Marine Management Organisation

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(email only)

Our reference: MLA/2013/00119

24 September 2013

Dear Mr Eades,

Application for a Marine Licence to Extract Aggregates, Ref: MLA/2013/00119

Thank you for your further correspondence dated 27 August 2013 in response to the Marine Management Organisation (MMO) letter dated 20 August 2013 concerning the above application for a marine licence.

The MMO understands that Marinet contacted HR Wallingford Ltd (letter dated 26 August 2013) and Nortec UK Ltd directly to seek clarification on a number of points regarding the wave modelling data used in the 'Anglian Offshore Dredging Association (AODA) Marine Aggregate Environmental Assessment (MAREA): Wave Study, Technical Note DDR4472-04'. The Wave Study was used to inform the Area 212, 240, 328 (b and c) Coastal Impact Study that formed part of the application for the above marine licence.

HR Wallingford has provided the MMO with its response to the clarifications you requested in your letter. We have responded to each of your points below. In preparing this response and reviewing the suitability of the data used, we have consulted with our technical advisers at the Centre for Environment, Fisheries, and Aquaculture Science.

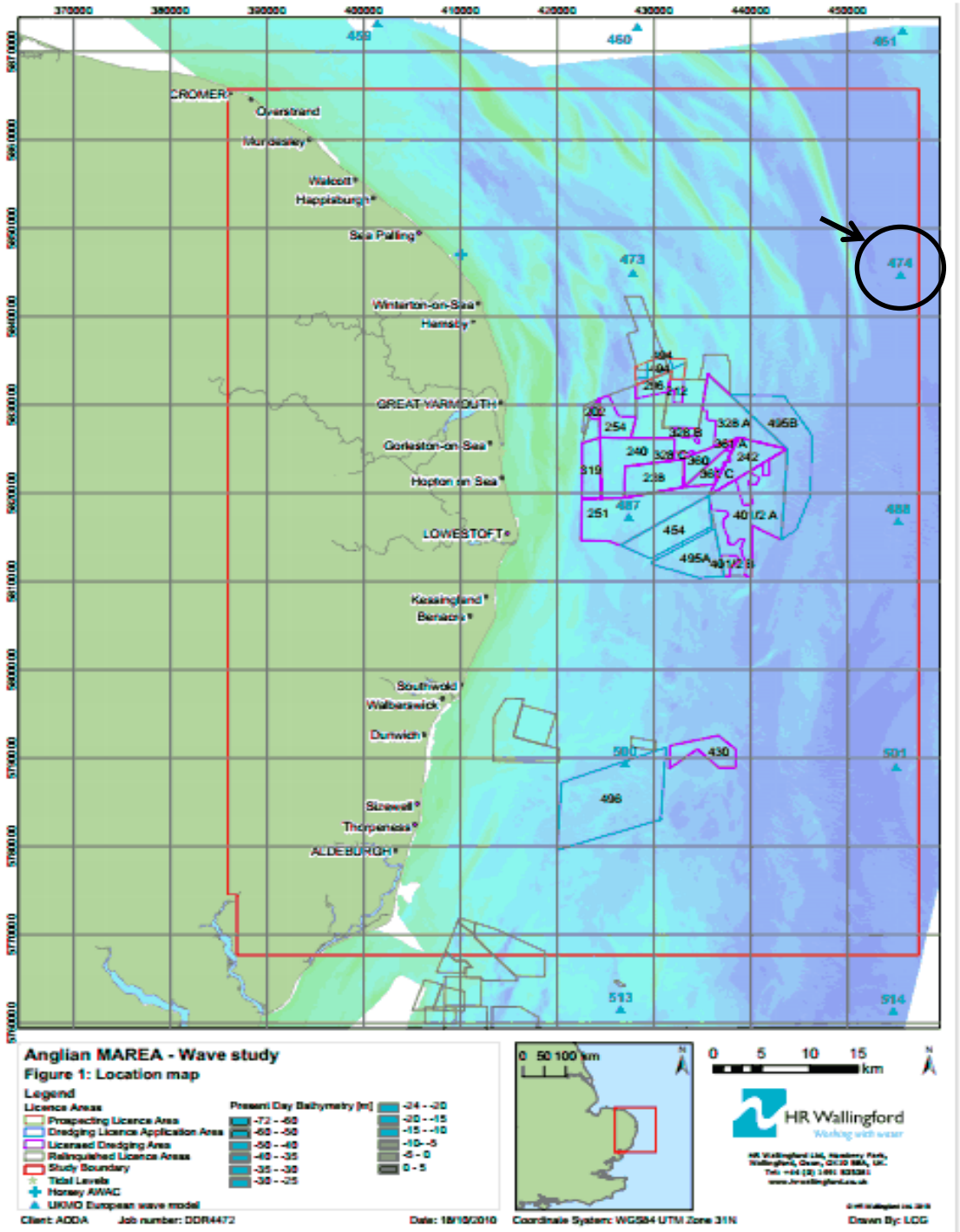
1) **Has the wave model used offshore meteorological data from the area in question for its wind speeds?**

   The wave modelling study does not use measured offshore wind data to drive it; instead modelled wind data has been used. The wind data used originates from the 20 year hindcast (covering a 20 year period from 1986 up to 2006) of the Met Office European model, which provides a representation of the long term climate. The offshore boundary wave data was obtained from this hindcast in the same way.

   The European model is extensively calibrated and validated by the Met Office around the UK. The Met Office continually compares its forecast models against measured data from buoys and satellites. The nowcast (T=0) each day is then stored to build up the hindcast dataset that was used in this assessment.

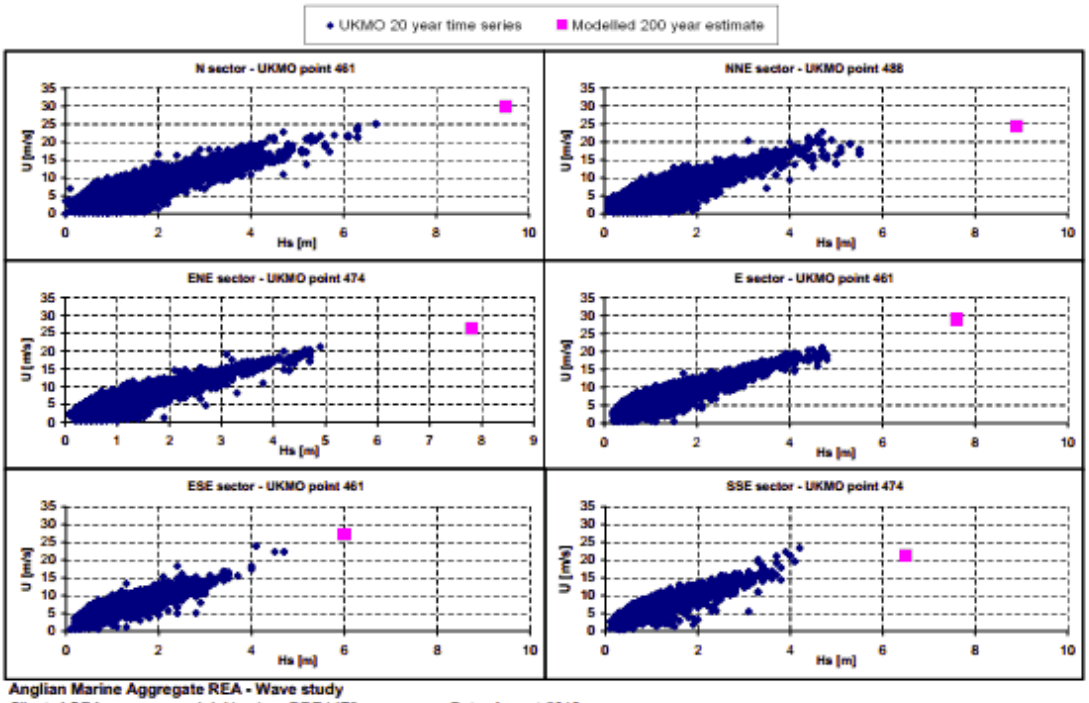
2) What is the source of the data (e.g. precise location and who supplied the data)?

The waves used were derived from conditions close to the relevant part of the SWAN model boundary. For example, when modelling waves from the north east, conditions derived from Met Office point 474 was used (shown in Figure 1 of the AODA MAREA: Wave Study (below)).



Wind conditions blown over the model were chosen to match each offshore wave condition by correlating the wind and wave data (see Figure 5 of the AODA MAREA: Wave Study (below)).

Figure 5: Scatter plots of wind speed U against significant wave height Hs per directional sector.



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The winds were therefore those most likely to have occurred at the same time as the offshore waves. In order for large waves to occur, strong winds must have occurred. By applying the wind conditions over the SWAN wave model area, the wave is sustained.

3) What time period was the data collected in and used as source data for the model?

The purpose of Technical Note DDR4472-04 was to compare the effects of the pre-dredge, present and post-dredge bathymetries on waves. For such a comparative study, the absolute test conditions selected are not critical. The critical issue is that the same conditions are tested for each bathymetric layout so that a direct comparison can be made. Severe test conditions were selected from each relevant direction sector (shown in Table 4 of the AODA MAREA: Wave Study (below)).

Table 4 Incident wave and wind conditions

Directional sector	Significant wave height, H_S [m]	Mean wave period, T_M [s]	Peak wave period, T_P [s]	Mean wave direction, Dir [°]	Wind speed, U [m/s]
N	9.5	12.5	16.25	0	29.9
NNE	8.9	12.1	15.73	30	29.0
ENE	7.8	11.1	14.43	60	27.2
E	7.6	10.6	13.78	90	26.3
ESE	6.0	9.3	12.09	120	21.3
SSE	6.5	9.7	12.61	150	24.4

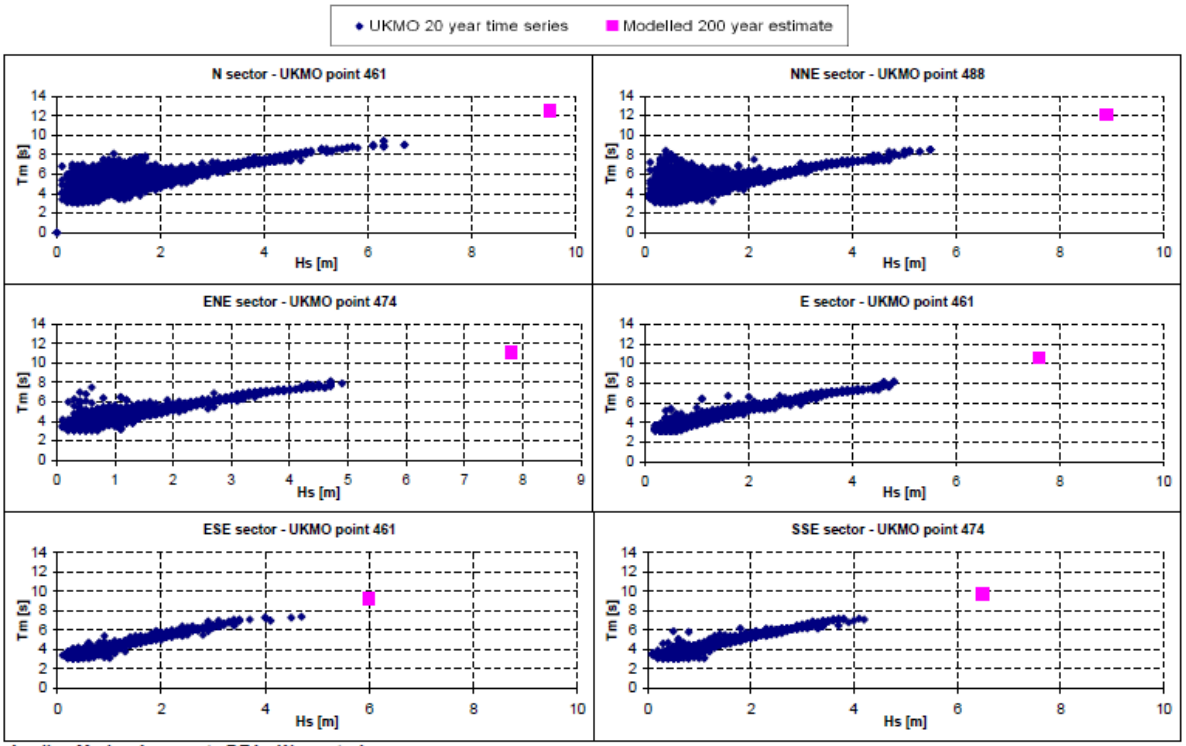
The test conditions were selected as corresponding estimates to the 200 year offshore waves, together with typical associated winds from the correlation identified in Figure 5 (above).

Summary

It is considered that HR Wallingford has undertaken a scientifically robust exercise in order to create a realistic worst scenario for wave conditions for the Anglian

MAREA. Figure 4 taken from the AODA MAREA: Wave Study (below) demonstrates that HR Wallingford has taken UK Met Office wave climatology predictions from a number of points around the MAREA study area. Estimates for a 200 year return wave have then been made based on these graphs.

Figure 4: Scatter plots of mean period Tm against significant wave height Hs per directional sector.



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The above graphs, when combined with current estimates, give an estimate of the potential sediment flux and of natural variability versus potential anthropogenic impacts.

The MMO are content that the meteorological data used in the study is robust, timely and appropriate for its intended use.

Yours sincerely,

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Reference:

HR Wallingford (2011). *Anglian Offshore Dredging Association. Marine Aggregate Regional Environmental Assessment: Wave Study, Technical Note DDR4472-04.*