NOTICE TO MARINERS

Beatrice Offshore Windfarm Ltd

Beatrice Offshore Windfarm Limited (BOWL) – Notice to Mariners August 2017.

Backhoe trenching & seabed preparation, completion of operations

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Please promulgate the following as a Notice to Mariners

Export Cable Installation Stage 2 – Completion of backhoe trenching & seabed preparation, nearshore area, Portgordon

In preparation for the installation of two export cables in the Beatrice Offshore Windfarm construction site, it is a requirement that the cable runs are excavated in the nearshore area close to Portgordon. In this respect the work listed here was completed as described below during June and July 2017.

On behalf of BOWL, Nexans Norway AS contracted Boskalis to prepare two export cable trenches, running from KP 0.42 to KP 4.5. The objective of the trenching works was to establish a cable route that is free from boulders and excavated and documented to burial depth of 2m, bottom of trench. The backhoe operation utilized the tidal cycles for the section shallower than 3m. Clay and gravel spoil, along with large boulders encountered along the route were side casted. The operation was carried out by the dredging barge Manu Pekka, with the BKM103 used as support vessel. The Norsemaid also carried out survey and crew transfer operations.

1. Area of Activity

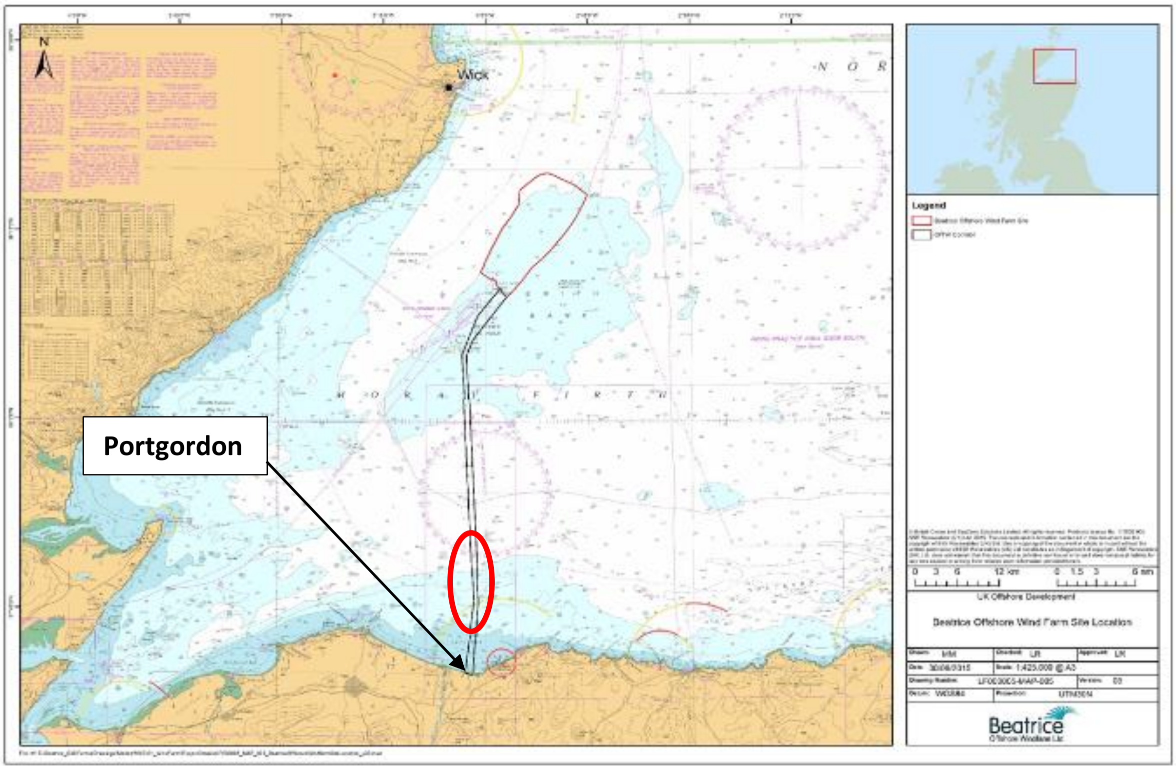

Fig 1 trenching locations, approximately 420m – 4.5km from the Portgordon Beach

Name and Registered Office: Beatrice Offshore Windfarm Limited. One Waterloo Street, Glasgow. G2 6AY

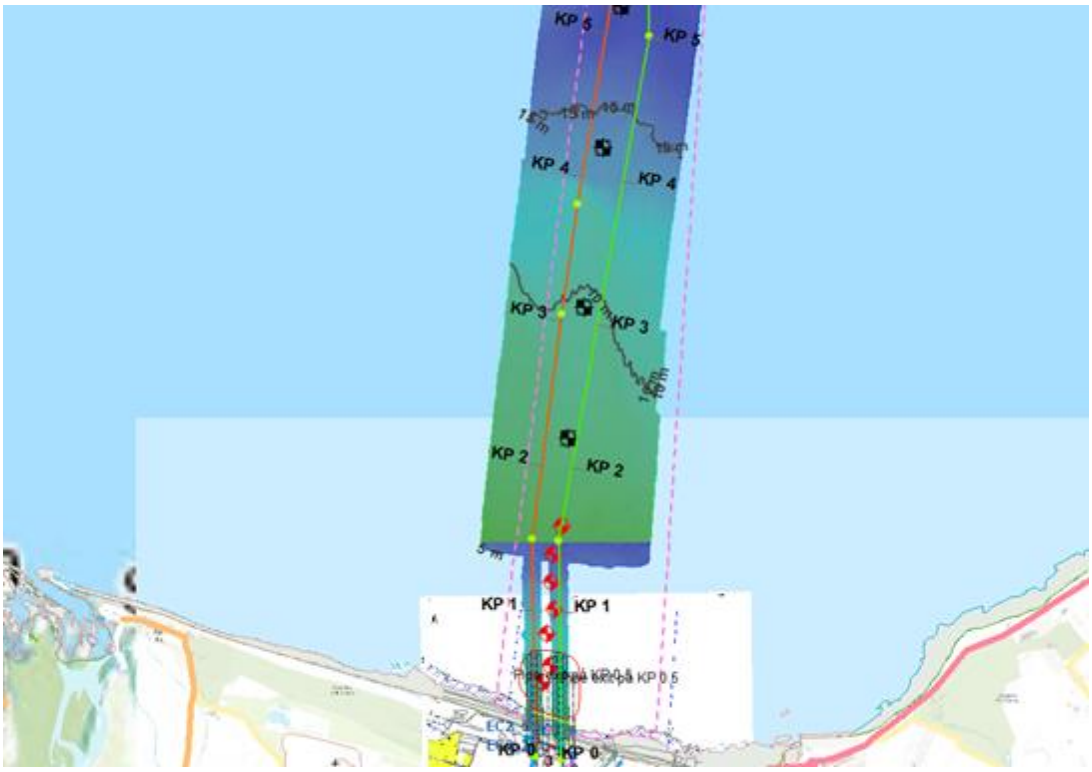

Fig 2 Backhoe trenching routes.

2. Backhoe Trenching Operation

The reason that backhoe trenching is needed between the Direct Pipe exit point and 4.5km offshore (also known as Kilometre Point (KP) 4.500) is because numerous cobbles and boulders are encountered at the seabed and are likely to be present within the shallow soil units. Whilst there is a veneer 0.25 – 0.5m thick of loosely gravelly fine to coarse sand (which becomes sandy gravel by KP4.500), the additional presence of cobbles and boulders constrains the ability to post-lay the cable using water jetting by diver or ROV. Consequently, for each Export Cable, a trench has been excavated using a barge-mounted backhoe. The principal purpose of this exercise is to remove any cobbles or boulders that would otherwise prevent the cable from successfully being post-lay buried through water jetting. However, other sediments were also excavated during the trenching process.

The trench for each Export Cable has the following dimensions:

Trench length for each Export Cable 4 km

Trench width for each Export Cable 4 m

Trench depth for each Export Cable 2 m

Total seabed footprint from trenching 32,000 m^2

Total volume excavated from trenching 64,000 m^3

Material excavated from the trench has been side-cast beside the trench. The maximum reach of the backhoe is 12.5m and the side-cast material forms a small mound on the seabed of between 0.5m and 1.0m in height. The trenching and side-casting operations are shown in Figure 3. The maximum footprint width of seabed affected is 12.5m for each Export Cable, including the trench and side-cast material.

The excavated material from the trench comprises mostly sands, gravels, cobbles and boulders. There will be no mechanical backfill of the excavated trench with the side-cast material. Rather, the sands and gravels will become re-worked by physical processes over time, especially over the winter months, and partially backfill the trench naturally. The cobbles and boulders will remain in situ where side-cast onto the seabed. The cable will then be laid into the trench and burial to the target depth will be achieved using post-lay water jetting.

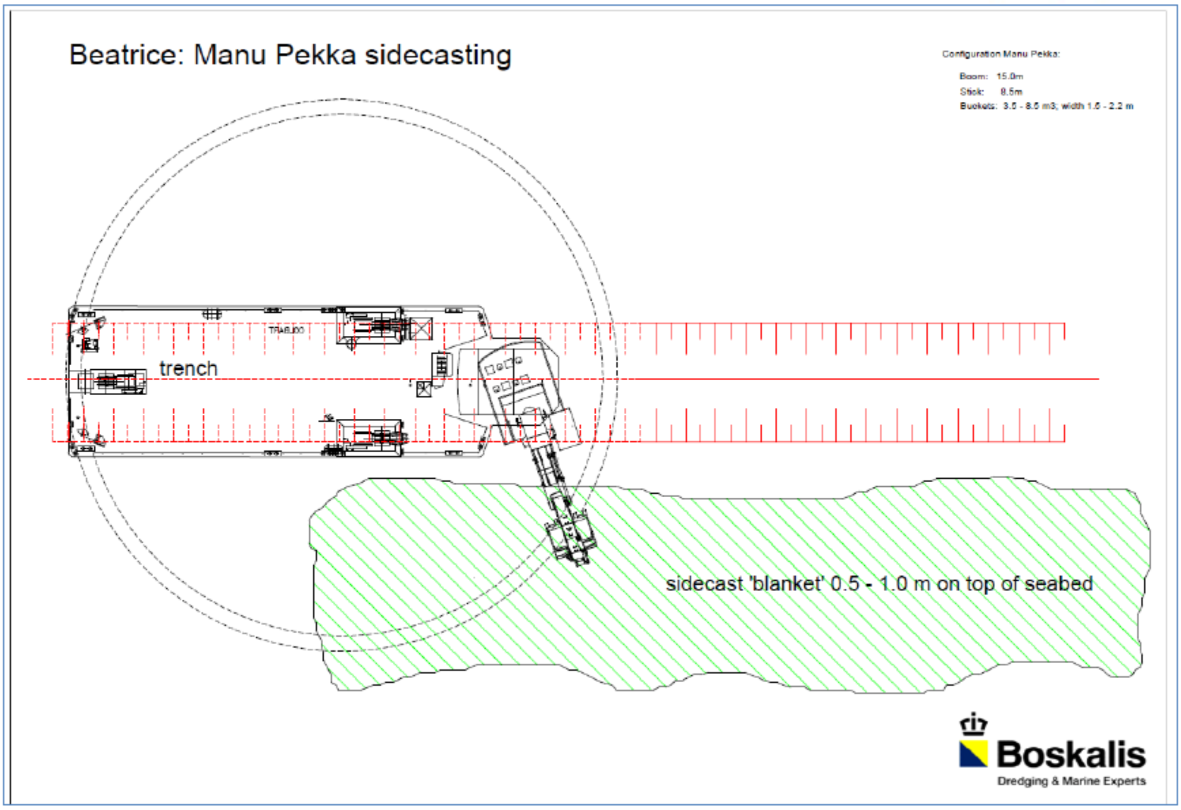

Fig 3 Top view BHD trenching and sidecasting

3. Assessment of Effects

Given that the side-cast material will form a mound on the seabed up to 0.5 - 1.0m in height, a worst case scenario is a 1.0m reduction in water depth immediately after side-casting (i.e. before any potential re-mobilisation of side-cast sediments and thus lowering of the mound). Similarly, given that individual boulders can be up to 1m in height a worst case scenario is that even after dispersal of any more mobile sediment, the excavated boulders remain in situ in their side-cast locations and are not re-mobilised. Under either of the above situations, the maximum change in navigable water depth is a temporary or permanent reduction of 1.0m. For this worst case to represent a 5% or greater reduction in navigable depth it would have to occur in existing water depths of 20m CD or shallower.

Figure 4 shows the seabed contours (in Chart Datum) extending from the shore seawards along the OfTW corridor. It can be seen that the 20m CD contour, which has been highlighted as the ‘Area of Interest’, is relatively close to shore.

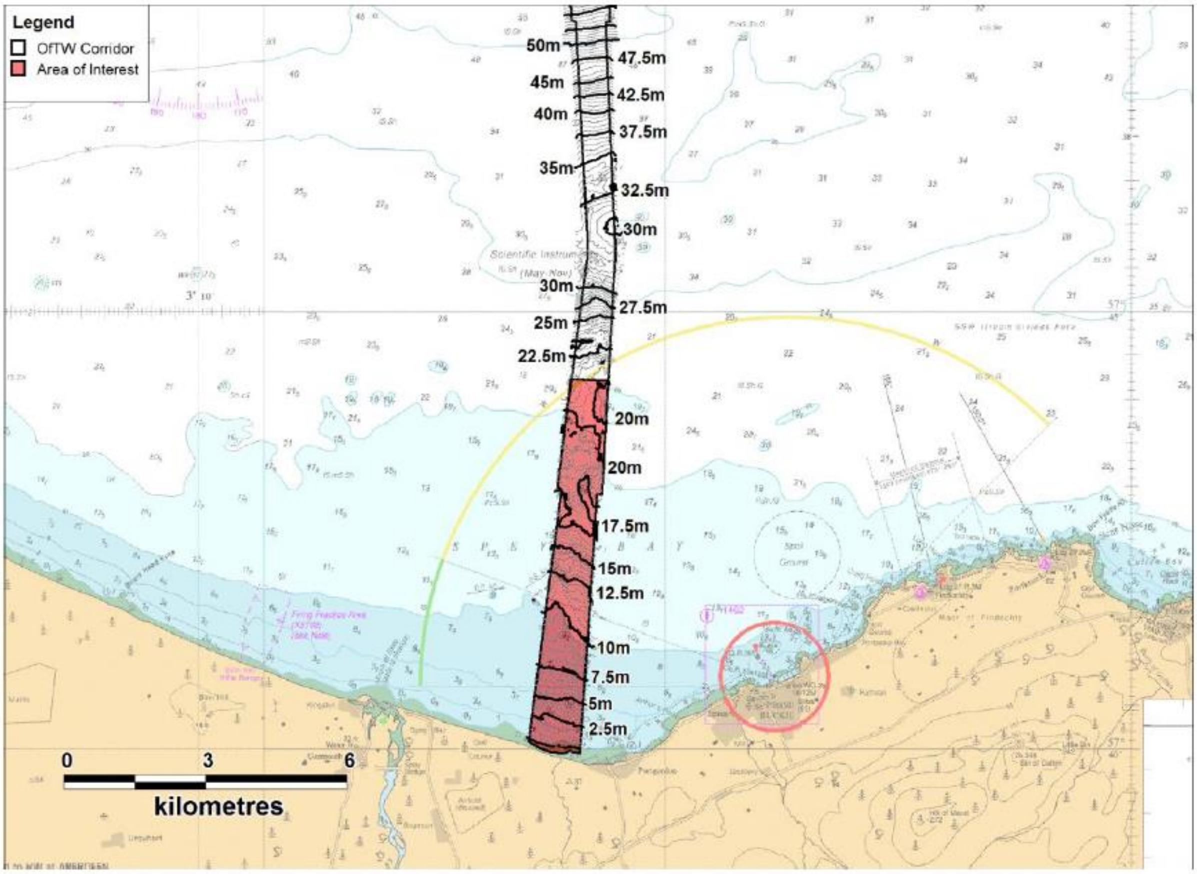

Fig 4 OfTW Corridor Bathymetry and Area of Interest (from Anatec, 2017)

In shallower areas of the seabed, it is reasonable to expected that:

(i) the tidal currents may increase, as flow is constrained by the land mass boundary; and

(ii) shallower water depths, and furthermore wave-induced currents, will become more important, with currents from tides and waves combined increasing with progression towards shore and shallowing of the water depth.

Given this, it is likely that current velocities acting on the seabed in areas shallower than 20m CD will be sufficient to mobilise most silts, all sand fractions, and some gravels (pebbles) during most mean spring tides and certainly during storms. Depending on the severity of any storms, small to medium cobbles and the finest (aggregated) clasts of silts and clays are also likely to be mobilised, leaving only the largest cobbles and the boulders unmoved on the seabed. Whilst large clumps of clay would also remain on the seabed until they break down over time into small clumps and ultimately individual grains, there is very little clay present, other than highly locally, within the excavated material.

There are two other important points that require consideration in assessing the potential effects on navigation due to the side-casting and presence of boulders on the seabed. Firstly, the project-specific bathymetric survey by MMT provides a high-resolution dataset. When the seabed bathymetry of each Export Cable is plotted as a transect from shore to the 20m seabed contour and compared against the Admiralty Chart contours for the same locations, it is apparent that the 'actual' seabed is considerably lower in places than the 'charted' seabed. This is largely due to the linear interpolation between contour lines on the Admiralty Chart, which tends to underestimate water depth due to the more undulating topography in reality.

In places along each Export Cable, the actual seabed can be up to 4m deeper than may be interpreted from the Admiralty Chart. This reduces the percentage reduction in navigable depth caused by the presence of side-cast mounds or boulders on the seabed (although the values still exceed the maximum 5% reduction in surrounding depth by virtue of their less than 20m depth).

Secondly, from the landfall to approximately 10.5km along the OfTW cable corridor, there is a high density of naturally occurring large boulders on the existing seabed. Therefore, side-casting of boulders in these areas will not significantly change the topography or (once the finer material has dispersed) the sediment character of the seabed, and nor will it significantly change the available navigable depths from the baseline conditions.

Overall, the effect of the side-casting operations is deemed to have an insignificant effect on navigable water depths because:

(i) large cobbles and any boulders that are side-cast and remain in situ on the seabed will be of a similar size to those already present on the seabed between the landfall and approximately 10.5km offshore along the OfTW cable corridor in extensive numbers;

(ii) most silts, all sand fractions, and some gravels (pebbles) side-cast to the seabed will become mobilised by natural processes of tidal currents during mean spring tides and by wave-induced currents during storms;

(iii) small to medium cobbles and aggregated clasts of silts and clays are also likely to be mobilised during more severe storms;

(iv) there is very little clay present that would form large clumps when excavated and side-cast, but any that is locally present would remain on the seabed until it breaks down over time into small clumps and ultimately individual grains and becomes naturally dispersed.

4. Results from the post dredging survey

The following illustrations are taken from the post trenching surveys conducted by Boskalis on behalf of Nexans. They are taken from various locations along both of the cable trenches for EC1 and EC2.

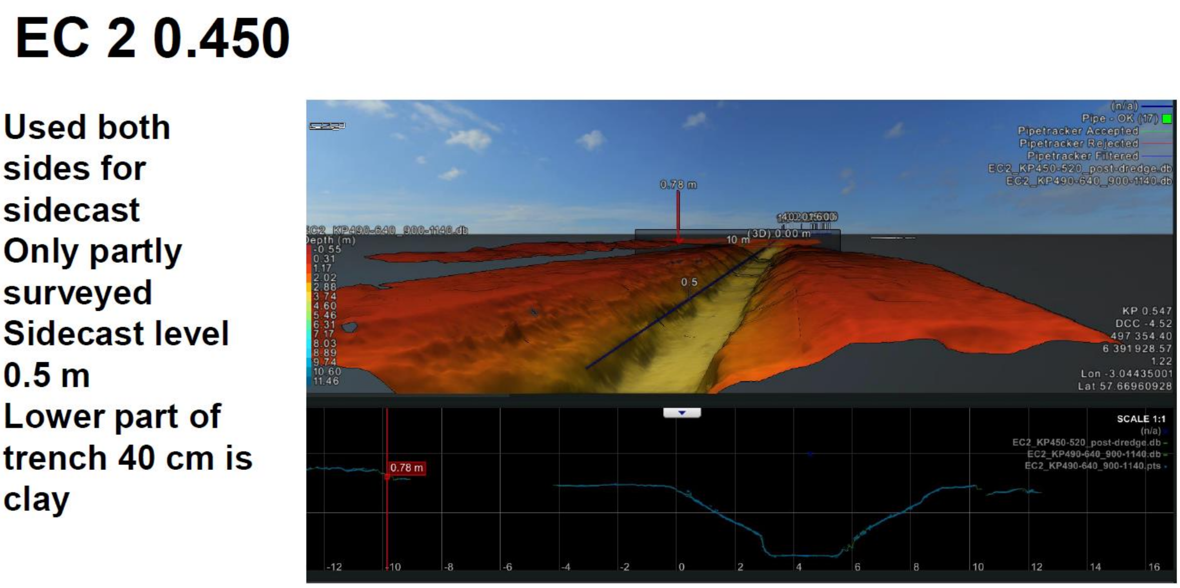

Fig 5 Cross section of EC2 at the start of the trenching KP 0.450

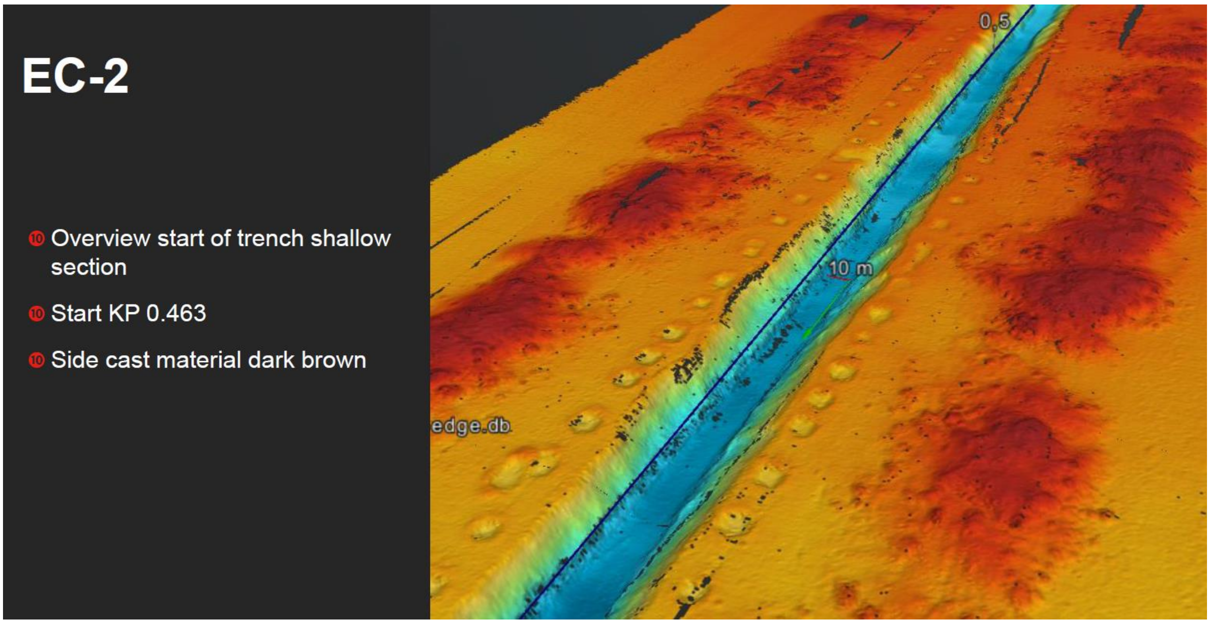

Fig 6 Cross section of EC2 at KP 0.463

General sidecast depth < 0.5 m
Very local small peaks 20-30 cm above 1 m contour – shown in red

Fig 7 Overview of EC1 from KP 1.0 to KP1.9

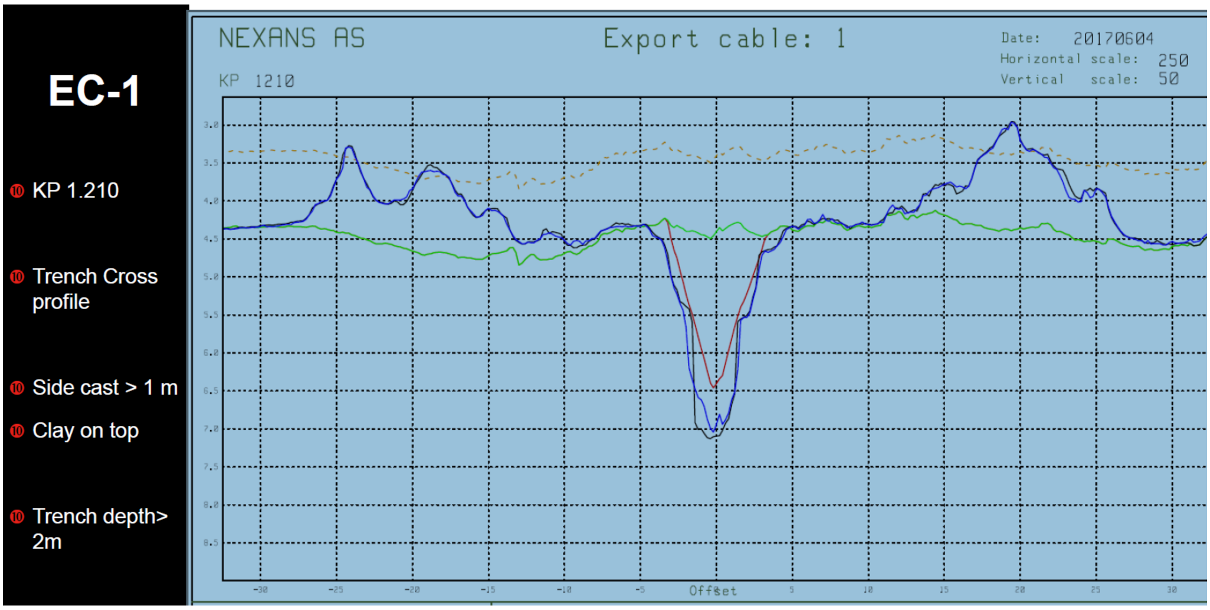

Fig 9 Cross section of EC1 at KP1.210

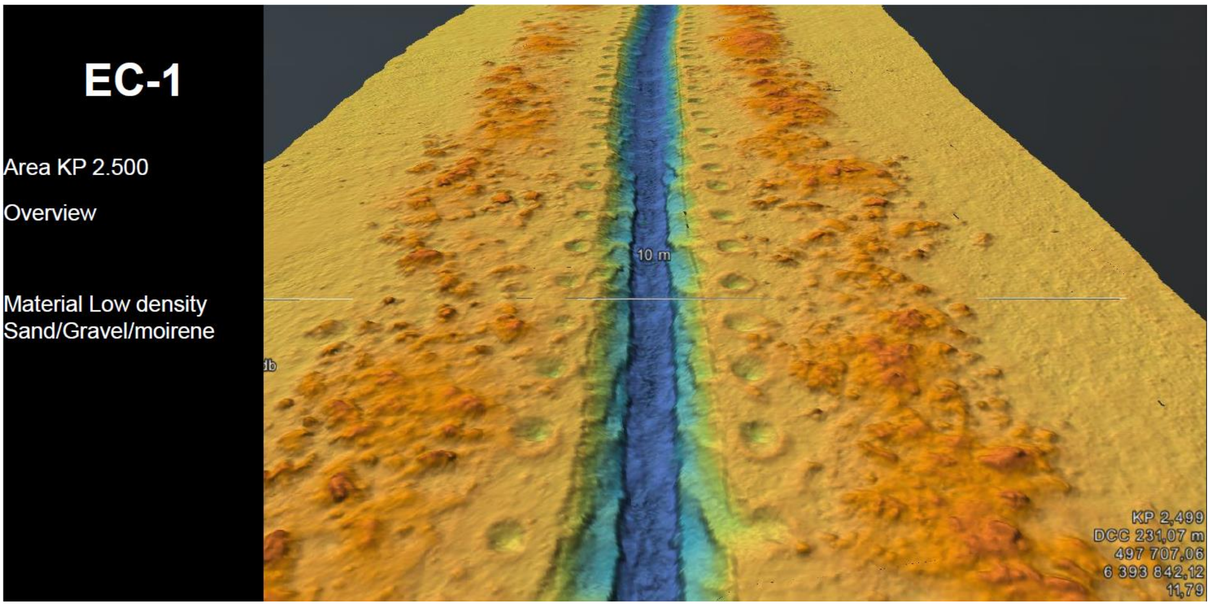

Fig 10 Overview of EC1 at KP 2.5

5. General Safety Advice

Whilst the berms created by the side casting from the excavation activity do not constitute a significant hazard to navigation for vessels crossing the cable corridor, there is likely to be a deviation from the charted profile in the immediate area of the trenching works up to and exceeding >1m in some places.

Vessels are advised to avoid engaging in fishing or laying of static gear in the vicinity of the cable routes. For specific information please contact Alex Winrow-Giffin at Brown and May (see para 6 below).

6. Fisheries Liaison

Fisheries liaison associated with the activity will be co-ordinated by Brown and May Marine. For any commercial fishery queries please contact: Alex Winrow-Giffin, telephone: +44 (0)1379 872144 and mobile: +44 (0)7760 160039 or email: alex@brownmay.com

7. Distribution List

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Notice issued by:
BOWL Marine Coordinator
Beatrice Offshore Windfarm Limited
Unit 1
Harbour Office
Wick
Caithness
KW1 5HA
email: mc.bowl@sse.com
phone: +44 (0) 3302020329
mob: +44 (0) 7342 028207
web site: https://www.beatricewind.com/