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CONSTRUCTION METHOD STATEMENT
KINCARDINE OFFSHORE WINDFARM PROJECT

Prepared	Checked	Reviewed	Approved	ECoW Approved
Jan 14, 2020	Jan 14, 2020	Jan 14, 2020	Jan 14, 2020	Jan 14, 2020
Organisation: KOWL	Organisation: KOWL	Organisation: KOWL	Organisation: KOWL	Organisation: KOWL
Name / Signature: John Giles	Name / Signature: Alan West	Name / Signature: John Giles	Name / Signature: Alan West	Name / Signature: Catrin Fowden

Revision History

Date	Rev. Status	Purpose of Issue*	Remarks	Initials
19/03/2018	A1	Review	Issued for Internal Review	JD
23/03/2018	B1	External Review	Issued for External Review	JD
01/05/2018	C1	For Information	Issued for Final Review	AC
04/05/2018	C2	Approved for Use	Final	JD
14/05/2019	C3	External Review	Re-issued for review prior to Tranche 2	AF
14/01/2020	C4	For Information	No. Of Mooring lines advised Section 5.3	JG

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


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ACRONYMS, ABBREVIATIONS and DEFFINITIONS

AHT	Anchor Handling Vessel
CD	Chart Datum
CMS	Construction Method Statement
CWIL	Cobra Wind International Ltd
FPSO	Floating production, storage and offload.
HDD	Horizontal direction drilling
KOWL	Kincardine Offshore Wind Ltd
MHWS	Mean high water spring
NtoM	Notice to Mariners
ROV	Remotely operated vehicle
SFF	Scottish Fishermen's Federation
SFFSL	Scottish Fishermen's Federation Services Limited
WROV	Work ROV
WTG	Wind turbine generator

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1.0 INTRODUCTION

1.1. Purpose of the Document

This document has been created to satisfy Condition 10 of the Section 36 Consent issued by the Marine Scotland Licensing Operations Team (MS-LOT) to Kincardine Offshore Wind Limited (KOWL) for the Kincardine Offshore Windfarm (the Project).

Condition 10 requires the production of a Construction Method Statement (CMS) to outline the construction methods to be used in the Project. The submission of the CMS must be no later than six months prior to the Commencement of the Development.

1.2. Scope of the Document

This document confirms the construction methods for Tranche 2 of the Project. The CMS includes details of both on-shore and offshore works to provide full details of the Project, however, it should be noted that the requirements of the Section 36 Consents are pertinent to the offshore works only.

1.3. Amending and Updating of 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 to 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.

1.4. Compliance

Compliance with the various consent conditions are documented in the Commitments Register and where applicable throughout the CMS.

2.0 PROJECT OVERVIEW


2.1. Summary

The Project is considered a commercial demonstrator site, which will utilise floating foundation technology, and will be one of the world's first array 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 that provides suitable water depth for a floating offshore wind demonstrator development (approximately 60-80m).

The project is split into the following areas:

- The Development Area – the wind farm area including the Wind Turbine Generators (WTG) and inter-array cables.
- The Offshore Export Cable Corridor – the area within which the proposed export cables will be laid, from the perimeter of the Development Area to 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.

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2.2. Turbine Locations

The project originally consisted of 8 locations. This has been reduced to 6 locations and hence the designations have now changed 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. 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 (to be installed 2020)
- 5 x 33kv inter-array cables (to be installed 2020)
- 2 x export cables (one currently installed)
- All turbine substructures are the semi-submersible Windfloat™ design.

2.4. 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.

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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.

2.5. Project Design Life

The design life for the windfarm is 25 years.

2.6. Construction Programme Overview

The construction of the project is in-line with the Programme outlined in the document "Construction Programme", KOWL-REP-0004-001.

3.0 Consent Conditions

Table 3-1 Consent Conditions

Condition Number	Condition Wording	Where addressed in this document
Condition 10 of the S36 Consent	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 Construction Method Statement ("CMS"), in writing, to the Scottish Ministers for their written approval. Such approval may only be granted following consultation by the Scottish Ministers with SNH, SEPA, MoD, MCA, NLB, SFF, WDC and any such other advisors or organisations as may be required at the discretion of the Scottish Ministers.	This document sets out the CMS for approval by the Scottish Ministers. Consultation to be undertaken by the Scottish Ministers.
Condition 10 of the S36 Consent	The CMS must include, but not be limited to:	Sections 4.0, 5.0, 6.0.
	a) the construction procedures and good working practices for installing the Development;	Section 9.0
	b) details of the roles and responsibilities, chain of command and contact details of company personnel, any contractors or sub-contractors involved during the construction of the Development;	Section 10.0
	c) details of how the construction related mitigation steps proposed in the ES and in the ES Addendum are to be delivered; and	Section 8.0
	d) a waste management plan for the construction phase of the Development.	
Condition 10 of the S36 Consent	The CMS must adhere to the construction methods assessed in the Application, ES and ES Addendum. The CMS must also, so far as is reasonably practicable, be consistent with the Design Statement ("DS"), the Environmental Management Plan ("EMP"), the Vessel Management Plan ("VMP"), the Navigational Safety Plan ("NSP"), the Cable Plan ("CaP") and the Lighting and Marking Plan ("LMP").	The CMS has been produced in accordance with these documents.

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4.0 INSTALLATION METHODOLOGIES FOR THE EXPORT CABLES

4.1. Pre-Lay Grapnel Run

As part of the pre-lay operation an optional grapnel run will be undertaken along the export cable route to confirm the complete clearance of any abandoned fishing equipment (fishing nets and pots). This will be undertaken using normal operational approaches (such as an SFFSL vessel mobilised to undertake such activities), with the figure below showing a typical grapnel chain assembly that could be used for such operations.

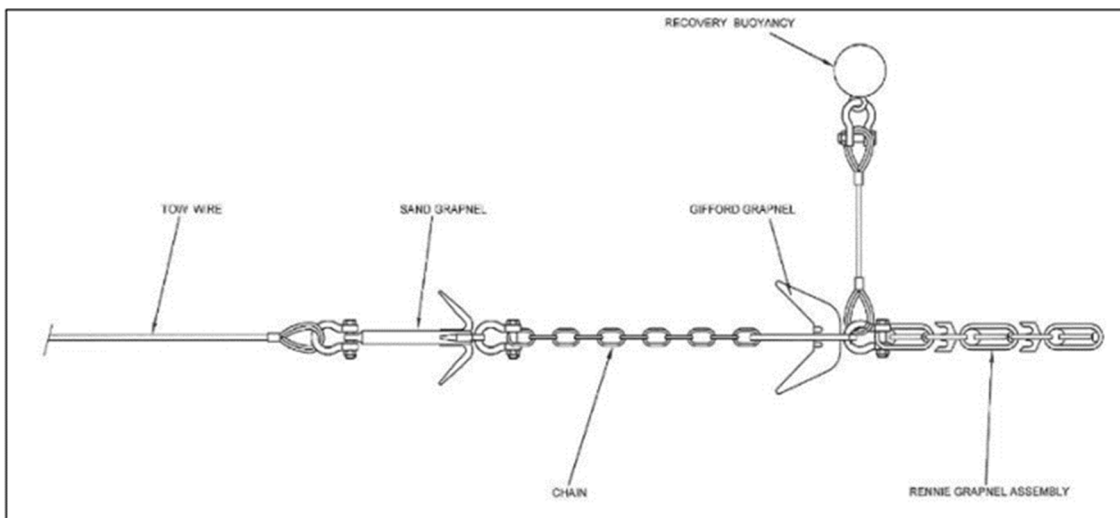


Figure 4-1 Typical grapnel chain assembly

4.2. Boulder Clearance

Where boulders are present within the cable route (large number noted during cable route survey), a boulder clearance campaign will be undertaken utilising a dedicated boulder grab to pick up larger boulders (>30cm) and shifting them approximately 15m perpendicular to the cable route. No boulders will be removed from site during this operation.

4.3. Cable Laying

The cable lay shall be installed from the HDD drill out location to the Development Area in one continuous operation using a dedicated cable lay vessel to undertake the operation.

The cable will be installed by utilising a cable trenching tool (either mechanical cutting or jetting depending on the sea bed material encountered). The cable will be laid within the trench and then buried to the required depth. Post cable lay surveys will be undertaken to ensure that no berm formation has occurred due to the potential build-up of seabed material caused by the trenching and cable lay operations. Should any berm be identified it will be removed using standard marine operations.

Where burial depth is not achieved suitable protective material (such as rock dump and rock mattresses) will be used to ensure cable protection.

4.4. Post Lay Survey

As part of the post lay work, a survey will be undertaken to ascertain the burial location, the depth of burial and any areas where the cable is still exposed. Should any areas be identified where post-lay protection is still required to ensure complete burial, additional measures will be brought into play to bury any exposed sections of the cable. This report will be submitted to MS-LOT as part of the consent discharge process.

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5.0 INSTALLATION METHODOLOGIES FOR THE MOORINGS

The mooring installation approach used in the CMS will utilise the approach described within the Regulatory Expectations on Moorings for Floating Wind and Marine Devices (MCA 2017¹). This will include CDM regulations with the application of the principal of prevention being used throughout the construction process for the mooring system.

5.1. Pre-Lay Survey

A pre-lay survey shall be performed in order to identify and remove any debris which is along the route of the mooring lines.

5.2. Mooring Line Deployment

The mooring lines will be deployed by connecting the chain to the anchor on the back deck of an Anchor Handling Vessel (AHV). The anchor will be lowered using the mooring chain to the seabed into a pre-determined target box and orientated to face the WTG location. The location of the anchor on the seabed will be recorded for comparison with the post embedment location.

The chain will then be deployed and laid along the survey corridor. Upon completion of the laying operation the chain end will be transferred onto the main winch wire for the load test procedure.

5.3. Anchor Embedment and Laydown

The 2MW Turbine has 4 off Mooring Lines. The (5 Off) 9.525 MW Mooring lines have 3 off Mooring lines each. Total Mooring lines 19.

The embedment of the anchor involves the AHV applying a large horizontal thrust to the mooring line which will act to pull the anchor down into the seabed.

The load applied is usually up to the maximum design tension with the WTG connected, in order that further movement of the anchor is prevented.


The load will be applied by the vessel and the tension monitored using the load cell on the main winch. The load will be applied gradually up to a target tension and held for a period of time to ensure the anchor has reached its final location.

The anchor will usually embed to a depth well below the seabed level and thus the monitoring of its' final position can be determined accurately by measuring the movement of a pre-defined point on the mooring line (for example a shackle connection). The length of the chain can then be adjusted to compensate for the drag distance of the anchor.

6.0 HOOK-UP METHODOLOGIES FOR THE FLOATING SYSTEMS

The hook-up of the WTG will follow similar principals for any floating structure such as floating production, storage and offloading vessels (FPSO's), dry-tow, drilling rigs plus draw on the experience of the vessels and crews experience involved in a range of similar activities.

¹ Regulatory Expectations on Moorings for Floating Wind and Marine Devices MCA 2017 - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/640962/Regulatory_expectations_on_moorings_devices_from_HSE_and_MCA.PDF

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6.1. Preparation and Tow

Prior to the tow of the WTG and its substructure, certificate of worthiness for sailing will be required from a Marine Warranty Surveyor, which will typically include but not be limited to the following checks:

- Towing calculations;
- Specification of towing equipment;
- Towing vessel audits and assessment of suitability;
- Towage route and safe havens / sheltered locations;
- Necessary permits and notifications for the towing operations;
- Contingency and emergency procedures;
- Checks of all vital hook-up equipment (i.e. winches); and
- Confirmation of a suitable weather window.

The tow will generally consist of at least two vessels to conduct the open ocean tow plus smaller supporting tugs for the sensitive operation of leaving a port area.

The towing operation will be performed at a safe speed for the WTG sub-structure and if there are any delays or issues in-field, a designated sheltered location or safe haven will be identified.

6.2. Hook-up Infield

Prior to the towing vessels and WTG arriving there will be a survey and preparation of the mooring system and cable, as required, to ensure that no damage has occurred prior to hook-up. This will normally be performed by a supporting AHT vessel complete with an WROV equipped.

The operation to perform the hook-up will occur following on immediately after the towing operation, effectively as part of the same operation. The towing vessels will have to setup on location in a pre-defined heading and position to keep the WTG above the target location.

A supporting AHT or crew transfer vessel will transfer hook-up personnel on-board ready for the hook-up operation. The operation will typically involve the transfer of the winch wire across to the support AHT. This wire will be connected to the end of the mooring line and a cross-haul operation conducted to pull-in the chain to the securing arrangement.


This operation will be performed for each mooring line in turn, after which once securely moored the towing vessels will be disconnected. Vessels will remain on standby until mooring is complete.

The last operation will be the final tensioning of the mooring lines to achieve the required pre-tension and ensure it is on-location as close as possible to the design position. For a three-leg system this often will involve the adjustment of the last mooring line only; however, some small adjustment may be required on the other mooring lines.

Once confirmed as securely moored, a sign off by the Designers Representative and Marine Warranty Surveyor will be undertaken prior to the towing vessels being demobilised.

Post installation, the position of the sub-structures will be monitored using GPS - one installed on each column. This system is used to monitor the position and yaw. This information is relayed to the Project's onshore substation. The control system calculates the drift from the installation point. If the drift is higher than the threshold value the control system issues alarms using email and SMS systems.

Additionally, each substructure will be equipped with an Automatic Identification System (AIS) that will broadcast location. This information can be read by near-by vessels or shore based AIS stations and vessels.

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6.3. As-built Survey

The final operation for the support vessel is a full WROV survey of the mooring system to identify and record the status to be compared against future surveys. The hull of the WTG will also be surveyed to confirm no damage occurred during the transit and hook up operation.

7.0 INSTALLATION METHODOLOGY FOR THE INTER-ARRAY CABLES

7.1. Vessel Specification

The inter-array cables will be installed from a suitable vessel with suitable storage for the cables and handling of the various ancillary items on the cable, such as buoyancy and bend stiffeners.

7.2. Pre-Lay Survey

Prior to the laying the route will be surveyed to identify and as required remove any items along the route.

7.3. Installation Operation

Subject to the schedule there are two installation methodologies.

If the WTG is on location, the cable can be initiated directly into the J-tube of the WTG and pulled up to deck level then permanently secured. The cable will then be laid away using attached buoyancy modules in the required locations on the cable. The lay will continue along the designated route; however, the action depends upon whether the WTG is in place or not.

If the WTG is present and a cross-haul operation is required, this will be conducted using buoyancy modules attached and laid continued until the end of the cable (bend stiffener) is on deck. A pulling winch wire will be accepted from the WTG and connected to the end of the cable to allow cross-haul operation to be performed, pulling in the cable to its final location.

7.4. As-Built Survey

The final operation of the cable installation will be an as-built survey of the cable to confirm it has been laid correctly. This will provide the confirmation and validation of the cable lay operation has been undertaken as per the licence requirements and provide the baseline for the future long-term assessment of the cable position which will be undertaken as part of the O&M process.


8.0 WASTE MANAGEMENT

The waste management framework for KOWL is set out in the Site Waste Management Plan, which sets out the following, with respect waste management from marine operations:

- regulatory framework relating to waste management;
- roles and responsibilities in relation to the management of waste;
- waste types that may be generated, including special waste; and
- the waste hierarchy (options to recycle, re-use and dispose) as well as the storage and segregation of waste offshore for subsequent onshore disposal.

KOWL will require that all contractors and sub-contractors for the construction and operation of the Project to:

- demonstrate waste management procedures for their activities providing details of expected waste streams and proposed procedures for waste management;
- meet the pertinent legislative requirements and obtain, where necessary, any licences in relation to waste management;
- ensure that all waste is placed in appropriately labelled containers;
- ensure that all waste is disposed of in accordance with the waste management framework; and
- ensure that the disposal of waste or refuse is transported by a suitably licensed waste carrier to a licensed waste facility.

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9.0 ROLES AND RESPONSIBILITIES

The KOWL Project team are responsible for the management of the project through the construction period and then the operational and maintenance for the life of the project. The KOWL team consist of the following roles and key contact names () and the Cobra Wind International Ltd (CWIL) project construction team consists of the following roles and key contact names (Figure 8.2):



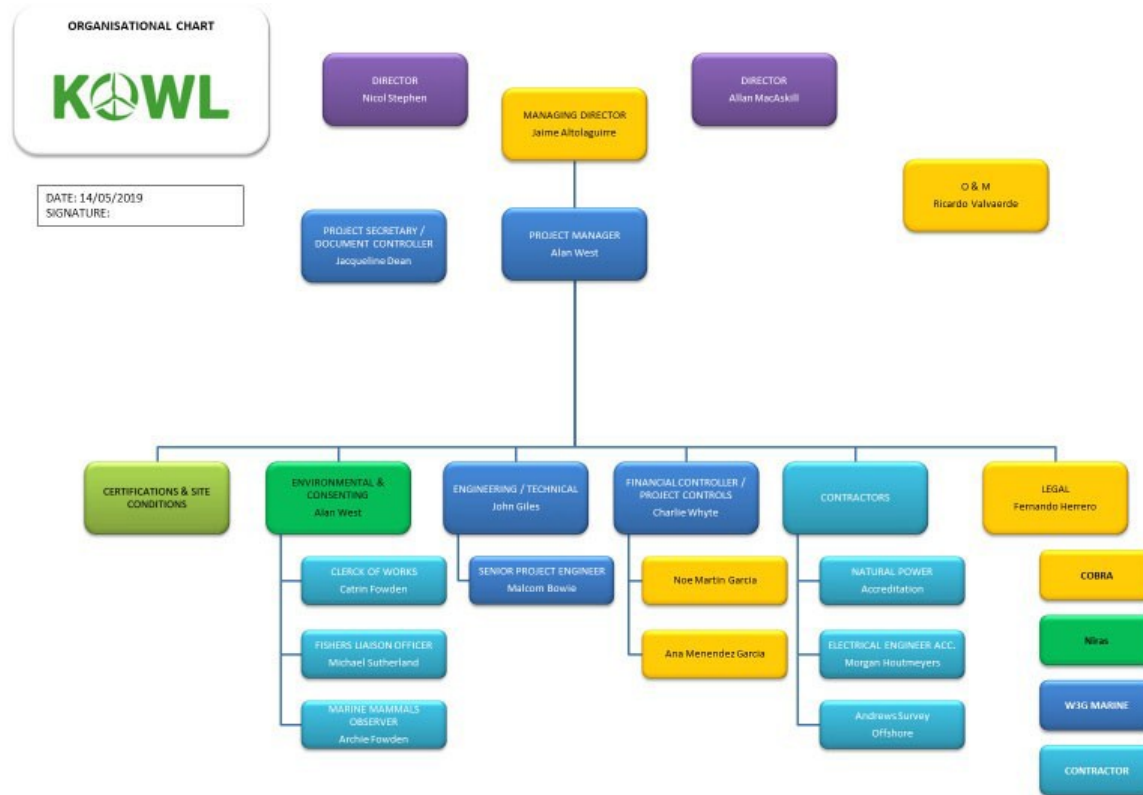
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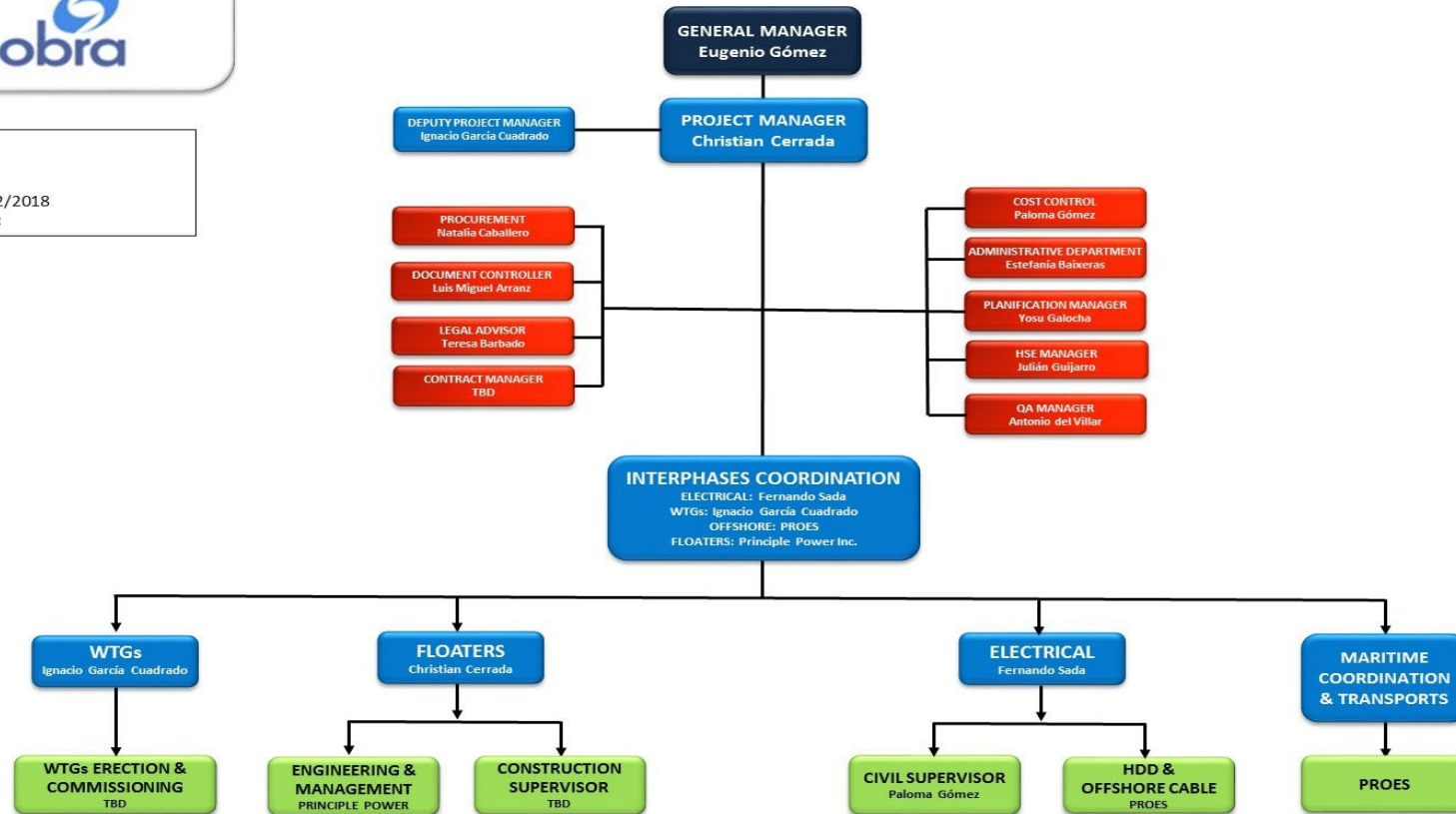
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ORGANIZATIONAL CHART
COBRA WIND INTERNATIONAL LTD.



REV: 3

DATE: 18/02/2018
SIGNATURE:




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10.0 COMPLIANCE WITH PROJECT MITIGATION


The following project management and mitigation elements (Table 10-1) have been included within the construction programme as noted within the ES and Variation. Due to the limited amount of time that the construction activities are active on site and the installation processes associated with the use of semi-sub floating offshore structures there are a limited number of identified environmental management and mitigation commitments noted in the table below.

Table 10-1 Compliance with identified management and mitigation embedded in ES and ES Variation

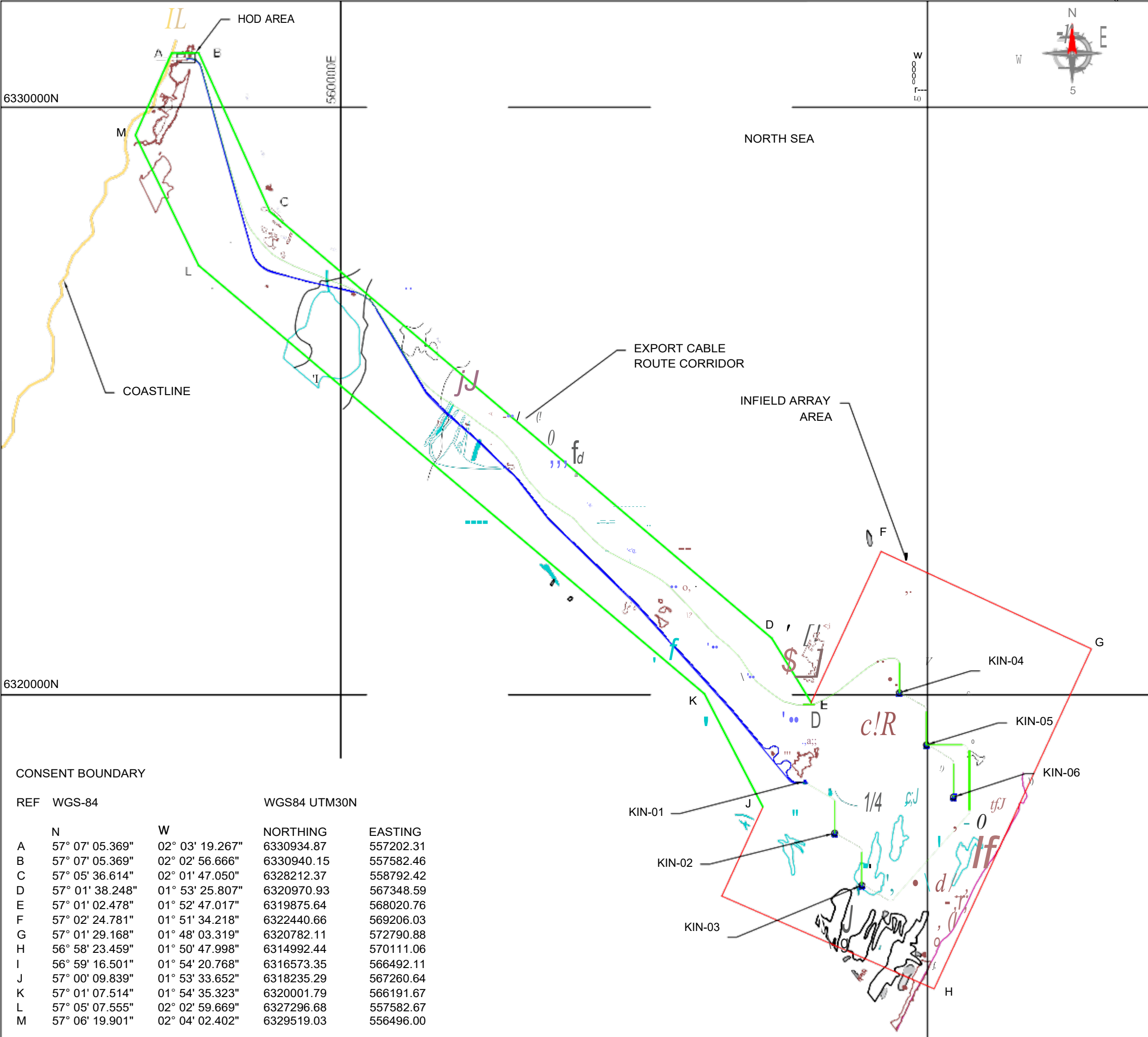
Identified Issue	Management and Mitigation noted within ES	Actioned in construction process
Cable burial and protection of Cables	Export cables would be protected appropriately taking into account fishing and anchoring practices and an appropriate burial protection index study. Positions of cables would be promulgated and charted by appropriate means. As per the requirements of MGN 543 any cable protection used will be risk assessed to ensure it does not present an under-keel clearance risk to vessels transiting over the top. This in particular is required in shallow waters areas where deep keeled recreational craft may transit.	KOWL will aim to bury the cable to a burial depth of 1.5m. This will be confirmed by a post-lay survey to identify cable burial and where required cable protection will be installed. This will also confirm the underwater clearance is not impacted by the cable installation.
Fisheries Liaison Officer (FLO)	The FLOWW (Fishing Liaison with Offshore Wind and Wet Renewables Group) best practice guidance for fisheries liaison will be followed, including the establishment of a fishing liaison plan. A FLO has been appointed for the Project and will continue in this role during construction.	FLO appointed to mitigate risk with fishing industry during construction. Fishing engagement plan completed following consultation with SFF.
Fisheries Management and Mitigation Strategy	In order to inform the production of the FMMS, the Company must monitor or collect data as relevant and agreed with Scottish Ministers in terms of the ES and ES Addendum and any subsequent monitoring or data collection for: <ul style="list-style-type: none"> a) the impacts on the adjacent coastline; b) the effects on local fishermen; and c) the effects on other users of the sea. As part of any finalised FMMS, the Company must produce and implement a mitigation strategy for each commercial fishery that can prove to the Scottish Ministers that they would be adversely affected by the Development. The Company must implement all mitigation measures committed to be carried out by the Company within the FMMS. Any contractors, or sub-contractors working for the Company, must co-operate with the fishing industry to ensure the effective implementation of the FMMS.	Fisheries Management and Mitigation Strategy for project submitted for consultation to ensure appropriate interactions with fishing community.
Guard vessels during construction	Guard vessels would be used during construction and significant maintenance, to protect both the installations and workers on the wind turbines, particularly in areas in proximity to main traffic routes. Their role would be to both alert vessels to the development activity and provide support in the event of an emergency situation. A guard vessel will be present for the period when the export cables, inter array cables and mooring structures will be in situ.	KOWL to appoint SFFSL guard vessels for construction work.

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Promulgation of information	Appropriate liaison and dissemination of information and warnings through Notices to Mariners and other appropriate media, (e.g. Admiralty Charts, fishermen's awareness charts and Pilot Books) would enable vessels to effectively and safely passage plan around the Project (including inter-array cables) and the offshore cable corridor. It is noted that this will include international promulgation of information.	Information on construction programme to be sent via Notice to Mariners (NtoM) and other appropriate notices.
Towing risk management plan	A management plan for the towing operation will be developed by the towage company; this will follow standard and international marine procedures.	KOWL has appointed a Master Mariner to review this tow and will report all information pertinent to NtoM.

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Appendix A – Field Layout Drawing



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

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

REV	DESCRIPTION	ORN	CKD	APP	DATE
A4	ISSUED FOR COMMENT	JD	JG	AW	03/04/2019
A3	ISSUED FOR COMMENT	JD	JG	AW	01/04/2019
A2	ISSUED FOR COMMENT	JD	JG	AW	29/01/2019
A1	ISSUED FOR COMMENT	GB	JG	AW	28/01/2019



CLIENT: KINCARDINE OFFSHORE WINDFARM LIMITED

PROJECT: KINCARDINE OFFSHORE WINDFARM PROJECT

TITLE: FIELD LAYOUT CONSENT AND WTG POSITION CHECK

CLIENT DRAWING NUMBER	SHEET 1 OF 1	SHEET SIZE A3
SCALE U.N.O. 1:60	W3G DRAWING NUMBER KOWL-DR-0001-015	REV A4

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