DEVELOPMENT SPECIFICATION AND LAYOUT PLAN
KINCARDINE OFFSHORE WINDFARM PROJECT

Prepared	Checked	Reviewed	Approved	ECoW Approved
Apr 23, 2019	Apr 23, 2019	Apr 23, 2019	Apr 23, 2019	Apr 23, 2019
Organisation: KOWL	Organisation: KOWL	Organisation: KOWL	Organisation: KOWL	Organisation: KOWL
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Revision History

Date	Rev. Status	Purpose of Issue*	Remarks	Initials
21-03-2018	A1	Internal Review		Re
22-03-2018	B1	External Review	Issued for External Review	R
27-04-2018	C1	For Information	-	R
08-04-2019	C2	Internal Review	Issued for Internal Review	R
10-04-2019	C3	External Review		R

*Purpose of Issue: for information, for review, for approval

Detailed Change Log

Date	Rev. Status	References	Description of changes	Initials
22-03-2018	A1	CRS	See Comments Review Sheet	R
27-04-2018	C1	-	Logo change, minor text changes, updated image	R
10-04-2019	C2	CRS	See CRS for Changes	R

Table of Contents

ACROYNMS, ABBREVIATIONS and DEFINITIONS

ALARP	As Low As Reasonably Practical
CaP	Cable Plan
DS	Design Statement
DSLP	Development Specification and Layout Plan
HDD	Horizontally Directional Drill
KOWL	Kincardine Offshore Wind Farm Limited
LMP	Lighting and Marking Plan
m	Metre
MCA	Maritime and Coastguard Agency
MS-LOT	Marine Scotland Licensing Operations Team
MW	Mega Watt
nm	Nautical Mile
OREI	Offshore Renewable Energy Installation
s	Second
S36C	Section 36 C Variation Application to vary the Section 36 Consent granted to KOWL in March 2017
UKHO	United Kingdom Hydrographic Centre
UXO	Unexploded Ordnance
WROV	“Work Class” Remotely Operated Vehicle

1. INTRODUCTION

1.1. Purpose of the Document

This document has been created to satisfy Condition 11 of the Section 36 Consent issued by the Marine Scotland Licensing Operations Team (MS-LOT) to Kincardine Offshore Wind Ltd (KOWL) for the Kincardine Offshore Windfarm (the Project).

This document provides the current Development Specification and Layout Plan (DSLP) proposed for the Project (see Section 1.5 for the wording of the condition). The submission of the DSLP must be no later than six months prior to the Commencement of the Development

1.2. Scope of the Document

This document outlines the indicative location and design parameters of the Project including, co-ordinates of the turbines and substructures, dimensions of the turbines, lighting and markings and both inter-array and export cables.

- This document makes reference to the following document in support;
- “Design Statement”, KOWL-DE-0004-001 (Condition 12 of the Section 36 Consent)
- “Lighting and Marking Plan”, KOWL-PL-0004-001 (Condition 18 of the Section 36 Consent).

1.3. Approach to Amending and Updating this Document

The nature of the construction process proposed for the Project, means that updates to this document may be required as the project progresses.

Where the need for an update or amendment of this document is identified following approval from Marine Scotland Licensing Operations Team (MS-LOT), either through a consultation response, or due to practicalities arising as the project progresses, KOWL will communicate the suggested update/amendment to MS-LOT prior to editing the approved document.

If the suggested change is accepted by MS-LOT, this document will be redrafted, and submitted for re-approval.

2. PROJECT OVERVIEW

2.1. Summary

The Project is considered a commercial demonstrator site, which will utilise Windfloat™ floating wind technology and will be one of the world's first arrays of floating wind turbines. It has been included within the Survey, Deploy and Monitoring scheme for offshore renewable systems (similar to wave and tidal devices).

The Project is located south-east of Aberdeen approximately 8nm (15km) from the Scottish coastline, in a location with water depths of 60-80m.

The project is split into the following areas:

- The Offshore Development Area – the Wind Turbine Generators (WTG) and inter-array cables.
- The Offshore Export Cable Corridor – the area within which export cables will be laid, from the onshore area at Mean High Water Spring (MHWS).
- The Onshore Area – the onshore area above MHWS including the underground cables connecting to the onshore substation at Redmoss.

2.2. Turbine Locations.

The project originally had 8 locations, which has been reduced to 6 locations designated as follows;

Table 2-1 Location designation changes

Location designation Pre-2019	New location designation post 2019
KIN-01	KIN-01
KIN-02	KIN-02
KIN-03	KIN-03
KIN-04	n/a
KIN-05	n/a
KIN-06	KIN-04
KIN-07	KIN-05
KIN-08	KIN-06

The position of the locations 'KIN-01' through to 'KIN-06' together with the key project boundaries are detailed in Appendix A in drawing KOWL-DR-0001-015.

This drawing is a controlled document and shall form the approved source for all coordinates in both UTM and Latitude/Longitude positions.

It must be stressed that the locations are the centre of the turbine and not the centre of the substructure.

2.3. Project Design Life

The design life for the wind farm is 25 years.

2.4. Principal Components

The maximum generation capacity of the windfarm is capped at 50MW, the main difference between the various stages of the applications have been the number, size and power rating of the turbines, together with the substructure type.

The Project will now consist of the following offshore components:

- 1 x 2MW WTG (currently in operation)
- 5 x 9.5MW WTG's (to be installed 2020)
- 5 x 33kv inter-array cables (to be installed 2020)
- 2 x export cables (one currently in operation)

2.5. Installed Components

The onshore sub-station has been completed.

The first deployment was a 2MW WTG and associated substructure, anchors and mooring lines in 2018 on location 'KIN-01'.

One export cable was also installed, through a Horizontal Directional Drilling (HDD) hole from landfall to circa 20m water depth and then along the export cable corridor to 'KIN-01' location.

A condition in the existing marine licence requires Third Party Certification or Verification (or suitable alternative as agreed, in writing, with the Licensing Authority) for all WTGs, mooring systems and WTG substructures prior to the commencement of the works.

2.6. Construction Programme Overview

The construction of the Project will occur in two 'Tranches' in-line with the Programme outlined in the document "Construction Programme", KOWL-REP-0004-001.

One Tranche has been completed and the Construction Programme for the second tranche will be provided to Scottish Ministers prior to commencement of the construction as a requirement of the consent conditions.

3. CONSENT CONDITIONS AND CHRONOLOGY

3.1. Consents Application History

This document focuses on the offshore elements only, as per Section 36 Consent and Marine Licences granted.

In April 2016 KOWL submitted applications for consent to construct and operate the Project, which included the Original ES. In September 2016 an addendum to the Original ES was also submitted. In March 2017 consent under Section 36 and Section 36A of the Electricity Act 1989 was granted.

Since consent was granted, there have been several necessary changes to the Project. Therefore, an application for a variation of the Section 36 consent granted by the Scottish Ministers under S36C of the Electricity Act 1989 was applied for in December 2017 (the 'Variation Application').

The table below outlines the application dates, relevant ES Documents and the components of the Project as were included in the Original Application and the Variation Application.

Table 3-1 Summary of document timelines

Original Documents	**Addendums**	**Variation**	**Variation**
Date Submitted: March 2016	**Date Submitted: September 2016**	**Date Submitted: November 2017**	**Date Submitted: April 2018**
Original Application	Original Application	S36C Variation Application	S36C Variation Application
Kincardine Offshore Windfarm ES (Original ES)	ES Additional Information Addendum (ES Addendum)	Section 36C Variation ES (Variation ES)	Section 36C Variation ES (Variation ES)
Maximum generation capacity: 50MW	Maximum generation capacity: 50MW	Maximum generation capacity: 50MW	Maximum generation capacity: 50MW
WTGs: 8 x 6MW	WTGs: 8 x 6MW	WTGs: 1 x 2MW and 6 x 8.4MW	Individual turbine capacity removed.
Substructures: semi-submersible	Substructures: semi-spar	Substructures: combination of semi-submersible and semi-spar	Substructures: Semi-submersible.
Cables: 33kv inter-array and export cables	Cables: 33kv inter-array and export cables	Cables: 33kv inter-array and export cables	Cables: 33kv inter-array and export cables

3.2. Consents Conditions

The following consent condition is taken from the Section 36 Consent which forms the requirements for this DSLP.

Table 3-2 Licence conditions relevant to the DSLP

Licence	Condition Number	Name	Details	Where Addressed in this Document
Section 36	11	Development Specification and Layout Plan	The Company must, no later than 6 months prior to the Commencement of the Development or at such a time as agreed with the Scottish Ministers, submit a Design Specification and Layout Plan ("DSLP"), in writing, to the Scottish Ministers for their written approval. Such approval may only be granted following consultation by the Scottish Ministers with SNH, MoD, SFF, JRC, CAA, ACC, AC, MCA, NLB, NATS, and any such other advisors or organisations as may be required at the discretion of the Scottish Ministers. The DSLP must include, but not be limited to: 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; 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 ("GIS") shapefile using the World Geodetic System 1984 ("WGS84") format;	a. plans are provided in Appendix A with further details in Section 4 b. provided in Appendix A

			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; d. the generating capacity of each WTG used on the Site and a confirmed generating capacity for the Site overall; e. the finishes for each WTG (see condition 18 on WTG lighting and marking); and f. the length and proposed arrangements on the seabed of all inter-array cables.	c. Provided in Section 4.7 d. Provided in Section 4.8 e. Information provided in Section 0 which references the LMP. f. Provided in Section 4.2 and 4.11

3.3. Linkages to Other Consent Plans

The following consent condition is taken from the Section 36 Consent with which this DSLP has linkages to.

Table 3-3 Licence conditions linked to the DSLP

Licence	Condition Number	Name	Details
Section 36	12	Design Statement	The Company must, no later than 6 months prior to the Commencement of the Development, submit a Design Statement ("DS"), in writing, to the Scottish Ministers. The DS, which must be signed off by at least one qualified landscape architect as instructed by the Company prior to submission to the Scottish Ministers, must include representative wind farm visualisations from key viewpoints as agreed with the Scottish Ministers, based upon the final DSLP as approved by the Scottish Ministers as updated or amended.

4. DEVELOPMENT SPECIFICATION AND LAYOUT PLAN DETAILS

4.1. Layout Plans

An overall layout plan of the development is provided in Appendix A;

The following information is provided within the layout plan:

- The location of each turbine including coordinates in UTM and Lat/Long;
- Turbine location numbering;
- Outline bathymetry;

A GIS shapefile with the centre locations listed above has also been provided to accompany this document which makes up the final configuration of turbines as presented in Appendix A, and aligns with the Variation ES and Design Statement (DS).

Further details on the remaining information requested in the Consent Condition is presented on the following;

- Spacing between each turbine;
- Seabed conditions;
- Bathymetry;
- Foundation type;
- Site constraints;
- Generating capacity;
- Finishes;
- Cable details;

4.2. Spacing between turbines

The spacing between the turbines are shown in Figure 2-3 and are typically circa 1000m between each turbine and circa 2167m between each row.

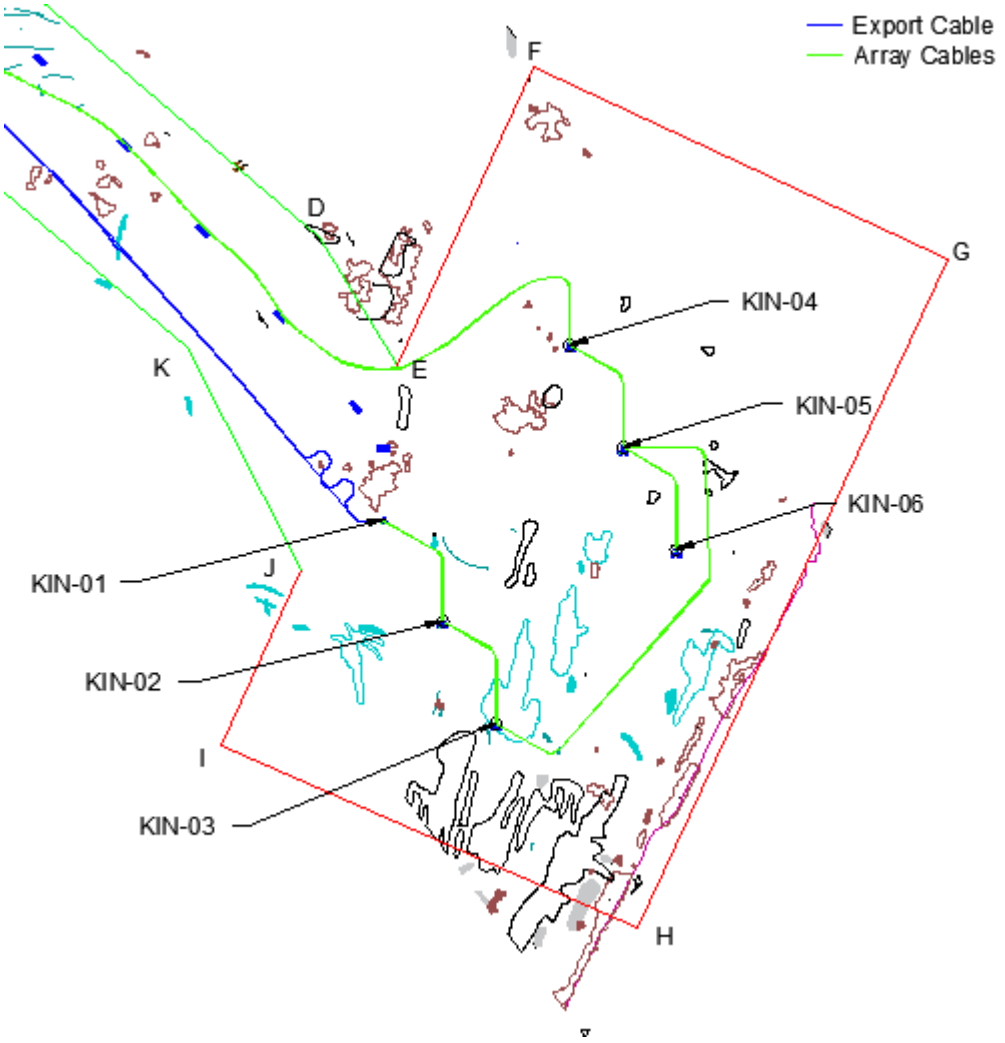


Figure 4-1 2MW and five 9.5MW turbine final layout plan showing spacing between the turbines

4.3. Seabed Conditions

The seabed type varies along the Offshore Export Cable Corridor but is predominately sand overlaying a range of gravel and clay substrates. There are sections along the route which have boulder clays which may present challenges for trenching and are identified in Figure 4-2 in pink as "Fine to medium SAND with occasional boulders".

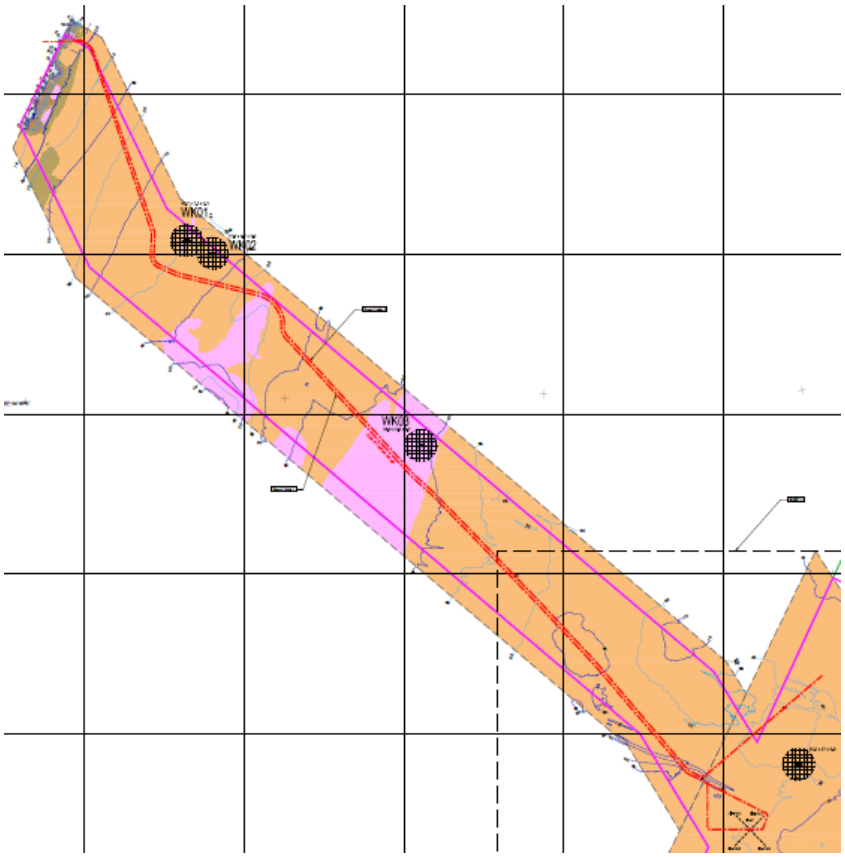


Figure 4-2 Seabed conditions in Export Cable Corridor.

The seabed type in the Development Area is also predominantly loose medium sand overlaying dense to very dense medium sand, with some clay deposits also presents.

4.4. Bathymetry

The water depth along the Offshore Export Cable Corridor varies from circa 20m (near shore) to approximately 70m within the Development Area. Detailed bathymetry from the Export Cable Corridor is illustrated in Figure 4-3 (N.B. the surveyed area shown in the figure below is bigger than the consented area).

The water depth in the Development Area varies from approximately 68 – 72m. The bathymetry in the Development Area is shown in Figure 4-4.

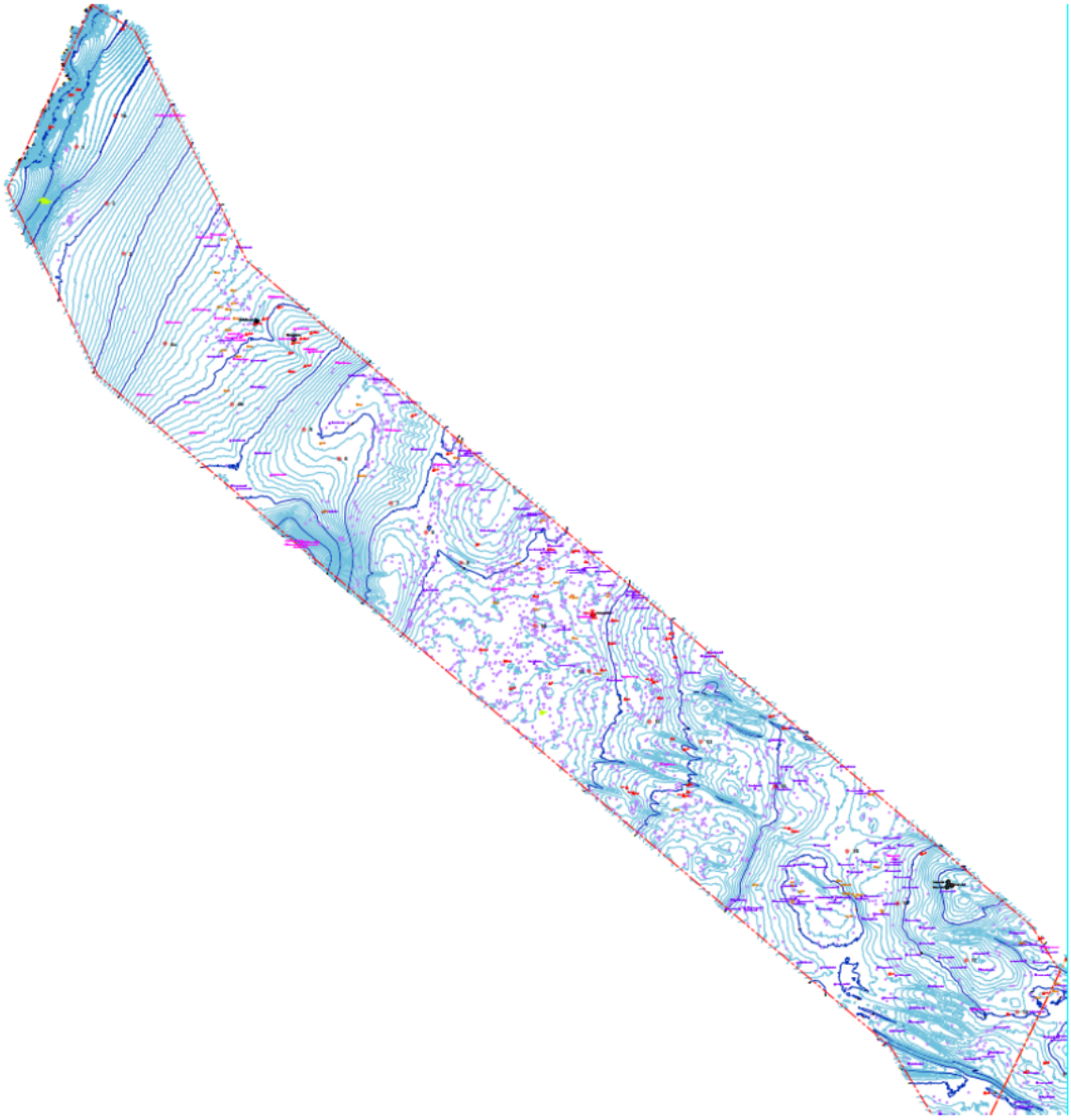


Figure 4-3 Detailed bathymetry of the Export Cable Corridor

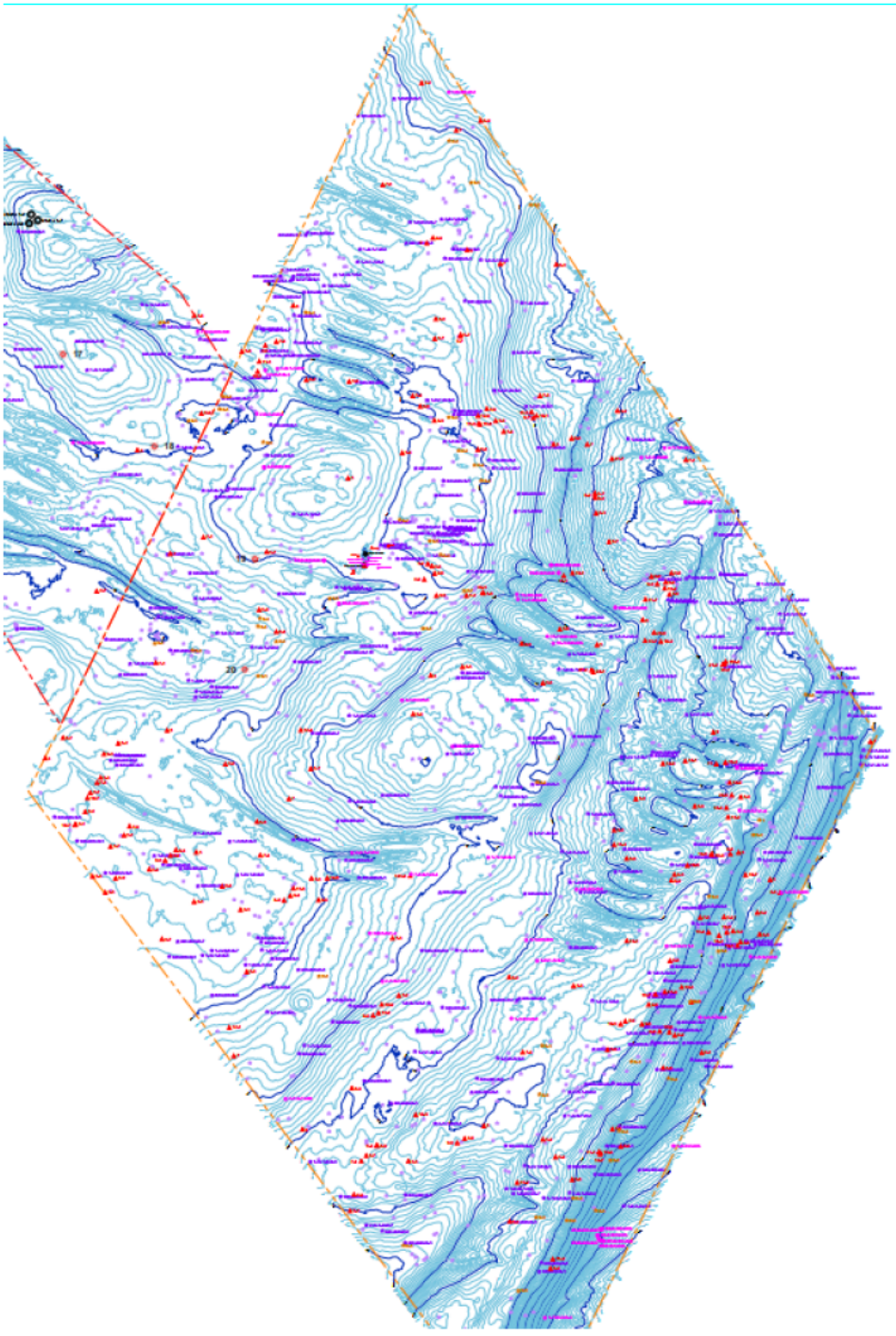


Figure 4-4 Detailed bathymetry of surveyed area within the Development Area

4.5. Foundation (Sub-structure) Type

The turbine will be sited on a Windfloat™ semi-submersible structure, thereafter referred to as the "substructure".

Figure 4-5 Windfloat ™Steel Semi-Submersible

The centre point of the substructure will be different to the coordinates provided, as the turbine is on one of the three columns of the structure. The location position for the turbines will all be based on the actual turbine centre.

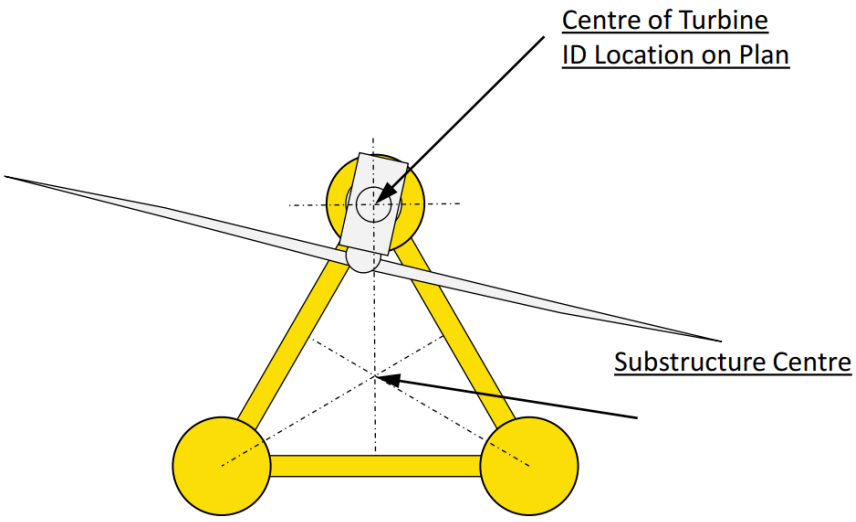


Figure 4-6 Terminology of Centre of Turbine and Substructure Centre

4.6. Site Constraints

The principal constraints on the site are illustrated Figure 4-2 and Appendix A;

- Identified wreck sites as confirmed in the geophysical survey
- Consented Project Site – As defined in the S36 Consent and Marine Licence
- Survey Extents – As surveyed in the offshore campaigns
- The Crown Estate Scotland Lease Area Boundary – a reduced area within the consented Project Site focused around the locations the turbines will be positioned in.

4.7. Turbine Dimensions

The dimensions of each of the two turbine types to be used for the Project are summarised below.

It should be noted that the turbines are floating and hence the heights are above the water surface the height of which varies with the tide.

Table 4-1 2MW and 9.5MW turbine dimensions

WTG	Vestas V80	Vestas V164
Height of blade tip above water surface	106m	191m
Height of the hub above water surface	66m	104m
Rotor diameter	80	164m
Maximum rotation speed	17rpm	12.1rpm

4.8. Generating Capacity

The table below outlines the generating capacity of each turbine type and the overall capacity of the Project.

Table 4-2 Generating Capacity of the individual turbine and whole Project

Details	Generating Capacity
Vestas V80	2MW
Vestas V164	9.525MW
Whole Project	49.625 MW

4.9. Finishes of the Turbine

The markings to be used on the turbines and substructures have been defined in the Lighting and Marking Plan, KOWL-PL-0004-001

Details of the following is given in the Lighting and Marking Plan;

- Lighting
- ID Markings and Signage
- Paint
- Sound Signals
- Blade and Nacelle Marking

4.10. Inter-array Cables

The inter-array cables will be installed during the second Tranche construction.

The layout of the inter-array cables provided in Figure 4-1 is only indicative at this stage and a final layout will be provided prior to the commencement of the final Tranche.

There are a total of five inter-array cables, four of which are approximately 1.2km in length and a single cable of approximately 3km in length.

It should be noted that the cables will be in a buoyant wave configuration prior to entering the turbine and hence the plan distance of the cable route will be slightly less. The exact length of each cable will be confirmed once the final seabed micro-routing has been completed.

Further details of the inter-array cables are provided in the Cable Plan, KOWL-PL-0004-009.

4.11. Export Cables

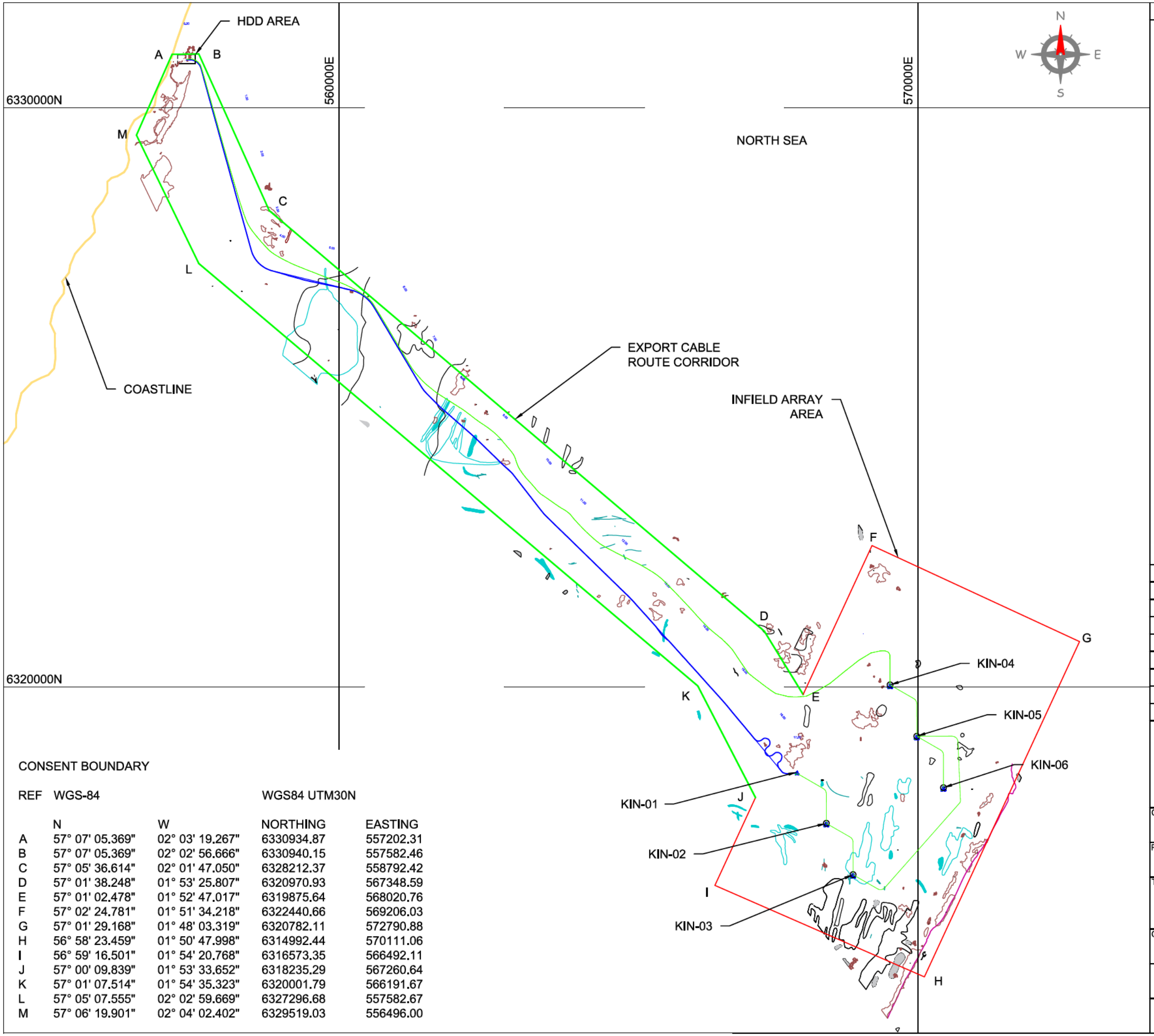
The routes for the export cables are shown in Appendix A.

Further details of the export cables are provided in the Cable Plan, KOWL-PL-0004-009.

5. REFERENCES

1. “Design Statement”, KOWL-DE-0004-001
2. “Lighting and Marking Plan”, KOWL-PL-0004-001
3. “Cable Plan”, KOWL-PL-0004-009

APPENDIX A - LAYOUT PLAN



CONSENT BOUNDARY

REF	WGS-84		WGS84 UTM30N	
	N	W	NORTHING	EASTING
A	57° 07' 05.369"	02° 03' 19.267"	6330934.87	557202.31
B	57° 07' 05.369"	02° 02' 56.666"	6330940.15	557582.46
C	57° 05' 36.614"	02° 01' 47.050"	6328212.37	558792.42
D	57° 01' 38.248"	01° 53' 25.807"	6320970.93	567348.59
E	57° 01' 02.478"	01° 52' 47.017"	6319875.64	568020.76
F	57° 02' 24.781"	01° 51' 34.218"	6322440.66	569206.03
G	57° 01' 29.168"	01° 48' 03.319"	6320782.11	572790.88
H	56° 58' 23.459"	01° 50' 47.998"	6314992.44	570111.06
I	56° 59' 16.501"	01° 54' 20.768"	6316573.35	566492.11
J	57° 00' 09.839"	01° 53' 33.652"	6318235.29	567260.64
K	57° 01' 07.514"	01° 54' 35.323"	6320001.79	566191.67
L	57° 05' 07.555"	02° 02' 59.669"	6327296.68	557582.67
M	57° 06' 19.901"	02° 04' 02.402"	6329519.03	556496.00

LEGEND

PLANNED TURBINE LOCATIONS

REF	WGS-84	
	N	W
KIN-01*	57° 00' 19.095"	01° 52' 52.181"
KIN-02	56° 59' 50.109"	01° 52' 25.710"
KIN-03	56° 59' 21.214"	01° 51' 59.269"
KIN-04	57° 01' 06.828"	01° 51' 18.166"
KIN-05	57° 00' 37.897"	01° 50' 51.666"
KIN-06*	57° 00' 08.931"	01° 50' 25.179"

* CURRENT 2MW TURBINE AT KIN-01 LOCATION WILL BE REMOVED AND REDEPLOYED AT KIN-06 LOCATION

REF	WGS84 UTM30N	
	NORTHINGS	EASTINGS
KIN-01	6318532.87	567955.65
KIN-02	6317645.51	568416.70
KIN-03	6316758.16	568878.75
KIN-04	6320034.94	569517.86
KIN-05	6319147.58	569978.91
KIN-06	6318260.23	570440.96

EXISTING EXPORT CABLE ROUTE
PROPOSED 2ND EXPORT CABLE ROUTE

REV	DESCRIPTION		DATE
A4	ISSUED FOR COMMENT	Redacted	3/04/2019
A3	ISSUED FOR COMMENT	Redacted	01/04/2019
A2	ISSUED FOR COMMENT	Redacted	29/01/2019
A1	ISSUED FOR COMMENT	Redacted	28/01/2019

KOWL

CLIENT
KINCARDINE OFFSHORE WINDFARM LIMITED

PROJECT
KINCARDINE OFFSHORE WINDFARM PROJECT

TITLE
FIELD LAYOUT CONSENT AND WTG POSITION CHECK

CLIENT DRAWING NUMBER	SHEET	SHEET SIZE
	1 OF 1	A3

SCALE U.N.O.	W3G DRAWING NUMBER	REV
1:60	KOWL-DR-0001-015	A4