1. METHOD STATEMENT

This method statement is provided in support of the Marine Licence Application for the Proposed Marine Works - Cable tunnel construction and laying of cables within (hereafter referred to as Tunnel). The information provided in this method statement includes the project description for the Proposed Marine Works specific to tunnel construction and laying cables within the tunnel and the coordinates of the marine licence application area for the Proposed Marine Works (Tunnel).

1.1 Proposed Marine Works

1.1.1 Design considerations

The Proposed Marine Works have been designed through an iterative process, in consultation with Natural Resources Wales (NRW), that sought to avoid or reduce environmental effects. Constraints which form part of the design of the Proposed Project and which National Grid has committed to for the Proposed Marine Works which are designed to avoid or abate negative environmental effects are presented below.

Table 1-1 Design considerations

During Construction
National Grid have made a commitment not to undertake the proposed works within the Dwyryd Estuary to remove the overhead line during the period 01 November and 31 March to minimise impacts on overwintering birds.
Existing tracks, where possible, will be used to access the pylons. In addition, where possible, access tracks to pylons will be shared (e.g. at 4ZC30 and 4ZC30R).
The same access track route as used in 2013 for the 4ZC030R pylon replacement will be used.
Access trackways will be constructed from temporary trackway instead of stone. This will distribute weight across sensitive habitat better and can be easily removed.
Cranes will not be used at pylons 4CZ031 and 4CZ032 to reduce the load on the saltmarsh habitat.
Where possible bridges instead of culverts will be used to cross saltmarsh creeks. Bridges are quicker to install and will therefore reduce the amount of time works will be undertaken on the saltmarsh.
Where stone is used it will be contained e.g. by membranes or bags, ensuring direct and specific placement.
Navigational safety will be maintained within the estuary by disseminating the appropriate notices to mariners and adding markers to the temporary stone platform at pylon site 4ZC030

1.1.2 Cable tunnel construction

The 4ZC OHL will be replaced with an underground high voltage cable system. In order to construct the cable tunnel, vertical shafts (outside the Marine Environment Area) will need to be constructed at the start and end points of the tunnel either side of the Dwyryd Estuary; one near Garth (western side of the estuary) and one near Cilfor (eastern side of the estuary).

A tunnel with an internal diameter up to 4.4m, will be constructed between the two shafts. Tunnel construction is likely to take 17 months following shaft construction. The tunnelling method will use a tunnel boring machine (TBM) to bore through the ground. The tunnel will then be lined with precast concrete segments behind the TBM. The TBM will be launched from the west (Garth) and received at the shaft at the eastern end of the tunnel (Cilfor). The TBM will be fitted with an effective dust-control system and controlled in a way to minimise noise and vibration. Initially a short section of tunnel (launch chamber (forward shunt) / back shunt) may be constructed using drill and blast or mechanical

excavation to enable the TBM to be built below ground and improve the efficiency of the tunnelling process, this will be outside the marine environment.

The type of TBM will be determined and fully specified by the appointed contractor, based upon the geology and hydrogeology to be expected. It is currently anticipated that the contractor will adopt the use of a slurry TBM which works on the principle that the ground to be tunnelled through in front of the cutter head is supported by bentonite slurry. Bentonite is a naturally occurring clay mineral used extensively in the construction industry. The mineral is mixed with water at the surface in large tanks to form a slurry, which is supplied to the TBM by a delivery pipeline. The slurry is contained in the head of the TBM in a pressurised chamber that also contains the cutter head which is used to excavate the ground. The slurry is further utilised to remove excavated material in suspension. The slurry is mixed with the excavated material by the rotating cutter head and is then removed from the tunnel via a return pipeline in a closed piped network. At the surface, the excavated material is removed from the slurry by a treatment plant, which includes settlement tanks, cyclones and filter presses to allow the heavier particles of excavated rock to be separated from the lighter bentonite particles. The slurry is then reconditioned and topped-up as necessary with fresh bentonite before being returned to the TBM head through the supply pipes.

The launch/ drive shaft is used for launching the TBM (on the western side of the tunnel), removing excavated material, supplying materials to the tunnel face and allowing personnel access for construction of the tunnel. The tunnel drive shaft needs to accommodate the plant required to support the tunnel construction such as ventilation ducting, power cables and cooling water pipes. The size of the reception shaft needs to be adequate to allow removal of the TBM on completion of the tunnel.

The tunnel will be constructed at varying depths depending on the final verdict alignment proposed by the contractor, the top of the tunnel will remain below -15m OD for the full tunnel drive. In areas of soft or poor ground, a number of additives may be required to condition the soil to facilitate tunnel construction. Onve appointed, the contractor will supply details of all additives to Natural Resources Wales to confirm that they are acceptable for use.

1.1.3 Cable installation

Two High Voltage electrical systems will be installed in the tunnel. One circuit will be operated at 400kV and the other at 132kV. Installation of the High Voltage system within the tunnel will utilise the existing site compound and the shafts created to build the tunnel. The work to install the High Voltage System will largely be completed underground with some activities on the surface at each end to connect to the existing infrastructure.

1.1.4 Project programme

The current indicative programme for the Proposed Project is that, assuming planning consent, on-site works would commence in 2021 and take approximately 5-6 years to complete.

First site access is likely to be taken at the western tunnel drive site near Garth, this is currently expected to take place in early 2021 and is subject to gaining all necessary approvals.

Site establishment near Cilfor is likely to begin later and will be started at a time to allow completion of the shaft prior to the arrival of the TBM. Site establishment at Cilfor will involve building the floating access road (which will permanently remain in situ), a construction compound and any associated groundworks.

The shaft, tunnel head house, and SEC will be constructed at Cilfor. Once the outage is in place, the erection of the new pylon will be completed, as well as the removal of the current 4ZC027 pylon. Once these, and the tunnel are complete and the new conductors and cables energised, the OHL removal

will take place. All tunnel, tunnel head house and sealing end compound construction work is expected to be complete by the end of 2025.

Overhead line removal work (including the Proposed Marine Works) is expected to take place in 2026. The Proposed overhead line Marine Works will take place between 01 April and 31 October, with the foundation removal completed and the physical barriers within the estuary removed as far as possible by the end of this period. If the contractor is able to complete the works earlier overhead line removal works may take place in 2025 but would still take place between 01 April and 31 October.

1.1.5 Tunnel Proposed Marine Works Application Area

The Tunnel Proposed Marine Works Application Area is shown in Figure 1-1 (see Location Plan for Proposed Marine Works (Tunnel) (P2048-LOC-006) for a full-page copy) and the coordinates for these areas are listed in Table 1-2 below.

Figure 1-1 Proposed Marine Works Tunnel

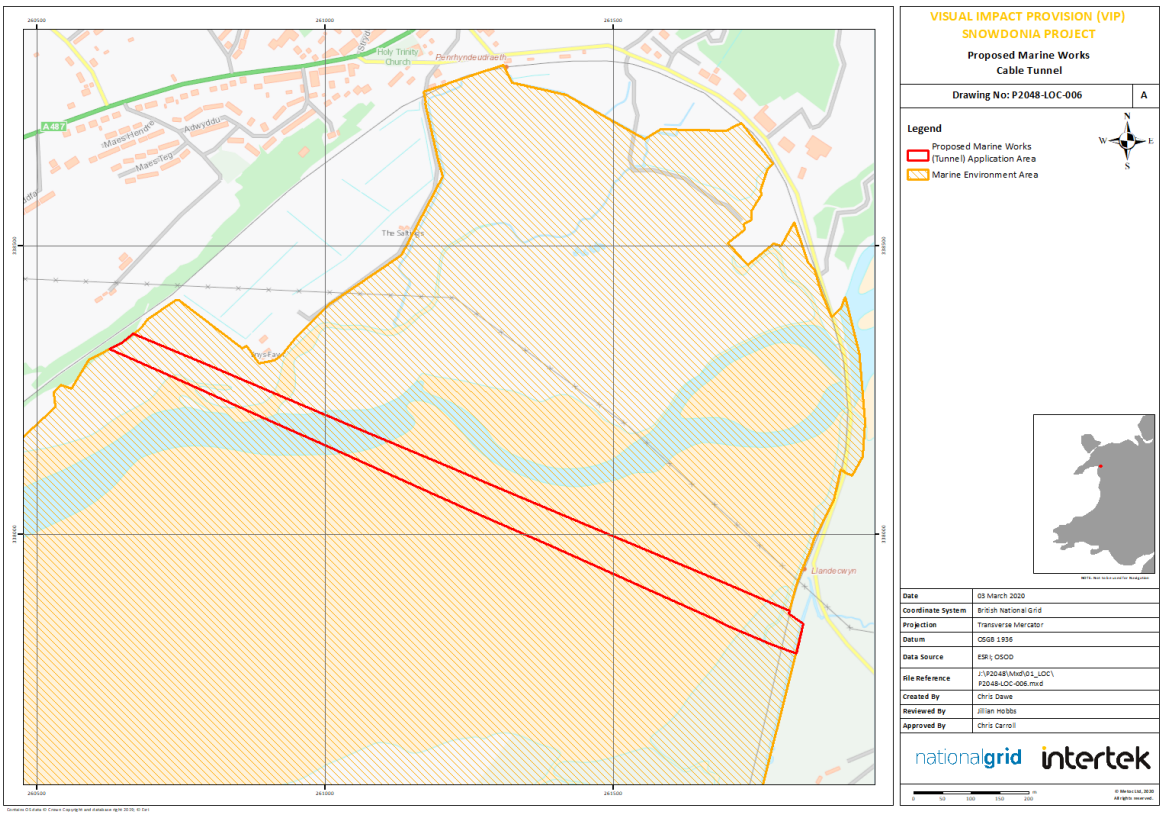

Table 1-2 Proposed Marine Works Tunnel coordinates

Point ID	Easting	Northing	Point ID	Easting	Northing
0	261805	337868	14	260900.1	338198.2
1	261803.6	337862.6	15	260726.6	338275.7
2	261829.6	337844.7	16	260625.3	338320.9
3	261816.8	337793.9	17	260646.3	338331.7
4	261798.6	337800.2	18	260666.5	338347.8
5	261773.2	337809.5	19	260761.5	338307.8
6	261748	337819.5	20	260793.4	338294.3
7	261723	337830	21	260935.5	338234.4
8	261698.2	337841	22	261039.5	338190.6
9	261673.7	337852.6	23	261226.1	338112
10	261390.4	337979.3	24	261290	338085
11	261266.3	338034.7	25	261415.6	338032.1
12	261193.2	338067.3	26	261669.5	337925.1
13	261004.8	338151.5	27	261805	337868

Coordinate system: British national Grid