

**Moray Offshore Windfarm (West) Limited  
Development Specification and Layout Plan**



8460005-DBHA05-MWW-PLN-000001

**MORAY OFFSHORE WINDFARM (WEST) LIMITED**

## **Development Specification and Layout Plan**

**Document Name: 8460005-DBHA05-MWW-PLN-000001**

**Revision: 1**

**Status: Final**

**Date: 10-05-2022**

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

Version Control				
Revision	Date	Status	Revision Description	Distribution List
0	28-02-22	Draft	Moray West review	Moray West
1	10-05-2022	Final	Submission to MS-LOT	MS-LOT

Document Approval				
Prepared by:	ECoW Review by:	Legal Review by:	Approved by:	Approved by:
Moray West		Shepherd & Wedderburn 	 (Senior Development Manager)	 (Project Director)

## **Plan Overview**

### **Purpose and Objectives of the Plan**

This Development Specification and Layout Plan (DSLP) has been prepared to address the specific requirements of the relevant conditions attached to the Section 36 (S36) consent and Marine Licences (collectively referred to as ‘offshore consent conditions’) issued to Moray Offshore Windfarm (West) Limited (Moray West).

The overall objective of the DSLP is to set out the final design and layout parameters associated with the Moray West Offshore Wind Farm (‘Wind Farm’) and the Offshore Transmission Infrastructure (OfTI) (collectively referred to as ‘the Development’) required under the offshore consent conditions.

The DSLP confirms that the design and layout parameters of the Development align with those considered in the Application for the Offshore Consents.

### **Scope of the Plan**

In line with the requirements of the offshore consent conditions, which are presented in Appendix B (Table B.2), along with industry standards and good practice, the DSLP confirms the following:

- The layout of the Wind Farm;
- Dimensions of Wind Turbine Generators (WTGs) and Offshore Substation Platforms (OSPs);
- Locations of WTGs and OSPs;
- The generating output of each WTG and a confirmed generating output for the Development;
- The finishes for WTGs and OSPs; and,
- The length and proposed arrangements on the seabed of all cables.

### **Structure of the Plan**

Section 1 gives an overview of the Development, sets out the scope and objectives of the DSLP, provides details of the offshore consent conditions set out in S36 and Marine Licences, the process for making updates to this document and demonstrates compliance with the Offshore Consents.

Section 2 presents a detailed Development description.

Section 3 details the Wind Farm layout, key constraints and key design parameters associated with the wind farm, inter-array cables and OSP inter-connector cable.

Section 4 details the offshore export cable arrangements, key constraints and key design parameters associated with the OfTI including the export cables and OSPs.

The accompanying Appendices presents defined terms, comparison of the consented design envelope and DSLP design parameters, and GIS shapefile links.

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

## Plan Audience

The DSLP is intended to be referred to by personnel involved in the design and construction of the Development, including Moray West personnel and Contractors. All marine construction statements and documents produced in relation to the Development must comply with this DSLP.

Compliance with this DSLP will be monitored by the Moray West Development Team, Moray West's Environmental Clerk of Works (ECOW), and the Marine Scotland - Licensing Operations Team (MS-LOT).

## Plan Locations

The latest version of this DSLP can be obtained from Moray West's document management system, Viewpoint For Projects and from Marine Scotland website<sup>1</sup>. In addition, copies of the DSLP are to be held in the following locations:

- Moray West's main project office in Edinburgh; and
- with the ECOW(s).

---

<sup>1</sup> <https://marine.gov.scot/ml/moray-west-offshore-windfarm>

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

## Table of Contents

1	Introduction .....	8
1.1	Background .....	8
1.2	Purpose of the Development Specification and Layout Plan.....	8
1.3	Linkages with other Consent Plans .....	11
1.4	Document Structure and Control.....	11
1.4.1	Document Control.....	12
2	Development Description .....	13
3	Development Specification and Layout – Wind Farm .....	15
3.1	Introduction .....	15
3.2	Wind Farm Layout and Specification .....	15
3.2.1	WTG Spacing .....	17
3.2.2	WTG Identification .....	17
3.2.3	WTG Foundation Type .....	18
3.2.4	Wind Farm Bathymetry and Seabed Conditions.....	22
3.2.5	Key Constraints .....	25
3.3	Co-ordinates for WTG Locations .....	29
3.4	WTG Dimensions.....	31
3.5	Generating Capacity.....	33
3.6	WTG Finishes.....	33
3.7	Length and Proposed Arrangement of Cables .....	33
3.7.1	Inter-Array Cables .....	34
3.7.2	OSP Inter-connector Cable.....	37
4	Development Specification and Layout – Offshore Transmission Infrastructure.....	39
4.1	Introduction .....	39
4.2	OSP Layout and Specification.....	39
4.2.1	OSP Foundation Types .....	39
4.2.2	Wind Farm Bathymetry and Seabed Conditions.....	39
4.2.3	Key Constraints .....	39
4.3	Co-ordinates for OSP Locations .....	39

Moray Offshore Windfarm (West) Limited  
Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

4.4    OSP Dimensions and Finishes ..... 40

    4.4.1    OSP Dimensions ..... 40

    4.4.2    OSP Topside Finishes..... 41

4.5    Offshore Export Cables Length and Proposed Arrangement..... 44

    4.5.1    Bathymetry and Seabed Conditions ..... 47

    4.5.2    Key Constraints ..... 50

Appendix A – Defined terms ..... 52

Appendix B – Comparison of the Consented Design Envelope and DSLP Design Parameters ..... 54

Appendix C – GIS Shapefile Links ..... 56

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

## Abbreviations and Acronyms

Acronym / Abbreviation	Description
AEZ	Archaeological Exclusion Zone
ASA	Archaeological Study Area
BOWL	Beatrice Offshore Windfarm Limited
CAA	Civil Aviation Authority
CaP	Wind Farm Cable Plan
CBRA	Cable Burial Risk Assessment
CoP	Construction Programme
CMS	Construction Method Statement
DS	Design Statement
DSLPL	Development Specification and Layout Plan
ECOW	Environmental Clerk of Works
ECP	Export Cable Plan
EIA	Environmental Impact Assessment
FMMS	Fisheries Management and Mitigation Strategy
GIS	Geographic Information System
HAT	Highest Astronomical Tide
HDD	Horizontal Directional Drilling
HSE	Health, Safety and Environment
HVAC	High Voltage Alternating Current
LAT	Lowest Astronomical Tide
LMP	Lighting and Marking Plan
MCA	Maritime and Coastguard Agency
MCC	Marine Coordination Centre
MS-LOT	Marine Scotland - Licensing Operations Team
NLB	Northern Lighthouse Board
OEC	Offshore Export Cable
O&M	Operations and Maintenance
OfTI	Offshore Transmission Infrastructure
OnTI	Onshore Transmission Infrastructure
OSP	Offshore Substation Platform
PS	Piling Strategy
S36	Section 36
SAR	Search and Rescue
WTG	Wind Turbine Generators

## **1 Introduction**

### **1.1 Background**

The Moray West Offshore Wind Farm and associated Offshore Transmission Infrastructure (OfTI) (referred to as ‘the Development’) is being developed by Moray Offshore Windfarm (West) Limited (known as ‘Moray West’). Consent for the Development was granted on 14 June 2019 under Section 36 (S36) of the Electricity Act 1989 (as amended), Part 4 of the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 from Scottish Ministers. One S36 consent was granted by Scottish Ministers for the wind farm (012/OW/MORLW – 8) and two Marine Licences were granted by Scottish Ministers, one for the Wind Farm and another for the OfTI.

Variation of the S36 consent and Wind Farm Marine Licence were granted by the Scottish Ministers on 7 March 2022, and further variations of the Wind Farm Marine Licence (licence number: MS-00009774) and OfTI Marine Licence (licence number: MS-00009813) were granted on 11 April 2022. The revised S36 consent and associated Marine Licences are referred to collectively as ‘offshore consents’.

### **1.2 Purpose of the Development Specification and Layout Plan**

The S36 consent and Marine Licences conditions (referred to as ‘offshore consent conditions’) require the production of a Development Specification and Layout Plan (DSLPP; Condition 12 of S36 and Wind Farm and OfTI Marine Licences conditions 3.2.2.9 and 3.2.2.8 respectively).

This DSLPP has been prepared to address the specific requirements of the relevant offshore consent conditions attached to the S36 consent and Marine Licences issued to Moray West.

The relevant conditions setting out the requirement for a DSLPP for approval, and which are to be discharged by this DSLPP, are presented in full in Table 1-1.



# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

**Table 1.1 Consent conditions to be discharged by this DSLP**

Consent Condition Reference	Condition	Addressed
S36 Consent Condition 12  Wind Farm Marine Licence MS-00009774 Condition 3.2.2.9  OfTI Marine Licence MS-00009813 Condition 3.2.2.8	The Company must, no later than six months prior to the Commencement of the Development, submit a Development Specification and Layout Plan ("DSLP"), in writing, to the Scottish Ministers for their written approval.	This document sets out the DSLP for approval by the Scottish Ministers.
	Such approval may only be granted following consultation by the Scottish Ministers with SNH, Royal Yachting Association Scotland ("RYA"), MCA, NLB, Ministry of Defence ("MOD"), Civil Aviation Authority ("CAA"), SFF, Aberdeenshire Council, Moray Council, the Highland Council, Joint Radio Company ("JRC") and any such other advisors or organisations as may be required at the discretion of the Scottish Ministers. Commencement of the Development cannot take place until such approval is granted.	Consultation to be undertaken by the Scottish Ministers
	The DSLP must include, but not be limited to the following:	
	a) A plan showing the location of each individual WTG (subject to any required micro-siting), including information on WTG spacing, WTG identification/numbering, seabed conditions, bathymetry, confirmed foundation type for each WTG and any key constraints recorded on the site;	Section 3.2
	b) A list of latitude and longitude co-ordinates accurate to three decimal places of minutes of arc for each WTG. This should also be provided as a Geographic Information System shape file using WGS84 format;	Section 3.3 Appendix C
	c) A table or diagram of each WTG dimensions including - height to blade tip (measured above Lowest Astronomical Tide ("LAT")) to the highest point, height to hub (measured above LAT to the centreline of the generator shaft), rotor diameter and maximum rotation speed;	Section 3.4
	d) The generating output of each WTG used on the site and a confirmed generating output for the site overall;	Section 3.5
	e) The finishes for each WTG (see condition 20 on WTG lighting and marking); and	Section 3.6
	f) The length and proposed arrangements on the seabed of all inter-array and OSP inter-connector cables.	Section 3.7

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

Table 1.1 Consent conditions to be discharged by this DSLP		
Consent Condition Reference	Condition	Addressed
OfTI Marine Licence MS-00009813 Condition 3.2.2.8	The DSLP must include, but not be limited to the following:	
	a) A plan showing the location of each individual OSP (subject to any required micro-siting), including information on OSP spacing, OSP identification/numbering, seabed conditions, bathymetry, confirmed foundation type for each OSP and any key constraints recorded on the site;	Section 4.2
	b) A list of latitude and longitude co-ordinates accurate to three decimal places of minutes of arc for each OSP. This should also be provided as a GIS shape file using WGS84 format;	Section 4.3 Appendix C
	c) A table or diagram of each OSP dimensions including –	Section 4.4.1
	d) The finishes for each OSP; and	Section 4.4.2
	e) The length and proposed arrangements on the seabed of all export cables.	Section 4.5

### 1.3 Linkages with other Consent Plans

This DSLP document sets out the proposed design and layout specification for the wind farm and the OfTI, and forms part of a suite of approved documents that provides the framework for the design and construction process of the Development– namely the other Consent Plans required under the offshore consents.

The linkage between this DSLP and other Consent Plans is summarised in Table 1-2.

Table 1-2 DSLP linkage with other Consent Plans	
Other Consent Plans and Documents	Linkage with DSLP
Wind Farm Cable Plan (CaP)	The Wind Farm CaP and ECP provide details on cable specification, installation methods and cable protection. The detailed cable route layout is also presented in line with the cable arrangements provided within the DSLP.
Export Cable Plan (ECP)	
Design Statement (DS)	Provides representative visualisations of the wind farm layout, as detailed in the DSLP, from key viewpoints.
Piling Strategy (PS)	Provides details of piling locations, installation methods, and depths.
Lighting and Marking Plan (LMP)	Provides details of lighting and marking of the Development during construction and operation. Operational lighting requirements have been defined based upon the Development layout presented in the DSLP.

### 1.4 Document Structure and Control

In response to the specific requirements of the offshore consent conditions, this DSLP has been structured to show that each part of the specific requirements have been met and that the relevant information to allow the Scottish Ministers to approve the DSLP has been provided.

The structure of this DSLP is provided in Table 1-3.

Table 1-3 DSLP document structure		
Section	Title	Summary of Content
1	Introduction	Provides an overview of the Development and its associated consent requirements.
2	Development Description	Detailed information of the Development.
3	Design, Specification and Layout – Wind Farm	Provides the required details in relation to the design, specification and layout of the wind farm including inter-array cables and OSP inter-connector cable.

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

Table 1-3 DSLP document structure		
Section	Title	Summary of Content
4	Design, Specification and Layout – Offshore Infrastructure	Provides the required details in relation to the design, specification and layout of the offshore substation platforms and export cables.
Appendix A	Defined Terms	A list of terms used in the DSLP requiring definition.
Appendix B	Comparison of the Consented Design Envelope and DSLP Design Parameters	Provides a summary of the parameters of the consented design envelope in comparison to the actual DSLP design parameters.
Appendix C	GIS shapefile links	Links to wind farm layout GIS shapefiles.

## 1.4.1 Document Control

This DSLP will be revised as relevant to ensure the information is kept up to date, at intervals agreed with the Scottish Ministers. Linkages exist between a number of offshore Consent Plans as highlighted in Section 1.3 within Table 1-2. As plans are updated, there will be a review of inter-linkages with other Consent Plans to ensure these are also updated as relevant. The document is controlled via Viewpoint For Projects, an electronic document management system.

## **2 Development Description**

Moray West Offshore Wind Farm is being developed by Moray Offshore Windfarm (West) Limited (Moray West; Company Number 10515140) which is registered at Octagon Point, 5 Cheapside, London, England, EC2V 6AA. Moray Offshore Windfarm (West) Limited is a wholly owned subsidiary of Moray West Holdings Limited which in turn is owned by Moray Offshore Renewable Power Limited, Delphis Holdings Limited, EDP Renewables Europe, S.L.U and UAB Ignitis Renewables.

The Moray West Site covers an area of approximately 225 km<sup>2</sup> on the Smith Bank in the Outer Moray Firth approximately 22 km from the Caithness coastline.

The Moray West Offshore Wind Farm will comprise 60 wind turbine generators (WTGs), associated substructures and seabed foundations, inter-array cables, one OSP inter-connector cable and any scour protection around substructures or cable protection. The OfTI comprises two offshore substation platforms (OSPs) which will be located within the Moray West Site and two offshore export cable (OEC) circuits which will be located within the offshore export cable corridor (referred to as 'OfTI Corridor') and will be used to transmit the electricity generated by the offshore wind farm to shore.

The offshore export cable circuits will come ashore at Sandend Bay, which is located on the Aberdeenshire Coast at Broad Craig, approximately 65 km south of the Moray West Site. There will be two underground circuits from landfall at Sandend Bay to Whitehillock where the onshore substation will be located. There will also be further underground cabling between Whitehillock substation and Blackhillock substation. Moray West will transfer ownership of the transmission asset to an Offshore Transmission Owner (OFTO) who will manage the transmission infrastructure.

Figure 2-1 displays a map of the Moray West Site and OfTI corridor.

The development is aiming to be fully operational in 2024/25 with an operational life of 25 years from the date of final commissioning of the Development.

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

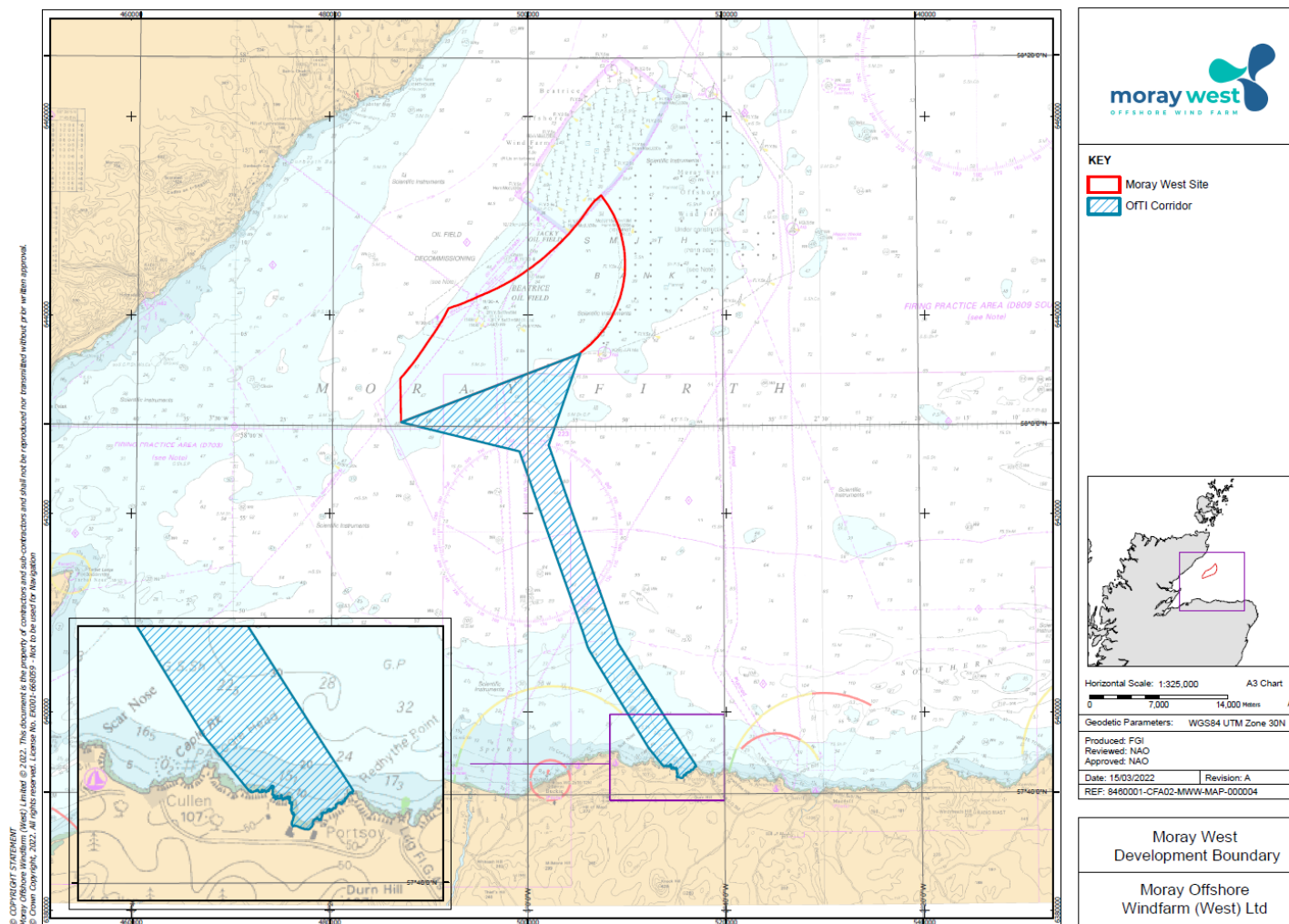


Figure 2-1 Geographical location of the Moray West Site and OfTI Corridor

### 3 Development Specification and Layout – Wind Farm

#### 3.1 Introduction

This section of the DSLP details the wind farm design and layout specification as required by the S36 consent condition 12 and the Wind Farm Marine Licence condition 3.2.2.9 detailed in Table 1-1.

Details related to the design and layout specifications of the OfTI are provided separately in Section 4 below.

#### 3.2 Wind Farm Layout and Specification

The S36 consent condition 12 and the Wind Farm Marine Licence condition 3.2.2.9 requires that this DSLP includes the following:

*A plan showing the location of each individual WTG (subject to any required micro-siting), including information on WTG spacing, WTG identification/numbering, seabed conditions, bathymetry, confirmed foundation type for each WTG and any key constraints recorded on the site;*

The wind farm layout is presented in Figure 3-1 below. There is a total of 69 locations shown in Figure 3-1 which represent:

- 60 Wind Turbines Generators (WTG),
- 2 Offshore Substation Platforms (OSP); and
- 7 ‘backup’ locations.

The backup locations will only be utilised if ground conditions which represent a high risk of pile refusal are encountered during the foundation installation operations at one or more of the WTGs or OSP locations that cannot be overcome by micro-siting.



# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

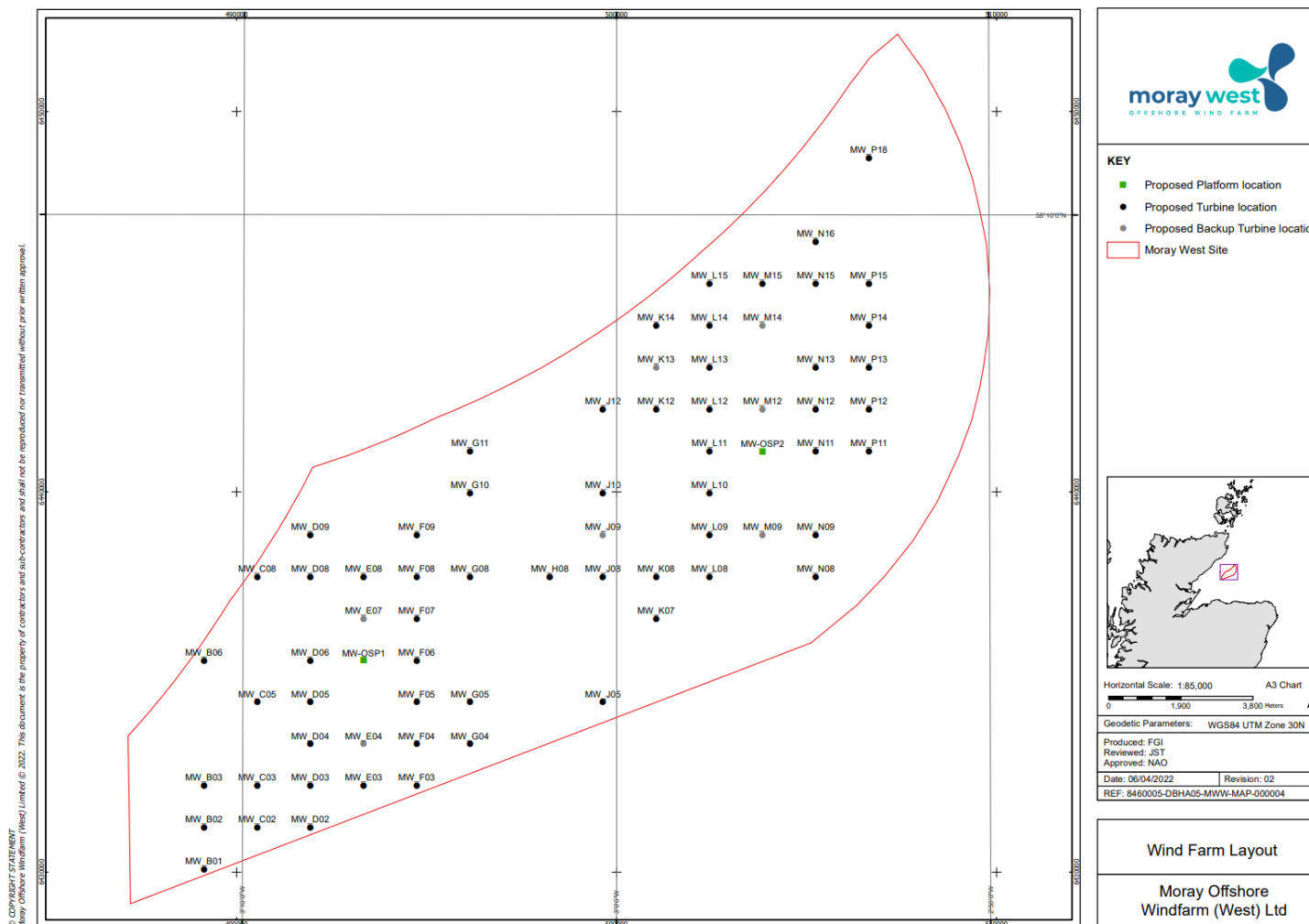


Figure 3-1 Moray West Wind Farm Layout including proposed WTG, backup and OSP locations.



### **3.2.1 WTG Spacing**

The WTG are arranged in a grid pattern that permits navigation between rows of WTG in any direction. The WTG rows maintain a northwest to southeast orientation and a grid layout.

The WTG are spaced at a distance of 1,100 m apart in the north to south axis and at a distance of 1,400 m apart in the east to west axis.

Safe passage distances between WTGs will vary between 860 m and 1,250 m taking into account advisory safety distances that will be promulgated during the operational phase of the Development. The width of primary Search and Rescue (SAR) lanes are in excess of 861 m between blade tips along a north to south orientation and in excess of 1,155 m between blade tips along an east to west orientation.

It is considered that there is sufficient distance between WTG locations that fishing vessels would be able to operate within the site. A Fisheries Management and Mitigation Strategy (FMMS) will be finalised in consultation with fishing industry representatives to develop practical coexistence and mitigation measures.

There are minor variations in spacing in the layout shown in Figure 3-1 where WTG spacing differs from the distance specified above. This is due to non-use of adjacent WTG positions in the Moray West layout. The WTGs that are spaced differently are as follows:

- MW\_B06 (1,780 m to the nearest WTG)
- MW\_J05 (2,607 m to the nearest WTG)
- MW\_P18 (2,607 m to the nearest WTG)

The distances stated are separations pre-micro-siting. Micro-siting allows for the movement of a WTG or OSP structure by up to 50 m within the Moray West Site on any axis as measured from the centre-point substructure position. Micro-siting of turbine locations will take into consideration the primary SAR lanes so as not to reduce the width of navigable rows to less than 800 m. Any micro-siting exceeding 50 m will be agreed in advance with the Maritime and Coastguard Agency (MCA) and Northern Lighthouse Board (NLB).

The final coordinates of the WTGs will be confirmed following completion of installation activities, and this DSLP will be updated consequentially.

### **3.2.2 WTG Identification**

Each WTG is marked with a unique alpha-numeric identifier, as shown in Figure 3-1. The WTG identification system has been devised in line with the following principles and/or requirements:

- Each unique WTG or OSP identifier is prefixed with a capital MW;
- The unique identifiers consist of black letters and numbers on yellow background;
- 360° visibility;
- The use of 'O' and 'I' has been avoided to prevent confusion with numeric characters in line with MCA guidance (MGN 654);

- Consideration has been given to ‘SAR Lanes’ and facilitating navigation through the Wind Farm.

Primary SAR lanes through the Moray West Site extend in north to south orientation, and in an east to west orientation. Additional, secondary SAR lanes coverage is provided by lanes passing through the turbine array in a northwest to southeast orientation.

The proposed numbering system has considered the primary northwest to southeast orientated indicative SAR lanes in that the WTGs and OSPs located along these lanes all have the same letter in their unique identifiers, followed by a descending or ascending number from the next turbine / OSP along the lane, depending on the direction of travel.

Further, the numbering system has been designed to aid navigation through the Wind Farm. When navigating through the Wind Farm along any lane in any direction, one would follow rows of WTGs and OSPs with unique identifiers of either the same letter and ascending/ descending number, or letters in ascending/ descending alphabetical order, and the same number.

The unique identifiers will be displayed on ID marker boards attached to handrails or painted directly onto the WTG to provide adequate visual coverage such that they can be read from all directions. The lettering will be black on a yellow background that is clearly readable by an observer stationed 3 m above sea level, at a distance up to 150 m away from the WTG and illuminated via low-level baffled lighting which can be controlled remotely.

Aviation unique identifiers will be on top of the WTG nacelles in clear black lettering and designed so as to be visible from a height of 500 ft (152 m) above the highest part of the WTG (excluding the blades). The WTG markings will be designed taking into account the MGN 654 SAR Annex 5 and any feedback provided by the Civil Aviation Authority (CAA) and MCA during consultation on the LMP.

Further details on the WTG marking will be provided within the LMP.

### **3.2.3 WTG Foundation Type**

All of the 60 WTGs will be supported by steel monopile foundations. The diameter of the upper section of monopile (both transition piece and upper monopile) will be 7.5 m. The diameter of the lower section of the WTG monopiles will be between 9.5 – 10 m, penetrating the seabed by approximately 30 - 40 m. Examples of the WTG monopile and the transition pieces are shown in Figure 3-2 to Figure 3-4.

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan

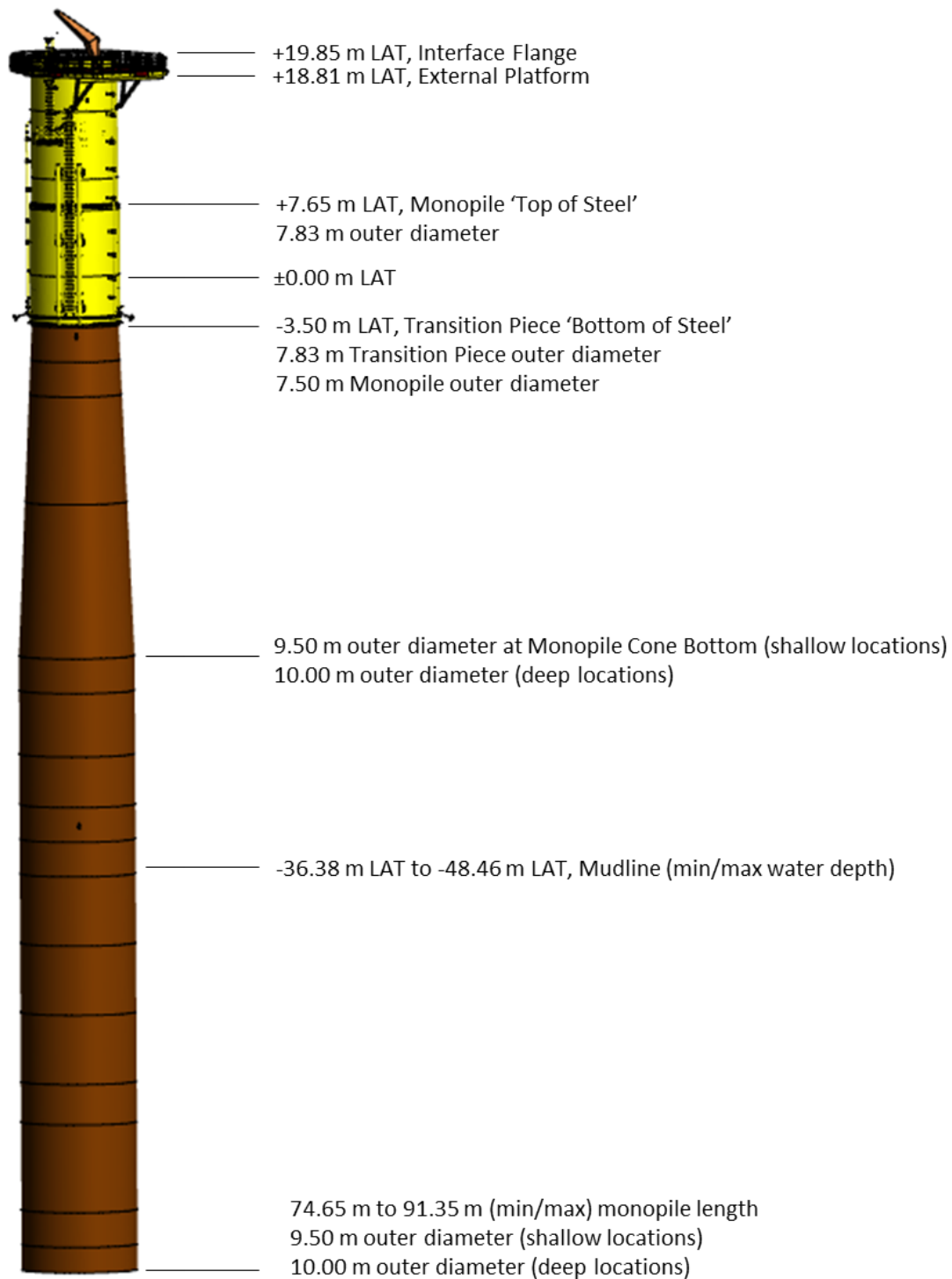


Figure 3-2 Example of Moray West WTG monopile

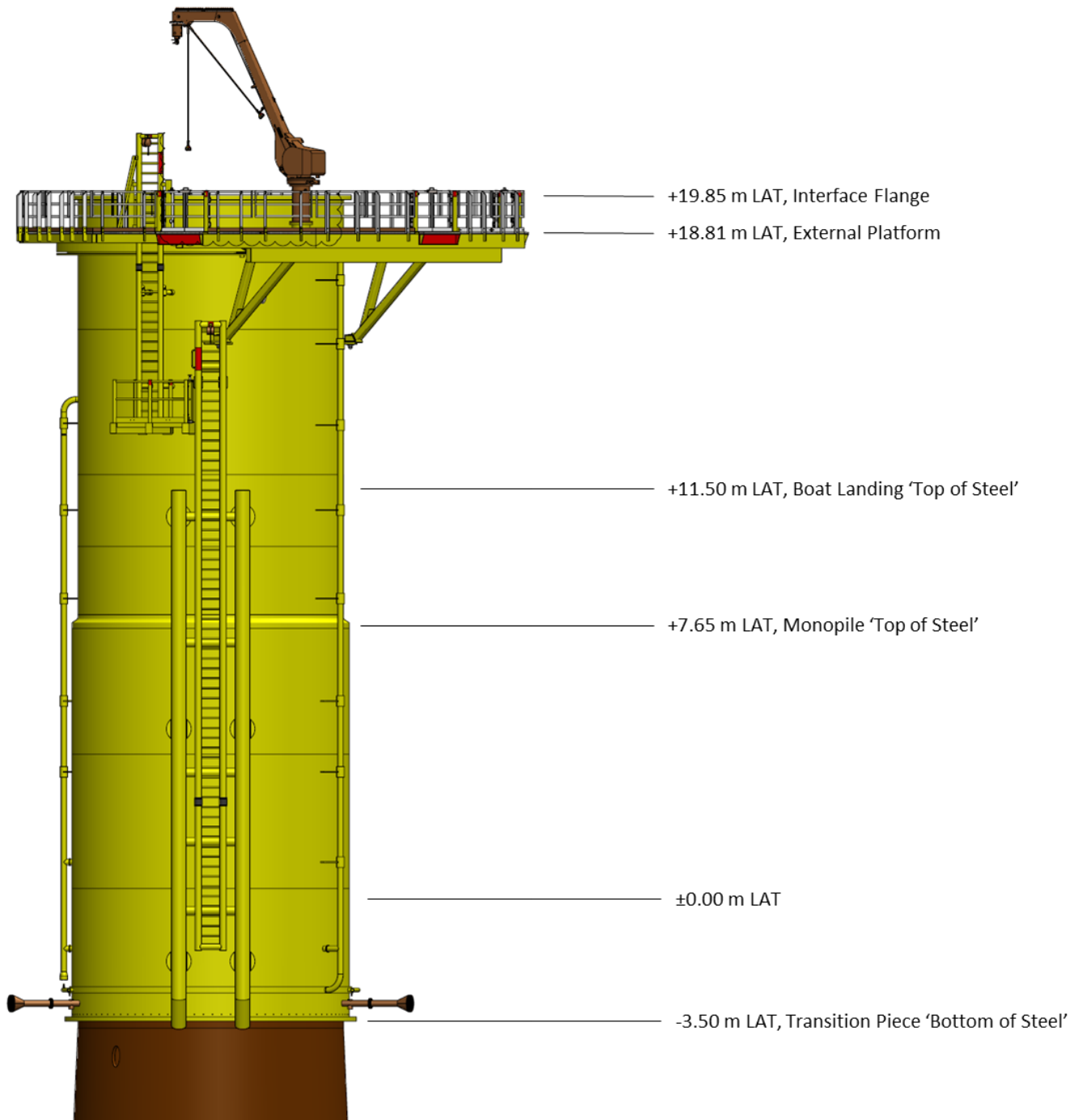


Figure 3-3 Drawing of WTG monopile transition piece (1 of 2)

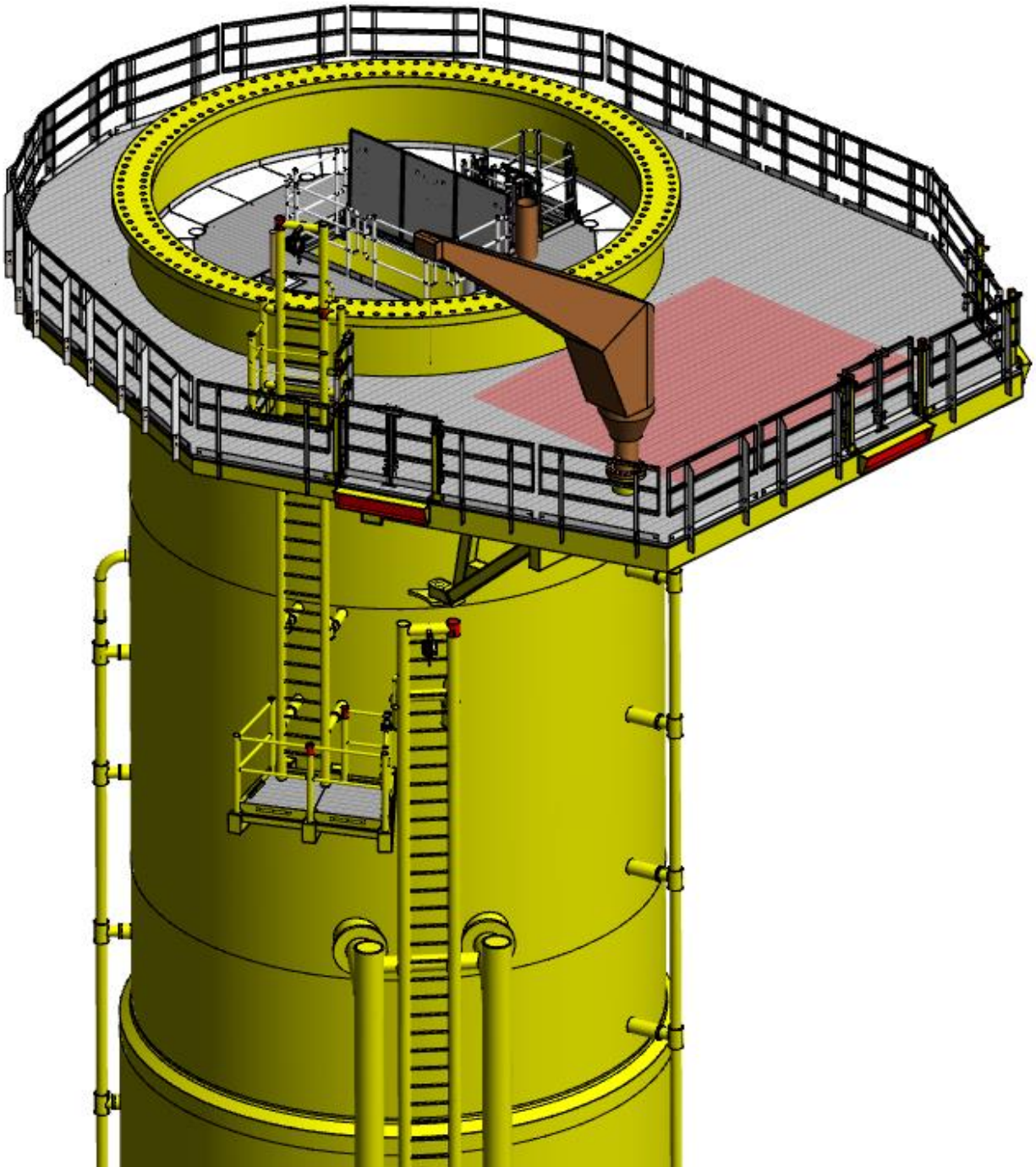


Figure 3-4 Drawing of WTG monopile transition piece (2 of 2)

### **3.2.4 Wind Farm Bathymetry and Seabed Conditions**

Bathymetry across the Moray West Site ranges from 53.3 m below LAT in the west up to 34.6 m in the east (see Figure 3-5).

The WTGs will be installed in water depths ranging from approximately 36.4 m to 46.8 m below LAT. Water depths at each WTG location are listed in Table 3-1 below.

Throughout the Moray West Site, the dominant seabed sediment varies between sand and gravel. Seabed sediments are shown in Figure 3-6.

There is the potential for surface boulders to be present across the Moray West Site. Based on the most recent analysis of the geophysical information approximately 25% of the boulders in the Moray West Site are greater than 1 m in length, width, or height. In areas where boulders are present that may inhibit cable or foundation installation, a boulder clearance campaign will be carried out ahead of cable or WTG foundation installation activities. Boulder clearance methods will be described in the Moray West Construction Programme and Construction Method Statement (CoP & CMS) and the Wind Farm CaP.



# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

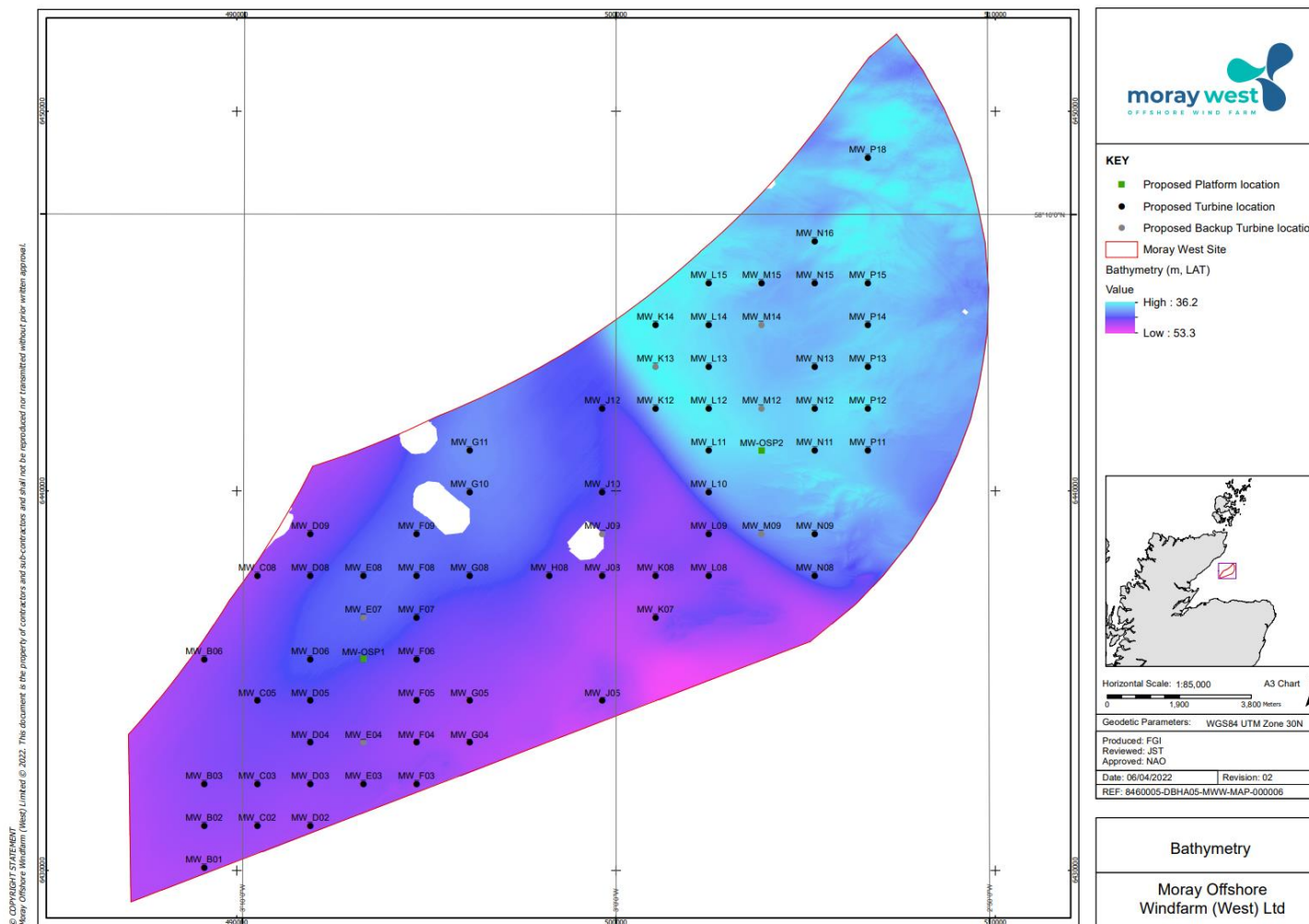


Figure 3-5 Moray West Site bathymetry (m,LAT)

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

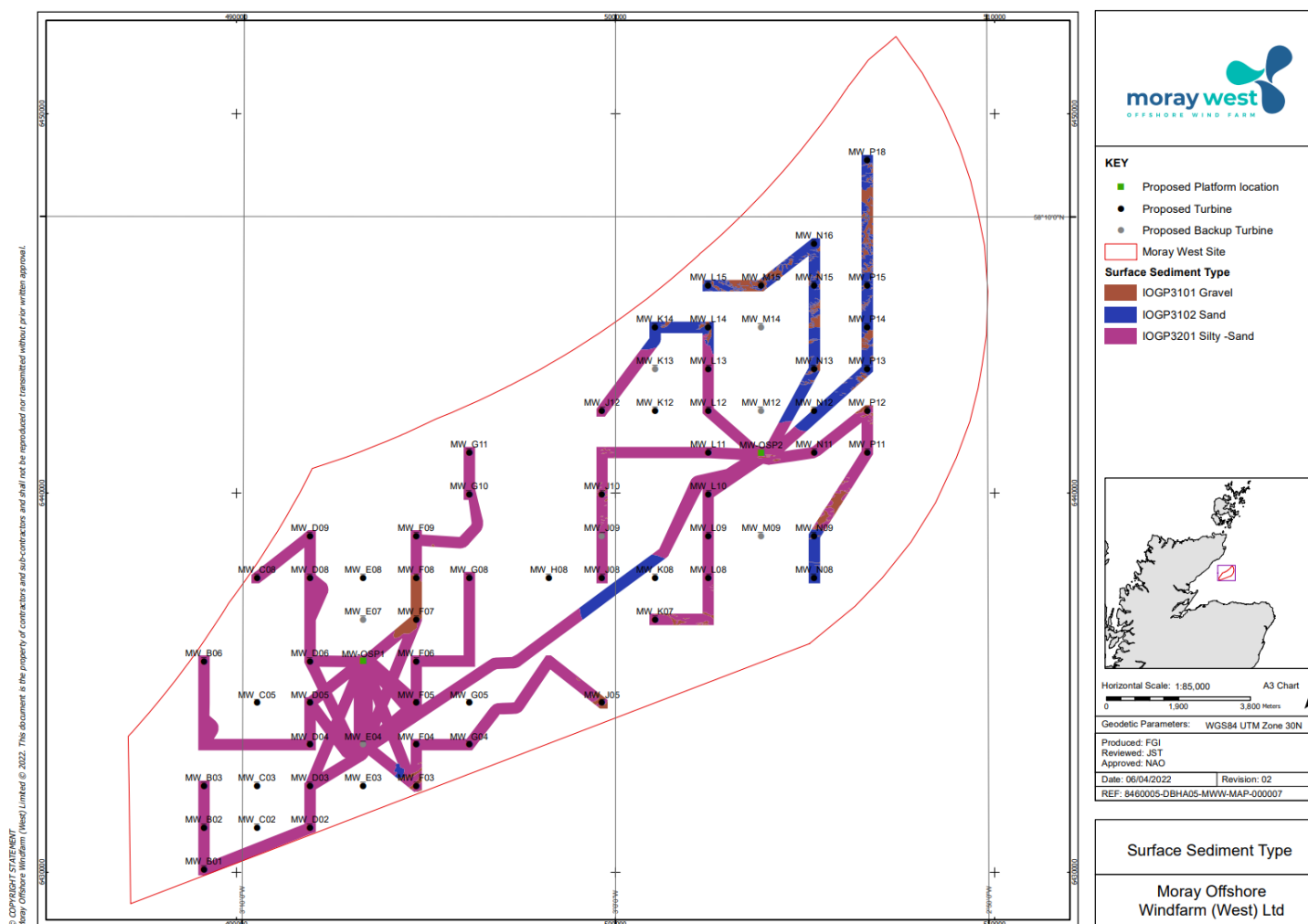


Figure 3-6 Moray West Site surface sediment types



### **3.2.5 Key Constraints**

There are a small number of physical spatial constraints within the Moray West Site (see Figure 3-7). The final layout ensures that infrastructure avoids the following constraints:

- Beatrice Wind Farm Demonstrator project is located adjacent to the Beatrice oil field, immediately to the north-west of the Moray West Site.
- Moray West is located within an area surrounded by oil and gas activity and is in close proximity to, but not overlapping the Beatrice oil field, which is located in Block 11/30a immediately to the north of the Moray West Site and was in production from 1981-2015, and the “Jacky” oil field, which is located immediately adjacent to “Beatrice” in Block 12/21c and commenced production in 2009. The Beatrice platforms lie between 200 – 1,200 m from the Moray West Site boundary, whilst the Jacky platform lies approximately 2.5 km away. Both the Jacky and Beatrice oil fields are no longer producing and are scheduled for decommissioning in 2023 and 2024-2025, respectively.
- Beatrice Offshore Wind Farm (BOWL) lease area lies adjacent to the extreme north-east corner boundary of the Moray West Site approximately 13.5 km from the Caithness Coast in the Outer Moray Firth. BOWL’s offshore export cable extends approximately 65 km from the BOWL wind farm, through the Moray West Site.
- The Caithness Moray Interconnector Cable passes through the Moray West OfTI Corridor and has been considered when defining the design layout.

The Moray West inter-array cables are expected to cross BOWL offshore export cable and both 16" diameter main oil export pipelines PL16 and PL1838 to the Nigg Oil Terminal which runs between Beatrice ‘Alpha Production’ (AP) Platform to landfall at Shandwick Bay. This includes the replacement section of subsea pipeline (PL1838) which is laid alongside (20- 50m distance) the original line (PL16). The OSP inter-connector is also expected to cross the BOWL offshore export cable.

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

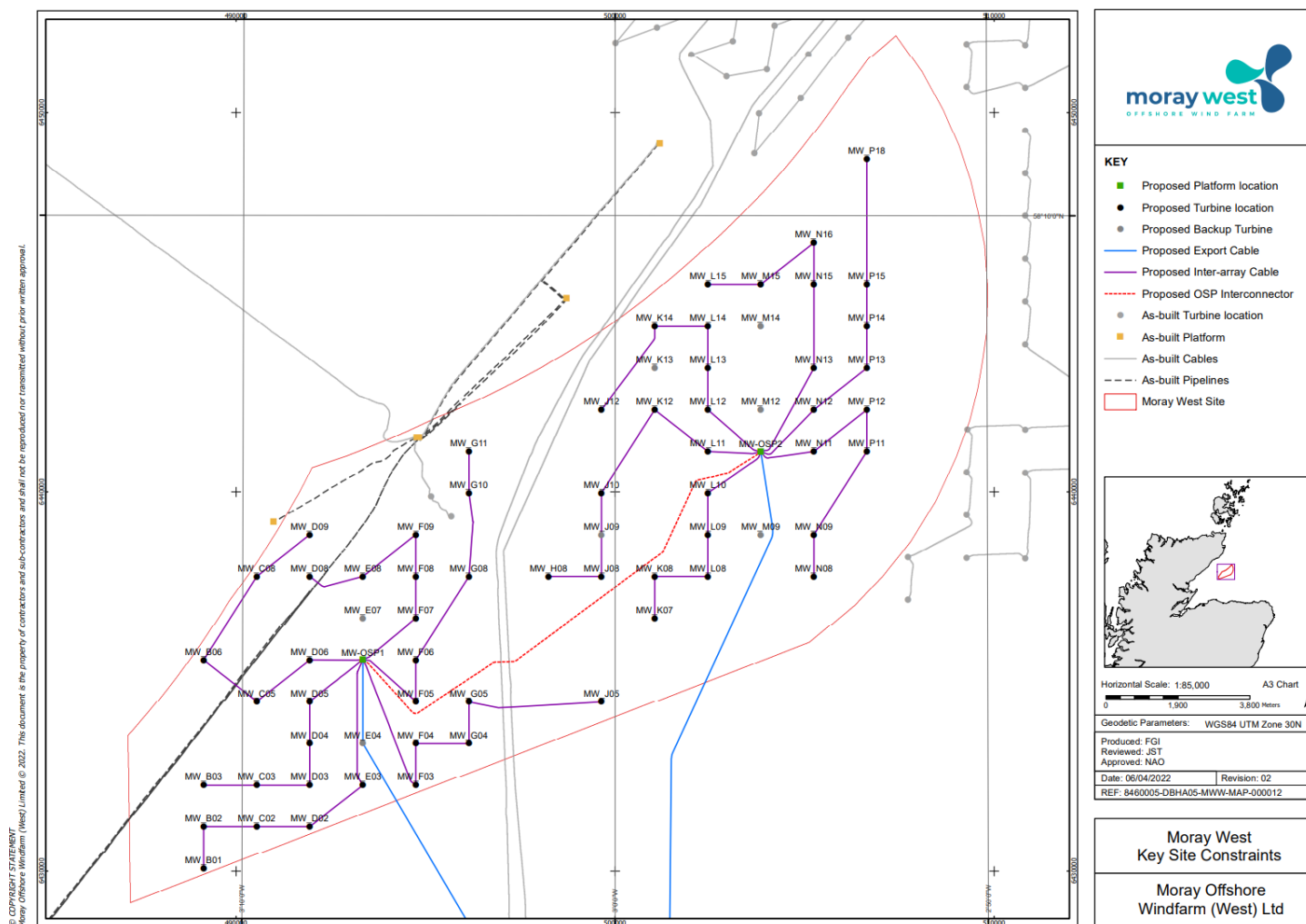


Figure 3-7 Key infrastructure constraints within the Moray West Site

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

For the purpose of the archaeological assessment undertaken for the Moray West EIA Report (Moray West, 2018), a study area referred to as the Development Archaeological Study Area (ASA) was defined to include the Moray West Site and the OfTI Corridor with a 2 km buffer. The assessment of the 2010 geophysical survey data resulted in the identification of 29 anomalies of archaeological interest within the Moray West Site (Wessex Archaeology, 2018).

Wessex Archaeology operate a process of archaeological discrimination as follows:

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest with no corresponding geophysical anomaly

The A3 record within the Moray West Site corresponds to a wreck (7228) recorded by the UKHO as the *Sunbeam* (Possibly), last identified by geophysical survey for the UKHO in 2008. Although the 2010 geophysical survey did not locate its position, it can be assumed to still exist at the recorded location and therefore, a precautionary Archaeological Exclusion Zone (AEZ) of 100 m radius is recommended around the location.

The seabed features of archaeological potential and exclusion zones are shown in Figure 3-8.

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

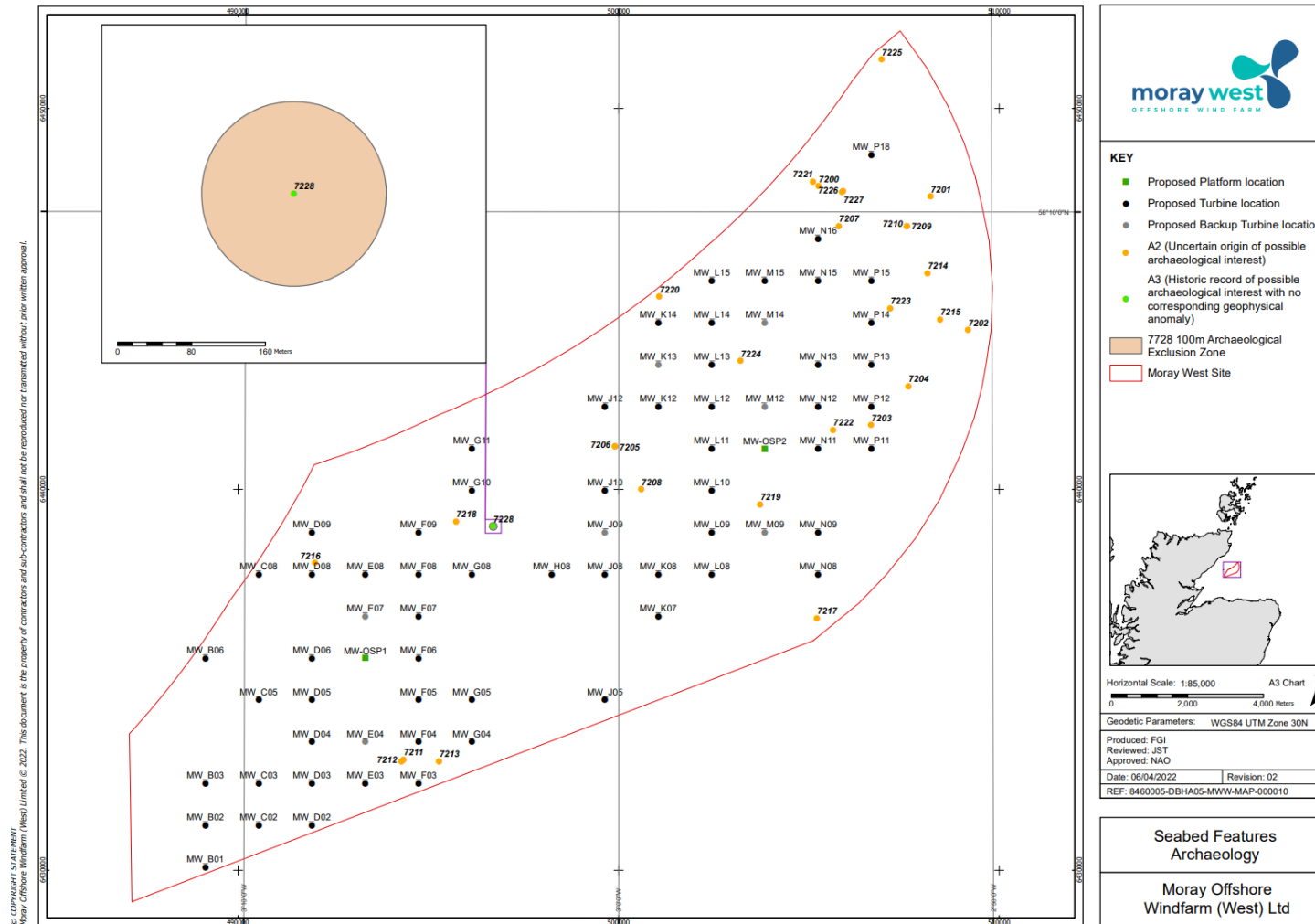


Figure 3-8 Moray West Site seabed features (archaeology)

### 3.3 Co-ordinates for WTG Locations

The S36 condition 12 and the Wind Farm Marine Licence condition 3.2.2.9 requires that this DSLP includes the following:

*A list of latitude and longitude co-ordinates accurate to three decimal places of minutes for each WTG, this should also be provided as a GIS shape file using WGS84 format;*

The co-ordinates of the 60 WTGs and 7 “backup” locations are provided in Table 3-1.

As required by the S36 condition, a GIS shape files with these co-ordinates is provided to accompany this DSLP in Appendix D.

Table 3-1 WTG location co-ordinates (WGS84) and approximate water depths				
WTG Identification	Latitude	Longitude	Depth (m) Below LAT	Status
MW_B01	58° 0' 43.525" N	3° 11' 1.479" W	48.45	Proposed location
MW_B02	58° 1' 19.094" N	3° 11' 1.661" W	47.60	Proposed location
MW_B03	58° 1' 54.662" N	3° 11' 1.844" W	47.05	Proposed location
MW_B06	58° 3' 41.368" N	3° 11' 2.392" W	47.52	Proposed location
MW_C02	58° 1' 19.209" N	3° 9' 36.343" W	47.65	Proposed location
MW_C03	58° 1' 54.777" N	3° 9' 36.502" W	46.84	Proposed location
MW_C05	58° 3' 5.915" N	3° 9' 36.820" W	45.64	Proposed location
MW_C08	58° 4' 52.620" N	3° 9' 37.299" W	47.56	Proposed location
MW_D02	58° 1' 19.308" N	3° 8' 11.025" W	48.04	Proposed location
MW_D03	58° 1' 54.877" N	3° 8' 11.161" W	47.28	Proposed location
MW_D04	58° 2' 30.445" N	3° 8' 11.296" W	46.32	Proposed location
MW_D05	58° 3' 6.014" N	3° 8' 11.432" W	45.29	Proposed location
MW_D06	58° 3' 41.583" N	3° 8' 11.568" W	44.38	Proposed location
MW_D08	58° 4' 52.719" N	3° 8' 11.839" W	45.10	Proposed location
MW_D09	58° 5' 28.288" N	3° 8' 11.975" W	46.59	Proposed location
MW_E03	58° 1' 54.960" N	3° 6' 45.819" W	47.24	Proposed location
MW_E04	58° 2' 30.529" N	3° 6' 45.931" W	46.88	Backup
MW_E07	58° 4' 17.235" N	3° 6' 46.267" W	43.87	Backup
MW_E08	58° 4' 52.803" N	3° 6' 46.380" W	43.73	Proposed location
MW_F03	58° 1' 55.028" N	3° 5' 20.477" W	48.46	Proposed location
MW_F04	58° 2' 30.597" N	3° 5' 20.566" W	47.84	Proposed location

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

**Table 3-1 WTG location co-ordinates (WGS84) and approximate water depths**

WTG Identification	Latitude	Longitude	Depth (m) Below LAT	Status
MW_F05	58° 3' 6.165" N	3° 5' 20.654" W	47.13	Proposed location
MW_F06	58° 3' 41.734" N	3° 5' 20.743" W	45.88	Proposed location
MW_F07	58° 4' 17.302" N	3° 5' 20.831" W	44.70	Proposed location
MW_F08	58° 4' 52.871" N	3° 5' 20.920" W	43.76	Proposed location
MW_F09	58° 5' 28.439" N	3° 5' 21.009" W	43.48	Proposed location
MW_G04	58° 2' 30.648" N	3° 3' 55.200" W	48.60	Proposed location
MW_G05	58° 3' 6.217" N	3° 3' 55.265" W	48.26	Proposed location
MW_G08	58° 4' 52.923" N	3° 3' 55.460" W	44.21	Proposed location
MW_G10	58° 6' 4.059" N	3° 3' 55.590" W	42.45	Proposed location
MW_G11	58° 6' 39.628" N	3° 3' 55.656" W	41.44	Proposed location
MW_H08	58° 4' 52.971" N	3° 1' 47.270" W	45.97	Proposed location
MW_J05	58° 3' 6.277" N	3° 0' 21.793" W	48.28	Proposed location
MW_J08	58° 4' 52.983" N	3° 0' 21.811" W	47.38	Proposed location
MW_J09	58° 5' 28.551" N	3° 0' 21.817" W	46.20	Backup
MW_J10	58° 6' 4.119" N	3° 0' 21.823" W	45.06	Proposed location
MW_J12	58° 7' 15.256" N	3° 0' 21.835" W	44.81	Proposed location
MW_K07	58° 4' 17.410" N	2° 58' 56.368" W	48.18	Proposed location
MW_K08	58° 4' 52.979" N	2° 58' 56.351" W	47.71	Proposed location
MW_K12	58° 7' 15.252" N	2° 58' 56.280" W	38.71	Proposed location
MW_K13	58° 7' 50.820" N	2° 58' 56.263" W	36.08	Backup
MW_K14	58° 8' 26.388" N	2° 58' 56.245" W	36.38	Proposed location
MW_L08	58° 4' 52.959" N	2° 57' 30.891" W	47.15	Proposed location
MW_L09	58° 5' 28.527" N	2° 57' 30.850" W	46.56	Proposed location
MW_L10	58° 6' 4.096" N	2° 57' 30.808" W	41.59	Proposed location
MW_L11	58° 6' 39.664" N	2° 57' 30.767" W	37.71	Proposed location
MW_L12	58° 7' 15.232" N	2° 57' 30.726" W	36.73	Proposed location
MW_L13	58° 7' 50.800" N	2° 57' 30.684" W	37.29	Proposed location
MW_L14	58° 8' 26.369" N	2° 57' 30.643" W	37.68	Proposed location
MW_L15	58° 9' 1.937" N	2° 57' 30.602" W	36.94	Proposed location
MW_M09	58° 5' 28.492" N	2° 56' 5.366" W	41.83	Backup
MW_M12	58° 7' 15.196" N	2° 56' 5.171" W	37.99	Backup
MW_M14	58° 8' 26.333" N	2° 56' 5.041" W	38.45	Backup
MW_M15	58° 9' 1.901" N	2° 56' 4.976" W	38.87	Proposed location

Table 3-1 WTG location co-ordinates (WGS84) and approximate water depths				
WTG Identification	Latitude	Longitude	Depth (m) Below LAT	Status
MW_N08	58° 4' 52.871" N	2° 54' 39.971" W	43.56	Proposed location
MW_N09	58° 5' 28.440" N	2° 54' 39.883" W	40.18	Proposed location
MW_N11	58° 6' 39.576" N	2° 54' 39.706" W	38.06	Proposed location
MW_N12	58° 7' 15.145" N	2° 54' 39.617" W	37.73	Proposed location
MW_N13	58° 7' 50.713" N	2° 54' 39.528" W	38.24	Proposed location
MW_N15	58° 9' 1.849" N	2° 54' 39.351" W	39.35	Proposed location
MW_N16	58° 9' 37.417" N	2° 54' 39.262" W	37.47	Proposed location
MW_P11	58° 6' 39.509" N	2° 53' 14.175" W	38.97	Proposed location
MW_P12	58° 7' 15.077" N	2° 53' 14.063" W	37.34	Proposed location
MW_P13	58° 7' 50.645" N	2° 53' 13.950" W	38.03	Proposed location
MW_P14	58° 8' 26.213" N	2° 53' 13.838" W	38.15	Proposed location
MW_P15	58° 9' 1.781" N	2° 53' 13.725" W	38.04	Proposed location
MW_P18	58° 10' 48.485" N	2° 53' 13.387" W	38.32	Proposed location

### 3.4 WTG Dimensions

The S36 condition 12 requires that this DSLP includes the following:

*A table or diagram of each WTG dimensions including - height to blade tip (measured above Lowest Astronomical Tide ("LAT")) to the highest point, height to hub (measured above LAT to the centreline of the generator shaft), rotor diameter and maximum rotation speed;*

Moray West has chosen to install Siemens Gamesa DD-222 WTGs. The dimensions of the WTGs are summarised in Table 3-2, and shown in Figure 3-9.

Table 3-2 Key dimensions of the WTG	
WTG Parameter	Dimensions
Height to blade tip (m LAT)	+262.02
Height to hub (m LAT)	+151.02
Rotor diameter (m)	222
Blade width (m)	6.5
Air Gap (m LAT)	+40.02
Maximum rotation speed (m/s)	28



# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

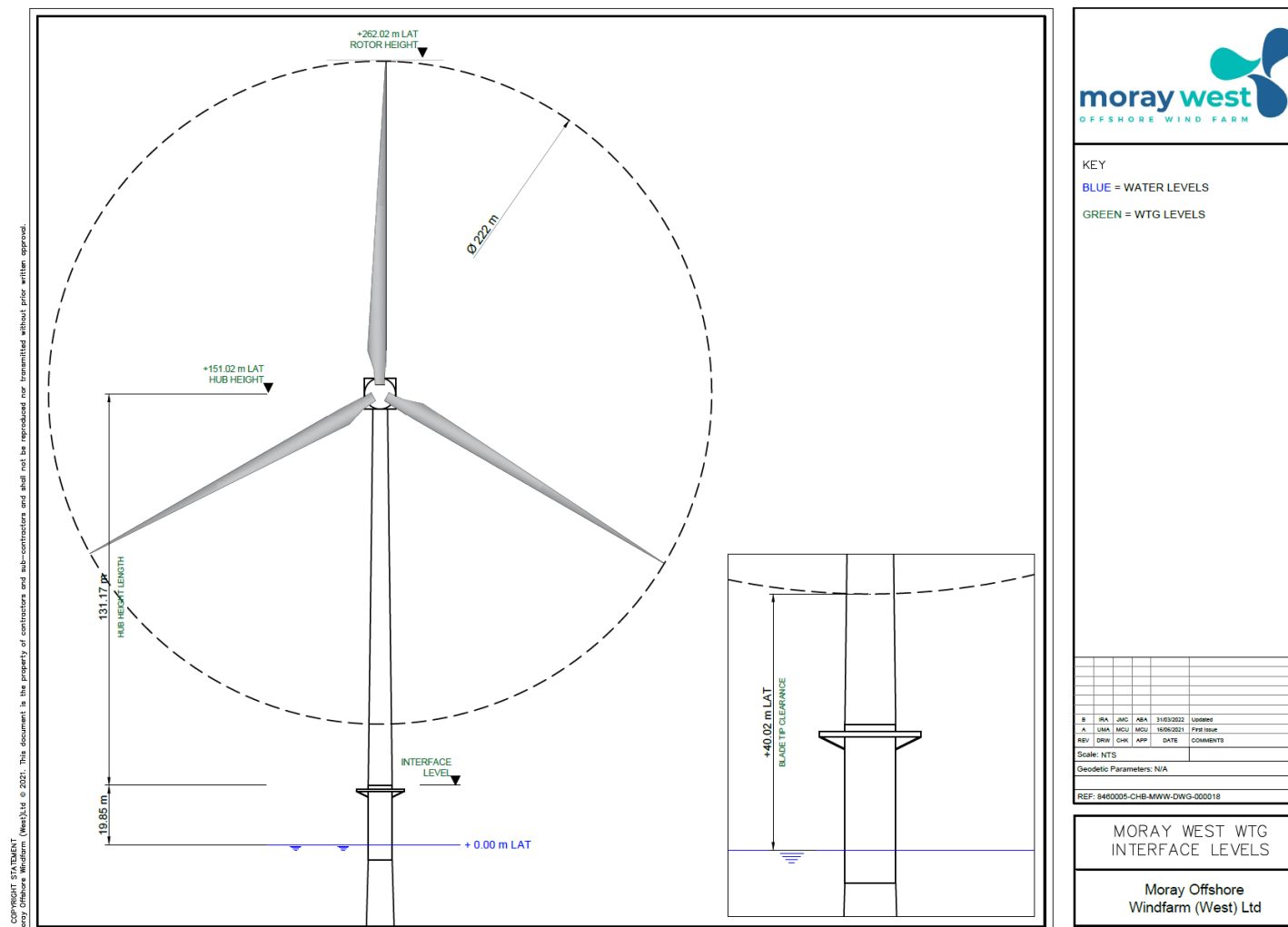


Figure 3-9 Key dimensions of the Moray West WTG



### 3.5 Generating Capacity

The S36 condition 12 requires that this DSLP include the following:

*The generating output of each WTG used on the site and a confirmed generating output for the site overall;*

The chosen WTG for installation at the Moray West Offshore Wind Farm is the Siemens Gamesa DD-222. Each of the WTGs will have a generating capacity of 14.7 MW.

The total generating capacity of the Moray West Offshore Wind Farm will be 882 MW. The ultimate export capacity of the wind farm is currently constrained by a grid connection transmission entry capacity of 860 MW.

### 3.6 WTG Finishes

The S36 condition 12 and the Wind Farm Marine Licence condition 3.2.2.9 requires that this DSLP includes the following:

*The finishes for each WTG (see Condition 20 on WTG lighting and marking);*

Each WTG (tower sections, nacelle and blades) will be finished in the standard light grey, RAL 7035.

To comply with aviation and marine navigation requirements the WTGs will have additional marking which are detailed within the LMP. This is likely to include:

- Blade markings in all WTG: three marked dots along the blade (at 10, 20 and 30 m intervals from root of the blade) will be painted in red to provide SAR helicopter pilots with a reference when hovering over the nacelle during a rescue;
- Blade tip marking in all WTG: from blade tip to a point on the blade corresponding to 2% of the blade length when measured from tip.
- ID marking in all WTG nacelle roofs
- Heli-hoist platforms on top of the WTG Nacelle will be painted as per CAA CAP 437 - Standards for Offshore Helicopter Landing Areas; and
- Monopile foundations (from at least 2 m below LAT) and transition piece up to WTG tower interface level will be painted in traffic yellow (RAL 1023).

The LMP should be referred to for full details of WTG marking.

### 3.7 Length and Proposed Arrangement of Cables

The S36 condition 12 and the Wind Farm Marine Licence Consent Condition 3.2.2.9 requires that this DSLP include the following:

*The length and proposed arrangements on the seabed of all inter-array and OSP inter-connector cables.*

### 3.7.1 Inter-Array Cables

The WTGs are connected at a voltage of 66 kV by inter-array cabling in collector “circuits” or “strings”. There will be up to 60 cable lengths connected in 12 strings with 5 WTGs connected on each string. The first WTG in each string is connected by an inter-array cable to an OSP and there will be 6 strings connected to each OSP.

The inter-array cables will be comprised of between 1,100 - 5,000 m lengths of 66 kV cable. The arrangement of the cables between the WTGs and the connections between the WTGs to the OSPs is set out in Figure 3-10. The cable arrangement is routed around known constraints but otherwise assumes generally straight line routes between WTGs, and WTGs and OSPs, as presented in Figure 3-10. Further geophysical and geotechnical survey work will be completed to identify any further constraints within the Moray West Site and final cable routing will be refined to avoid any additional constraints identified. The final proposed inter-array cable route will be detailed in the Moray West Wind Farm CaP.

The lengths of each of the inter-array cables between the WTGs and OSP locations (where relevant) are presented in Table 3-3. The total length of the inter-array cabling to be installed on the seabed is anticipated to be approximately 150 km. The final installed cable length is subject to optimisation of the orientation of the bellmouth on each OSP and the entry hole on the WTG and micro-siting around any additional constraints identified during ongoing geophysical surveys. Details of the final cable lengths will be detailed within the Wind Farm CaP.

The inter-array cabling will be protected primarily by burial. Full details of the proposed cable protection and a summary of the cable burial risk assessment (CBRA) will be presented in the Moray West Wind Farm CaP.

**Table 3-3 Inter Array cable proposed arrangements and approximate cable lengths**

Array Route		Start Point			End Point			Route Length between structures (m)
Start	End	Latitude (DDM) WGS84	Longitude (DDM) WGS84	Water depth (m) LAT	Latitude (DDM) WGS84	Longitude (DDM) WGS84	Water depth (m) LAT	
B01	B02	58° 0' 43.525" N	3° 11' 1.479" W	48.45	58° 1' 19.094" N	3° 11' 1.661" W	47.60	1100
B06	C08	58° 3' 41.368" N	3° 11' 2.392" W	47.52	58° 4' 52.620" N	3° 9' 37.299" W	47.55	2608
C02	B02	58° 1' 19.209" N	3° 9' 36.343" W	47.65	58° 1' 19.094" N	3° 11' 1.661" W	47.60	1400
C03	B03	58° 1' 54.777" N	3° 9' 36.502" W	46.84	58° 1' 54.662" N	3° 11' 1.844" W	47.05	1400
C05	B06	58° 3' 5.915" N	3° 9' 36.820" W	45.64	58° 3' 41.368" N	3° 11' 2.392" W	47.52	1780
C08	D09	58° 4' 52.620" N	3° 9' 37.299" W	47.55	58° 5' 28.288" N	3° 8' 11.975" W	46.58	1780
D02	C02	58° 1' 19.308" N	3° 8' 11.025" W	48.05	58° 1' 19.209" N	3° 9' 36.343" W	47.65	1400
D03	C03	58° 1' 54.877" N	3° 8' 11.161" W	47.28	58° 1' 54.777" N	3° 9' 36.502" W	46.84	1400

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

**Table 3-3 Inter Array cable proposed arrangements and approximate cable lengths**

Array Route		Start Point			End Point			Route Length between structures (m)
Start	End	Latitude (DDM) WGS84	Longitude (DDM) WGS84	Water depth (m) LAT	Latitude (DDM) WGS84	Longitude (DDM) WGS84	Water depth (m) LAT	
D04	D03	58° 2' 30.445" N	3° 8' 11.296" W	46.32	58° 1' 54.877" N	3° 8' 11.161" W	47.28	1100
D05	D04	58° 3' 06.014" N	3° 8' 11.432" W	45.29	58° 2' 30.445" N	3° 8' 11.296" W	46.32	1100
D06	C05	58° 3' 41.583" N	3° 8' 11.568" W	44.38	58° 3' 5.915" N	3° 9' 36.820" W	45.64	1780
D07	D08	58° 4' 45.639" N	3° 7' 54.613" W	44.52	58° 4' 44.098" N	3° 7' 46.690" W	44.38	1524
E03	D02	58° 1' 54.960" N	3° 6' 45.819" W	47.24	58° 1' 19.308" N	3° 8' 11.025" W	48.05	1780
F03	F04	58° 1' 55.028" N	3° 5' 20.477" W	48.45	58° 2' 30.597" N	3° 5' 20.566" W	47.84	1100
F04	G04	58° 2' 30.597" N	3° 5' 20.566" W	47.84	58° 2' 30.648" N	3° 3' 55.200" W	48.60	1400
F05	F06	58° 3' 06.165" N	3° 5' 20.654" W	47.13	58° 3' 41.734" N	3° 5' 20.743" W	45.88	1100
F06	G08	58° 3' 41.734" N	3° 5' 20.743" W	45.88	58° 4' 52.923" N	3° 3' 55.460" W	44.21	2608
F07	F08	58° 4' 17.302" N	3° 5' 20.831" W	44.70	58° 4' 52.871" N	3° 5' 20.920" W	43.76	1100
F08	F09	58° 4' 52.871" N	3° 5' 20.920" W	43.76	58° 5' 28.439" N	3° 5' 21.009" W	43.33	1100
F09	E08	58° 5' 28.439" N	3° 5' 21.009" W	43.33	58° 4' 52.803" N	3° 6' 46.380" W	43.85	1780
G04	G05	58° 2' 30.648" N	3° 3' 55.200" W	48.60	58° 3' 6.217" N	3° 3' 55.265" W	48.16	1100
G05	J05	58° 3' 01.145" N	3° 3' 7.894" W	48.44	58° 3' 1.777" N	3° 2' 41.046" W	48.67	3520
G08	G10	58° 4' 52.923" N	3° 3' 55.460" W	44.21	58° 6' 4.059" N	3° 3' 55.590" W	42.38	2200
G10	G11	58° 6' 04.059" N	3° 3' 55.590" W	42.38	58° 6' 39.628" N	3° 3' 55.656" W	41.44	1100
J08	H08	58° 4' 52.983" N	3° 0' 21.811" W	47.39	58° 4' 52.971" N	3° 1' 47.270" W	45.97	1400
J10	J08	58° 6' 04.119" N	3° 0' 21.823" W	45.06	58° 4' 52.983" N	3° 0' 21.811" W	47.39	2200
K08	K07	58° 4' 52.979" N	2° 58' 56.351" W	47.71	58° 4' 17.410" N	2° 58' 56.368" W	48.19	1100
K12	J10	58° 7' 15.252" N	2° 58' 56.280" W	38.72	58° 6' 4.119" N	3° 0' 21.823" W	45.06	2608
K14	J12	58° 8' 26.388" N	2° 58' 56.245" W	36.38	58° 7' 15.256" N	3° 0' 21.835" W	44.82	2665
L08	K08	58° 4' 52.959" N	2° 57' 30.891" W	47.14	58° 4' 52.979" N	2° 58' 56.351" W	47.71	1400
L09	L08	58° 5' 28.527" N	2° 57' 30.850" W	46.56	58° 4' 52.959" N	2° 57' 30.891" W	47.14	1100
L10	L09	58° 6' 4.096" N	2° 57' 30.808" W	41.59	58° 5' 28.527" N	2° 57' 30.850" W	46.56	1100
L11	K12	58° 6' 39.664" N	2° 57' 30.767" W	37.64	58° 7' 15.252" N	2° 58' 56.280" W	38.72	1780
L12	L13	58° 7' 15.232" N	2° 57' 30.726" W	36.73	58° 7' 50.800" N	2° 57' 30.684" W	37.28	1100
L13	L14	58° 7' 50.800" N	2° 57' 30.684" W	37.28	58° 8' 26.369" N	2° 57' 30.643" W	37.68	1100
L14	K14	58° 8' 26.369" N	2° 57' 30.643" W	37.68	58° 8' 26.388" N	2° 58' 56.245" W	36.38	1400
M15	L15	58° 9' 1.901" N	2° 56' 4.976" W	38.87	58° 9' 1.937" N	2° 57' 30.602" W	36.94	1400

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

**Table 3-3 Inter Array cable proposed arrangements and approximate cable lengths**

Array Route		Start Point			End Point			Route Length between structures (m)
Start	End	Latitude (DDM) WGS84	Longitude (DDM) WGS84	Water depth (m) LAT	Latitude (DDM) WGS84	Longitude (DDM) WGS84	Water depth (m) LAT	
N09	N08	58° 5' 28.440" N	2° 54' 39.883" W	40.17	58° 4' 52.871" N	2° 54' 39.971" W	43.56	1100
N11	P12	58° 6' 39.576" N	2° 54' 39.706" W	38.06	58° 7' 15.077" N	2° 53' 14.063" W	37.34	1780
N12	P13	58° 7' 15.145" N	2° 54' 39.617" W	37.73	58° 7' 50.645" N	2° 53' 13.950" W	38.02	1780
N13	N15	58° 7' 50.713" N	2° 54' 39.528" W	38.24	58° 9' 1.849" N	2° 54' 39.351" W	39.36	2200
N15	N16	58° 9' 1.849" N	2° 54' 39.351" W	39.36	58° 9' 37.417" N	2° 54' 39.262" W	37.44	1100
N16	M15	58° 9' 37.417" N	2° 54' 39.262" W	37.44	58° 9' 1.901" N	2° 56' 4.976" W	38.87	1780
OSP1	D05	58° 3' 41.650" N	3° 6' 46.476" W	44.81	58° 3' 6.014" N	3° 8' 11.432" W	45.29	1776
OSP1	D06	58° 3' 41.776" N	3° 6' 46.403" W	44.78	58° 3' 41.583" N	3° 8' 11.568" W	44.38	1397
OSP1	F03	58° 3' 41.502" N	3° 6' 46.069" W	44.82	58° 1' 55.028" N	3° 5' 20.477" W	48.45	3602
OSP1	F05	58° 3' 41.805" N	3° 6' 45.969" W	44.76	58° 3' 6.165" N	3° 5' 20.654" W	47.13	1810
OSP1	F07	58° 3' 41.835" N	3° 6' 46.100" W	44.76	58° 4' 17.302" N	3° 5' 20.831" W	44.70	1783
OSP1	E03	58° 3' 41.666" N	3° 6' 46.155" W	44.79	58° 1' 54.960" N	3° 6' 45.819" W	47.24	3345
OSP2	L10	58° 6' 39.459" N	2° 56' 5.293" W	37.49	58° 6' 4.096" N	2° 57' 30.808" W	41.59	1806
OSP2	L11	58° 6' 39.567" N	2° 56' 5.538" W	37.49	58° 6' 39.664" N	2° 57' 30.767" W	37.64	1405
OSP2	L12	58° 6' 39.643" N	2° 56' 5.558" W	37.49	58° 7' 15.232" N	2° 57' 30.726" W	36.73	1797
OSP2	N11	58° 6' 39.697" N	2° 56' 4.941" W	37.50	58° 6' 39.576" N	2° 54' 39.706" W	38.06	1491
OSP2	N13	58° 6' 39.797" N	2° 56' 5.180" W	37.45	58° 7' 50.713" N	2° 54' 39.528" W	38.24	2677
OSP2	P13	58° 6' 39.767" N	2° 56' 5.049" W	37.46	58° 7' 15.145" N	2° 54' 39.617" W	37.73	1905
P11	N09	58° 6' 39.509" N	2° 53' 14.175" W	38.96	58° 5' 28.440" N	2° 54' 39.883" W	40.17	2608
P12	P11	58° 7' 15.077" N	2° 53' 14.063" W	37.34	58° 6' 39.509" N	2° 53' 14.175" W	38.96	1100
P13	P14	58° 7' 50.645" N	2° 53' 13.950" W	38.02	58° 8' 26.213" N	2° 53' 13.838" W	38.16	1100

### 3.7.2 OSP Inter-connector Cable

A single 66 kV inter-connector cable will connect the two OSPs and allow routing of power from one OSP to the other.

The total length of the OSP Inter-connector cable will be approximately 14 km (see Table 3-4 for cable start and end point and length data). The arrangement of the OSP inter-connector cable is shown in Figure 3-10.

The OSP inter-connector cable will be buried along its length or protected where burial is not possible. Full details of the OSP inter-connector cable installation methods and cable protection arrangements will be provided in the Wind Farm CaP.

Table 3-4 OSP Inter-connector cable proposed arrangements and approximate cable lengths								
OSP inter-connector Route		Start Point			End Point			Route Length from J tube to J tube (m)
Start	End	Latitude (DDM) WGS84	Longitude (DDM) WGS84	Water depth (m) LAT	Latitude (DDM) WGS84	Longitude (DDM) WGS84	Water depth (m) LAT	
OSP1	OSP2	58° 2' 56.434" N	3° 5' 18.019" W	44.79	58° 2' 56.434" N	3° 5' 18.019" W	37.52	13846.3

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

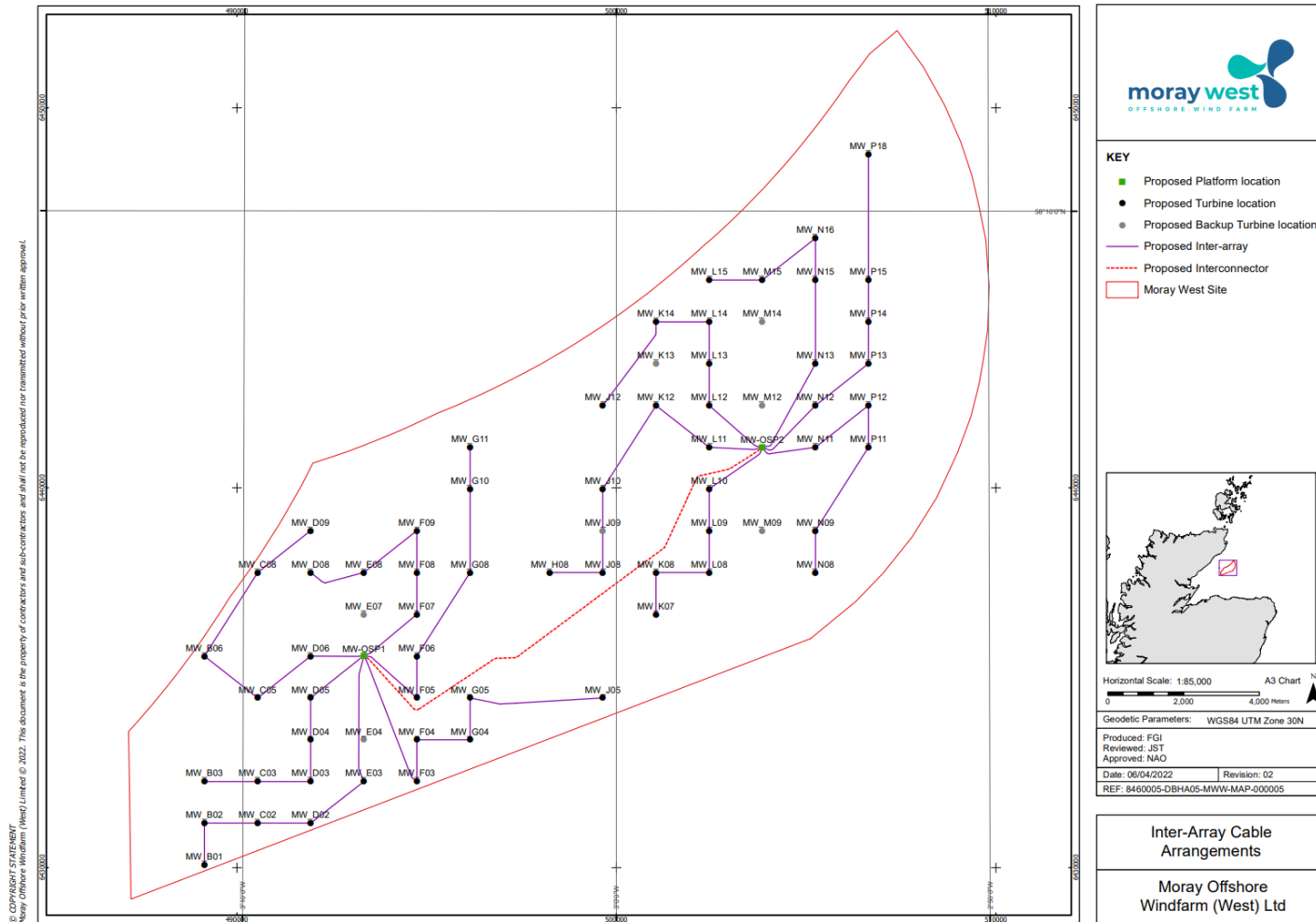


Figure 3-10 Inter-array cable connection configuration between WTGs and OSPs, and OSP inter-connector cable configuration between OSPs.

## 4 Development Specification and Layout – Offshore Transmission Infrastructure

### 4.1 Introduction

This section of the DSLP details the design and layout specification associated with the OfTI as required by the OfTI Marine Licence condition 3.2.2.8 detailed in Table 1-1.

### 4.2 OSP Layout and Specification

OfTI Marine Licence condition 3.2.2.8 requires that this DSLP include the following:

*A plan showing the location of each individual OSP (subject to any required micro-siting), including information on OSP spacing, OSP identification/numbering, seabed conditions, bathymetry, confirmed foundation type for each OSP and any key constraints recorded on the site;*

The Wind Farm layout presented in Figure 3-1 above includes the location of the 2 OSPs.

#### 4.2.1 OSP Foundation Types

The 2 OSPs will be supported by steel monopiles. The diameter of the lower section of the OSP monopiles will measure at a maximum of 9.5 m. These monopiles will be similar to the WTG monopiles as shown in section 3.2.3.

#### 4.2.2 Wind Farm Bathymetry and Seabed Conditions

The bathymetry and the dominant seabed substrate and sediments conditions in the OSPs locations are characterised similarly to those of the wider Moray West Site, which are detailed in section 3.2.4 and shown in Figure 3-5.

The OSPs will be installed in water depths ranging from approximately 37.5 m to 44.8 m below LAT. Water depths at each OSP location are listed in Table 4-1 below.

#### 4.2.3 Key Constraints

The key constraints that have been taken into account in defining the Moray West developable area boundaries, within which the OSPs are located, are presented in section 3.2.5.

### 4.3 Co-ordinates for OSP Locations

OfTI Marine Licence condition 3.2.2.8 requires that this DSLP include the following:

*A list of latitude and longitude co-ordinates accurate to three decimal places of minutes of arc for each OSP. This should also be provided as a GIS shape file using WGS84 format;*

The OSPs will be installed, within a permitted 50 m radius micro-siting tolerance, in the locations presented in Table 4-1, below. Any micro-siting exceeding 50 m will be agreed in advance with the MCA and NLB.



The final coordinates of the OSPs will be confirmed following completion of installation activities, and this DSLP will be updated consequentially.

As required by the OfTI Marine Licence consent condition, the GIS shapefile in Appendix C includes the co-ordinate data for the OSPs.

Table 4-1 OSPs location co-ordinates (WGS84) and approximate water depths			
OSP Identification	Latitude (DDM) WGS84	Longitude (DDM) WGS84	Depth (m) Below LAT
MW OSP1	58° 3' 41.666" N	3° 6' 46.155" W	44.79
MW OSP2	58° 6' 39.628" N	2° 56' 5.236" W	37.52

#### 4.4 OSP Dimensions and Finishes

OfTI Marine Licence condition 3.2.2.8 requires that this DSLP include the following:

*A table or diagram of each OSP dimensions including – The finishes for each OSP;*

##### 4.4.1 OSP Dimensions

The OSPs are comprised of the OSP topside which sits upon the monopile transition piece.

The key dimensions for both OSPs are provided in Table 4-2. Figure 4-1 and Figure 4-2 show the OSP1 and OSP2 layout elevations, respectively.

Table 4-2 Key dimensions of the OSP1 and OSP2	
MW OSP 1 (E06) Parameter	Dimensions
OSP Topside (L x W x H) (m)	36.4 x 31.01 x 15.12 m
Distance from Lower Deck to Highest point (m)	+15.12
Height to Lower Deck (m LAT)	+25.35
Height of OSP foundation Top of Girder (m LAT)	+21.85
Height of topside (m LAT)	+40.45
MW OSP 2 (M11) Parameter	Dimensions
OSP Topside (L x W x H) (m)	36.4 x 31.01 x 15.12 m
Distance from Lower Deck to Highest point (m)	+15.12
Height to Lower Deck (m LAT)	+26.15
Height of OSP foundation (m LAT)	+22.65



# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

Height of topside (m LAT)	+41.25
---------------------------	--------

## 4.4.2 OSP Topside Finishes

The topside of each OSP will be finished in light grey (RAL 7035) or other non-reflective grey materials, excluding topside structures such as work cabins, cranes, ladders, and other working areas.

To comply with aviation and marine navigation requirements, the OSPs will have additional marking which are detailed within the LMP. This is likely to include:

- Monopile foundations (from at least 2 m below LAT) and transition piece will be painted in traffic yellow (RAL 1023).
- ID numbers will be marked on the OSP Topside
- Heli-hoist platforms on top of the OSP will be painted as per CAA CAP 437 - Standards for Offshore Helicopter Landing Areas; and

The LMP should be referred to for full details of OSP markings.

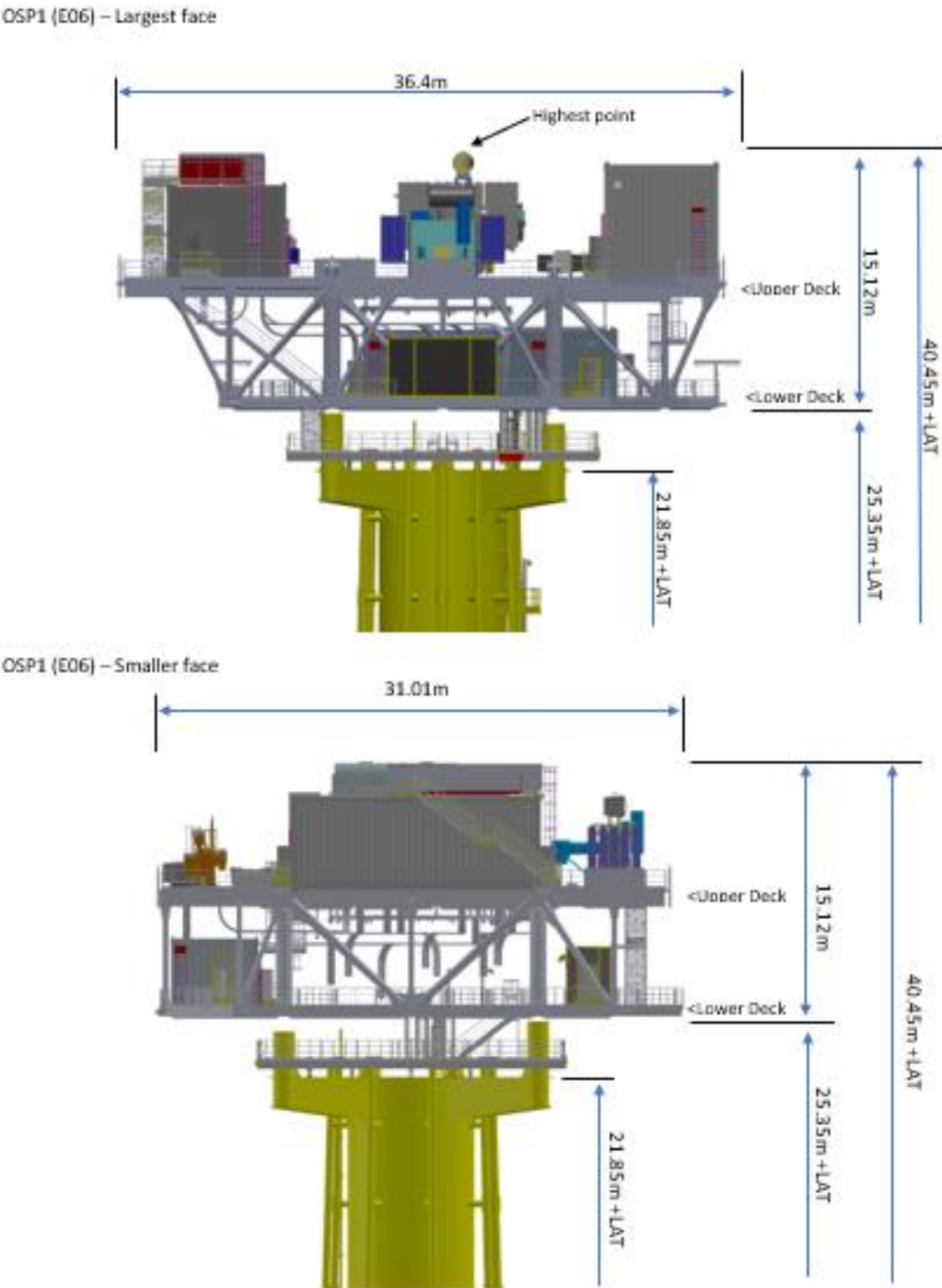


Figure 4-1 OSP1 Indicative Layout Elevations

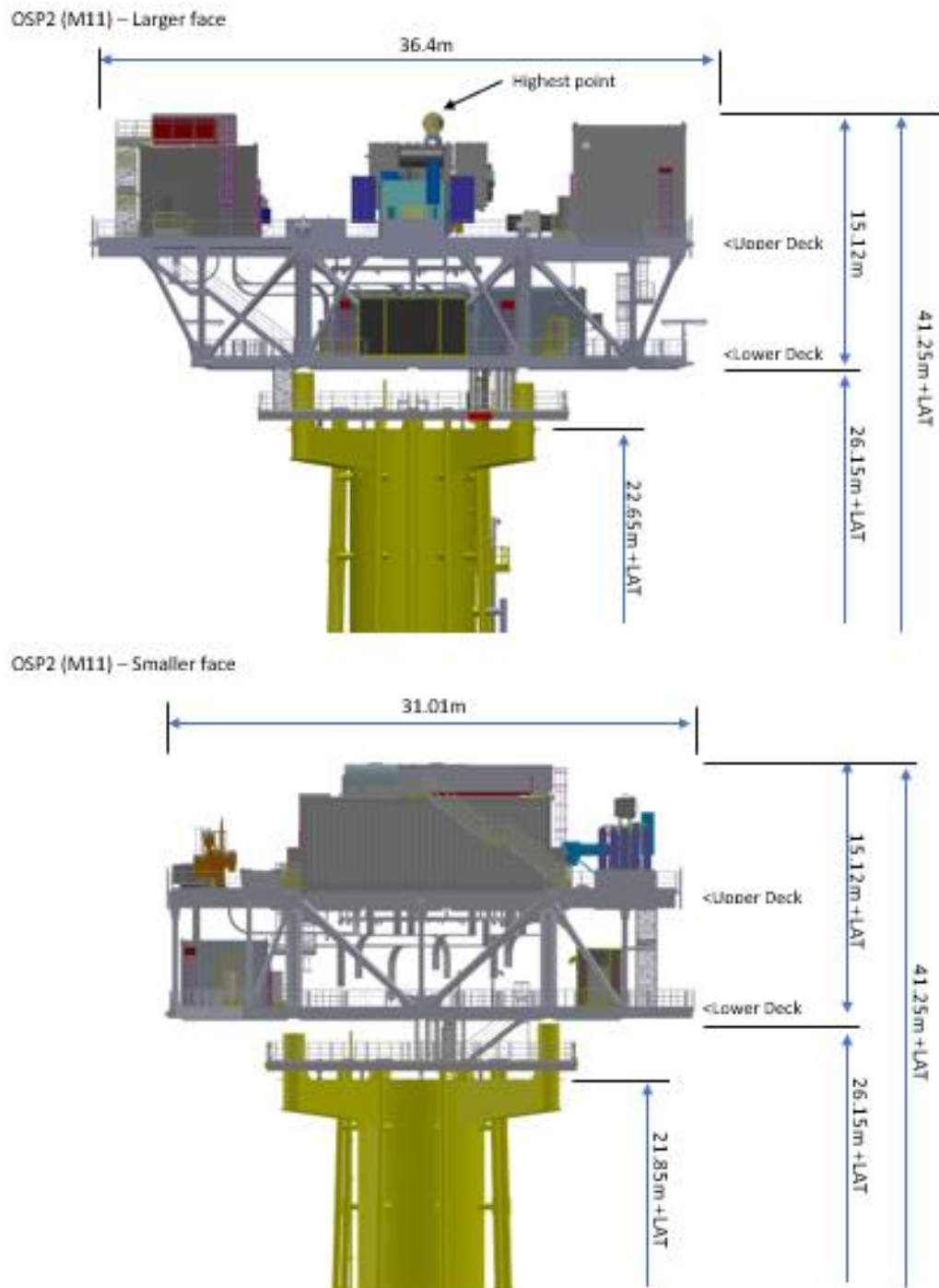


Figure 4-2 OSP2 Indicative Layout Elevations

#### 4.5 Offshore Export Cables Length and Proposed Arrangement

OfTI Marine Licence condition 3.2.2.8 and Wind Farm Marine Licence condition 3.2.2.9 requires that this DSLP include the following:

*The length and proposed arrangements on the seabed of all export cables.*

The WTGs and OSPs are connected to the onshore transmission infrastructure (OnTI) by two High Voltage Alternating Current (HVAC) 220 kV cables, referred to as 'offshore export cables'. The two offshore export cables (OEC) will be located within the OfTI Corridor shown in Figure 4-3, and as defined in the OfTI Marine Licence. The OfTI corridor is 3000 m wide and approximately 45 km long from the landfall to the Moray West Site boundary.

The arrangement of the offshore export cables between the OSPs and the OnTI is shown in greater detail in Figure 4-3.

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

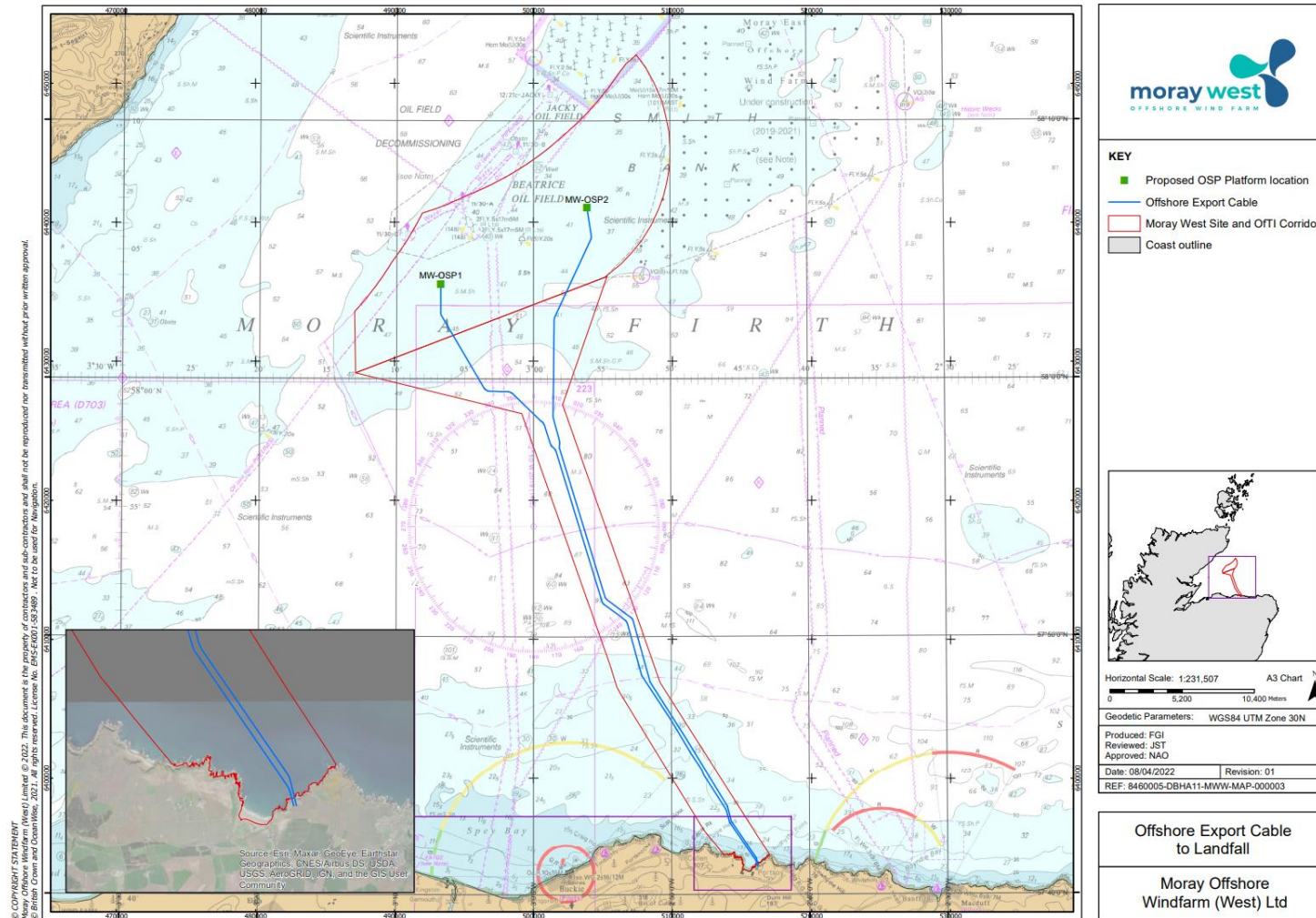


Figure 4-3 Moray West Site, OfTl Corridor, OSPs proposed locations and proposed offshore export cables arrangements



# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

These two subsea offshore export cables will run from the OSPs within the Moray West Site to a common landfall location at Broad Craig, at the eastern coastline of Sandend Bay.

Offshore export cables installation works will take place beneath the Cullen to Stake Ness Coast Site of Special Scientific Interest (SSSI), which is designated for both earth science and habitat features. Therefore, the Horizontal Directional Drilling (HDD) will extend underground from the OnTI Landfall Area out to an exit point on the seaward side, located beyond the extent of the SSSI.

Within the OfTI Corridor, the cables will, where possible and practicable, be routed to avoid engineering and environmental constraints. In addition, the cables will be routed in such a way as to minimise the anticipated amount of remedial rock protection required. Analysis of the pre-construction site investigation data will provide the required information to be able to microsite the OEC route. The routes will be further micrositied using data collected during the pre-lay surveys. The final cable routes and full details of the cable installation methods and cable protection will be confirmed in the ECP.

The total lengths of the offshore export cables, and the start and end locations of the cables, are set out in Table 4-3 below.

Table 4-3 Export cable proposed arrangements and approximate cable lengths								
Export Cable Route		Start Point			End Point			Route Length from TJB to OSP J tube (m)
Start	End	Latitude (DDM) WGS84	Longitude (DDM) WGS84	Water depth (m) LAT	Latitude (DDM) WGS84	Longitude (DDM) WGS84	Water depth (m) LAT	
Export Cable 1								
OSP1	HDD1	57° 41' 6.884" N	2° 43' 47.056" W	44.79	58° 3' 41.498" N	3° 6' 46.213" W	0	49533.7
Export Cable 2								
OSP2	HDD2	57° 41' 6.848" N	2° 43' 43.474" W	37.52	58° 6' 39.464" N	2° 56' 5.147" W	0	51855.1

#### **4.5.1 Bathymetry and Seabed Conditions**

A series of geotechnical and geophysical have already been completed by Moray West to understand seabed conditions along the OfTI Corridor, in order to initially define, and then refine the offshore export cable routes and determine the most appropriate installation methods. Further detail will be provided within the ECP.

Bathymetry along the OfTI Corridor is highly variable ranging from approximately 10 m (LAT) in the shallow inshore area adjacent to the Aberdeenshire coast to approximately 98.8 m (LAT) in the Southern Trench, a long deep channel located in the southern part of the outer Moray Firth. The OEC route reaches a maximum water depth of approximately 90 m below LAT before shallowing to approximately 45 m below LAT for OSP1 and up onto Smith Bank to approximately 37 m below LAT for OSP2.

Seabed sediments along the OfTI Corridor are variable. The northern end of the OfTI Corridor is majorly comprised of silty sand. The southern end and in the vicinity of the landfall, seabed sediments generally consist of gravelly sands and sandy gravel.

The bathymetry and seabed conditions of the OEC routes are shown in Figure 4-3 and Figure 4-4 respectively.

There is the potential for surface boulders to be present across the OfTI Corridor. In areas where boulders are present that may inhibit cable installation, a boulder clearance campaign will be carried out ahead of cable installation activities. Boulder clearance methods will be described in the Moray West Construction Programme and Construction Method Statement (CoP & CMS) and the ECP.



# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan

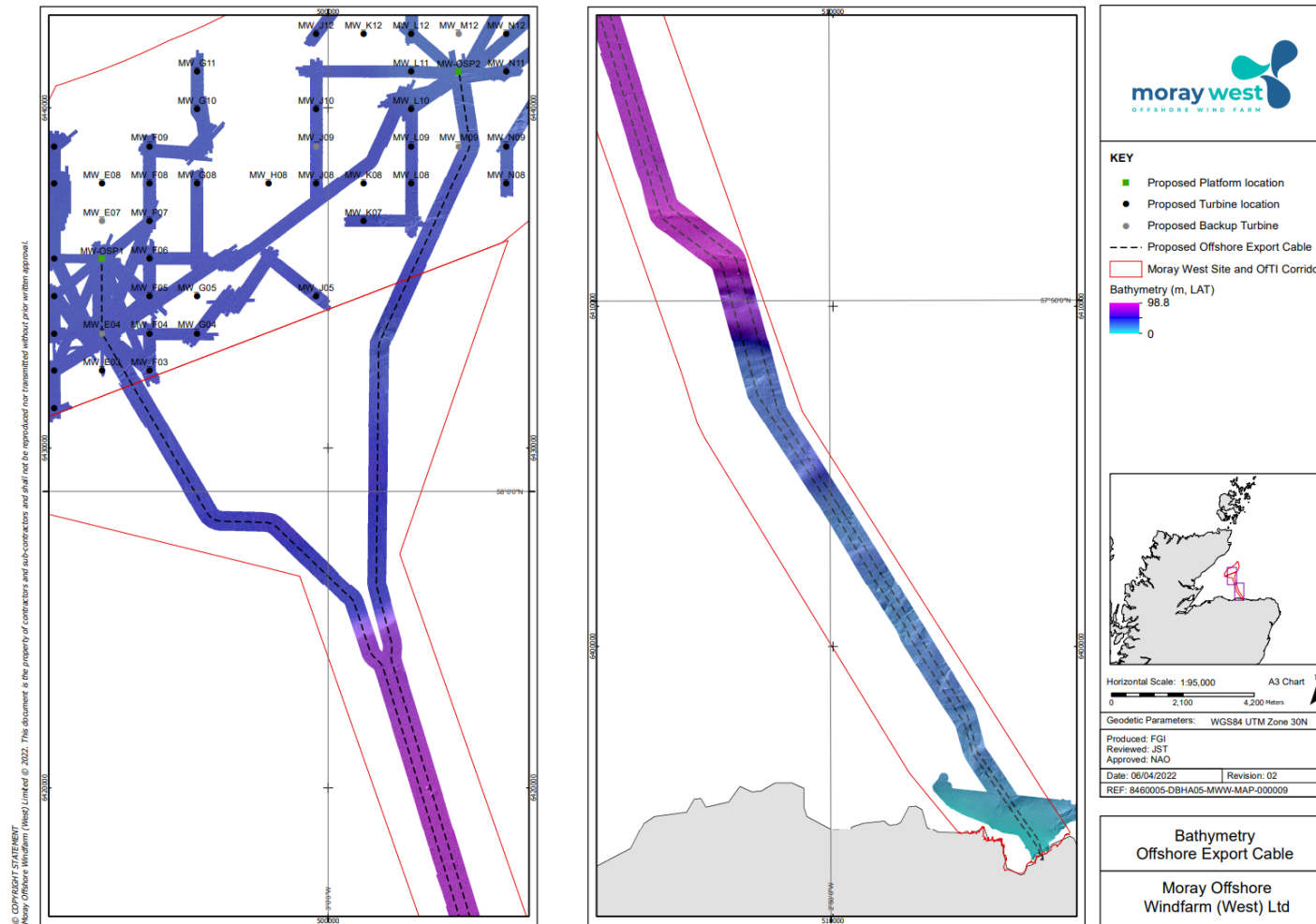


Figure 4-4 OFTI Corridor Bathymetry (m, LAT)

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

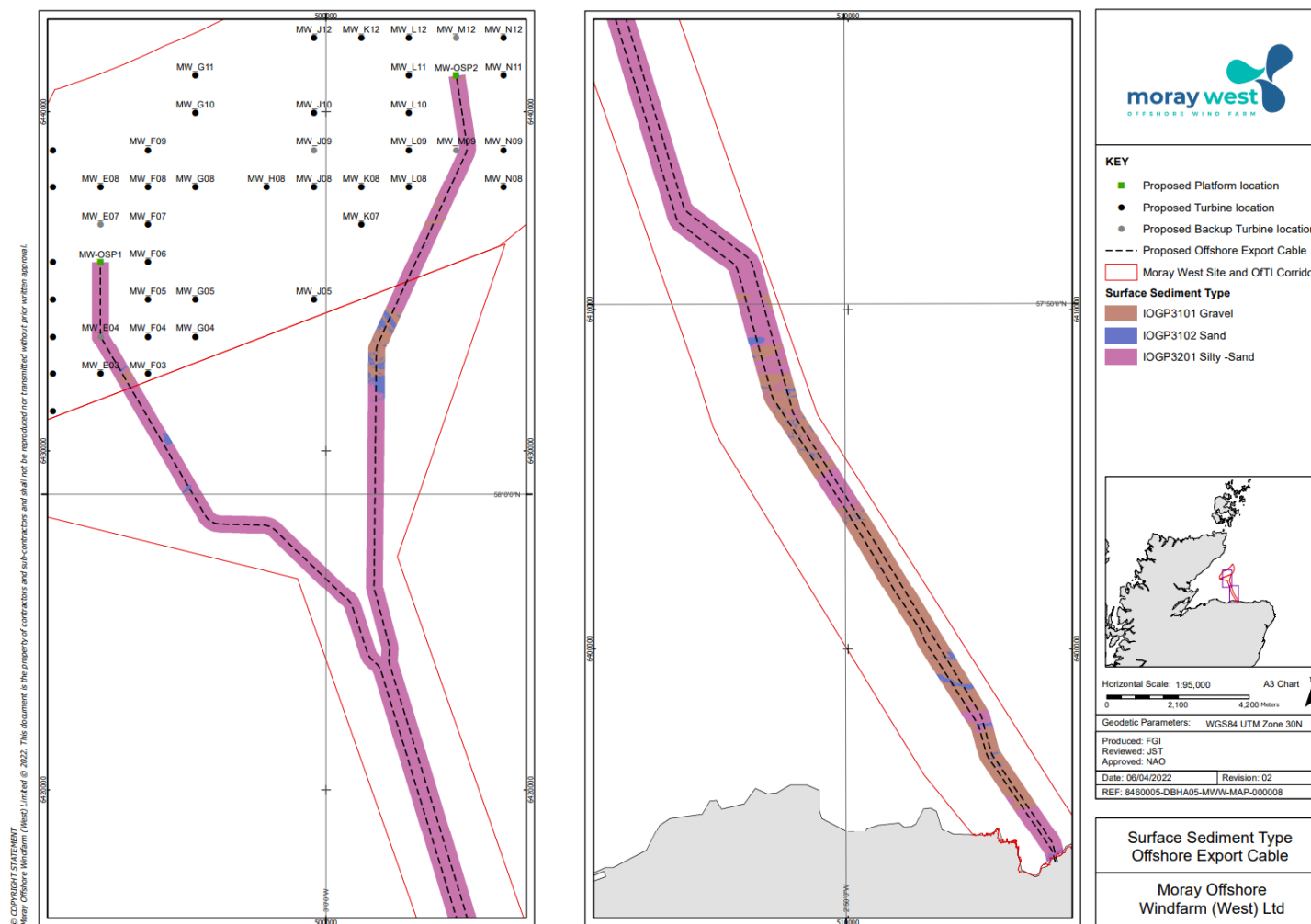


Figure 4-5 OfTI Corridor Surface Sediment Type

#### **4.5.2 Key Constraints**

The physical spatial constraints detailed within Section 3.2.5 and presented in Figure 4-6 have been considered in routing the export cable from the edge of the Moray West Site boundary to the OSPs.

Along the OfTI Corridor, the seabed features of archaeological potential and AEZ are shown in Figure 4-6. The Archaeological Study Area assessment of the 2010 geophysical survey data resulted in the identification of 10 A3 anomalies of archaeological interest within the Moray West Site (Wessex Archaeology, 2018).

A feature of potential archaeological interest, Record 7231, is located within the OfTI Corridor and was last located in 1986, classified as recorded MFV Mayflower. As the record is a known and located wreck an AEZ of 100m radius is recommended around the boundary of the field.

In addition to the constraints listed above, the OfTI Marine Licence includes a provision for HDD to install the export cables beneath the Cullen to Stake Ness Coast where the cable makes landfall in order to avoid potential effects on features of geological conservation interest. Further geophysical surveys will be undertaken to further define the presence and extent of archaeological features. Any refinements in the offshore export cable route will be detailed within the Export Cable Plan (ECP).

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

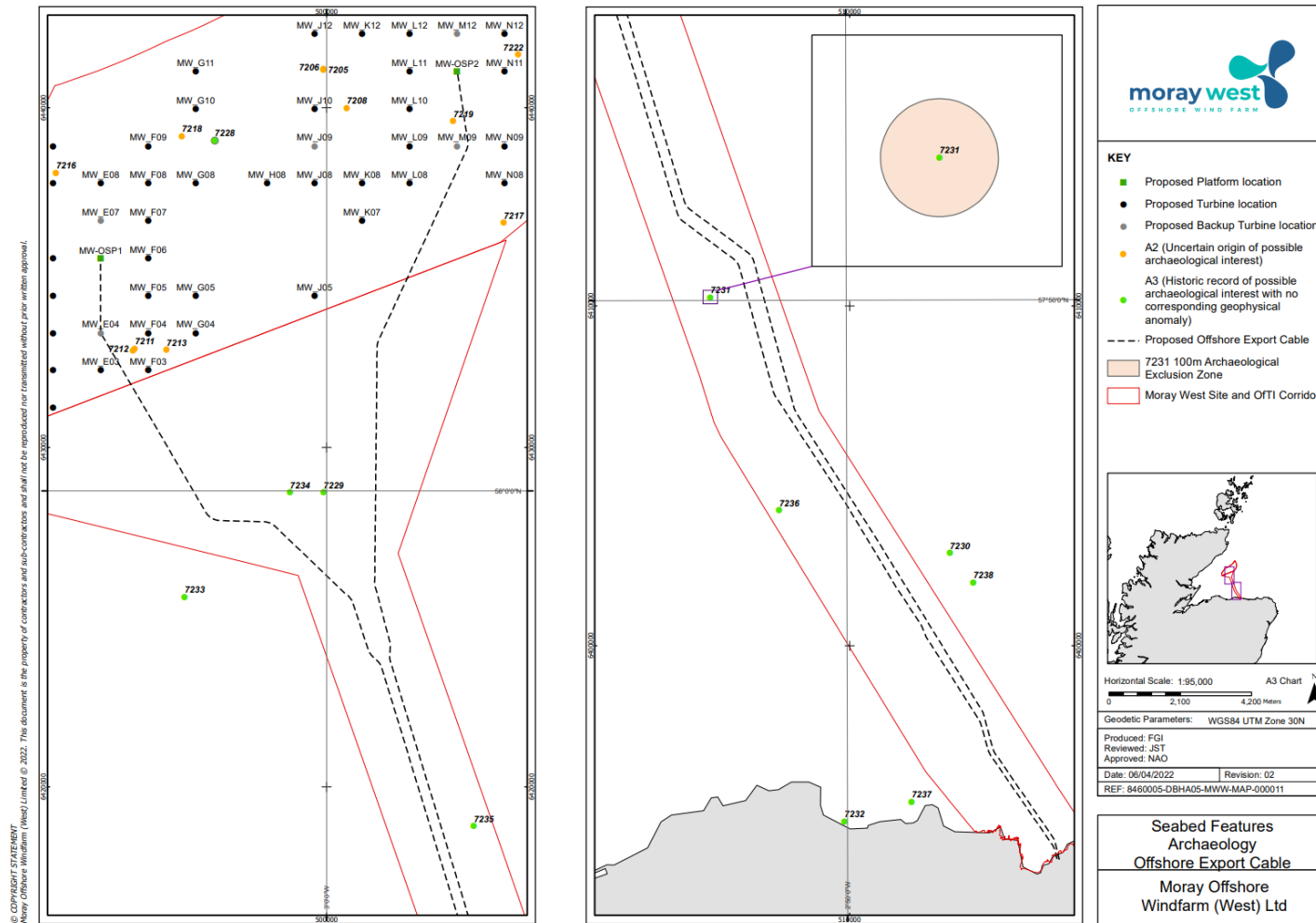


Figure 4-6 OfTI corridor seabed features of archaeological potential

## Appendix A – Defined terms

Term	Description
Design Envelope	The range of design parameters used to inform the assessment of impacts.
Marine Licence for the Generating Station	Marine Licence for the Moray West Offshore Wind Farm - Licence Number: MS-00009774 - granted under the Marine and Coastal Access Act 2009, Part 4 Marine Licensing for marine renewables construction works and deposits of substances or objects in the Scottish Marine Area and the United Kingdom Marine Licensing Area transferred to Moray West on 14 June 2019, varied on 7 March 2022 and on 11 April 2022.
Marine Licence for the Transmission Works	Marine Licence for the Offshore Transmission Infrastructure – Licence Number: MS-00009813 – granted under the Marine and Coastal Access Act 2009, & Marine (Scotland) Act 2010, Part 4 Marine Licensing for marine renewables construction works and deposits of substances or objects in the Scottish Marine Area and the UK Marine Licensing Area (referred to as the “OfTI Marine Licence”), granted to Moray West on 14 June 2019, and varied on 11 April 2022.
Micrositing	A minor deviation of an asset location to avoid previously unknown constraints.
Moray Offshore Windfarm (West) Limited	The legal entity submitting this Development Specification and Layout Plan (DSLPL).
Moray West EIA Report	The Environmental Impact Assessment Report for the Moray West Offshore Wind Farm and Associated Transmission Infrastructure, submitted July 2018. Additional information was provided in the Moray West Report to Inform an Appropriate Assessment (RIAA) July 2018 and Moray West Application Addendum Document November 2018
Moray West Offshore Wind Farm	The wind farm to be developed in the Moray West site (also referred as the Wind Farm).
Offshore Consents	Collective term for the two Marine Licences and the Section 36 consent
Offshore Consents Conditions	Collective term for the conditions attached to the Section 36 Consent and Marine Licences
Offshore Export Cables	The Wind Farm and OSPs are connected to the OnTI by two HVAC 220 kV cables, referred to as ‘Offshore Export Cables’.
OfTI Corridor	The export cable route corridor. The two Offshore Export Cables will be located within the OfTI Corridor shown in Figure 2 1, and as defined in the OfTI Marine Licence; i.e., the OfTI area excluding the Moray West Site
Offshore Transmission Infrastructure (OfTI)	The offshore elements of the transmission infrastructure.
OSP Inter-connector Cable	A single 66 kV Interconnector Cable will connect the two OSPs

# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

Section 36 Consent	Section 36 consent under Section 36 of the Electricity Act 1989 for the construction and operation of the Moray West Offshore Wind Farm was granted on 14 June 2019 and varied on 7 March 2022.
The Development	The Moray West Offshore Wind Farm and OfTI.
The Development Site	The area outlined in Figure 1 attached to the Section 36 Consent Annex 1, Figure 1 attached to the two Marine Licences, and Figure B.1 of this DSLP.
The Moray West Site	The area in which the Moray West Offshore Wind Farm will be located. Section 36 Consents and associated Marine Licence to construct and operate generating stations on the Moray West Site were granted in June 2019 and varied in March 2022.
The Works	The construction activities undertaken for the Development
Transmission Infrastructure (TI)	Includes both offshore and onshore electricity transmission infrastructure for the consented wind farm. Includes connection to the national electricity transmission system near Broad Craig in Aberdeenshire encompassing Alternating Current (AC) Offshore Substation Platforms (OSPs), AC export cables offshore to landfall point at Broad Craig, near Sandend in Aberdeenshire continuing onshore to the AC collector station (onshore substation) at Whitehillock and the additional regional Transmission Operator substation at Blackhillock near Keith. A Marine Licence for the OfTI was granted in June 2019 and varied on 11 April 2022.

## Appendix B – Comparison of the Consented Design Envelope and DSLP Design Parameters

Parameter	Consented Parameter Range	Final Design Parameter
<b>Wind Turbine Generators (WTGs) (where rotor tip height &lt; 230 m)</b>		
Maximum number	85	N/A
Maximum hub height	132.5 m	N/A
Maximum tip height	230 m	N/A
Maximum rotor diameter	195 m	N/A
Blade width range up to	6 m	N/A
Minimum blade tip clearance	35 m	N/A
Minimum spacing Downwind Crosswind	1,050 m 1,200 m	N/A
<b>Wind Turbine Generators (WTGs) (where rotor tip height &gt; 230 m)</b>		
Maximum number	72	60
Maximum hub height	150 m (measured from HAT)	146.94 m (measured from HAT) 151.02 m (measured from LAT)
Maximum tip height	265 m (measured from HAT)	258.31 m (measured from HAT) 262.39 m (measured from LAT)
Maximum rotor diameter	230 m	222 m
Blade width range up to	6.6 m	6.5 m
Minimum blade tip clearance	35 m (measured from HAT)	37.63 m (measured from HAT) 41.71 m (measured from LAT)
Minimum spacing: Downwind Crosswind	1,050 m 1,200 m	1,100 m 1,400 m
<b>WTG Foundations</b>		
Maximum number of foundations and substructures, and associated fixtures, fittings and protections	85	60
WTG substructure design options.	Gravity base	Monopile



# Moray Offshore Windfarm (West) Limited Development Specification and Layout Plan



8460005-DBHA05-MWW-PLN-000001

	Monopile Jacket Foundation Suction Caisson	
Parameter	Consented Parameter Range	Final Design Parameter
<b>Inter-Array cables</b>		
Number of cables	85	60
Total length of cabling (km)	275 km	Approximately 150 km
<b>Offshore Substation Platform - Foundations</b>		
Number of OSP	No more than 2 OSP	2 OSP
OSP foundations design	Gravity base Monopile Jacket Foundation Suction Caisson	Monopile
<b>Offshore Substation Platform - Topside</b>		
Maximum topside length	75 m	36.4 m
Maximum topside width	75 m	31.01 m
Maximum topside height	60 m	OSP1 – 40.45 m LAT OSP2 – 41.25 m LAT
<b>Export Cables</b>		
Number of cables	Up to 2	2
Total length of cabling (km)	65 km each export cable	EC1 – approximately 50 km EC2 – approximately 52 km
<b>Inter-connector Cable</b>		
Number of cables	1	1
Total length of cabling (km)	15 km	Approximately 14 km

## **Appendix C – GIS Shapefile Links**

GIS Shapefiles provided separately in WGS84 projection as .shp file (8460005-DBHA05-MWW-GIS-000003).