application. The Projects comprise two HVDC Onshore Converter Stations which require less space than HVAC technology. In committing to HVDC technology, the overall area which would be occupied by the Projects would be reduced compared to

National Grid's Approach to Design and Siting of Substations (Overall System Options and Site Selection)	Dogger Bank South Onshore Converter Station Considerations
	<p>if a HVAC option was taken forward. As such, direct effects related to land take would be reduced with the HVDC option due to the smaller footprint of the Onshore Converter Stations. In addition, the Applicants submitted a Change Request in the Examination (accepted on 21st January 2025) to reduce the size of the Onshore Converter Stations footprint (Project Change Request 2 - Onshore Substation Zone [AS-152] when design development and supply chain engagement provided further certainty that a smaller Onshore Converter Station footprint is required.</p> <p>As a result, the potential adverse effects on existing land use and rights of way have been minimised as far as reasonably practical as outlined in Volume 7, Chapter 21 Land Use (application ref: 7.21) and Volume 7, Chapter 29 Tourism and Recreation (application ref: 7.29).</p>
<p>The design of access roads, perimeter fencing, earth shaping, planting and ancillary development should form an integral part of the site layout and design to fit in with the surroundings.</p>	<p>The design of access roads, perimeter fencing, earth shaping, planting and ancillary development will be subject to final detailed design, however these will be designed in accordance with principles of the DAS (Volume 8, application reference 8.8) to minimise impacts on surroundings.</p> <p>The DAS (Volume 8, application reference 8.8) sets out the design principles that would be applied to the detail design of the Projects. This would ensure that a sense of place is considered and integrated throughout the design process and adverse environmental effects are mitigated where possible.</p>
Line Entry	

National Grid's Approach to Design and Siting of Substations (Overall System Options and Site Selection)	Dogger Bank South Onshore Converter Station Considerations
<p>In open landscape especially, high voltage line entries should be kept, as far as possible, visually separate from low voltage lines and other overhead lines so as to avoid a confusing appearance.</p> <p>The inter-relationship between towers and substation structures and background and foreground features should be studied to reduce the prominence of structures from main viewpoints. Where practicable the exposure of terminal towers on prominent ridges should be minimised by siting towers against a background of trees rather than open skylines.</p>	<p>The design of the Projects will be subject to final detailed design, however these will be designed in accordance with principles of the DAS (Volume 8, application reference 8.8) to minimise impacts on surroundings.</p> <p>Volume 7, Chapter 5 Project Description (application ref: 7.5) outlines the details with regards to the project description. All cables to the connection point will be buried underground.</p>

RWE Renewables UK Dogger Bank
South (West) Limited

RWE Renewables UK Dogger Bank
South (East) Limited

Windmill Business Park
Whitehill Way
Swindon
Wiltshire, SN5 6PB

