

Hornsea Project Four

Volume A6, Annex 4.1: Landscape and Visual Resources: Wireframes and Photomontages

Deadline 5, Date: 20 June 2022 Document Reference: A6.4.1 Revision: 02

PreparedLand Use Consultants, June 2022CheckedRoyal HaskoningDHV, June 2022AcceptedThomas Watts, Orsted, June 2022ApprovedJulian Carolan, Orsted, June 2022

A6.4.1 Version B

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Revision Summary				
Rev	Date	Prepared by	Checked by	Approved by
01	29/09/2021	Land Use Consultants	Thomas Watts	Julian Carolan
02	20/06/2022	Land Use Consultants	Thomas Watts	Julian Carolan

Revision Change Log			
Rev	Page	Section	Description
01	N/A	N/A	Submitted as part of DCO Application
02	6, 10-12, 15-16, 18-19, 21-22, 29-38	1.1	Additional text added to set out changes made to the images within the annex. Revised HVDC photomontages provided as Figures 2, 3, 5, 6, 8, 9, 11 & 12 reducing the ground levels. Additional HVAC photomontages included for reference (Figures 19 to 26).





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Glossary

Term	Definition
Energy balancing	The onshore substation includes energy balancing Infrastructure. These provide
infrastructure (EBI)	valuable services to the electrical grid, such as storing energy to meet periods of peak demand and improving overall reliability.
Export cable corridor (ECC)	The specific corridor of seabed (seaward of Mean High Water Springs (MHWS)) and land (landward of MHWS) from the Hornsea Project Four array area to the Creyke Beck National Grid substation, within which the export cables will be located.
f/1.8	Refers to the maximum aperture of the camera used.
High Voltage Alternating Current (HVAC)	High voltage alternating current is the bulk transmission of electricity by alternating current (AC), whereby the flow of electric charge periodically reverses direction.
High Voltage Direct Current (HVDC)	High voltage direct current is the bulk transmission of electricity by direct current (DC), whereby the flow of electric charge is in one direction.
Hornsea Project Four Offshore Wind Farm	The term covers all elements of the project (i.e. both the offshore and onshore). Hornsea Four infrastructure will include offshore generating stations (wind turbines), electrical export cables to landfall, and connection to the electricity transmission network. Hereafter referred to as Hornsea Four.
Landfall	The generic term applied to the entire landfall area between Mean Low Water Spring (MLWS) tide and the Transition Joint Bay (TJB) inclusive of all construction works, including the offshore and onshore ECC, intertidal working area and landfal compound. Where the offshore cables come ashore east of Fraisthorpe.
Maximum design scenario	The maximum design parameters of each Hornsea Four asset (both on and offshore) considered to be a worst case for any given assessment.
National Grid Electricity Transmission (NGET) substation	The grid connection location for Hornsea Four at Creyke Beck.
Onshore substation (OnSS)	Comprises a compound containing the electrical components for transforming the power supplied from Hornsea Project Four to 400 kV and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid. If a HVDC system is used the OnSS will also house equipment to convert the power from HVDC to HVAC.
Order Limits	The onshore limits within which Hornsea Project Four (the 'authorised project') may be carried out.
Orsted Hornsea Project Four Ltd.	The Applicant for the proposed Hornsea Project Four Offshore Wind Farm Development Consent Order (DCO).





Acronyms

Acronym	Definition
AF	Auto focus
AGL	Above ground level
AOD	Above Ordnance Datum
E	East
EBI	Energy balancing infrastructure
ECC	Export Cable Corridor
ES	Environmental Statement
HVAC	High voltage alternating current
HVDC	High voltage direct current
LVIA	Landscape and visual impact assessment
LUC	Land Use Consultants
MDS	Maximum Design Scenario
Ν	Ν
NGET	National Grid Electricity Transmission
OnSS	Onshore substation
OS	Ordnance Survey
PRoW	Public Right of Way
S	South
W	West

Units

Unit	Definition
km	kilometre
m	metre
mm	millimetre

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Orsted

1 Introduction

1.1 Project Background

- 1.1.1.1 Orsted Hornsea Project Four Limited (the 'Applicant') is proposing to develop Hornsea Project Four Wind Farm (hereafter 'Hornsea Four'). Hornsea Four will be located approximately 69 km offshore the East Riding of Yorkshire in the Southern North Sea and will be the fourth project to be developed in the former Hornsea Zone. Hornsea Four will include both offshore and onshore infrastructure including an offshore generating station (wind farm), export cables to landfall and on to an onshore substation (OnSS) with energy balancing infrastructure (EBI), and connection to the electricity transmission network.
- 1.1.1.2 Land Use Consultants (LUC) was commissioned to undertake a Landscape and Visual Impact Assessment (LVIA) for Hornsea Four. This technical annex has been produced to provide the supporting wireframes and photomontages (for that assessment), specifically within and around the Hornsea Four OnSS. This baseline data has been used to inform and support the Environmental Statement (ES) for Volume A3, Chapter 4: Landscape and Visual.
- 1.1.1.3 Following submission of this annex as part of the DCO application, the Examining Authority (ExA) at Issue Specific Hearing 2: Onshore Environmental Matters which was held on the 26 April 2022, requested illustrative photomontages for the HVAC technology at the Hornsea Four OnSS to be submitted (Hearing Action Point 6 of **EV-OlOa**). In response to this request additional illustrative photomontages have been included in this annex to present the additional HVAC model (Figure 19 to Figure 26). All viewpoints remain the same for all illustrative photomontages. During this process the relative heights of all the model elements, including the ground levels, for the HVDC photomontages have also been checked and where required amended to reflect the MDS dimensions (Figure 2 & Figure 3, Figure 5 & Figure 6, Figure 8 & Figure 9 and Figure 11 & Figure 12) (in relation to Hearing Action Point 8 of **EV-OlOa**) since the Applicant has since committed to specific ground heights (G1.6 Onshore Substation Site (OnSS) and Energy Balancing Infrastructure (EBI) Ground Levels Clarification Memo (AS-024)) which has resulted in the buildings being lowered. The ground heights used previously accounted for a conservative worst-case scenario prior to ground data being obtained.

1.2 Notes on the Wireframes and Photomontages

- The visualisations show the illustrative appearance of the Hornsea Four OnSS (for both HVAC and HVDC technologies) from selected representative viewpoints, at various points throughout the lifetime of the project.
- Viewpoints were listed in the Hornsea Four Landscape and Visual Impact Assessment (LVIA) Position Paper, which was circulated to stakeholders in March 2019 for agreement prior to drafting the Preliminary Environmental Information Report (PEIR). The LVIA Position Paper also stated the intended approach to presenting visualisations (photomontage or baseline photography only). Feedback from East Riding of Yorkshire Council, Hull City Council and Natural England indicated agreement to the approach

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presented, as set out in Table 4, Volume A3, Chapter 4: Landscape and Visual (ON-HUM-1.12).

- For each viewpoint, a visualisation is presented to show the Maximum Design Scenario (MDS) including placement of the largest buildings in the most visually prominent locations. The MDS used can be found in Table 4.12, Volume A3, Chapter 4: Landscape and Visual, and in the 'Landscape and Visual' section of Volume A4, Annex 5.1: Impacts Register. These 'block visualisations' represent the worst case in terms of visual obstruction and serve as a primary reference for the LVIA.
- For the four closest representative viewpoints to the OnSS site (Viewpoints 1 to 4), further photomontages have been prepared to show an illustrative 3D model of the OnSS (based on the MDS and for both HVAC and HVDC technologies), prepared by the Applicant. These visualisations (Figure 2, Figure 3, Figure 5, Figure 6, Figure 8, Figure 9, Figure 11 and Figure 12) present a more photorealistic impression of the OnSS than the block visualisation. The model shown in these visualisations may differ from the final design of the OnSS. Three iterations of these photomontages have been prepared, showing the illustrative model immediately following construction (Year 1), and at Year 10 and Year 30 following completion. This is to show the likely effect of maturing mitigation planting. The depiction of landscape mitigation is similarly illustrative, and these photomontages therefore serve as a secondary reference for the LVIA.



Figure: 1 Viewpoint 1: PRoW South of Burn Park Farm



EBI and Substation Area (15m Height) EBI Buildings (20m Height) Substation Buildings (25m Height) ---- Lightning Protection (30m Height)

Direction of view: 25°

OS reference: 503721 E 434760 N AOD: 14.99 m Distance to site: 0.24 km

Horizontal field of view: Principal distance: Paper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm

90° (cylindrical projection) 522 mm



Figure: 1 Viewpoint 1: PRoW South of Burn Park Farm



EBI and Substation Area (15m Height) EBI Buildings (20m Height) Substation Buildings (25m Height) ---- Lightning Protection (30m Height)

Direction of view: 70°

OS reference: 503721 E 434760 N AOD: 14.99 m Distance to site: 0.24 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



OS reference: 503721 E 434760 N AOD: 14.99 m Direction of view: 335° Distance to site: 0.24 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



OS reference:503721 E 434760 NAOD:14.99 mDirection of view:70°Distance to site:0.24 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 3 Viewpoint 1: PRoW South of Burn Park Farm

OS reference: 503721 E 434760 N AOD: 14.99 m Direction of view: 335° Distance to site: 0.24 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm





OS reference:503721 E 434760 NAOD:14.99 mDirection of view:70°Distance to site:0.24 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 4 Viewpoint 2: Park Lane Cottingham



Direction of view: 350°

 OS reference:
 504069 E 434252 N

 AOD:
 14.92 m
Distance to site: 0.66 km

Horizontal field of view: Principal distance: Paper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm

90° (cylindrical projection) 522 mm



Figure: 5 Viewpoint 2: Park Lane Cottingham

OS reference:504069 E 434252 NAOD:14.92 mDirection of view:351°Distance to site:0.66 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm





Figure: 6 Viewpoint 2: Park Lane Cottingham

OS reference: 504069 E 434252 N AOD: 14.92 m Direction of view: 351° Distance to site: 0.66 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 7 Viewpoint 3: Footbridge over A1079



OS reference:503831 E 435980 NAOD:17.00 mDirection of view:175°Distance to site:0.67 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 8 Viewpoint 3: Footbridge over A1079

OS reference:503831 E 435980 NAOD:17.00 mDirection of view:175°Distance to site:0.67 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 9 Viewpoint 3: Footbridge over A1079

OS reference:503831 E 435980 NAOD:17.00 mDirection of view:175°Distance to site:0.67 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



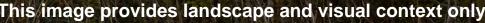
Figure: 10 Viewpoint 4: PRoW East of A164





 OS reference:
 502255 E 434521 N

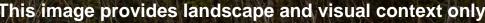
 AOD:
 35 m
Direction of view: 70° Distance to site: 1.36 km



Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 11 Viewpoint 4: PRoW East of A164



OS reference: 502255 E 434521 N AOD: 35 m Direction of view: 70° Distance to site: 1.36 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 12 Viewpoint 4: PRoW East of A164

OS reference: 502255 E 434521 N AOD: 35 m Direction of view: 70° Distance to site: 1.36 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 13 Viewpoint 5: A164 layby near Bentley



AOD:502191 E 433609 NDirection of view:110°Distance to site:1.201

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm





OS reference: 501454 E 435403 N AOD: 45 m Direction of view: 95° Distance to site: 2.02 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 15 Viewpoint 7: Little Weighton Road



 OS reference:
 499859 E 433991 N

 AOD:
 83.60 m

 Direction of view:
 80°
Distance to site: 3.79 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 16 Viewpoint 8: Minster Way



OS reference: AOD: Direction of view: 170°

503396 E 437490N 13.66 m Distance to site: 2.21 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 17 Viewpoint 9: Beverley Minster Tower



 OS reference:
 503712 E 439248N

 AOD:
 50.39 m

 Direction of view:
 180°
Distance to site: 3.93 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1) Paper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 18 Viewpoint 10: St Mary's Church Cottingham



504763 E 432938N 27.51 m Distance to site: 2.1 km

Horizontal field of view: Principal distance: Paper size: Paper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm

90° (cylindrical projection) 522 mm

Camera: Lens: Camera height: 1.5 m AGL Date and time: 04/04/2019 12:15

Nikon D600 AF 50mm f/1.8D



OS reference: 503721 E 434760 N AOD: 14.99 m Direction of view: 335° Distance to site: 0.24 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 19 Viewpoint 1: PRoW South of Burn Park Farm

OS reference:503721 E 434760 NAOD:14.99 mDirection of view:70°Distance to site:0.24 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm





OS reference:503721 E 434760 NAOD:14.99 mDirection of view:335°Distance to site:0.24 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm





Figure: 20 Viewpoint 1: PRoW South of Burn Park Farm

OS reference:503721 E 434760 NAOD:14.99 mDirection of view:70°Distance to site:0.24 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 21 Viewpoint 2: Park Lane Cottingham

OS reference: 504069 E 434252 N AOD: 14.92 m Direction of view: 351° Distance to site: 0.66 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm





Figure: 22 Viewpoint 2: Park Lane Cottingham

OS reference: 504069 E 434252 N AOD: 14.92 m Direction of view: 351° Distance to site: 0.66 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 23 Viewpoint 3: Footbridge over A1079

OS reference:503831 E 435980 NAOD:17.00 mDirection of view:175°Distance to site:0.67 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



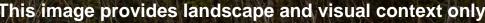
Figure: 24 Viewpoint 3: Footbridge over A1079

OS reference:503831 E 435980 NAOD:17.00 mDirection of view:175°Distance to site:0.67 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 25 Viewpoint 4: PRoW East of A164



OS reference: 502255 E 434521 N AOD: 35 m Direction of view: 70° Distance to site: 1.36 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm



Figure: 26 Viewpoint 4: PRoW East of A164

OS reference: 502255 E 434521 N AOD: 35 m Direction of view: 70° Distance to site: 1.36 km

Horizontal field of view:90° (cylindrical projection)Principal distance:522 mmPaper size:841 x 297 mm (half A1)Correct printed image size:820 x 260 mm