
The skirt of the suction bucket will have some tension capacity due to the skirt's skin friction (mostly outer skin friction). When the outer load exceeds the skirt's skin friction, a negative differential pressure develops under the suction bucket dome, carrying higher loads for a certain time. This beneficial effect has not yet been accounted for in the design.

By close cooperation of load and geotechnical experts the relevant load time series has been simulated to ensure that the design is safe under full power operational loads.

B6.3 Foundation Deformation Analysis (SLS)

The calculated permanent rotation of the SBJ shall be less than 0.50 degrees, as required in the design basis evaluation report. The maximum accumulated permanent rotation has been calculated by the designer to be less than 0.17 degrees.

B6.4 Soil Structure Interaction Analysis (ULS and FLS)

The soil structure interaction was assessed for ULS and FLS loads. Linear soil response stiffness matrices are applied, and soil degradation due to cyclic loading was included in the analyses.

As it is not obvious whether stiff or soft soil is the most conservative, sensitivity studies were carried out for a range of soil/foundation stiffness matrices. Sensitivity studies carried out by Rambøll show that the foundation structure fulfils the requirements in standards listed in Section A2 with respect to structural integrity.

The soil stiffness matrix for ULS and FLS cases presented by the designer have been verified by a parallel FE-calculation in Plaxis 3D.

B7 SCOUR PROTECTION

A scour protection system will be applied. It is laid out to be permanently in place which is also considered in the design calculations.

For the 11 suction bucket jacket substructures at the Aberdeen Offshore Wind Farm which consist of a three-cornered jacket the scour protection will at all locations consist of rocks in the form of a double layer scour protection.

The scour protection design is based on physical model tests. The comparability between model and real-life scale is achieved mainly by a comparison of the respective Shields parameter, which is a non-dimensional number used to calculate the initiation of motion of sediment in a fluid flow.


The design is devised as a dynamic scour protection, meaning that a certain amount of damage to the rock pad and a rearrangement of the rock material is taken into account. An inspection and maintenance plan is prescribed in the Scour Protection Design documentation which must be upheld throughout the design lifetime.

B8 CONDITIONS TO BE CONSIDERED IN OTHER CERTIFICATION PHASES/MODULES

The conditions identified during the technical evaluation are listed in the following. The conditions are assigned to the certification phases in which they need to be considered and evaluated.

Installation phase:

- The designer may intent to use pressure cycling to mitigate an unexpected higher installation soil resistance. This will disturb the mechanical properties of the soil, and these effects have not been considered in the design. Thus, the design has been approved with the condition of



avoiding pressure cycling. If pressure cyclic is applied nevertheless, the design strength of the foundation must be re-evaluated again.

- It is noted that the grouting is an interface between SPT and Boskalis regarding its feasibility and procedure. The grouting procedures have not been issued to DNV GL at this point of time as a part of the certification work. Since the soil may be in contact with the mud-mat, it must be ensured that a sufficient grout filling can be ensured.

Installation and Operation & maintenance phases:

- An inspection and maintenance plan is prescribed in the Scour Protection Design documentation which must be upheld throughout the design lifetime.

B9 OUTSTANDING ISSUES

No outstanding issues have been identified.

B10 CONCLUSION

The verification work performed by DNV GL confirms that the documentation from customer related to the Aberdeen project as listed under Section A4 fulfils the relevant demands set up in the Certification scheme "IEC 61400-22:2010-05 Wind turbines – Part 22: Conformity testing and certification" and the "Basis for the evaluation" listed in section A3 with due consideration of the listed conditions.



About DNV GL

Driven by our purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. We provide classification and technical assurance along with software and independent expert advisory services to the maritime, oil & gas and energy industries. We also provide certification services to customers across a wide range of industries. Operating in more than 100 countries, our professionals are dedicated to helping our customers make the world safer, smarter and greener.

[Redacted]

From: [Redacted]
Sent: 13 February 2018 16:14
To: [Redacted]
Cc: [Redacted]
Subject: EOWDC - Condition 3.2.1.3 of the Marine Licence_Third Party Certification - Evaluation Report - Acknowledgement of receipt

Hi [Redacted]

Thanks very much, MS-LOT acknowledge receipt and will respond in due course.

Kind regards

[Redacted]

From: [Redacted]
Sent: 13 February 2018 15:53
To: [Redacted]
Cc: [Redacted]
Subject: RE: Condition 3.2.1.3 of the Marine Licence_Third Party Certification

Dear [Redacted]

As discussed yesterday attached you can find the evaluation report. Please note that this report is currently under review by AOWFL.

Please let me know if you have any queries or require any further information.

Regards,
[Redacted]

From: [Redacted]
Sent: Monday, February 12, 2018 11:50 AM
To: [Redacted]
Cc: [Redacted]

Subject: RE: Condition 3.2.1.3 of the Marine Licence_Third Party Certification

Dear [Redacted]

As discussed attached you can find the Third Party Certification for the foundation substructures.

Please let me know if you have any queries.

Regards,
[Redacted]

From: [Redacted]
Sent: Wednesday, August 23, 2017 10:53 PM
To: [Redacted]
Cc: [Redacted]

Subject: RE: Condition 3.2.1.3 of the Marine Licence_Third Party Certification

Dear [Redacted]

Following on from our discussions AOWFL proposes to submit the Third Party Certification for the foundation substructures prior to the erection of the wind turbine generators upon the foundation substructures. Please find attached letter confirming this approach.

AOWFL trusts that this is sufficient to proceed with the installation of the foundation substructures and for MS-LOT to partially discharge Condition 3.2.1.3.

Please do not hesitate to contact us if you have any further queries.

Regards,
[Redacted]

From: [Redacted]
Sent: Thursday, August 10, 2017 8:08 AM
To: [Redacted]
Cc: [Redacted]
Subject: RE: Condition 3.2.1.3 of the Marine Licence_Third Party Certification

Hi [Redacted]

As discussed in the meeting yesterday, MS LOT do require additional TPC for the suction bucket and suction bucket with turbine. Adam will discuss with the EOWDC team and come back to MS LOT.

Kind regards,

[Redacted]

From: [Redacted]
Sent: 08 August 2017 16:17
To: [Redacted]
Cc: [Redacted]
Subject: RE: Condition 3.2.1.3 of the Marine Licence_Third Party Certification

[Redacted]

We would like to clarify that the TPC for the suction buckets, for the suction buckets when assembled with the turbine and these also insitu, will be covered by the "foundation detailed design".

Following on from my email below the statements of conformity for the design basis for the foundation design, the loads and for the foundation detailed design are expected to be available in October 2017. These would be then submitted to MS-LOT.

Could you please confirm that this information is sufficient to satisfy the requirements of Marine Licence Condition 3.2.1.3?

Thanks,
[Redacted]

From: [Redacted]
Sent: Monday, August 07, 2017 3:04 PM
To: [Redacted]
Cc: [Redacted]

Good afternoon [Redacted]

Further to your email below, MS LOT do require the TPC (including a report) for the Suction buckets and for the suction buckets when assembled with the turbine and these also insitu.

Kind regards,

[Redacted]

From: [Redacted]
Sent: 19 July 2017 09:09
To: [Redacted]
Cc: [Redacted]

Subject: RE: Condition 3.2.1.3 of the Marine Licence_Third Party Certification

Dear [Redacted]

As stated on the letter submitted to MS-LOT on the 15th May, regarding the third party certification requirements, attached you can find the corresponding certificate for the MK1C model.

The statements of conformity for the design basis for the foundation design, the loads and for the foundation detailed design are not yet available and will be submitted to MS-LOT as soon as they become available. However, it is considered that the information provided is sufficient to satisfy the requirements of Marine Licence Condition 3.2.1.3.

Could MS-LOT please confirm that this is the case?

Thanks,
[Redacted]

From: [Redacted]
Sent: Monday, May 15, 2017 5:37 PM
To: [Redacted]
Cc: [Redacted]
Subject: Condition 3.2.1.3 of the Marine Licence_Third Party Certification

Dear [Redacted]

Condition 3.2.1.3 of the Marine Licence requires that Aberdeen Offshore Wind Farm Limited (AOWFL) provides the Licensing Authority with a covering certificate detailing Third Party Certification, or a suitable alternative as agreed in writing with the Licensing Authority, of the turbines and sub-structures, no later than three months prior to the Commencement of the Works, unless otherwise agreed in writing with the Licensing Authority.

It is considered that the enclosed information is sufficient to satisfy the requirements of Marine Licence Condition 3.2.1.3.

Please do not hesitate to contact me if you require any further information.

Regards,

[Redacted]

[Redacted]

[Redacted]

Aberdeen Offshore Wind Farm

3rd Floor, The Tun Building

4 Jackson's Entry

Holyrood Road

Edinburgh

EH8 8PJ

[Redacted]

[Redacted]

This email has been scanned by the Symantec Email Security.cloud service.
For more information please visit <http://www.symanteccloud.com>

This email has been received from an external party and

has been swept for the presence of computer viruses.

This e-mail (and any files or other attachments transmitted with it) is intended solely for the attention of the addressee(s). Unauthorised use, disclosure, storage, copying or distribution of any part of this e-mail is not permitted. If you are not the intended recipient please destroy the email, remove any copies from your system and inform the sender immediately by return.

Communications with the Scottish Government may be monitored or recorded in order to secure the effective operation of the system and for other lawful purposes. The views or opinions contained within this e-mail may not necessarily reflect those of the Scottish Government.

Tha am post-d seo (agus faidhle neo ceanglan còmhla ris) dhan neach neo luchd-ainmichte a-mhàin. Chan eil e ceadichte a chleachdadh ann an dòigh sam bith, a' toirt a-steach còraichean, foillseachadh neo sgaoileadh, gun chead. Ma 's e is gun d'fhuair sibh seo le gun fhiosd', bu choir cur às dhan phost-d agus lethbhreac sam bith air an t-siostam agaibh, leig fios chun neach a sgaoil am post-d gun dàil.

Dh'fhaodadh gum bi teachdaireachd sam bith bho Riaghaltas na h-Alba air a chlàradh neo air a sgrùdadh airson dearbhadh gu bheil an siostam ag obair gu h-èifeachdach neo airson adhbhar laghail eile. Dh'fhaodadh nach eil beachdan anns a' phost-d seo co-ionann ri beachdan Riaghaltas na h-Alba.

[Redacted]

From: [Redacted]
[Redacted]
Sent: 13 February 2018 22:43
To: MS Marine Renewables; 'offshore.inspectorate@decc.gsi.gov.uk'; 'PON2@sff.co.uk';
[Redacted]
[Redacted]'; 'nffo@nffo.org.uk';
'aberdeen.coastguard@mcga.gov.uk'; 'kingfisher@seafish.co.uk'
Cc: [Redacted]
Subject: RE: Aberdeen Offshore Wind Farm Ltd_Dropped Objects Form_South Cardinal
Buoy
Attachments: FORM - MS Renewables Dropped Objects Form_South Cardinal Buoy_Updated
130218.pdf

Dear All,

Following on from my email below, in order to be able to redeploy the south cardinal buoy as soon as possible, and due to current vessel availability, the lost clump weight is proposed to be left in situ, while the cardinal buoy with the new clump weight is redeployed. However, it should be noted that all five clump weights, used for construction buoyage, will be removed following final commissioning of the construction marking for the Wind Farm.

Please do not hesitate to get in contact if you have any queries or require any further information.

Regards,
[Redacted]

From: [Redacted]
Sent: Monday, February 12, 2018 8:36 AM
To: 'MS.MarineRenewables@gov.scot' <MS.MarineRenewables@gov.scot>; 'offshore.inspectorate@decc.gsi.gov.uk' <offshore.inspectorate@decc.gsi.gov.uk>; 'PON2@sff.co.uk' <PON2@sff.co.uk>;
[Redacted]
[Redacted]
[Redacted] 'nffo@nffo.org.uk' <nffo@nffo.org.uk>; 'aberdeen.coastguard@mcga.gov.uk' <aberdeen.coastguard@mcga.gov.uk>; 'kingfisher@seafish.co.uk' <kingfisher@seafish.co.uk>
Cc: [Redacted]

Subject: Aberdeen Offshore Wind Farm Ltd_Dropped Objects Form_South Cardinal Buoy

Dear All,

Aberdeen Offshore Wind Farm Limited notifies that the South Cardinal Buoy of the European Offshore Wind Deployment broke loose from its mooring on the 10th February and was recovered within a few hours. The cause of the incident is believed to be the failure of the chain or connection which held the clump weight to the mooring chain for the buoy. The clump weight is to be located and removed to allow for redeployment of South Cardinal Buoy as soon as possible .

We will let you know once the clump weight has been recovered and the south cardinal buoy redeployed.

In the meantime please do not hesitate to contact me if you have any queries or require any further information.

Regards,

[Redacted]
[Redacted]
Aberdeen Offshore Wind Farm

3rd Floor, The Tun Building
4 Jackson's Entry
Holyrood Road
Edinburgh
EH8 8PJ

[Redacted]
[Redacted]

We have recently changed the registered offices of a number of our companies. The following are now registered at 1 Tudor Street, London, EC4Y 0AH:
Vattenfall Wind Power Ltd, Border Wind Ltd, Border Wind Farms Ltd, BW Ops Ltd, Clashindarroch Wind Farm Ltd, Eclipse Energy UK Ltd,
Eclipse Energy Company Ltd, Kentish Flats Ltd, Ormonde Energy Ltd, Ormonde Energy Holdings Ltd, Ormonde Project Company Ltd, Thanet Offshore

This email has been scanned by the Symantec Email Security.cloud service.
For more information please visit <http://www.symanteccloud.com>

This email has been received from an external party and has been swept for the presence of computer viruses.



OFFSHORE WIND & MARINE RENEWABLES DROPPED OBJECTS FORM

Marine Scotland notification pro-forma for reporting the dropped materials from the offshore wind/marine renewables industry at sea

Forward to the following contacts within 6 hours of dropping object: [Marine Scotland Contact – 0300 244 4000 and ask for Marine Scotland Duty Officer]

Marine Scotland
Marine Scotland Licensing Operations Team
DECC Aberdeen:
Scottish Fisherman's Federation
Inshore Fisheries Groups

Compliance / Fisheries Policy
MS.MarineRenewables@gov.scot
offshore.inspectorate@decc.gsi.gov.uk or fax: 01224 254100
PON2@sff.co.uk or fax – 01224 647078
[Redacted]

National Federation of Fisherman's Org
Maritime & Coastguard Agency
Kingfisher at Seafish

nffo@nffo.org.uk or fax 01904 635431
aberdeen.coastguard@mcga.gov.uk or fax 01224 575920
kingfisher@seafish.co.uk or fax 01472 268792

Reporter Details		Date of Report: 13th February 2018
Full Name: [Redacted]	Position/Title: [Redacted]	
Contact Telephone No: 01224 984906	Contact E-Mail: [Redacted]	
Operator/Organisation/Company responsible for dropped object:	ABERDEEN OFFSHORE WIND FARM LTD	
Name offshore Wind/Marine Renewable development or ship responsible for dropped object		
Location/position at the time of dropping object:	Aberdeen Offshore Wind Farm	
Latitude: 57° 12' 15.98" N	Longitude: 002° 00' 08.95" W	
Date dropped: 10 th Feb 2018	Time (24hours): 13:26	
Weather conditions at time: No Significant Weather	Depth of Sea (metres) Approx. 30 Meters	
Wind Direction (0-360 degree): 220°	Wind Speed (knots): 16 to 21 Knots.	
Beaufort Scale: 5	Wave Height (metres): 1.7 M Significant, 2.8 Maximum	



Dropped Object(s) – provide full description. Materials involved, function of object, dimensions etc. Provide Photos if available.



- 10th February 2018 – South Cardinal buoy broke loose from its mooring.
- 10th Feb 2018 – 13:26 Hrs Guard vessel Isla-B reports South Cardinal buoy missing from position.
- 10th Feb 2018 – 13:50 Hrs South Cardinal buoy sighted at North end of wind farm site
- 10th Feb 2018 – 15:14 Hrs Anchor handling vessel Sea Bronco has recovered South Cardinal buoy along with 20 to 30 meters of chain.
- 10th Feb 2018 - 16:20 Hrs Sea Bronco heads for Aberdeen port to discharge South Cardinal buoy onto Mathews Quay for inspection.

Picture on left is of actual South Cardinal Buoy

If the materials are resting on the seabed are they near wind turbines / renewable devices? Yes or No:
No wind turbines are installed yet. The clump weight is believed to be located South of wind farm site.

Are the materials likely to float on sea surface or in water column? Yes or No:
NO

If the answer to question above is YES - are materials likely to reach shore or cross a median line ? - please specify

Reasons from dropping object(s) (if Force Majeure is invoked please clearly state this):-

The cause of incident was most likely failure of the chain or connection which held the clump weight to the mooring chain for the buoy

Are there plans to recover the materials ? – if yes, specify details including anticipated timescales for the recovery operation. If there are no plans to recover the materials the reason for this must be clearly specified.

In order to be able to redeploy the south cardinal buoy as soon as possible, and due to current vessel availability, the lost clump weight is proposed to be left in situ, while the cardinal buoy with the new clump weight is redeployed. However, it should be noted that all five clump weights used for construction buoyage will be removed following final commissioning of the construction marking for the Wind Farm.

Date & Time TBA

What are considered to be the risks and dangers to other users of the sea as a result of the lost or dumped materials not being recovered?

The clump weight is a 28 m long anchor chain and is not likely to be a risk/dangerous.

αβ



Scottish Government
Riaghaltas na h-Alba
gov.scot

Any further information that may be useful:

None

For Internal Marine Scotland use only

Close off's received from

MS – Compliance/Fisheries/Renewables	
SFF	
NFFO	
IFGs	
MCA	
Kingfisher	
BEIS	

[Redacted]

From: [Redacted]
[Redacted]
Sent: 13 February 2018 15:53
To: [Redacted]
Cc: [Redacted]
Subject: RE: Condition 3.2.1.3 of the Marine Licence_Third Party Certification
Attachments: ER-DE-IEC61400-22-02361-0.pdf

Dear [Redacted]

As discussed yesterday attached you can find the evaluation report. Please note that this report is currently under review by AOWFL.

Please let me know if you have any queries or require any further information.

Regards,
[Redacted]

From: [Redacted]
Sent: Monday, February 12, 2018 11:50 AM
To: [Redacted]
Cc: [Redacted]

Subject: RE: Condition 3.2.1.3 of the Marine Licence_Third Party Certification

Dear [Redacted]

As discussed attached you can find the Third Party Certification for the foundation substructures.

Please let me know if you have any queries.

Regards,
[Redacted]

From: [Redacted]
Sent: Wednesday, August 23, 2017 10:53 PM
To: [Redacted]
Cc: [Redacted]

Subject: RE: Condition 3.2.1.3 of the Marine Licence_Third Party Certification

Dear [Redacted]

Following on from our discussions AOWFL proposes to submit the Third Party Certification for the foundation substructures prior to the erection of the wind turbine generators upon the foundation substructures. Please find attached letter confirming this approach.