Addendum to the
Natura Impact Statement

NISA
North Irish Sea Array

Volume 2: Appendices

Appendix A11
Marine Physical Processes Numerical Modelling

Statkraft

CIP
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North Irish Sea Array (NISA) Offshore Wind Farm

Appendix:

Marine Physical Processes Numerical Modelling

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Commercial in Confidence

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R05	Final	Jamie Hernon and Patience Dring	Enda O'Doherty and Erin Snaith	03 June 2026
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R02	Final	Jamie Hernon	Bill Cooper	28 February 2024
R01	Draft	Jamie Hernon	Bill Cooper	28 June 2023

Disclaimer

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1 Definitions

1.1 Units and Conventions

There are no changes to this section. Refer to Section 1.1 of Appendix 10.2 in the 2024 EIAR.

1.2 Glossary of commonly used terms

There are no changes to this section. Refer to Section 1.2 of Appendix 10.2 in the 2024 EIAR.

2 Introduction

North Irish Sea Array Windfarm Ltd (NISA, hereafter referred to as 'the Developer') has been considering the Request for Further Information (RFI) issued by An Bord Pleanála (now An Coimisiún Pleanála) as well as the third-party submissions received following public consultation. At An Coimisiún Pleanála's behest, the Developer has also continued to consult with stakeholders in respect of the 2024 planning application throughout 2024-2026. The Developer has refined elements of the design to respond to the third-party submissions, the continued public and stakeholder consultation and the RFI. Amendments are therefore required to Appendix 10.2 Marine Physical Processes Numerical Modelling of the 2024 Environmental Impact Assessment Report (EIAR). Full details of consultation undertaken can be found in Appendix A1.2 Consultation Report.

For the purposes of clarity, this document shall be read in conjunction with the Appendix 10.2 submitted as part of the 2024 EIAR.

Any cross reference to a chapter, section, table, image, figure or appendix within this document is to another location within the Addendum to the EIAR unless explicitly stated otherwise. Any cross reference to anything included in the 2024 EIAR will be clearly labelled as such.

Text in bold is only used throughout this document to indicate where changes are required, and why they are required. Text in italics is text from a section of the 2024 EIAR which is deleted, or quotations from other documents (as explicitly stated). Replacement text is in normal font.

Tables which have been updated from the 2024 EIAR, or entirely new tables, have been included in the Addendum to the EIAR. These can be identified by the "A" prefix in the table caption. Any changes within an updated table, in comparison to tables within the 2024 EIAR, are indicated by grey shading in the relevant cell, column or row, as necessary. The exception to this is when a table has changed in its entirety.

The RFI Response Document identifies where topics relevant to Marine Geology, Oceanography and Physical Processes are responded to. In summary:

- **Topics 7 (g), (h), and (i) (part) are addressed in the amendment to Chapter 10: Marine Geology, Oceanography and Physical Processes.**
- **Topic 7 (f) and (q) (part) are addressed in Appendix A10.1: Marine Processes Review of Project Options.**
- **Topics 7 (a), (b), (c), (d), (i) (part), (l) and (p) are addressed in Appendix A10.2: Marine Physical Processes Numerical Modelling (this document).**
- **As dredging is no longer proposed, topics 7 (m), (n) and (o) no longer apply and Appendix 10.3 is removed.**
- **Topics 7 (e), (j), (k) and (q) (part) are addressed in Appendix A10.3 Supporting Assessment Sensitivity Studies providing details of sensitivity tests to justify the present modelling approach.**

The sections relevant to Appendix A10.2 in the RFI are included below.

RFI Section	RFI	Relevance to Chapter
1 (b)	The scientific information provided as part of the planning application documentation should be based on up-to-date survey reports and data. Accordingly, the applicant is requested to confirm/provide justification/verification that the information submitted in support of the planning application remains relevant and appropriate at the point of submitting further information or to update same as required.	The timeframes associated with the RFI have necessitated a review of the datasets previously used in the 2024 EIAR to ensure any necessary updates to the baseline environment are captured. Therefore, a review of the marine physical processes modelling baseline resources has been undertaken to comply with RFI 1 (b).
7 (a)	Chapter 10 of the EIAR addresses Marine Geology, Oceanography and Physical Processes and is supported by Appendix 10.2 Marine Process Modelling Report. The Board notes that statistical and timeseries calibration plots for the hydrodynamic modelling (water levels and currents) undertaken has been provided in the submitted EIAR, however, this has not been provided for wave modelling. The applicant is requested to provide statistical and timeseries calibration plots for the wave modelling, in addition to the submitted statistical (scatter) plots. The applicant is requested to specify the % variance between model and recorded current speeds for spring and neap tidal cycles.	As requested, timeseries calibration plots for the wave modelling have been provided in Section 5.4, in accordance with RFI Section 7 (a).
7 (b)	The labels on the directional plots on Figures 4.11 and 4.13 within Chapter 10 of the EIAR are incorrect. The applicant is requested to address this issue.	The labels on the directional plots on Figures A4.5 and A4.6 in A10.2 have been corrected as requested.
7 (c)	The applicant is requested to submit time series plots comparing simulated wave events relative to recorded wave buoy data including direction, period and wave height or water surface elevation (WSE).	Time series plots comparing simulated wave events have been provided in in Section 5.4 of Appendix A10.2.
7 (d)	The modelling undertaken in support of Chapter 10 of the EIAR does not demonstrate spatial variation of bed friction or bed shear stress values across the model domain. The	Confirmation of the modelling utilising a spatially-varying bed roughness across the model domain is provided in Section 4.3 of Appendix A10.2.

	applicant is requested to address this issue in a review of the modelling undertaken.	
7 (g)	There are two extrusion pits proposed as part of the development. It is stated in Chapter 8 of the EIAR (construction strategy) that 'the drilling of both bores may be carried out simultaneously to accelerate the works programme'. Only one is modelled in terms of potential impacts. It is requested that the drilling of both extrusion pits be assessed and in a concurrent scenario.	Confirmation that drilling will only be carried out at one bore hole at a time (consecutively) and that this is reflected in the modelling, is provided in Section 6.2.1 of Appendix A10.2.
7 (h)	The location of the extrusion pits related to the export cables are indicated to be within the surf zone (section 6.2.1 of Appendix 10.2). The applicant is requested to include an assessment of the impact of the extrusion pits at this location within the surf zone on coastal processes, and also include an assessment of the impact of the proposed temporary mounds at these locations on coastal processes.	The modelling required for the assessment of the impact of the extrusion pits within the surf zone on coastal processes has been included in Section of Appendix 6.2.3 of Appendix A10.2.
7 (i)	The modelling domain appears to be of insufficient extent to address potential impacts to the hydrodynamics of the Western Irish Sea Gyre and the cumulative impact with other projects, including Irish Sea Phase 1 ORE projects. The applicant is requested to extend the modelling domain to address this issue.	Confirmation of the spatial extent of the model is provided in Section 4 of Appendix A10.2.
7 (l)	It is unclear if the particle tracking modelling accounted for the flocculation of finer particles. The applicant is requested to address this issue.	Clarity has been provided on the inclusion of flocculation of finer particles within the modelling in Section 6.

2.1 Background

There are no changes to this section. Refer to Section 2.1 of Appendix 10.2 in the 2024 EIAR.

2.2 Report Structure

There are no changes to this section. Refer to Section 2.2 of Appendix 10.2 in the 2024 EIAR.

3 Common Modelling Inputs

3.1 Bathymetry

No changes have been made to the bathymetry used for the modelling, but a comparison of the array bathymetry from the 2022 and 2024 geophysical survey campaigns ([1] **[2]) does not reveal any change in seabed levels between the two survey periods which is distinguishable above the amplitude of survey uncertainties. Based on this, the bathymetry used for the modelling is considered robust and accurate. Therefore there are no changes to this section. Refer to Section 3.1 of Appendix 10.2 in the 2024 EIAR.**

3.2 Coastline

There are no changes to this section. Refer to Section 3.2 of Appendix 10.2 in the 2024 EIAR.

3.3 Wind

There are no changes to this section. Refer to Section 3.3 of Appendix 10.2 in the 2024 EIAR.

4 Hydrodynamics

There are no changes to this section. Refer to Section 4 of Appendix 10.2 in the 2024 EIAR. However, in accordance with RFI Section 7 (i), it is confirmed that a European, basin-scale flexible mesh hydrodynamic model was used, and thus, the extent includes the location of the Western Irish Sea Gyre.

4.1 Measured Hydrodynamic Data

There are no changes to this section. Refer to Section 4.1 of Appendix 10.2 in the 2024 EIAR.

4.2 Modelling Software

There are no changes to this section. Refer to Section 4.2 of Appendix 10.2 in the 2024 EIAR.

4.3 Model Boundary Conditions and Spatial Extent

In response to RFI Section 7 (d), it can be confirmed that the modelling uses a spatially-varying bed roughness (bed friction) across the model domain. Therefore, the following text is added to Section 4.3 of Appendix 10.2 of the 2024 EIAR.

The model applies a spatially-varying bed roughness to ensure optimal calibration of water levels and currents throughout the domain. Spatially-varying Manning's M values of between 35.5 and 70 $m^{1/3}/s$ are used. The standard of calibration of the model is shown in Section 4.4).

There are no further changes to this section. Refer to Section 4.3 of Appendix 10.2 in the 2024 EIAR.

4.4 Model Validation

The changes in this section are additional figures provided in response to RFI Sections 7 (a) and 7 (b). Figures A4.1 to A4.4 illustrate the comparison of measured and modelled depth-average currents, for Sites A and B, during neap and spring tidal periods. Figure A4.5 and Figure A4.6 replace Figures 4.11 and 4.13 in Appendix 10.2 of the 2024 EIAR respectively with corrected labels.

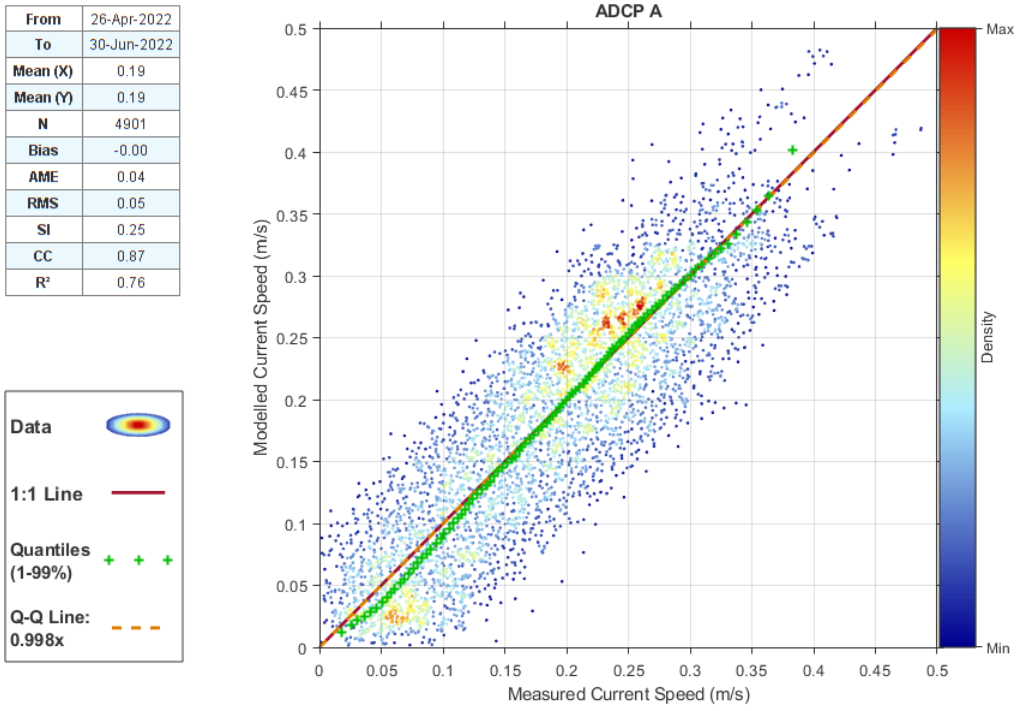

Figure A4.1: Comparison of neap measured and modelled depth-average currents, Site A.

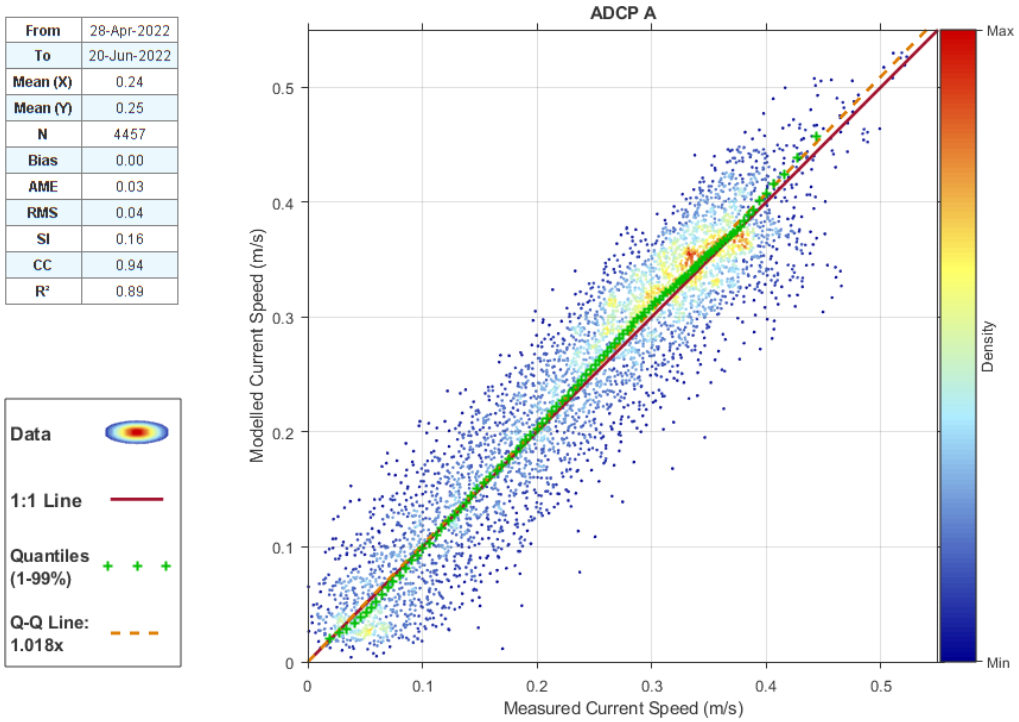

Figure A4.2: Comparison of spring measured and modelled depth-average currents, Site A.

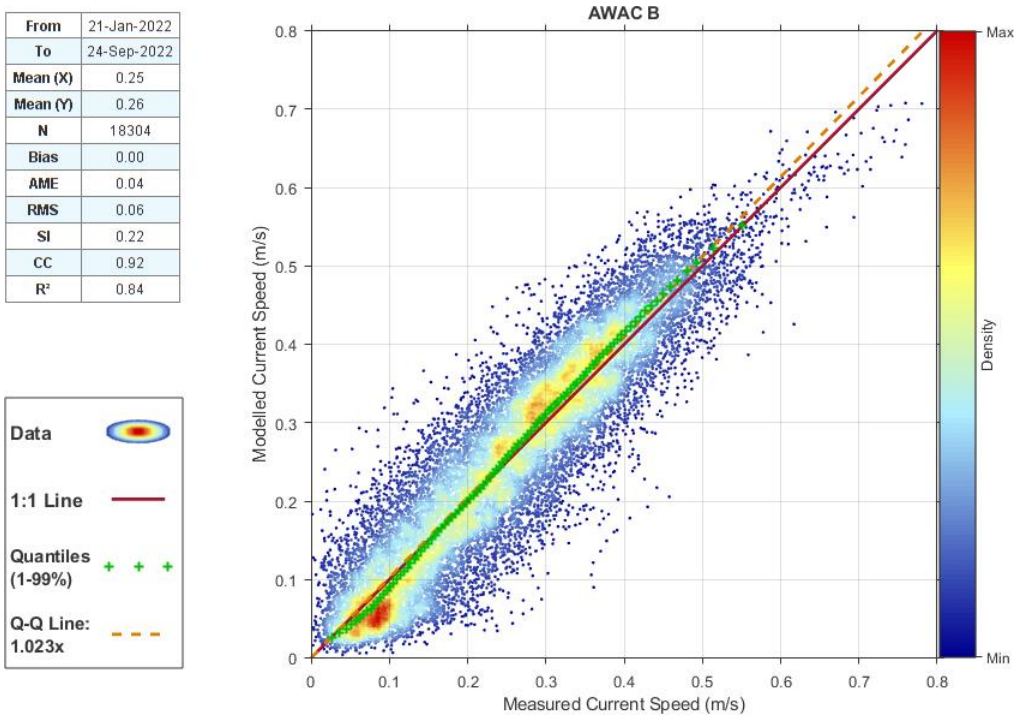

Figure A4.3: Comparison of neap measured and modelled depth-average currents, Site B.

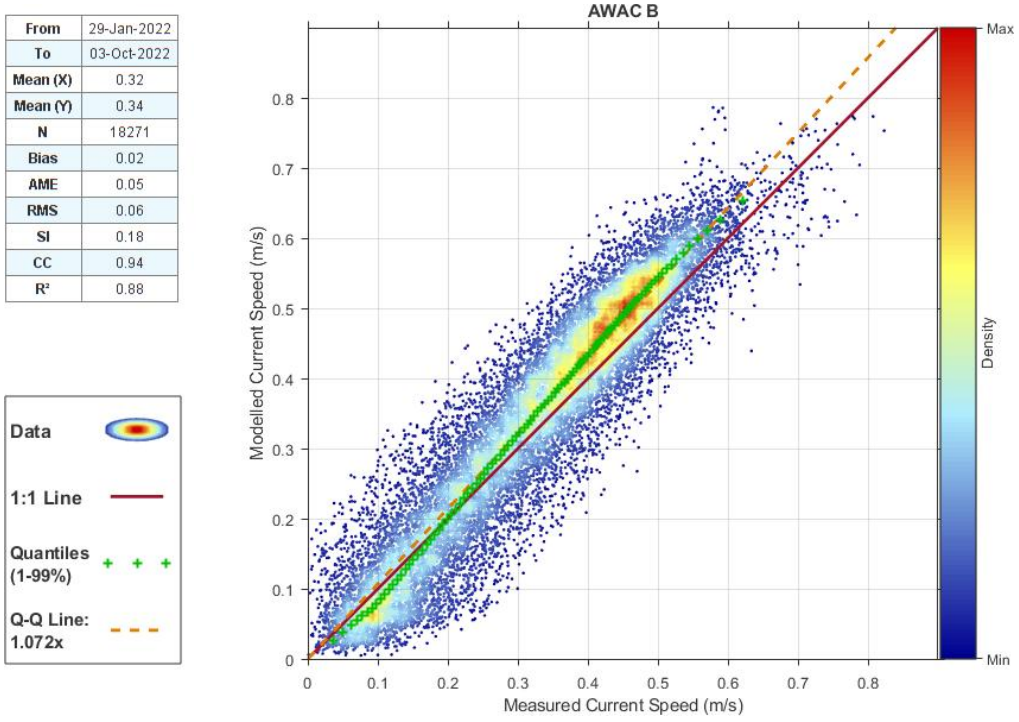

Figure A4.4: Comparison of spring measured and modelled depth-average currents, Site B.

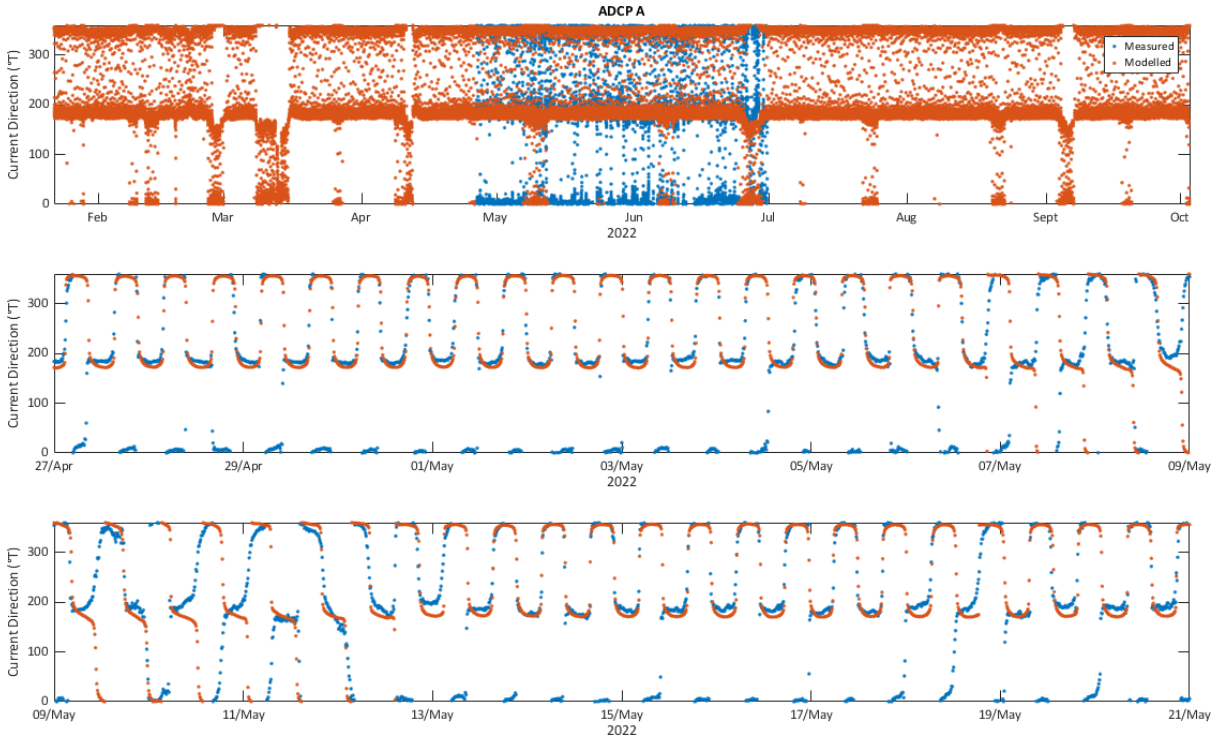

Figure A4.5: Time-series comparison of modelled and measured depth-average current directions, Site A (replaces Figure 4.11 in Appendix 10.2 of the 2024 EIAR).

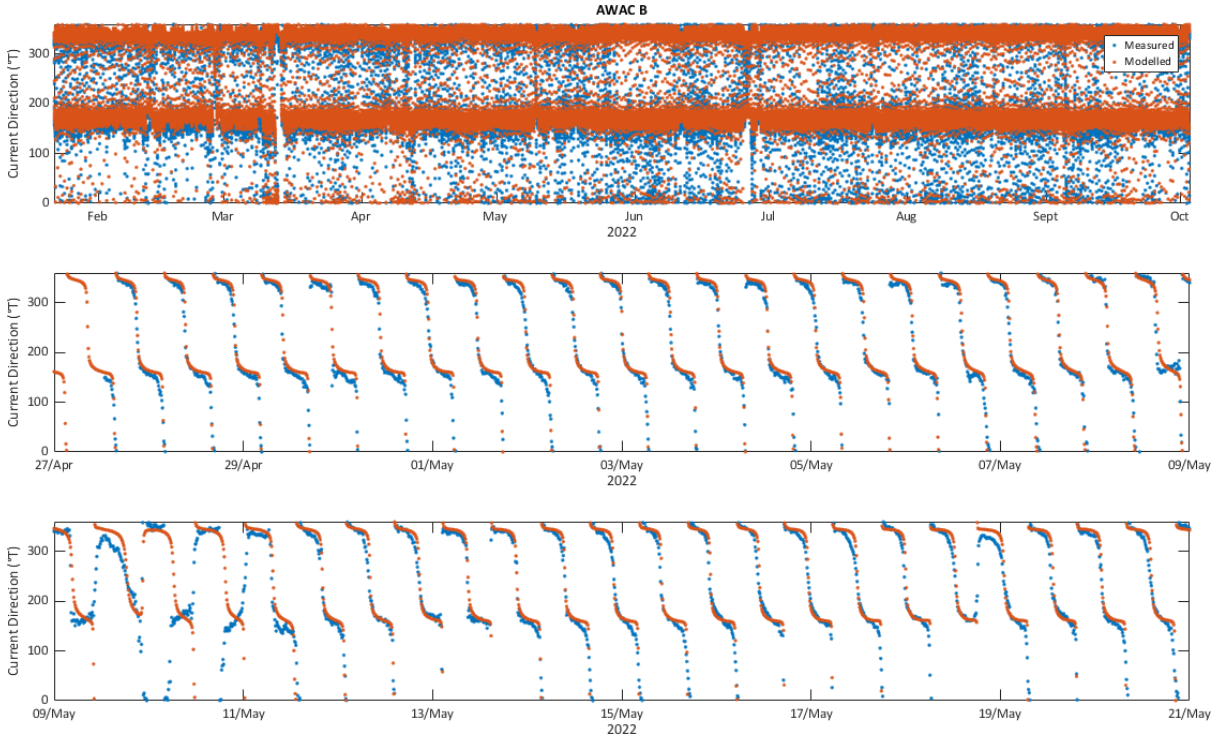

Figure A4.6: Time-series comparison of modelled and measured depth-average current directions, Site B (replaces Figure 4.13 in Appendix 10.2 of the 2024 EIAR).

There are no further changes to this section. Refer to Section 4.4 in Appendix 10.2 of the 2024 EIAR.

4.5 Selection of Tidal Events

There are no changes to this section. Refer to Section 4.5 of Appendix 10.2 in the 2024 EIAR.

4.6 Hydrodynamic Blockage Modelling

As a result of design refinements, the blockage model was re-run with the revised foundation geometry and layout and it is confirmed that it uses a spatially-varying bed roughness (bed friction) across the model domain (refer Appendix A5.1 Design Refinements and Appendix A10.1: Marine Processes Review of Project Options). However, there are no changes to this section. Refer to Section 4.6 of Appendix 10.2 in the 2024 EIAR.

5 Waves

The change in this section corrects a typographical error. Therefore, the first sentence of Section 5 of Appendix 10.2 of the 2024 EIAR is replaced by;

Waves were modelled using an Irish Sea SWAN model in conjunction with a higher resolution nested model of the proposed development and surrounds.

There are no further changes to this section. Refer to Section 5 of Appendix 10.2 in the 2024 EIAR.

5.1 Measured Wave Data

There are no changes to this section. Refer to Section 5.1 of Appendix 10.2 in the 2024 EIAR.

5.2 Modelling Software

There are no changes to this section. Refer to Section 5.2 of Appendix 10.2 in the 2024 EIAR.

5.3 Model Boundary Conditions

There are no changes to this section. Refer to Section 5.3 of Appendix 10.2 in the 2024 EIAR.

5.4 Model Validation

The change in this section is the addition of time series plots Figure A5.1 to Figure A5.12 comparing simulated wave events against recorded buoy data for wave height, period and direction, as requested in RFI Sections 7 (a) and 7 (c).

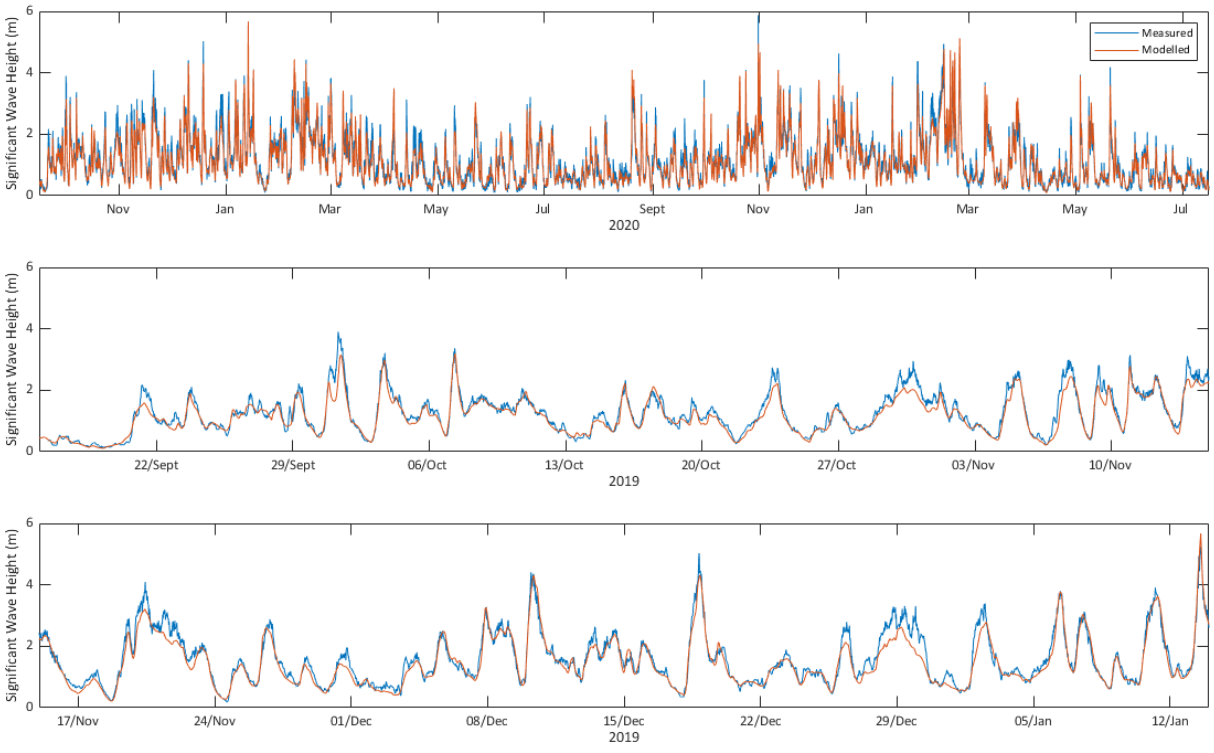

Figure A5.1. AFBI_038a, Hm0 time series validation, all data.

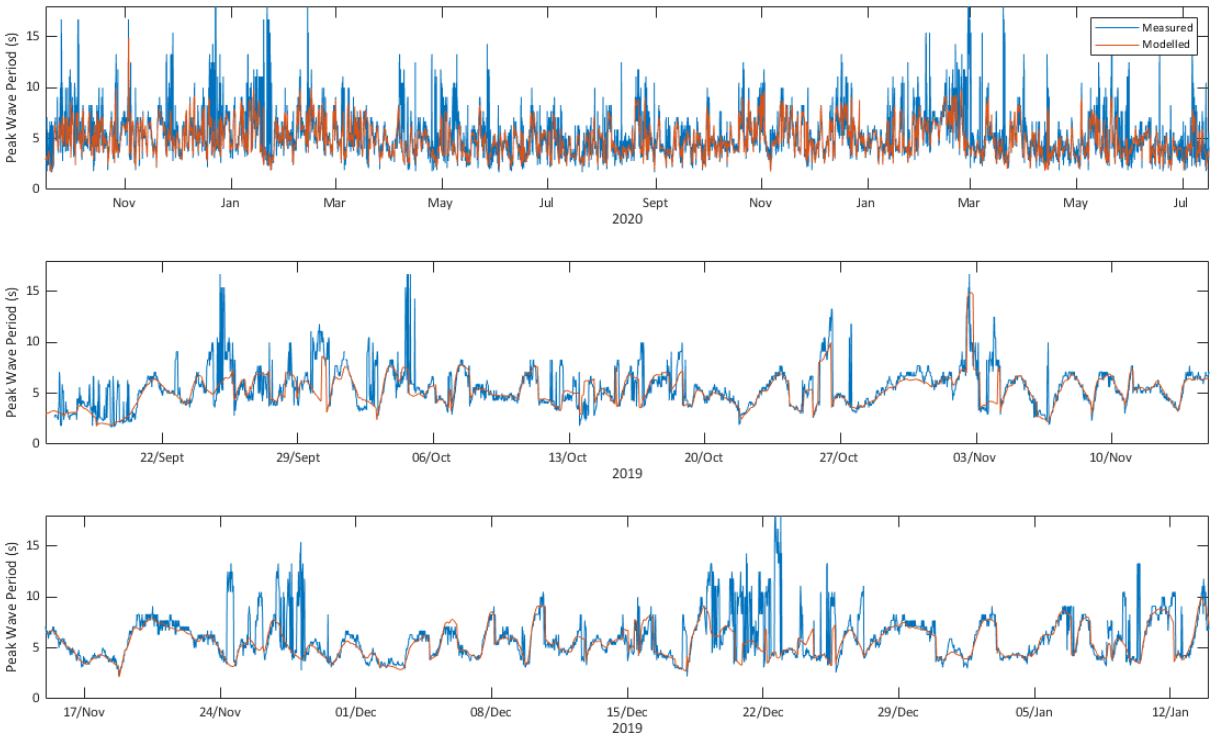

Figure A5.2. AFBI_038a, Tp time series validation, all data.

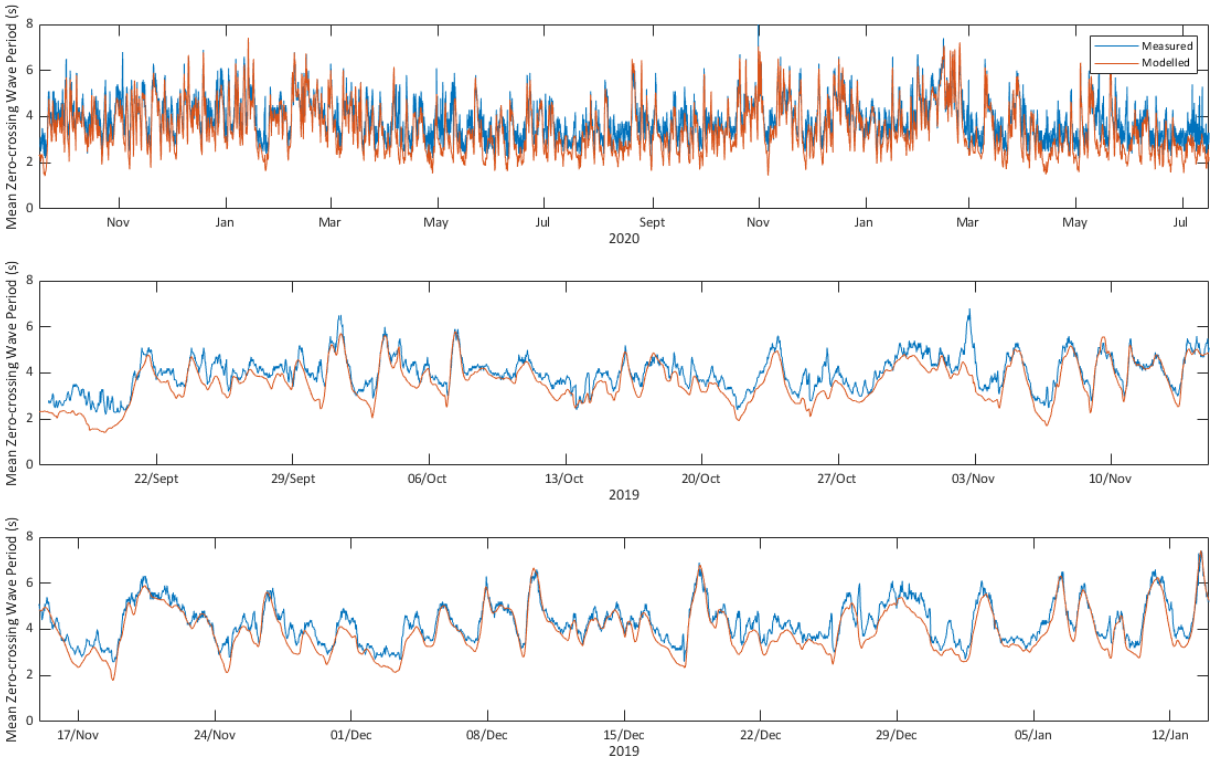

Figure A5.3. AFBI_038a, Tm02 time series validation, all data.

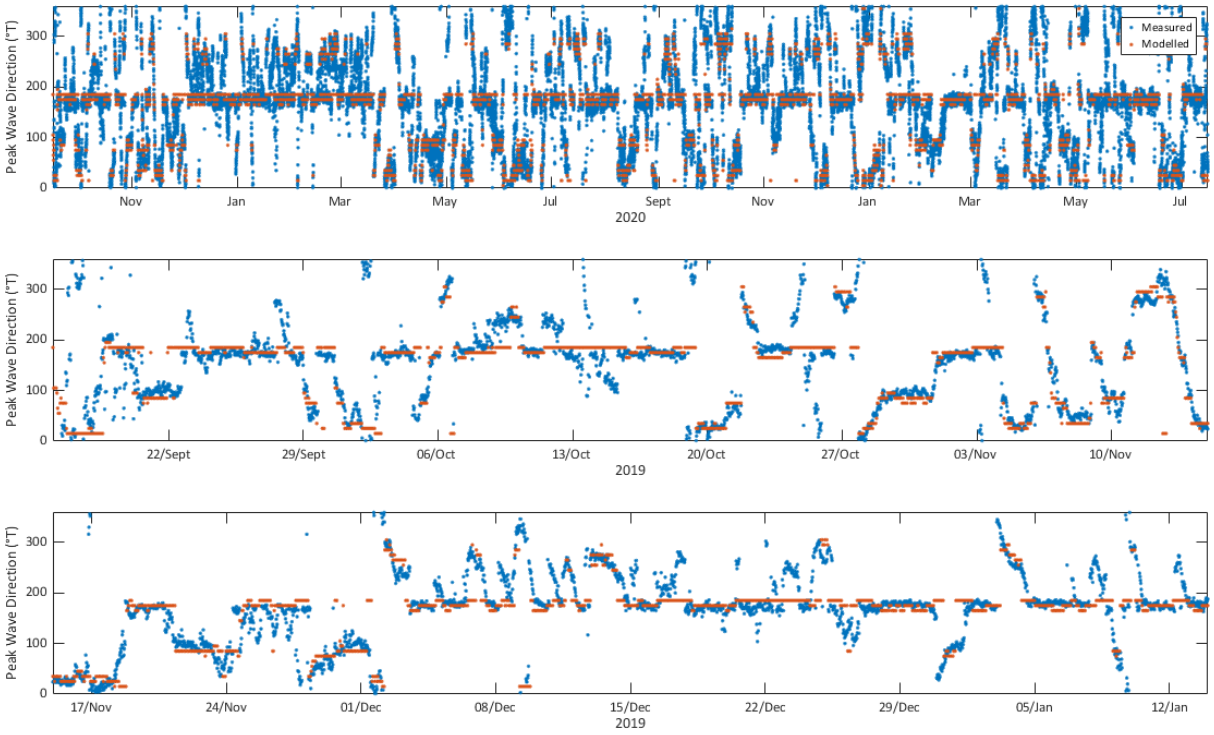

Figure A5.4. AFBI_038a, peak wave direction time series validation, all data.

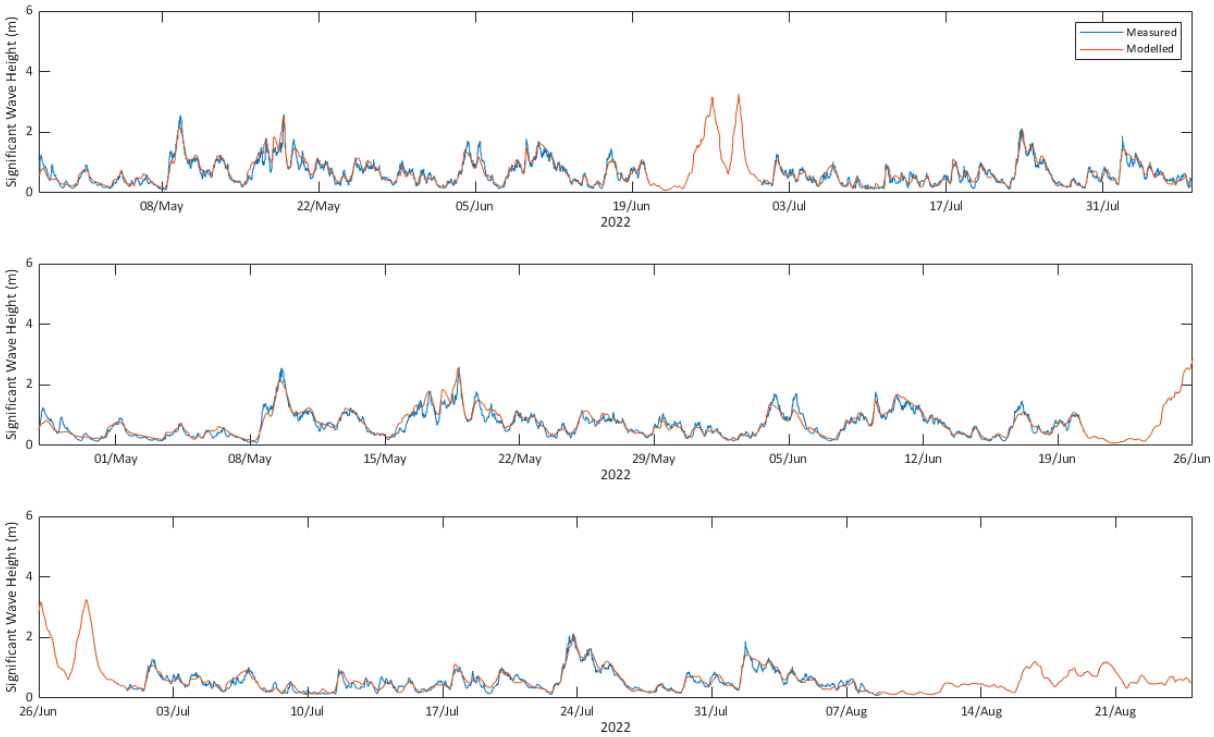

Figure A5.5. Site A, Hm0 time series validation, all data.

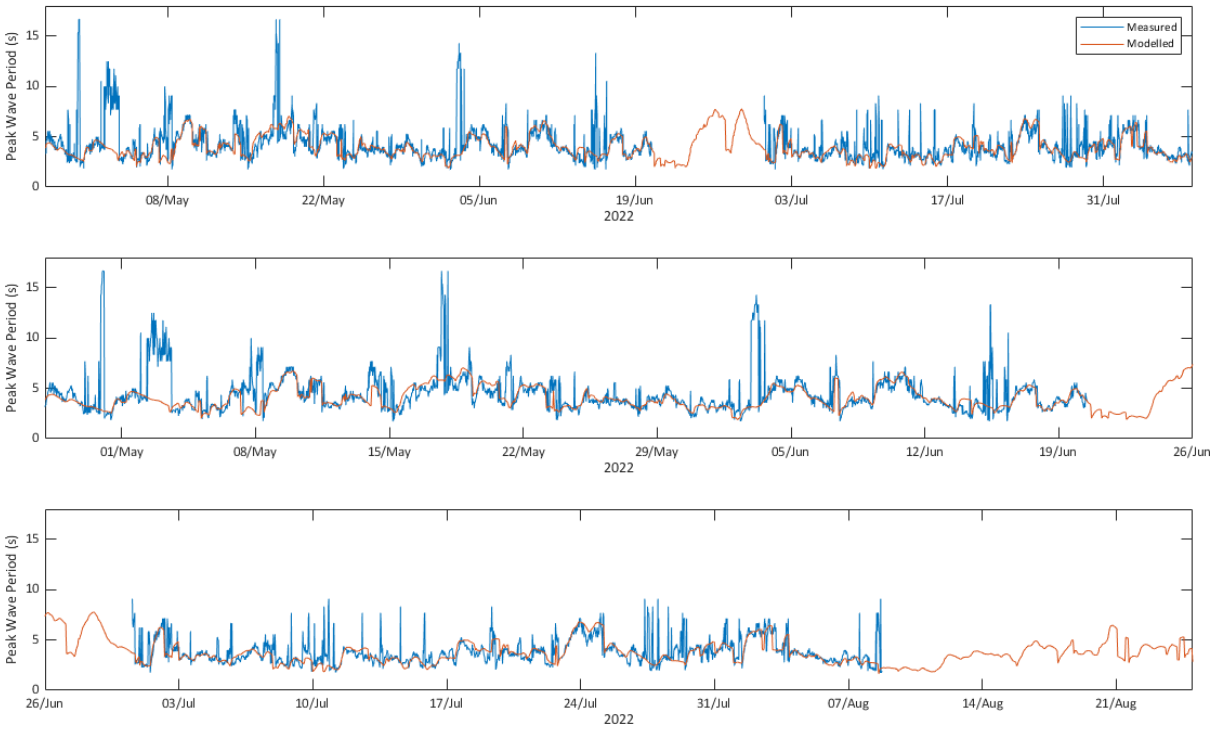

Figure A5.6. Site A, Tp time series validation, all data.

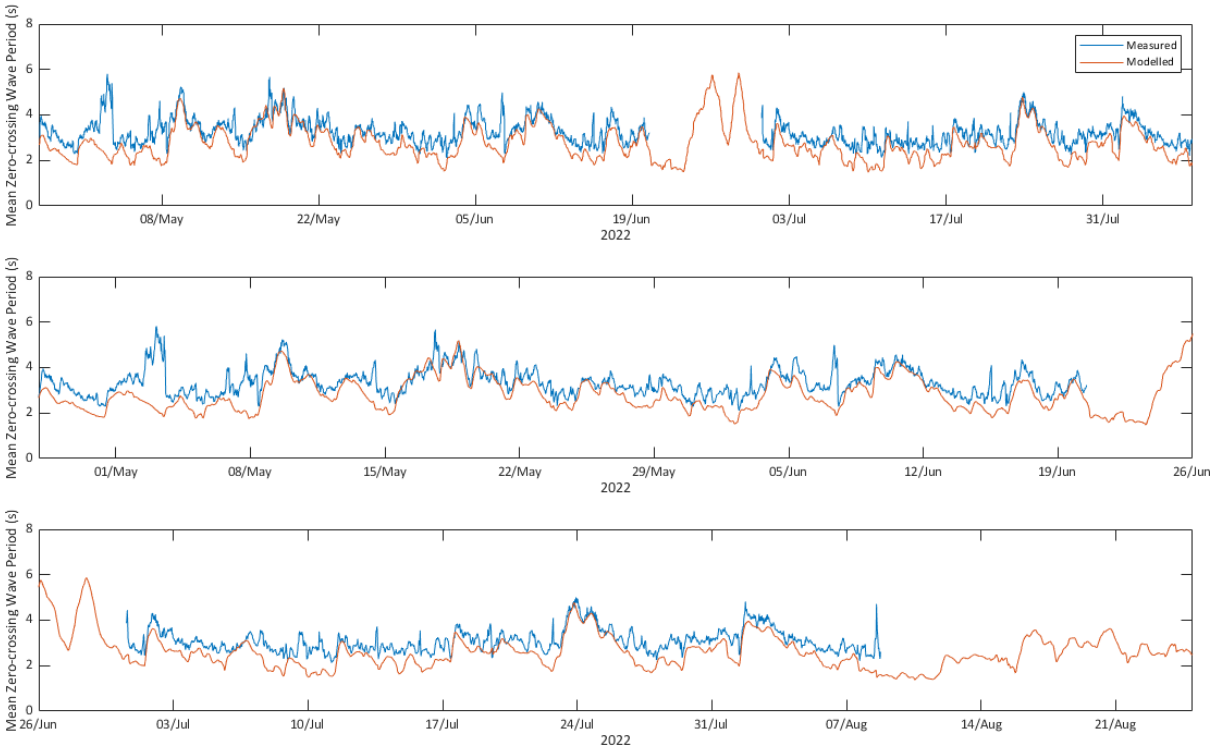

Figure A5.7. Site A, Tm02 time series validation, all data.

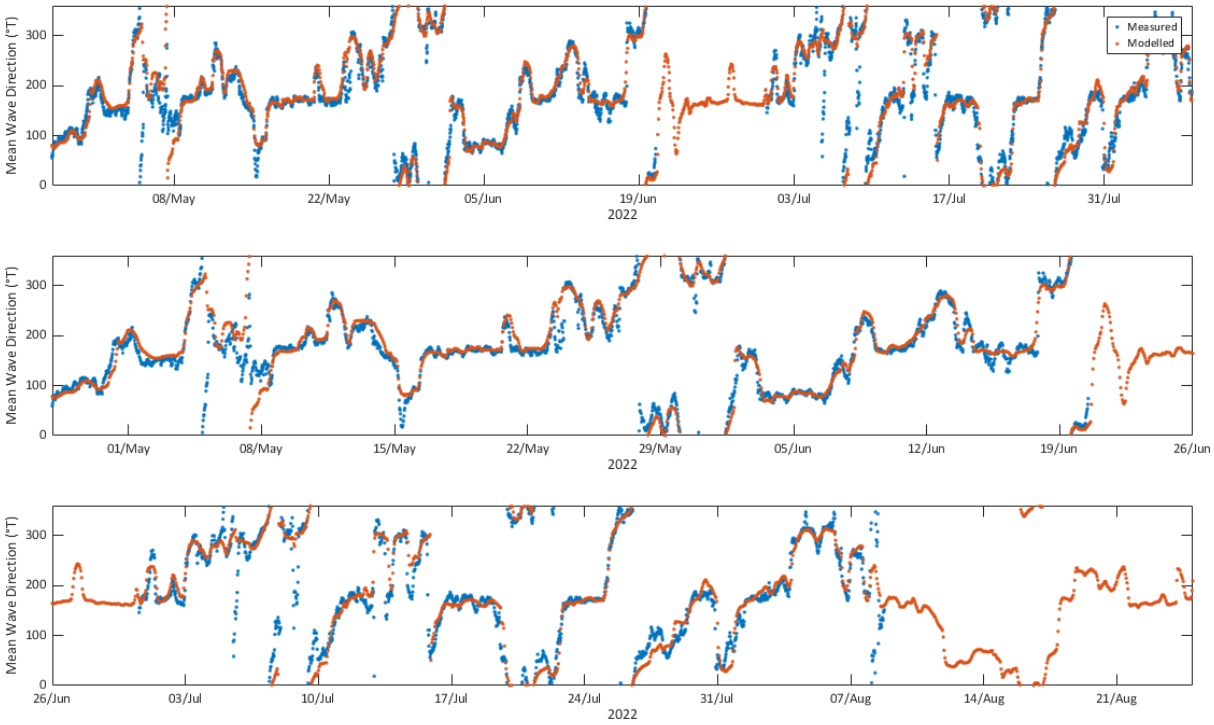

Figure A5.8. Site A, mean wave direction time series validation, all data.

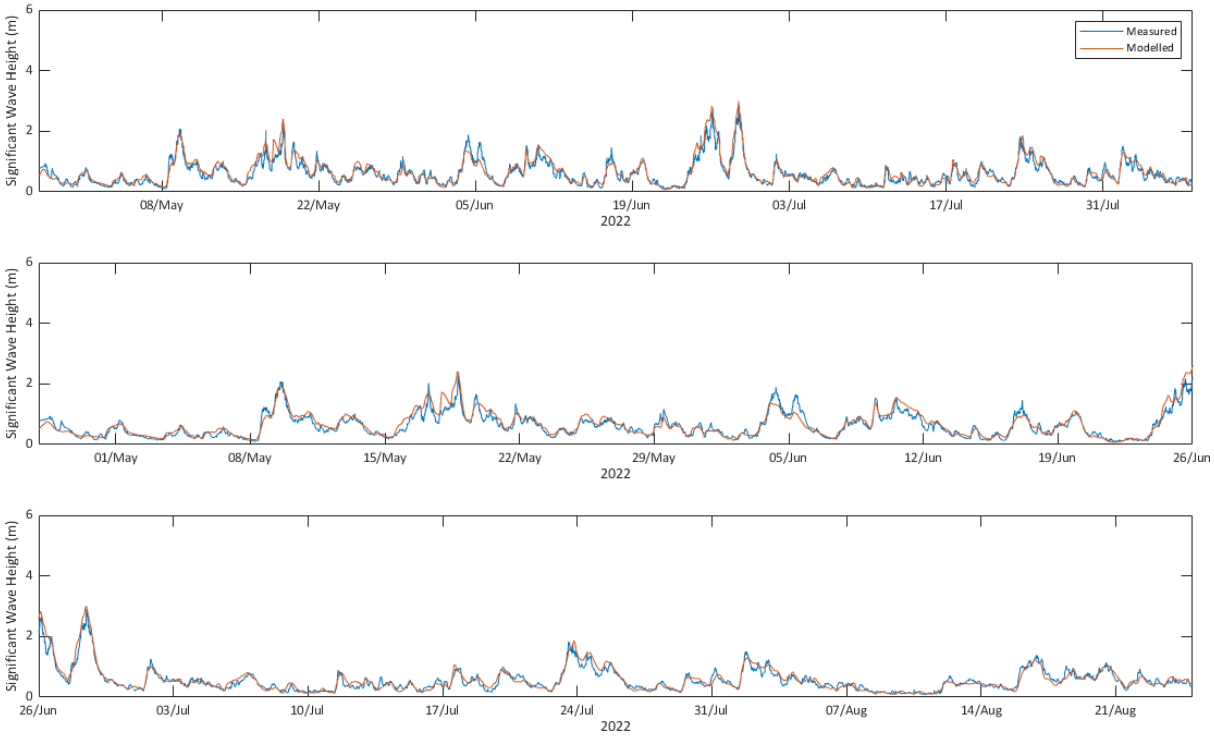

Figure A5.9. Site B, Hm0 time series validation, all data.

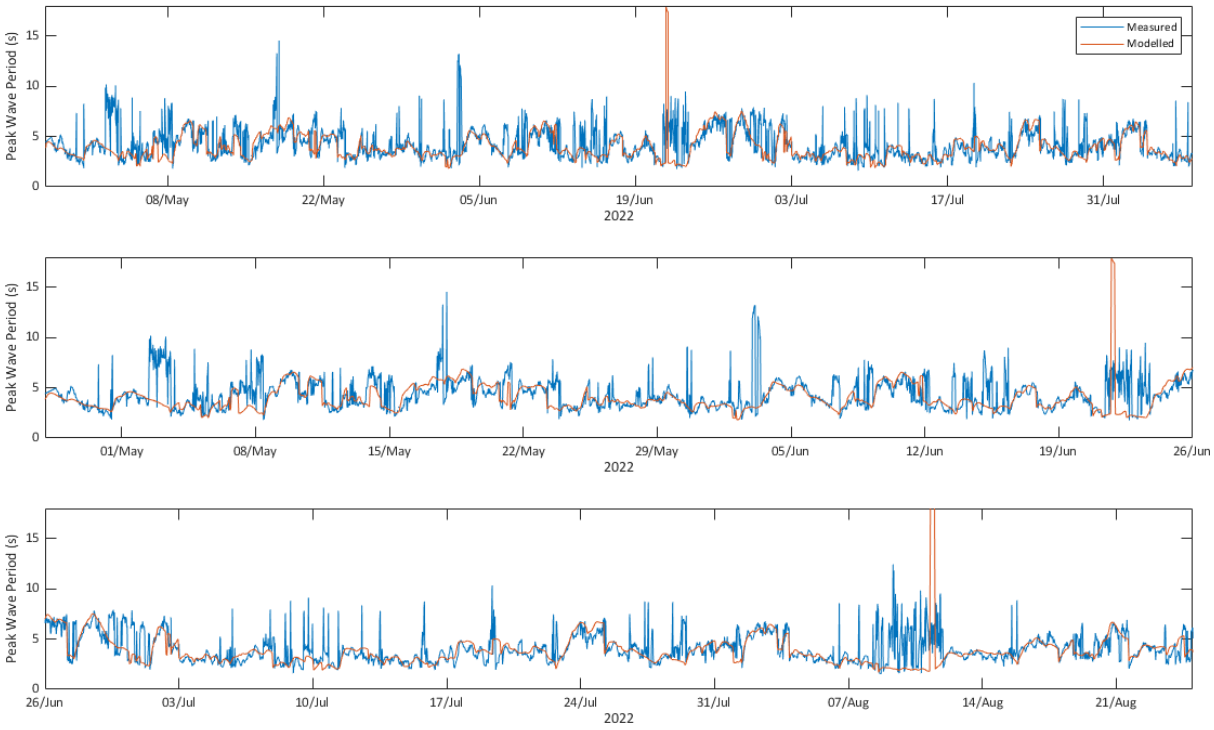

Figure A5.10. Site B, Tp time series validation, all data.

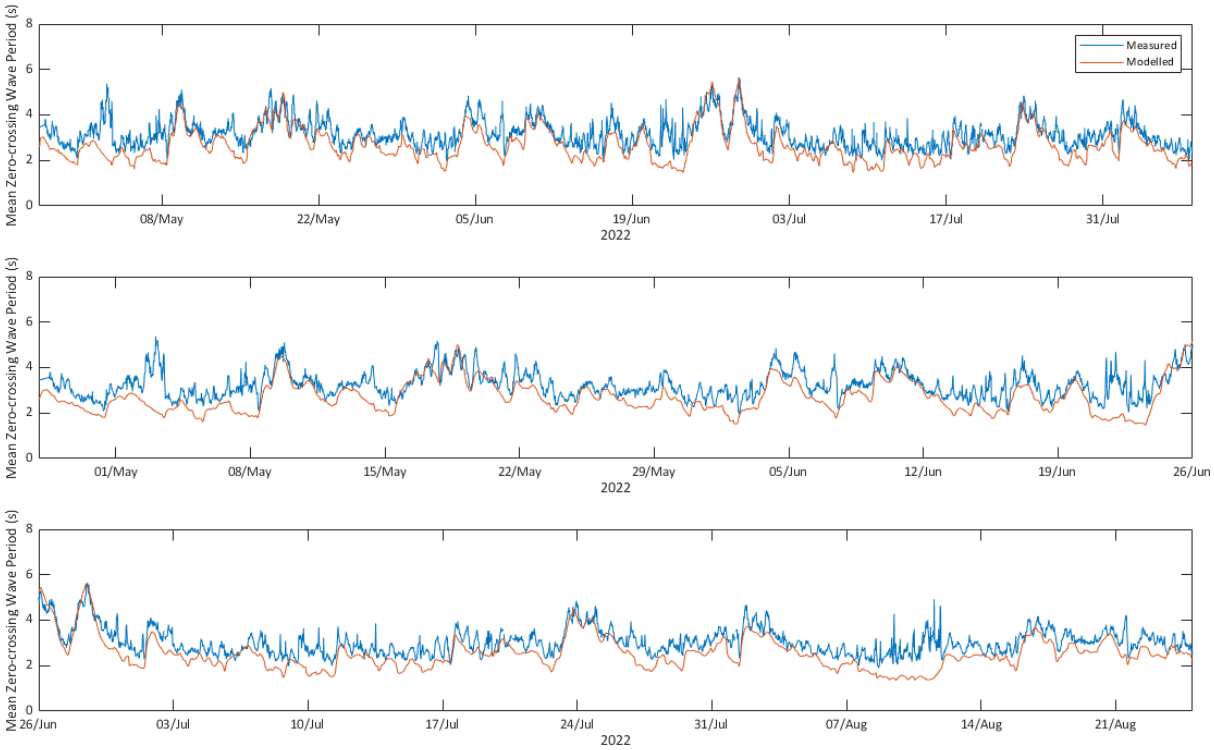

Figure A5.11. Site B, Tm02 time series validation, all data.

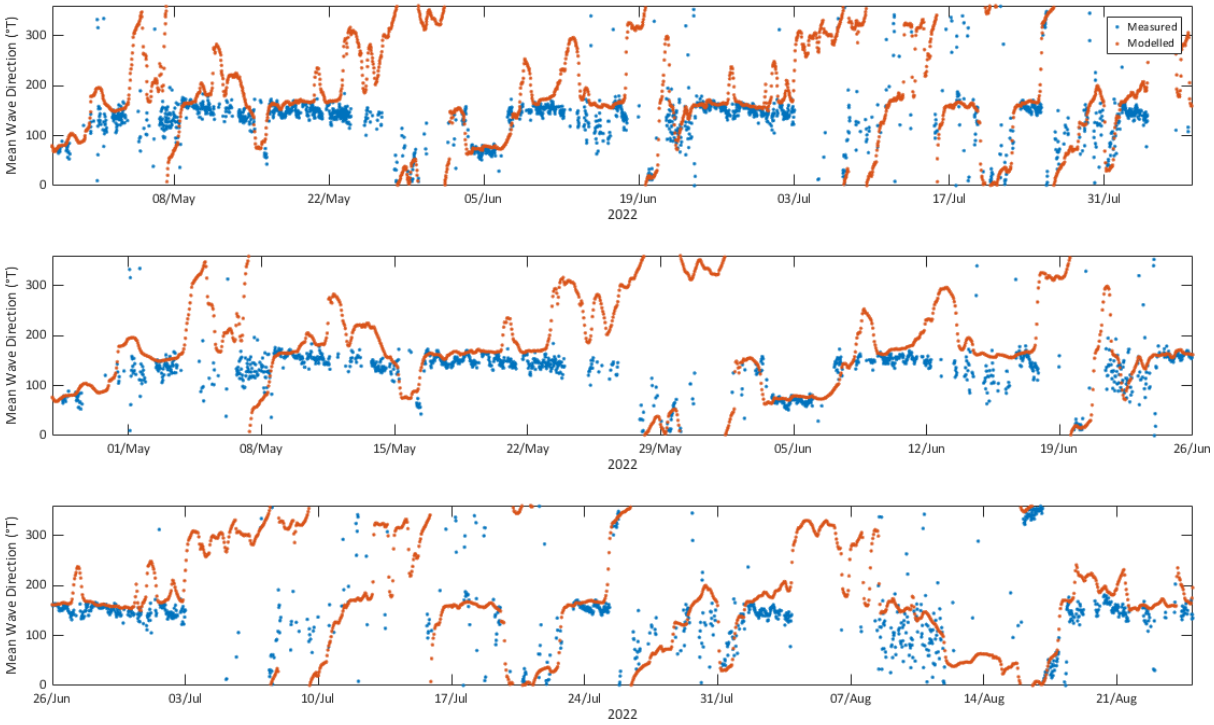

Figure A5.12. Site B, mean wave direction time series validation, all data.

Due to a typographical error, the data comparison at Tm02 is relevant to all three datasets, therefore the final paragraph of Section 5.4 of Appendix 10.2 of the 2024 EIAR shall be deleted and replaced with the following;

Care has been taken when comparing mean zero-crossing periods (Tm02) to ensure both modelled and measured values are derived using the same method. Parameters derived from higher order spectral moments, such as Tm02, can be sensitive to how high frequency wave energy is treated in their derivation. In particular, Tm02 as output directly by the SWAN model *does* make use of a theoretical high frequency extrapolation, whilst that reported by the DWR measurements at these locations does *not*. Direct comparison of these parameters can be misleading, the inclusion of such a tail generally being expected to reduce the Tm02 values. In order to more fairly compare, modelled Tm02 have been recalculated from modelled *spectra*, without including a high frequency extrapolation and instead using the same high frequency cut-off as the DWR measurements. It is these values which are compared to the measured Tm02 below.

There are no further changes to this section. Refer to Section 5.4 of Appendix 10.2 in the 2024 EIAR.

5.5 Selection of Wave Events

There are no changes to this section. Refer to Section 5.5 of Appendix 10.2 in the 2024 EIAR.

5.6 Wave Blockage Modelling

As a result of design refinements, the blockage model was re-run with the revised foundation geometry and layout (refer Appendix A5.1 Design Refinements and Appendix A10.1: Marine Processes Review of Project Options). However, there are no changes to this section. Refer to Section 5.6 of Appendix 10.2 in the 2024 EIAR.

6 Particle Tracking

Following design refinements in response to the RFI (refer Appendix A5.1), WTGs are now proposed with suction bucket foundations, and the OSP with a jacket foundation installed with either pin piles or suction bucket foundations. Furthermore, dredging is no longer included in the construction strategy. Table 6.1 in Appendix 10.2 of the 2024 EIAR shall be deleted and replaced with Table A6.1 in line with sediment types identified in Appendix 10.1. Amendments have been made in order to address RFI Section 7 (i) and Section 7 (l) relating to the extent of the modelling domain and consideration of flocculation respectively. Therefore, the following text shall be added to the text prior to Table A6.1;

Flocculation was not considered for the present study owing to the non-estuarine / riverine environment local to the proposed development .

Note that the domain of the particle tracking model is the same as the hydrodynamic model described in Section 4.3 (i.e., the entire north west European continental shelf).

Table A6.1: Details of the representative sediment types (replaces Table 6.1 in Appendix 10.2 of the 2024 EIAR).

Sediment type (Wentworth Scale [4])	Size range (mm)	Representative size (mm)	Settling velocity (m/s)
Fine sand	0.125 to 0.250	0.188	0.019
Very fine sand	0.063 to 0.125	0.094	0.0052
Coarse silt	0.031 to 0.063	0.047	0.0013
Medium silt / muds	< 0.031	0.023	0.0003

Coarser sediment types with a faster settling velocity are not considered in the particle model as they will fall to the seabed relatively quickly and are not subject to wider advection or dispersion to form part of any sediment plume.

Brief details of the model set-up for each of the scenarios follows. More details of realistic worst-case scenarios that these are based on can be found in Appendix 10.1 [3]. With the exception of the drilling for foundation installation scenario, for each scenario, four different current events were simulated, as described in Section 4.5. These are high and low current speeds, flowing northward (ebb) and southward (flood).

For the drilling for foundation installation scenario, the drilling event is expected to continue for around 106 hours, much longer than the 48-hour model runs used for the other scenarios. Therefore, in this case, only two scenarios were run (spring and neap – since flood and ebb tidal cycles lose significance over such long time periods), and these runs were allowed to continue for the full 106-hour drilling period, plus 48 hours after the end of drilling operations.

The geographical positions of each of the sediment release locations described below are shown in Figure A6.1. In each case, these locations are associated with the highest concentration of fine sediments in the seabed which are expected to lead to the largest suspended sediment concentrations within the short-term duration of plume

development. Other locations with a lower amount of fine sediment are expected to develop smaller suspended sediment concentrations within associated plumes.

Figure 6.1 in Appendix 10.2 of the 2024 EIAR shall be deleted and replaced with Figure A6.1, illustrating updated particle tracking release locations.

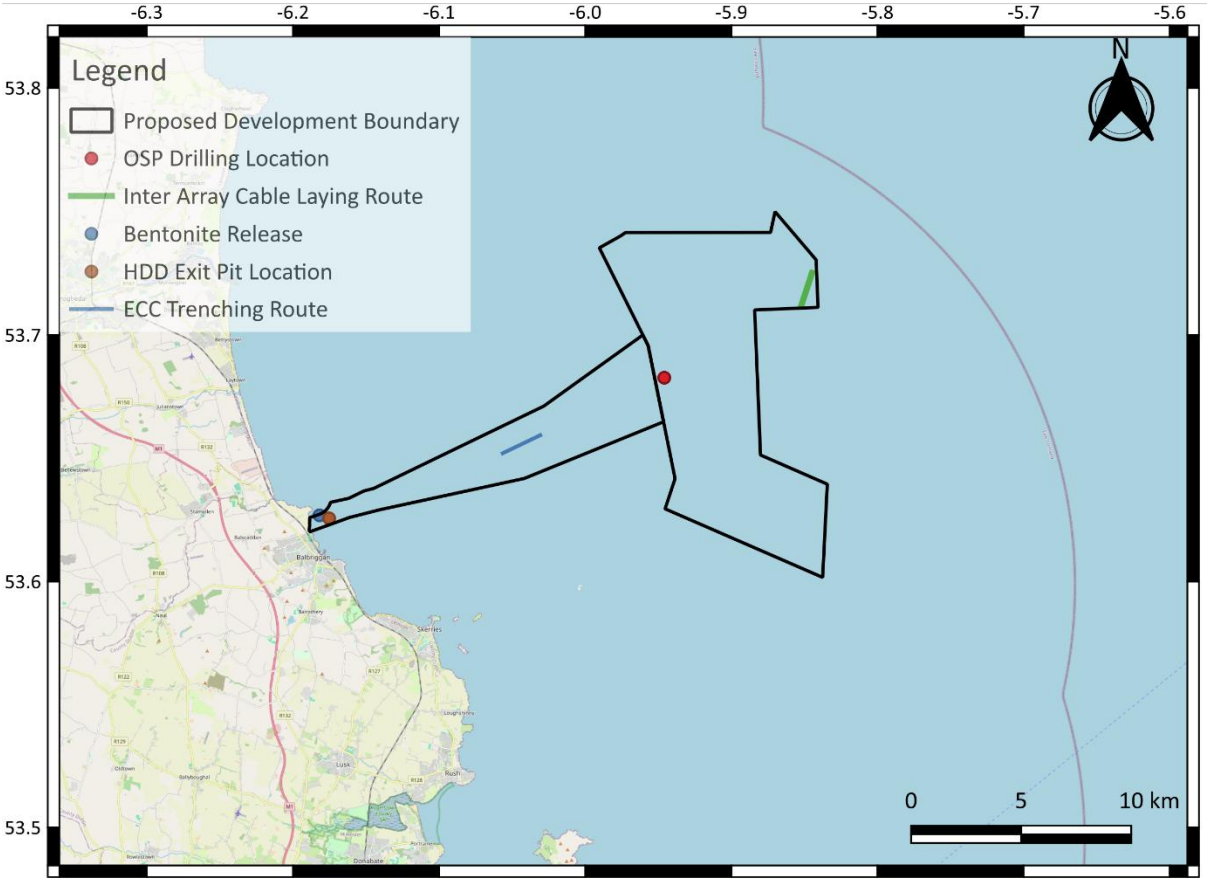

Figure A6.1. Locations used in particle tracking modelling (replaces Figure 6.1 in Appendix 10.2 of the 2024 EIAR).

There are no further changes to this section. Refer to Section 5.6 in Appendix 10.2 of the 2024 EIAR.

6.1 Array Area

6.1.1 Inter Array Cabling – Jetting

The changes in this section are a result of design refinements and updated sediment data (Aquafact, 2025). Therefore, the paragraph in section 6.1.1 of Appendix 10.2 of the 2024 EIAR shall be deleted and replaced with the following;

The jetting tool is simulated to be moving along the line between two WTG in the north-eastern part of the array area likely to encounter the highest proportion of fine sediments at a rate of 300 m per hour, meaning that the trenching between these two WTGs takes five hours. In each case, the jetting is simulated to start two and a half hours before the current speed peak, meaning that the current speed peak events occur approximately halfway along the jetting route. The disturbed fine sediments are released into the model at a height of three metres

above the bed. To convert the settled mass from the model into a depth in mm, a settled density of 254 kg/m³ was used. This scenario represents impact pathway C-03.

There are no further changes to this section. Refer to Section 6.1.1 in Appendix 10.2 of the 2024 EIAR.

6.1.2 Foundation Installation – Drilling

Due to the design refinements, only the OSP locations may require drilling. Therefore, two separate drilling scenarios with sensitivity testing are no longer required. Sections 6.1.2.1 and 6.1.2.2 in Appendix 10.2 of the 2024 EIAR shall be deleted and replaced with the text below;

A single location for drilling is simulated at the OSP. The installation of the OSP foundation for both Project Option 1 and Project Option 2 includes the same option of drilling for pin piles for a 4-legged jacket structure, with a corresponding number of pin piles, the same as the design in the 2024 EIAR. However, to ensure conservatism in the modelling and subsequent assessment, a 6-legged jacket has been assumed for the sediment dispersal assessment. This also ensures that there is redundancy in the assessment to cater for any repeat drilling events. Each of six pin piles is simulated as being drilled sequentially, with a single pin pile commencing first (taking 51 hours), followed by each subsequent pile commencing two hours later, up to a maximum of four piles being drilled out together, until all six are completed. The total time taken is therefore 106 hours, with the current speed peak occurring approximately 39 hours into the release period. To convert the settled mass from the model into a depth in mm, a settled density of 952 kg/m³ was used. This scenario represents impact pathway C-02.

A single location for drilling is simulated at the OSP. The release of drill arisings is simulated to persist for 86 hours, followed by a four-hour pause, followed by another 86-hour period of drilling, with the current speed peak occurring approximately 71 hours into the release period. To convert the settled mass from the model into a depth in mm, a settled density of 1,046 kg/m³ was used. This scenario also represents impact pathway C-02, albeit for a slightly different set of input parameters.

There are no further changes to this section. Refer to Section 6.1.2 in Appendix 10.2 of the 2024 EIAR.

6.1.3 Foundation Installation – Dredging

Due to the design refinements and the removal of dredging from the construction strategy (Appendix A5.1 and Chapter A8), Section 6.1.3 in Appendix 10.2 of the 2024 EIAR can be deleted.

6.2 Export Cable Route

6.2.1 HDD Punch-out - Bentonite Release

In response to RFI Section 7 (g), only one HDD punch out has been modelled as it can be confirmed that only one punch out will occur at a time (refer to Chapter 8 Construction Strategy). Therefore, there are no changes to this section. Refer to Section 6.2.1 of Appendix 10.2 in the 2024 EIAR.

6.2.2 Cable Trenching

The change in this section is a result of the updated sediment data (Aquafact, 2025). The following sentence from Section 6.2.2 of Appendix 10.2 of the 2024 EIAR shall be deleted;

To convert the settled mass from the model into a depth in mm, a settled density of 1,393 kg/m³ was used (Note: this is the estimated initial density of sand sized particles whereas over a longer period of time dewatering will increase the bulk density).

And replaced by;

To convert the settled mass from the model into a depth in mm, a settled density of 1,114 kg/m³ was used (Note: this is the estimated initial density of sand sized particles whereas over a longer period of time dewatering will increase the bulk density).

There are no further changes to this section. Refer to Section 6.2.2 in Appendix 10.2 of the 2024 EIAR.

6.2.3 Mass Flow Excavation of HDD Exit Pits

The change in this section is a result of the updated sediment data (Aquafact, 2025) and updating the timings of sediment releases in the plume modelling to be consistent between scenarios. This updated modelling is in accordance with RFI Section 7 (h) in which the impact of the exit pits within the surf zone on coastal processes is included in the assessment. It should be noted however, that the exit pits are within the subtidal environment, beyond the surf zone for the expected period of the excavation. The following sentences from Section 6.2.3 of Appendix 10.2 of the 2024 EIAR shall be deleted;

The current speed peaks occur two hours and 20 minutes after the beginning of the operations. The material is released into the model at 2.5 m above the seabed. To convert the settled mass from the model into a depth in mm, a settled density of 1,359 kg/m³ was used (n.b. this is the estimated initial density of sand sized particles whereas over a longer period of time dewatering will increase the bulk density). This scenario represents impact pathway C-05.

And replaced by:

The current speed peaks occur just over 18 hours after the beginning of the operations (i.e., halfway through the second release period). The material is released into the model at 2.5 m above the seabed. To convert the settled mass from the model into a depth in mm, a settled density of 985 kg/m³ was used (Note; this is the estimated initial density of sand sized particles whereas over a longer period of time dewatering will increase the bulk density). This scenario represents impact pathway C-05.

There are no further changes to this section. Refer to Section 6.2.3 in Appendix 10.2 of the 2024 EIAR.

7 Results

Following design refinements in response to the RFI, WTGs are now proposed with suction bucket foundations, and the OSP with a jacket foundation installed with either pin piles or suction bucket foundations. No WTG foundations will have drilled pin piles, resulting in the removal of modelling for drilling at WTG locations. Therefore, Section 7 of Appendix 10.2 of the 2024 EIAR shall be deleted and fully replaced with the text below:

Model outputs were provided to GoBe Consultants Ltd in GIS format for interpretation in the relevant EIAR chapters. For the wave blockage modelling, raster GeoTIFFs are used, and for all other results, ESRI-format vector shapefiles were used. In the case of the vector shapefiles, all parts of the shapefile where the concentration of raised levels of suspended sediment is zero, were removed.

- Two output parameters are provided for particle tracking scenarios:
    - Sedimented (showing the depth of sediment that has settled on the seabed after release). Note that re-suspension was switched off in the model.
    - Suspended (showing the depth-averaged concentration of sediment that is in suspension after release).
- For particle tracking scenarios, for each of the current events, and for each output parameter, the following were provided:
    - The situation at 0, 1, 2, 3, 4, 5, 10, 15 and 20 hours (and for the array drilling scenario, additionally 24, 48, 72, 96, 120, 144, 168, and 188 hours) after the beginning of operations.
    - Time series at selected locations relevant to environmental receptors.
    - The maximum of sedimented and suspended. This represents the largest value that occurred in each model grid cell over the entire simulation period. It is not representative of any single instant in time, but does provide a useful indication of the maximal extent of the plume and associated sedimentation.
- For particle tracking scenarios the units of ‘suspended’ are depth-averaged mg/l. The units of ‘sedimented’ are mm.
- For wave blockage scenarios, the following four output parameters are provided:
    - Hm0 = significant wave height. Units = metres.
    - Tm02 = mean zero-crossing wave period. Units = seconds.
    - Tp = peak wave period. Units = seconds.
    - mDIr = mean wave direction. Units = degrees relative to north (or absolute degrees for the difference layer).
- For each of three output types:
    - NO_BLOCKAGE = no wind farm included in the model
    - BLOCKAGE = wind farm included in the model
    - Diff = scheme results minus baseline results
- For the hydrodynamic blockage scenarios, the following three parameters are provided:
    - Current speed and difference in current speed (units = depth averaged current speed m/s)
    - Current direction and difference in current direction (Units = depth averaged current direction °T, or absolute ° for the difference layer)
    - Surface elevation and difference in surface elevation (Units = m MSL or absolute m for the difference layer).
- For each of two output types:

- Baseline = no wind farm included in the model
- Difference = scheme results minus baseline results

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