



# Nova Innovation Ltd

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## Shetland Tidal Array Decommissioning Schedule and Method Statement (T1-3)

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1.0	08/02/2023	First version, produced to support application for a Marine Licence.
1.1	28/03/2023	Updated to incorporate changes to ERCoP references.

### NOTICE

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# 1 Introduction

Nova Innovation has produced this Decommissioning Method Statement to describe the procedures and methods that will be followed to fully decommission the three geared M100 turbines in the Shetland Tidal Array in the Bluemull Sound near Cullivoe in Shetland in a safe and responsible manner.

Decommissioning will involve complete removal of each of the three M100 turbines (T1, T2 and T3) in turn. The turbine nacelle, substructure and cable will be removed from the seabed and taken to shore for recycling or disposal. The three M100-D direct drive turbines (T4, T5 and T6) and associated infrastructure (subsea hub and cables) in the Shetland Tidal Array will not be decommissioned and will remain *in situ* on the seabed.

Full details of the equipment to be decommissioned, and the vessels and equipment that will be used in decommissioning operations are provided. Decommissioning roles and responsibilities are detailed, as well as measures to ensure decommissioning is carried out safely and without risk to personnel involved, marine navigation, other sea users and the marine environment. Decommissioning is expected to be completed over one vessel mobilisation, lasting approximately two weeks. An outline schedule is provided.

Finally, details of post-decommissioning activities and commitments are provided to ensure compliance with the Decommissioning Programme and this Method Statement. This includes measures to ensure and demonstrate that all equipment and infrastructure has been removed from the seabed and responsibly removed from the site.

## 2 Decommissioning permits

Decommissioning the three Nova M100 turbines in the Shetland Tidal Array will be carried out under, and in accordance with, the conditions of the following project licences:

1. Shetland Islands Council Works Licence 2022/015/WL, issued by Shetland Island Council (SIC) under the Zetland County Council Act 1974 for offshore works associated with the Shetland Tidal Array.
2. Marine Licence MS-00009110 issued by Marine Scotland Licensing Operations Team (MS-LOT) under the Marine (Scotland) Act 2020, Part 4 for construction and operation of the Shetland Tidal Array.

A separate Marine Licence is required from MS-LOT for decommissioning the three M100 turbines (and other associated decommissioning activities below MHWS). This Decommissioning Method Statement has been produced in support of an application for this Marine Licence to MS-LOT under the Marine (Scotland) Act 2020, Part 4. A number of other documents have been produced in support of the decommissioning of T1 to T3 and associated Marine Licence Application. These are detailed in Table 1-1 and referred to (where relevant) within this Decommissioning Schedule and Method Statement.

**Table 1-1: Key documents relating to decommissioning of the three M100 turbines in the Shetland Tidal Array.**

Document	Details
Bluemull Sound Tidal Array Decommissioning Programme (Turbines T1-3). EnFAIT-0390 Version 3.0.	Produced as a condition of Marine Licence MS-00009110 issued by MS-LOT for construction and operation of the Shetland Tidal Array. Provides comprehensive details of offshore and onshore decommissioning methodologies for T1 to T3 and associated infrastructure.
Decommissioning Methodology for the Bluemull Sound Tidal Array (Turbines T1-3). EnFAIT-0389 Version 3.0.	Produced as a condition of Marine Licence MS-00009110 issued by MS-LOT for construction and operation of the Shetland Tidal Array. Provides comprehensive details of offshore and onshore decommissioning methodologies for T1 to T3 and associated infrastructure.
Shetland Tidal Array Operational Phase Emergency Response & Cooperation Plan (ERCOP). Addendum for Turbine 1 to 3 decommissioning.	Produced to ensure appropriate action and cooperation with the Shetland Coastguard and other authorities in the event of emergencies during decommissioning. Includes emergency contact details and the procedure to be followed during any incident within or near the decommissioning works.
Shetland Tidal Array Decommissioning Environmental and Protected Species Risk Assessment.	Assesses the potential environmental effects of decommissioning the three M100 turbines and cables, including the potential for adverse effects on the integrity of any European sites. Details of the activities likely to disturb European Protected Species are provided, and measures to mitigate (reduce or remove) the disturbance resulting from the proposed activity.
Shetland Tidal Array Decommissioning Environmental Monitoring and Mitigation Plan (T1-3).	Produced to ensure decommissioning is carried out without risk to the marine environment. Includes the procedure to be followed during decommissioning works to prevent damage to the marine environment or marine wildlife.

Nova Innovation maintains a Licence Conditions Status Register for the Shetland Tidal Array, which is regularly shared with Marine Scotland (MS-LOT) and Shetland Islands Council (SIC), to track and record compliance with all licence conditions. This register will be updated to include any new conditions associated with decommissioning (following issue of the Marine Licence by MS-LOT).

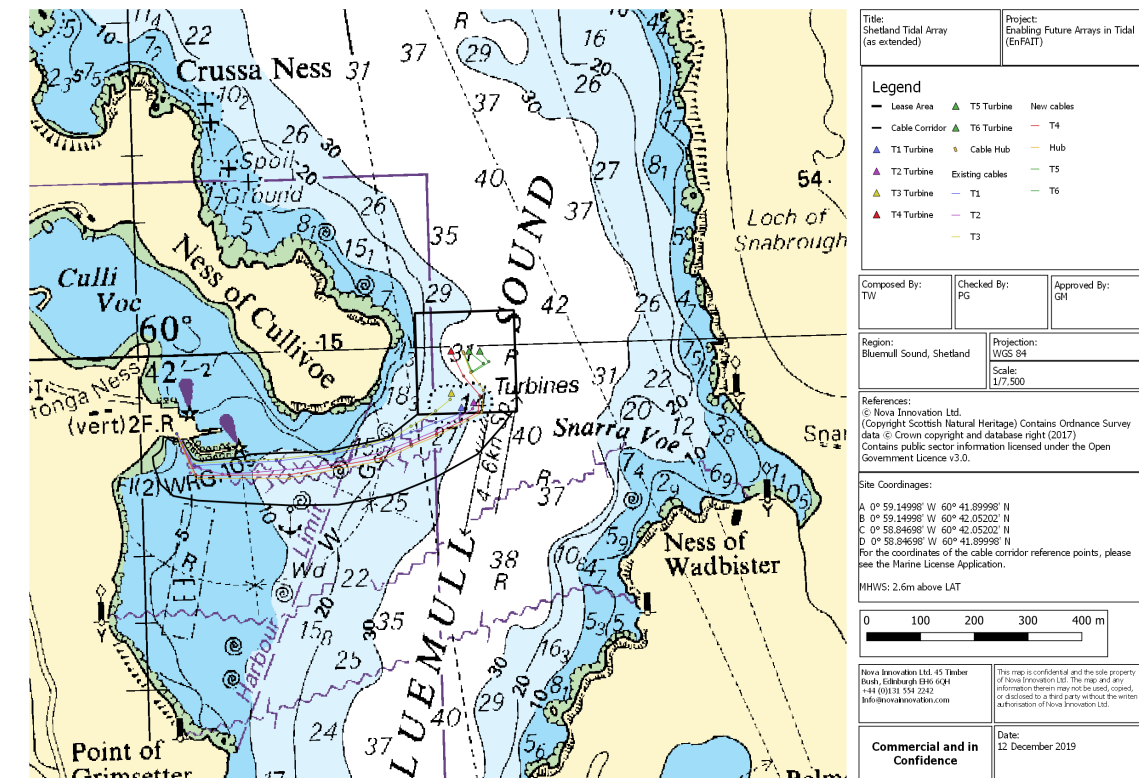
The three M100 turbines in the Shetland Tidal Array were licenced and installed when overall responsibility for decommissioning offshore renewable energy installations under the Energy Act (2004) lay with the Department for Business, Energy and Industrial Strategy (BEIS) rather than the Scottish Ministers. The Decommissioning Programme for T1 to T3, while shared with MS-LOT was produced for and approved by BEIS.

Reports on decommissioning, including as required under the Decommissioning Programme, as well as compliance with all relevant licence conditions will also be provided to BEIS.

### 3 Overview of works to be decommissioned

#### 3.1 Location

The Shetland Tidal Array is located in the Bluemull Sound, between the Shetland Islands of Yell and Unst. The array site is east of the Ness of Cullivoe. Figure 3-1 shows the location of the tidal array lease area and cable corridor.



**Figure 3-1: Project Location showing Licence Boundary**

Source: Copyright © Nova Innovation 2023; Admiralty Chart

The Shetland Tidal Array is located within the area bounded by joining the following points:

60° 41.900' N 000° 59.150' W  
60° 42.052' N 000° 58.847' W

60° 41.900' N 000° 58.847' W  
60° 42.052' N 000° 59.150' W

The cable landing point is at:

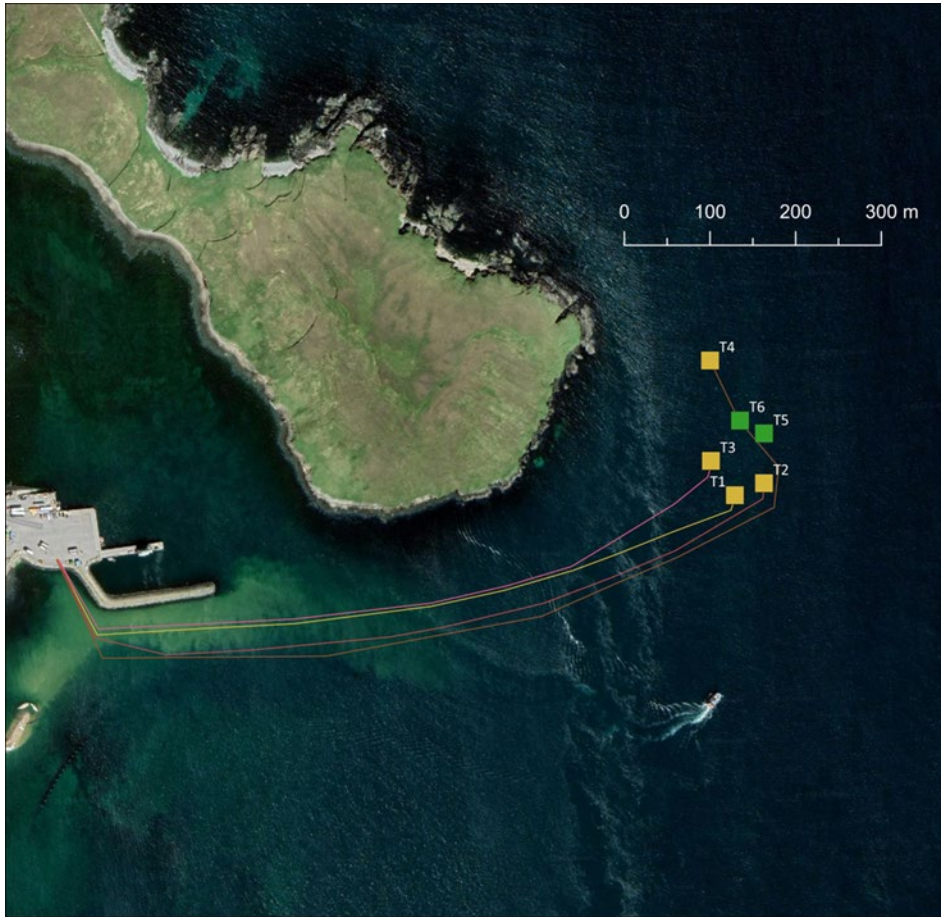
60° 41.883' N 000° 59.933' W

#### 3.2 Positions of equipment to be decommissioned

At the time of writing, the Shetland Tidal Array comprises the three M100 (geared) turbines (T1, T2 and T3) and three M100-D (direct drive) turbines. A subsea hub with export cable has also been installed, connected via jumper cables to the fifth and sixth M100-D turbines. In total there are five export cables back to the landfall at Cullivoe Pier. Figure 3-2 shows the as-installed turbine array and cable layout.

This document sets out the methodologies by which each of the three M100 turbines (T1, T2 and T3) in the Shetland Tidal Array will be fully decommissioned. The three M100-D turbines and associated infrastructure (cables and subsea hub) will not be decommissioned and will remain in situ on the seabed.





**Figure 3-2: Shetland Tidal Array installed layout, including six turbines and five export cables.**

Source: Copyright © Nova Innovation 2023

The as-installed coordinates for all six turbines and subsea hub in the Shetland Tidal Array are provided in Table 3-1 and coordinates for the subsea cables are provided in Table 3-2.

**Table 3-2: Turbine coordinates**

	UTM V30 N/E		WGS84 GPS Lat/Long					
			(Degrees and decimal minutes)					
	Northing	Easting	Deg	Min	N/S	Deg	Min	E/W
T1 Turbine	6730893	610079	60°	41.91	N	000°	59.02	W
T2 Turbine	6730908	610113	60°	41.92	N	000°	58.98	W
T3 Turbine	6730923	610049	60°	41.93	N	000°	59.05	W
T4 Turbine	6731051	610060	60°	41.99	N	000°	59.03	W
T5 Turbine	6730965	610113	60°	41.94	N	000°	58.98	W
T6 Turbine	6730980	610085	60°	41.96	N	000°	59.01	W
T5/6 Hub	6730970	610098	60°	41.95	N	000°	58.99	W

Source: Copyright © Nova Innovation 2023

**Table 3-2: Subsea cable routes**

	UTM V30 N/E		WGS84 GPS Lat/Long (Degrees and decimal minutes)					
			Lat			Long		
	Northing	Easting	Deg	Min	N/S	Deg	Min	E/W
<b>T1 Cable</b>								
Turbine T1	6730893	610079	60°	41.91	N	000°	59.02	W
WP01	6730876	610075	60°	41.90	N	000°	59.02	W
WP02	6730851	610007	60°	41.89	N	000°	59.10	W
WP03	6730824	609939	60°	41.87	N	000°	59.17	W
WP04	6730806	609889	60°	41.87	N	000°	59.23	W
WP05	6730784	609807	60°	41.85	N	000°	59.32	W
WP06	6730765	609725	60°	41.85	N	000°	59.41	W
WP07	6730745	609564	60°	41.84	N	000°	59.59	W
WP08	6730739	609461	60°	41.84	N	000°	59.70	W
WP09	6730731	609335	60°	41.83	N	000°	59.84	W
SHORE	6730819	609287	60°	41.88	N	000°	59.89	W
<b>T2 Cable</b>								
Turbine T2	6730908	610113	60°	41.92	N	000°	58.98	W
WP01	6730889	610110	60°	41.91	N	000°	58.98	W
WP02	6730828	610009	60°	41.88	N	000°	59.10	W
WP03	6730798	609938	60°	41.86	N	000°	59.17	W
WP04	6730767	609856	60°	41.84	N	000°	59.27	W
WP05	6730741	609740	60°	41.83	N	000°	59.39	W
WP06	6730726	609677	60°	41.83	N	000°	59.46	W
WP07	6730714	609513	60°	41.82	N	000°	59.64	W
WP08	6730707	609414	60°	41.82	N	000°	59.75	W
WP09	6730710	609325	60°	41.82	N	000°	59.85	W
SHORE	6730819	609287	60°	41.88	N	000°	59.89	W
<b>T3 Cable</b>								
Turbine T3	6730923	610049	60°	41.93	N	000°	59.05	W
WP01	6730915	610048	60°	41.92	N	000°	59.05	W
WP02	6730883	610007	60°	41.90	N	000°	59.10	W
WP03	6730840	609939	60°	41.88	N	000°	59.17	W
WP04	6730809	609889	60°	41.87	N	000°	59.23	W
WP05	6730785	609813	60°	41.86	N	000°	59.31	W
WP06	6730768	609725	60°	41.85	N	000°	59.41	W
WP07	6730748	609564	60°	41.84	N	000°	59.59	W
WP08	6730742	609461	60°	41.84	N	000°	59.70	W
WP09	6730734	609335	60°	41.84	N	000°	59.84	W
SHORE	6730819	609287	60°	41.88	N	000°	59.89	W

	UTM V30 N/E		WGS84 GPS Lat/Long (Degrees and decimal minutes)					
			Lat			Long		
	Northing	Easting	Deg	Min	N/S	Deg	Min	E/W
<b>T4 Cable</b>								
Turbine	6731051	610060	60°	41.99	N	000°	59.03	W
WP01	6730991	610102	60°	41.96	N	000°	58.99	W
WP02	6730947	610152	60°	41.94	N	000°	58.93	W
WP03	6730860	610140	60°	41.89	N	000°	58.95	W
WP04	6730753	610053	60°	41.83	N	000°	59.05	W
WP05	6730703	609945	60°	41.81	N	000°	59.17	W
WP06	6730665	609735	60°	41.79	N	000°	59.40	W
WP07	6730668	609409	60°	41.80	N	000°	59.76	W
WP08	6730733	609326	60°	41.83	N	000°	59.85	W
SHORE	6730819	609287	60°	41.88	N	000°	59.89	W
<b>T5/6 Cable</b>								
T5/6 Hub	6730970	610098	60°	41.95	N	000°	58.99	W
WP01	6730931	610109	60°	41.93	N	000°	58.98	W
WP02	6730920	610130	60°	41.92	N	000°	58.96	W
WP03	6730870	610130	60°	41.90	N	000°	58.96	W
WP04	6730763	610043	60°	41.84	N	000°	59.06	W
WP05	6730713	609935	60°	41.81	N	000°	59.18	W
WP06	6730675	609725	60°	41.80	N	000°	59.41	W
WP07	6730678	609419	60°	41.80	N	000°	59.75	W
WP08	6730743	609336	60°	41.84	N	000°	59.84	W
SHORE	6730819	609287	60°	41.88	N	000°	59.89	W

Source: Copyright © Nova Innovation 2023

## 4 Equipment to be decommissioned

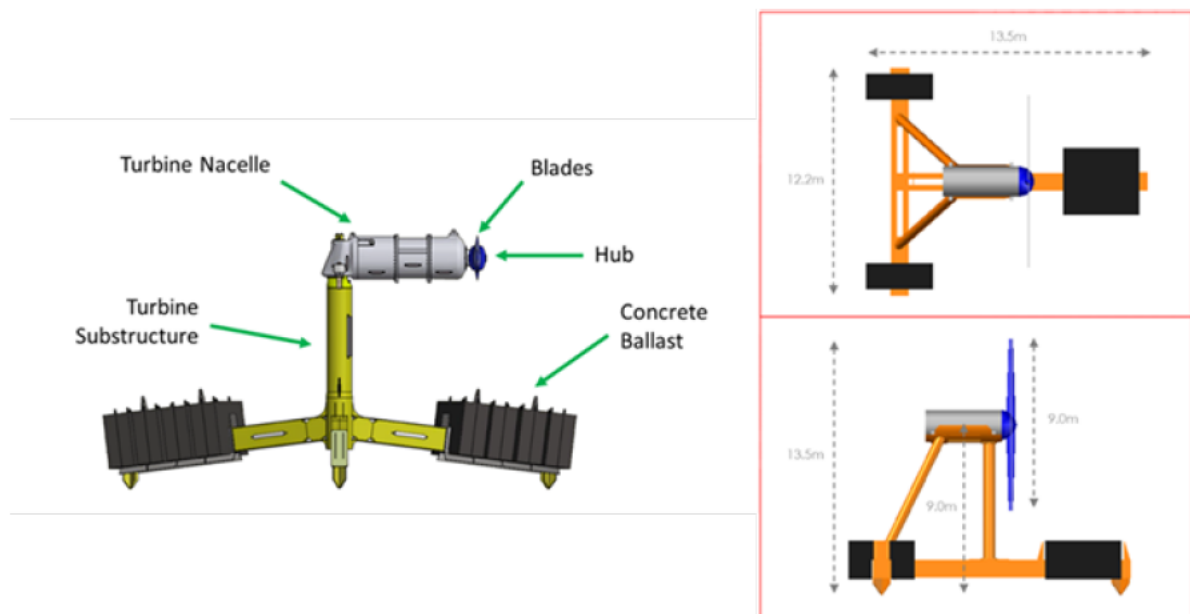
### 4.1 Overview

This document sets out the methodologies by which each of the three M100 turbines (T1, T2 and T3) in the Shetland Tidal Array will be fully decommissioned. The three M100-D turbines and associated infrastructure (cables and subsea hub) will not be decommissioned and will remain in situ on the seabed.

Decommissioning the three M100 turbines will involve the removal of the following infrastructure for each turbine:

- Turbine nacelle, including the hub and rotor.
- Gravity-base steel sub-structure and concrete ballast.
- Export cable.

Figure 4-1 provides an illustration of the M100 turbine (left) and dimensions (right).



**Figure 4-1: Shetland Tidal Array installed layout, including six turbines and five export cables.**

Source: Copyright © Nova Innovation 2023

Table 4-1 details key dimensions of the M100 turbines.

**Table 4-1: Key dimensions and dry/wet weights of M100 turbine components.**

M100 component parameter	Detail
Nacelle weight	13.5t / 1.0t
Steel substructure weight (inc. cable attachment)	32.0t / 28.0t
Concrete ballast blocks (each)	7.2t / 4.6t (14 individual blocks)
Weight of ballast units (total)	101.0t / 63.7t
Total weight	146.3t / 93.4t
Hub height	9.0m
Rotor diameter	9.0m
Blade tip height	13.5m
Substructure plan view footprint	13.5 x 12.2 m
Points of contact with seabed	Three single point contacts per turbine (>0.4m <sup>2</sup> each point)

Source: Copyright © Nova Innovation 2019

The turbine gravity-base substructures are ballasted using 14 individual concrete blocks per turbine. There are no permanent fixings or piles into the seabed.

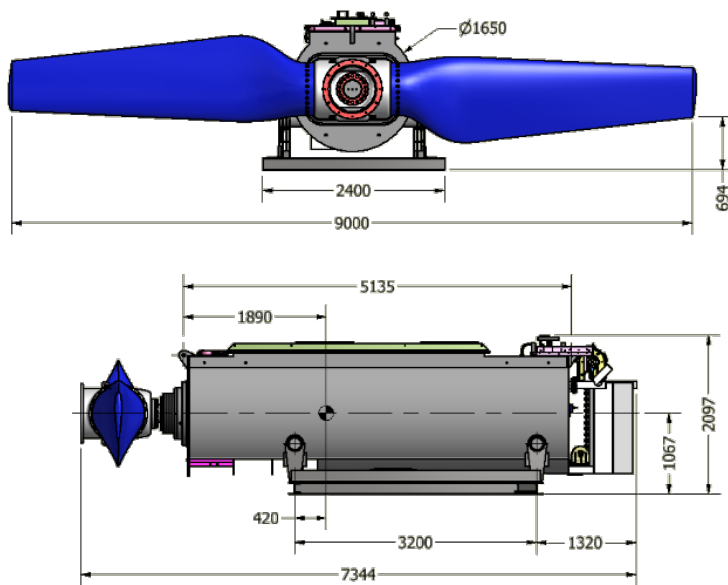
T1, T2 and T3 each have their own dedicated cables to shore. Approximate cable lengths are as follows:

- T1 = 1,007m
- T2 = 1,085m
- T3 = 971m

These cables retain position on the seabed under their own weight and through careful micro-siting and orientation. No cable protection has been used.

## 4.2 M100 nacelle

The key dimensions of the Nova M100 nacelle are provided in Figure 4-2.

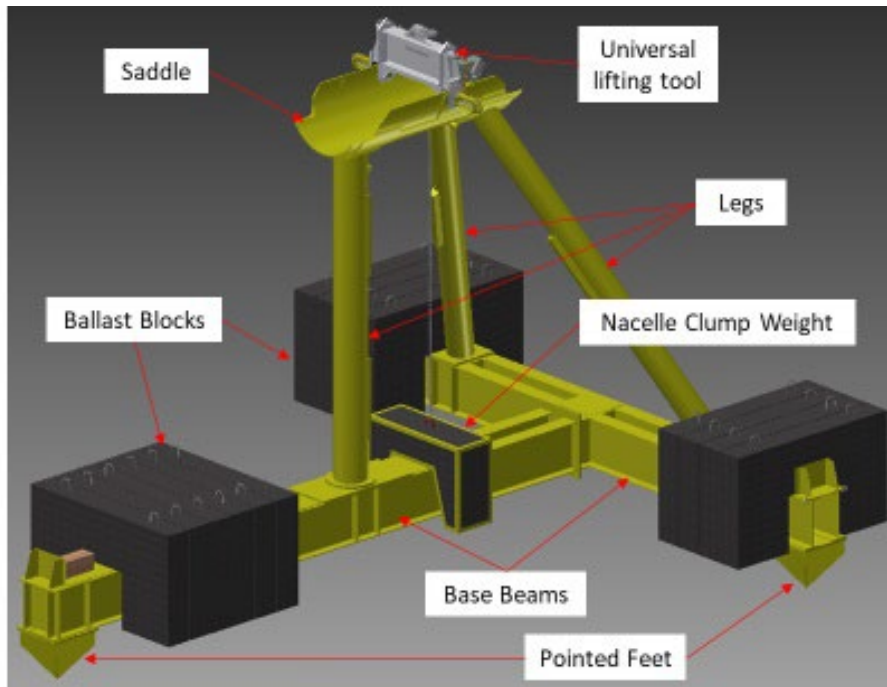


**Figure 4-2: Nova M100 nacelle and rotor on transport stand.**

Source: Copyright © Nova Innovation 2019

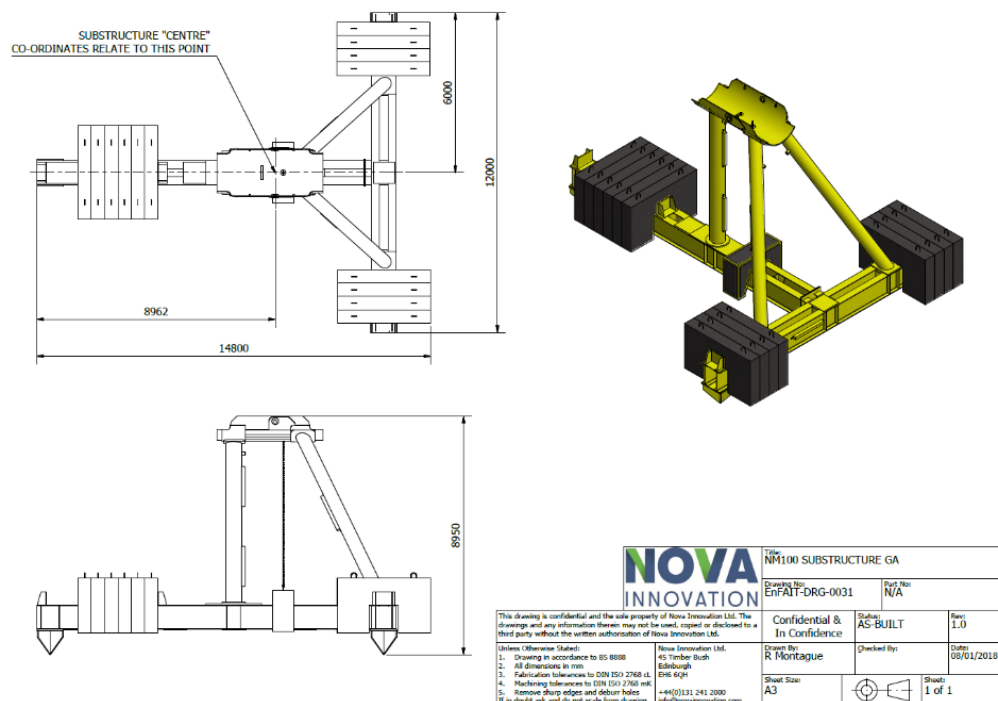
### 4.3 Turbine substructure

Components of the M100 turbine substructure are provided in Figure 4-3, with dimensions in Figure 4-4.



**Figure 4-3: Nova M100 turbine substructure components.**

Source: Copyright © Nova Innovation 2019



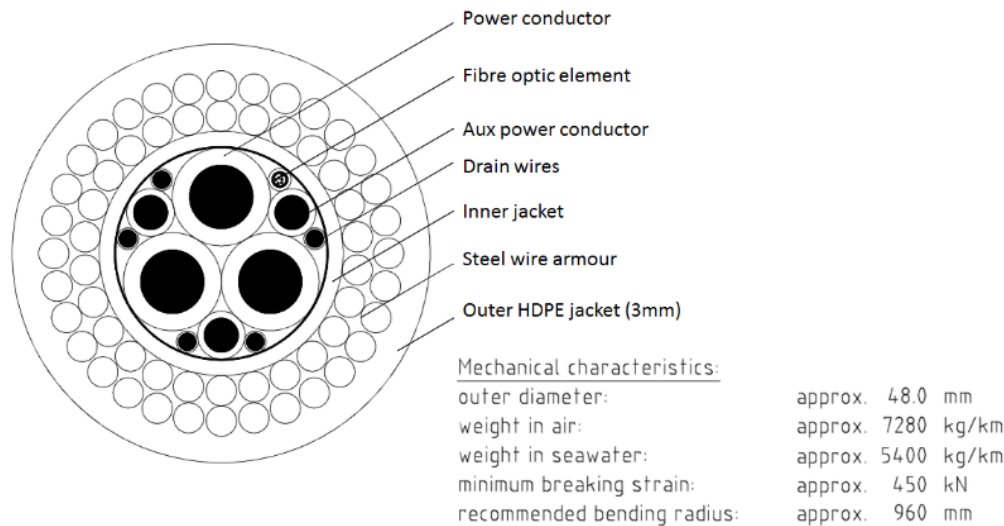
**Figure 4-4: Nova M100 turbine substructure dimensions.**

Source: Copyright © Nova Innovation 2019



## 4.4 Subsea cable

Each subsea cable (one for each of the three M100 turbines to be decommissioned) is around 1000m long and consists of a number of copper conductors and optical fibres, protected by a double armour layer and HDPE sheath. An indicative cross section is shown in Figure 4-5. The cable is laid directly on the seabed, without the need for any additional protection (e.g., concrete mattresses), other than a short HDPE pipe sheath at each end (the turbine sheath is described below).



**Figure 4-5: Subsea cable cross section.**

The subsea cable is fixed to a Cable Termination Module (CTM) which includes a pop-up-buoy unit. The CTM is usually detached from the nacelle during maintenance operations. During decommissioning, the CTM will be left attached to the nacelle and the cable cut below the CTM.

## 4.5 Overview of the decommissioning process

Once onshore, all components will be recycled or disposed of in accordance with relevant recycling and waste disposal procedures. All infrastructure and equipment will be removed from the seabed during decommissioning. This will be confirmed by post-decommissioning survey of the site.

The following sections provide more further details of the decommissioning process set out above, including the vessels and equipment to be used and the detailed decommissioning methodologies.

## 5 Decommissioning vessels and equipment

### 5.1 Decommissioning vessels

The small scale and modularity of Nova’s turbines mean that only one multicat workboat vessel is required to carry out decommissioning works for the three M100 turbines and cables. An example of a suitable vessel is shown in Figure 5-1.



**Figure 5-1: Representative turbine deployment and retrieval vessel (Leask Marine C-Odyssey).**

*Source: Leask Marine*

These types of vessel have proven capability of operating in the conditions commonly experienced in and around the Bluemull Sound since 2016, during the installation and maintenance of the six turbines in the Shetland Tidal Array. They have sufficient margin of additional operational safety capacity to comfortably deal with the size and weight of equipment involved in these decommissioning works.

Site surveys will be conducted using a smaller, local vessel. Nova do not intend to ever have more than one vessel on site at any time. As with previous STA operations, a 4-point mooring will be used as required.

The Decommissioning Phase Emergency Response Cooperation Plan (ERCoP) (see Section 2 for details) provides a full list of all vessels that may be used for decommissioning. In advance of decommissioning operations, Nova will notify Shetland Coastguard of which vessels will be used.

### 5.2 Ancillary decommissioning equipment

#### 5.2.1 Universal lifting tool

The universal lifting tool (shown in Figure 5-2) enables a fully ballasted substructure to be lifted from a single point via the 2 lifting sockets at the top of each substructure saddle. The lifting tool can be remotely engaged or released (incorporated hydraulic rams) either subsea or onshore.



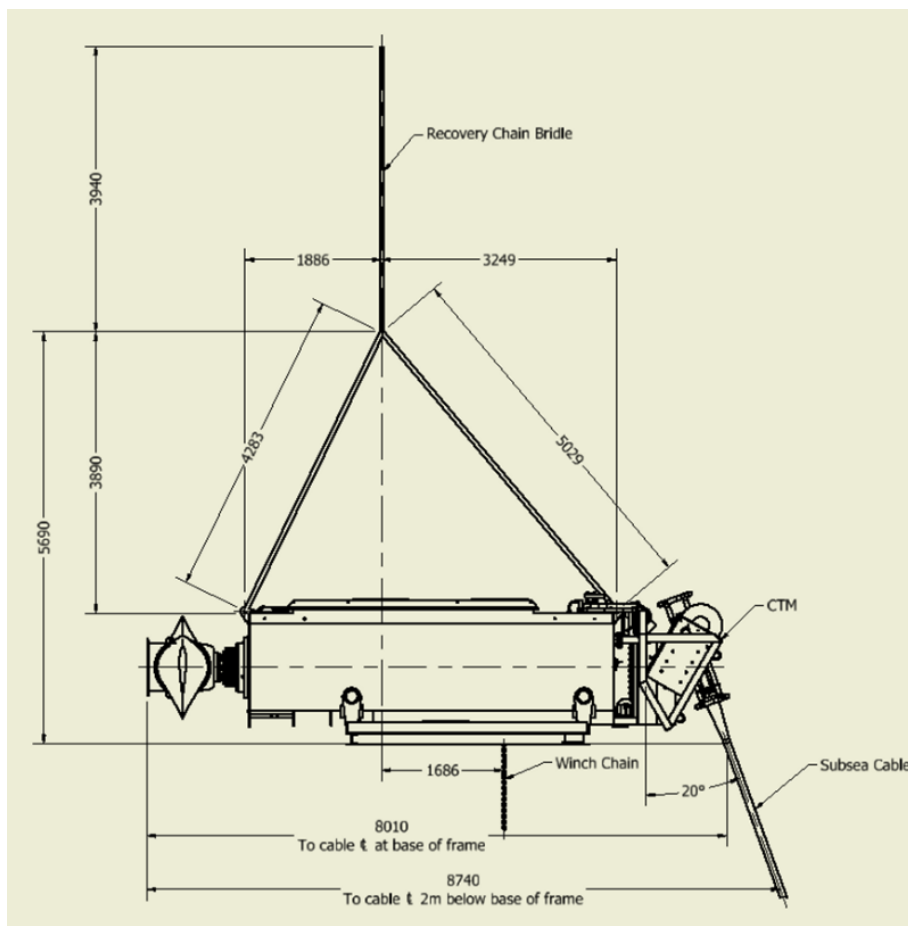


**Figure 5-2: Universal lifting tool used for lifting fully ballasted turbine substructures.**

Source: Copyright © Nova Innovation 2022

### 5.2.2 Lift bridle

The lift bridles ensure a stable lift of the turbine nacelle. They are a 22mm Grade 100 assembly comprising of: 22mm 2 leg chain sling, 5m B/B c/w self-locking hooks & shortening hooks. Two legs at 2m chains terminating in HA36ML masterlinks running off the main masterlink. Figure 5-3 shows a schematic of the bridles.

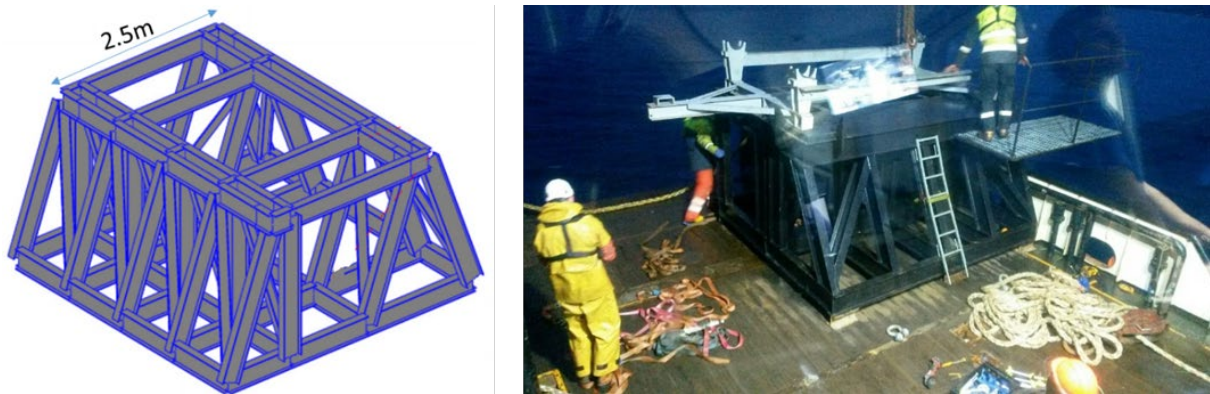


**Figure 5-3: Schematic showing lift bridle dimensions for a stable lift.**

Source: Copyright © Nova Innovation 2022

### 5.2.3 Turbine nacelle grillage

The “grillage”, shown in Figure 5-4, is a 2 m bespoke steel fabrication used during deployment and recovery operations to raise the turbine nacelle above the level of the deck so that the cable can be connected and disconnected more easily. NB Not all Multicats will require this: for example, a Damen 2611 or larger can accommodate the nacelle directly on-deck.



**Figure 5-4: Turbine nacelle grillage.**

### 5.2.4 Cable recovery reel and spooler

Each subsea cable will be reeled onto a steel transport reel (see Figure 5-5). This reel has an outside diameter of 2.4m and an external width of 1.84m. The empty weight of the reel is 950kg. The total weight of cable and reel is therefore approximately 9 tonnes.



**Figure 5-5: Cable reel and spooler.**

The cable spooler will be supplied by the marine contractor supporting Nova during decommissioning. It consists of a steel frame with a hydraulically driven axle and a diesel generator hydraulic power pack. These two units are transported and lifted separately but need to be positioned adjacent to each other and connected via hydraulic quick disconnect fittings prior to use. They are also shown in Figure 5-5.

The spooler power pack weighs 1.3 tonnes and has dimensions of 1.0 x 2.1m x 1.9m. The empty cable spooler weighs approximately 3 tonnes and has dimensions of 4.7m x 2.0m.

### 5.2.5 Decommissioning equipment list

Table 5-1 lists the equipment required for decommissioning operations, with items to be provided by the marine contractor highlighted in green. All “Nova” equipment is stored on-site in Cullivoe.

**Table 5-1: Decommissioning equipment list.**

Description	QTY	Responsible	Location
<b>Offshore (general)</b>			
4-point mooring spread	1	Contractor	Installed prior to ops
Vessel line boat / tender with A-frame, lights and back-up outboard	1	Contractor	Vessel equipment
Spyball camera, cable and command unit	1	Contractor	Vessel equipment
Subsea hydraulic grab and power pack	1	Contractor	Vessel stores
Spare Spyball camera, cable and command unit	1	Nova	Cullivoe
Safety harness and fall prevention system for working at height on nacelle	2	Nova (contractor supplies own)	Cullivoe
Lifejackets with personal AIS locator beacons for any night deck work or transfers	3	Nova (contractor supplies own)	Cullivoe
<b>Turbine nacelle retrieval</b>			
Appropriate nacelle transport frame (T1/T2/T3)	2	Nova	Cullivoe
Nacelle transport frame U-bolts, nuts and washers	4	Nova	Cullivoe
Nacelle deployment bridle (for use with diver to recover)	1	Nova	Cullivoe
12/13.5t tonne bow shackle with bolt and safety pin	2	Nova	Cullivoe
Nacelle grillage	1	Nova	Cullivoe
40m of 24mm Polysteel rope (or similar) tag lines	2	Contractor	Vessel stores
4m EWL 5 tonne soft sling (or similar)	1	Contractor	Vessel stores
35 tonne bow shackle (or similar to suit anchor handing winch wire socket)	1	Contractor	Vessel stores
<b>Turbine substructure retrieval</b>			
Universal substructure lift beam (T1/T2/T3)	1	Nova	Cullivoe
55t hydraulic shackle with associated lifting and actuation gear	1	Nova	Cullivoe
<b>Subsea cable retrieval</b>			
Cable reel (T1/T2/T3)	3	Nova	Cullivoe
Suitable cable reeler	1	Contractor	Hired
Grinder	1	Contractor	Vessel stores
Chinese fingers to immobilise cable end on reel	1	Contractor	Vessel stores

## 6 Decommissioning methods

### 6.1 Preparations

Decommissioning will involve removing each of the three M100 turbines in turn. Prior to decommissioning the following preparatory work will be conducted:

1. All necessary Notices to mariners will be issued in advance of the decommissioning works to ensure they are carried out safely and without risk to marine navigation and other sea users (see Section 8.4 for further details).
2. A drop down video survey will be conducted of all M100 turbines (nacelles, substructures and cables) to confirm their condition. If any issues or hazards that could risk safe and responsible decommissioning are identified, works will be rescheduled until such time as issues or hazards have been rectified.
3. Full project task and Health and Safety checks and briefings are completed<sup>1</sup> for all personnel involved in the decommissioning works.
4. The decommissioning vessel will be prepared with all necessary personnel and equipment (including the relevant items from the equipment list in Table 5-1).
5. All six turbines in the array will be parked and electrically isolated.
6. The vessel will deploy a four-point mooring spread over the turbine location mooring clump weight anchors with risers and suitable marker buoys.

### 6.2 M100 nacelle and cable

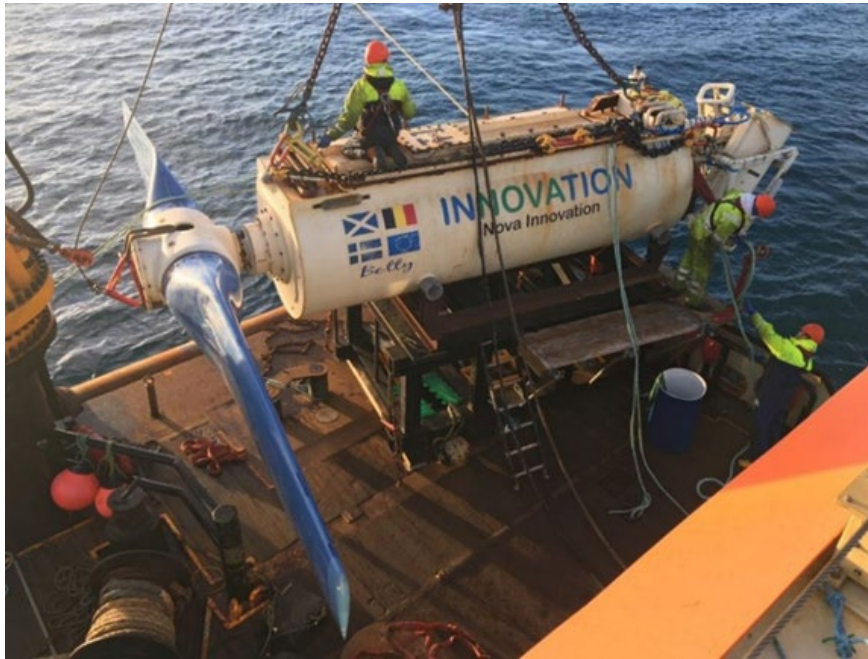
Following completion of decommissioning preparations, each turbine nacelle will be recovered onto the decommissioning vessel and to shore at Cullivoe in the following stages:

1. The nacelle is physically unlatched and shackled by a diver onto the appropriate lifting masterlink of the lifting bridle.
2. The nacelle is lifted by the decommissioning vessel winch using the lift bridle from the substructure to the surface.
3. At the surface, the turbine's cable is disconnected and wet-stowed on the seabed while the nacelle is recovered to shore.
4. The nacelle is transferred from the vessel winch to the lifting crane and lifted out of the water.
5. The nacelle is lowered into position and secured into a transport cradle on the deck of the decommissioning vessel (illustrated in Figure 6-1).
6. The nacelle is recovered to shore and transferred from the vessel to the quay at Cullivoe using the decommissioning vessel lifting crane.

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<sup>1</sup> For further details, see (Nova Innovation, 2023). Shetland Tidal Array Decommissioning Phase Emergency Response Cooperation Plan (ERCoP) (T1-3).





**Figure 6-1: Turbine nacelle in transport cradle on deck with deployment bridge.**

Source: Copyright © Nova Innovation 2022

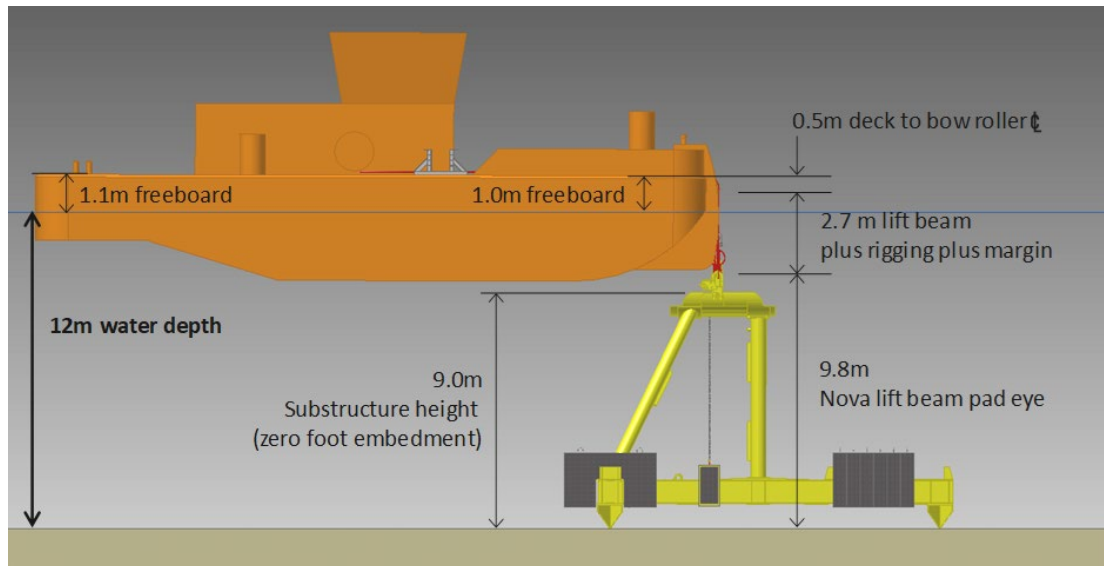
Having been wet-stowed on the seabed while the nacelle is recovered to shore, the turbine cable is now recovered separately by the decommissioning vessel and transported to shore at Cullivoe in the following stages:

1. The offshore end of the cable is pulled to the aft of the decommissioning vessel and secured on deck temporarily.
2. The cable end is then securely attached to the vessel winch, from where it is connected to the reeler on the deck of the vessel and spooled onto a drum. The cable's short turbine-end protective outer HDPE pipe is removed with the cable.
3. The cable is slowly recovered by reeling in as the vessel moves towards shore along the cable route at a speed no greater than 1 knot. The cable is recovered onto the reeler while constantly monitoring bottom 'lift-off' using a drop-down video camera. As the vessel moves, the subsea cable is reeled in using the cable spooler.
4. When the vessel is close to shore at Cullivoe a clump weight mooring may be used to assist the vessel with holding position while the shoreside/nearshore cable length is pulled aboard.
5. The shore end of each cable will have been previously disconnected at the appropriate housing and manually pulled through the onshore duct to lay on the beach. This shore end of the cable is pulled through the intertidal zone via the spool on the vessel.
6. Once all the cable is reeled aboard the vessel, the cable recovery operation is complete.
7. The cable reel is transferred from the vessel to the quay at Cullivoe using the decommissioning vessel lifting crane.

### 6.3 Turbine substructure

Following completion of turbine nacelle and cable decommissioning, each turbine gravity-base substructure will be recovered onto the decommissioning vessel and to shore at Belmont Pier (Unst) in the following stages:

1. The previously described four-point mooring spread described in Section 6.1 is utilised by the vessel to provide positional holding to recover the substructure from the seabed.
2. The decommissioning vessel is positioned with the centre of its bow directly above the substructure.
3. The universal lifting tool (see Section 5.2.1) is lowered from the vessel and attached to the substructure either remotely using the onboard cameras, or divers and hydraulics. Figure 6-2 provides an illustration of the substructure lift by the decommissioning vessel.



**Figure 6-2: Illustration of turbine substructure lift (minimum water depth required is 12m).**

Source: Copyright © Nova Innovation 2020

4. The substructure is lifted from the seabed using the universal lifting tool and the decommissioning vessel's main winches for a suspended tow to shore.
5. The substructure is set down at a temporary anchorage location at Cullivoe. The concrete ballast blocks are removed individually from the substructure utilising divers and secured on the multicat deck for unloading quayside once offshore operations are complete.
6. The decommissioning vessel lifts the de-ballasted substructure and transports it from the temporary anchorage location at Cullivoe to Belmont Pier using the universal lifting tool.
7. Once at Belmont Pier, the vessel positions the substructure ready for lifting ashore using a land-based 220-tonne mobile crane with full (71t) ballast.
8. Onshore, the substructure is set onto trestles or suitable packers so that it is level and the base spikes do not impact the quayside surface (as shown in Figure 6-3).



**Figure 6-3: Substructure on steel trestles at Belmont pier).**

Source: Copyright © Nova Innovation 2020

## 6.4 Onshore decommissioning works

Once onshore, further decommissioning works are carried out. Full details of which are provided in the following documents, also summarised in Table 1-1:

- Decommissioning Methodology for the Bluemull Sound Tidal Array (turbines T1-3). EnFAIT-0389 Version 3.0.
- Bluemull Sound Tidal Array Decommissioning Programme (Turbines T1-3). EnFAIT-0390 Version 3.0.

A summary of onshore decommissioning tasks is as follows:

1. The nacelle and substructure are inspected for the presence of Invasive Non-Native Species (INNS). If inspections identify INNS species, care will be taken to avoid contaminated material entering the marine environment. Full details of biosecurity measures during decommissioning are provided in the Decommissioning Environmental Monitoring and Mitigation Plan (see Table 1-1).
2. The nacelle and substructure are cleaned to enable safe onshore handling.
3. The hub is unbolted from the nacelle and both components are lifted by Hiab or the decommissioning vessel crane onto a flat-bed truck for removal from site.
4. The turbine substructure is dismantled and component parts are lifted by Hiab onto a flat-bed truck for removal from site.
5. The cable reel is lifted by Hiab onto a flat-bed truck for removal from site.

Where possible, all materials and components removed from site will be reused, reconditioned, repurposed or recycled. Material will only be disposed of where these other options are not possible. Where this is the case, all material will be disposed of responsibly in full compliance with corresponding waste regulations.

## 6.5 Site inspections

A full site survey will be performed after final decommissioning, covering all decommissioned turbine locations and cable routes. This will be carried out using a drop-down video camera.

The results of the post-decommissioning survey will be included in a post-decommissioning report that will be submitted to MS-LOT, SIC and BEIS. For further detail on the post-decommissioning report, see Section 8.6.

## 7 Decommissioning schedule

Decommissioning is currently planned to take place in late April and May 2023, based on vessel availability. Decommissioning will involve removing each of the three M100 turbines in turn: removing the turbine, foundation and cable to shore for recycling or disposal and surveying the site to confirm all equipment has been removed. Decommissioning will occur over one vessel mobilisation lasting approximately 2 weeks. An outline schedule is provided in Table 7-1. Notices to Mariners will be issued in advance of works commencing and will be notified to HM Coastguard at [renewables@hmcg.gov.uk](mailto:renewables@hmcg.gov.uk).

**Table 7-1: Outline decommissioning schedule for 2023.**

Turbine	Activity	w/c 24/05/2023	w/c 01/05/2023
T1	Remove nacelle	●	
	Lift substructure	●	
	Recover and spool cable	●	
T2	Remove nacelle	●	
	Lift substructure		●
	Recover and spool cable	●	
T3	Remove nacelle	●	
	Lift substructure		●
	Recover and spool cable	●	
T1-T3	Site survey		●

Source: Copyright © Nova Innovation 2023

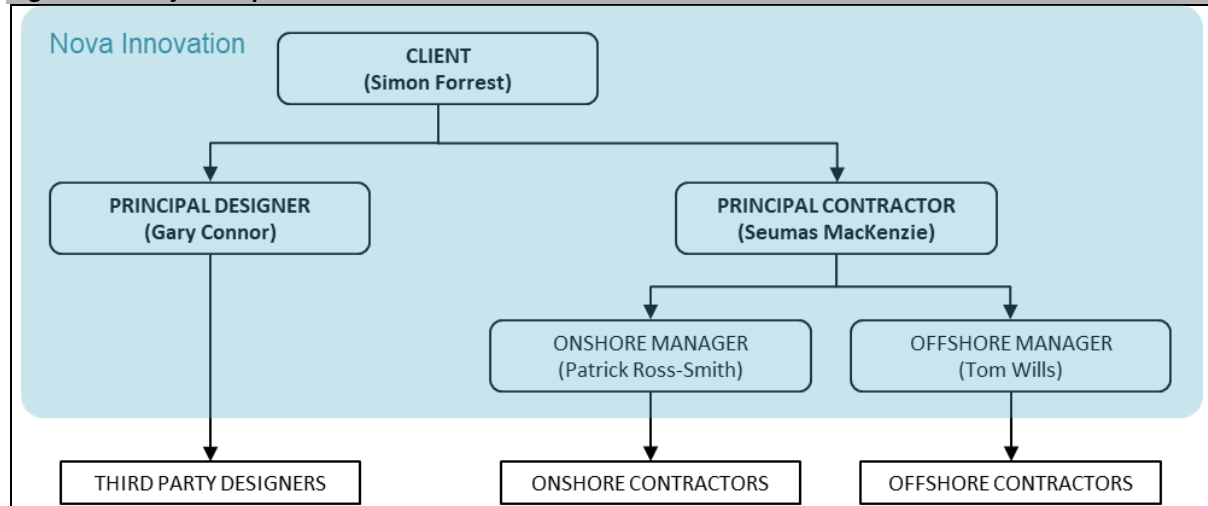


## 8 Decommissioning roles and responsibilities

### 8.1 Responsibilities

Nova Innovation has primary responsibility for implementing the Decommissioning Method Statement and in line with the UK Construction (Design and Management) Regulations 2015, the company is acting as client, principal designer and principal contractor for the development. To ensure accountability, named individuals within Nova Innovation are appointed to these different roles (Figure 8-1).

**Figure 1-1: Project responsibilities.**



Source: Nova Innovation 2020

Contact details for these individuals are as follows:

[redacted]

Simon Forrest, Client/CEO

Seumas Mackenzie, Principal Contractor/Project Manager

Gary Connor, Principal Designer/Engineering Director

Patrick Ross-Smith, Onshore Manager

Tom Wills, Offshore Manager

Contact details for nominated offshore contractors are detailed in Nova's Marine Licence (available here: <http://marine.gov.scot/ml/marine-licence-deposits-tidal-array-bluemull-sound-shetland-04859>), while contact details for onshore contractors are detailed in Nova's Construction Phase Plan.

In addition to the above Nova personnel, Kate Smith, Nova's Environmental Manager is responsible for overseeing delivery of the environmental commitments during decommissioning. Contact details are as follows: [kate.smith@novainnovation.com](mailto:kate.smith@novainnovation.com), 0131 241 2000.

## 8.2 Management of decommissioning operations

Offshore decommissioning operations will be carried out during appropriately slack tides with suitable wave and weather conditions. The operations will be managed by Nova Innovation staff who will be resident in Shetland for the project.

Temporary marker buoys required during vessel operations will be deployed in compliance with COLREGS and removed on completion of deployment.

## 8.3 Decommissioning compliance and review

As mentioned in Section 2, Nova maintains a Licence Conditions Status Register for the Shetland Tidal Array, which is regularly shared with Marine Scotland (MS-LOT) and Shetland Islands Council (SIC), to track and record compliance with all licence conditions. This register will be updated to include any new conditions associated with decommissioning (following issue of the Marine Licence by MS-LOT).

The register will also be shared with BEIS, to reflect its overall responsibility for decommissioning the three M100 turbines.

## 8.4 Good practice and mitigation

Full details of all good practice measures during decommissioning are provided in the Decommissioning Environmental Monitoring and Mitigation Plan and summarised in Table 8-1. This table will be included in the operational documentation provided to the offshore contractor and measures included in all site and task briefings.

Table 3-1: Environmental mitigation and good practice measures during decommissioning.		
Mitigation or good practice measure	Responsible person(s)	Corresponding licence condition
<b>Minimising disturbance to wildlife during site operations</b>		
All personnel to adhere to the Scottish Marine Wildlife Watching Code during all installation, operation and maintenance activities. Copies of the code kept in site files at Cullivoe, and Nova offices and onboard all vessels engaged in Works. Included in all site briefings.	Tom Wills	Marine Licence condition 3.1.10 Works Licence condition 8
<b>Avoidance of damage to seabed habitats and species</b>		
Siting of clump chains and moorings for decommissioning undertaken utilising visual feedback system such as a camera or ROV, to prevent placing in or on maerl or horse mussel beds <sup>2</sup> .	Tom Wills	Marine Licence condition 3.1.10 Works Licence condition 4; 7
All lifting equipment appropriately certified and all lifts and offshore operations appropriately risk assessed to minimise the risk of dropped objects during deployment and retrieval.	Tom Wills	Marine Licence condition 3.1.10 Works Licence condition 3

<sup>2</sup> Detailed video surveys have been conducted of the deployment site and cable route throughout construction and operation phase of the Shetland Tidal Array. No evidence of species on the marine priority list (in particular horse mussels or Maerl) have been observed.

MS-LOT to be notified within 24 hours in the event of a dropped object event.		
<b>Waste and pollution</b>		
All debris or waste material (including that below MHWS) will be removed from the site at Cullivoe and disposed of responsibly (recycled where possible).	Patrick Ross Smith	Marine Licence condition 3.1.10 Works Licence condition 3
Only contractors with ISO 14001:2015 environmental management systems accreditation to be used in marine operations	Tom Wills	Marine Licence condition 3.1.10
No chemicals or fuel storage on site. If situation changes, materials will be stored appropriately including use of bunding if necessary.	Patrick Ross Smith	Marine Licence condition 3.1.8; 3.1.10; 3.2.1.3
No drilling or piling to be carried out during decommissioning, avoiding significant underwater noise and associated impacts	Tom Wills	Marine Licence condition 3.1.10
<b>Unexpected pollution or breaches of environmental obligations</b>		
Any accidental pollution or breaches to be reported to Marine Scotland within 24 hours.	Tom Wills	Marine Licence condition 3.2.1.2
Copy of Shetland Contingency Plan kept on site at Cullivoe and onboard all vessels engaged in Works. Measures in the Plan to be followed as appropriate.	Tom Wills	Marine Licence condition 3.1.10; 3.2.1.2 Works Licence condition 3
<b>Post-decommissioning</b>		
All reasonable, appropriate, and practicable steps will be taken to restore the Site to its original condition before the Works were undertaken, or to as close to its original condition as is reasonably practicable. A drop-down video survey will confirm the condition of the site and confirm that all infrastructure and equipment has been removed from the seabed.	Tom Wills	Marine Licence condition 3.2.1.4
<b>Biosecurity and Invasive Non Natives Species (INNS)</b>		
Northern Isles-based vessels to be used for decommissioning, to minimise potential for transfer of INNS	Tom Wills	Marine Licence condition 3.1.10 Works Licence condition 9
Operator used for marine operations follows its own biosecurity good practice and has ISO 14001:2015 environmental management systems accreditation	Tom Wills	Marine Licence condition 3.1.10 Works Licence condition 9
Temporary moorings (e.g., chains) used during deployment will be sourced from Shetland or pressure washed / air dried prior to use in Bluemull Sound.	Tom Wills	Marine Licence condition 3.1.10 Works Licence condition 9
Turbines and substructures will undergo visual inspections when removed from the water. Biological material is removed as standard (on Cullivoe or Belmont Pier), to avoid dangerous handling conditions. If inspections identify INNS species, care will be taken to avoid contaminated material entering the marine environment. Any INNS identified will be reported to Shetland Islands Council, Marine Scotland and Scottish Natural Heritage.	Tom Wills	Marine Licence condition 3.1.10 Works Licence condition 9

## 8.5 Communication strategy

Nova will communicate with all relevant parties to ensure that they have the information they require to ensure the decommissioning works are carried out safely and without risk to marine navigation.

Direct notifications will be issued to MS-LOT, SIC, CES and the UKHO one month in advance of the construction phase and following the completion of the construction works.

The following organisations will be notified in advance of the start of site works via a Notice to Mariners, issued at least one month prior to commencement of decommissioning works:

- Maritime and Coastguard Agency
- Crown Estate Scotland
- Marine Scotland Licensing Operations Team (MS-LOT)
- SIC (Works License Team)
- SIC Ports and Harbours
- SIC Ferries
- Northern Lighthouse Board
- Shetland Fisherman's Association (SFA)
- Shetland Shellfish Management Organisation (SSMO)
- Royal Yachting Association (RYA) – admin@ryascotland.org.uk
- Lerwick Boating Club
- Clyde Cruising Club
- Royal National Lifeboat Institution (RNLI) – Lerwick Lifeboat Station
- Shetland Maritime Rescue Coordination Centre (MRCC)
- UK Hydrographic Office
- Local Recreational Angling Associations/Operators

If necessary, additional Notices to Mariners will be issued to update the relevant parties on the progression of the decommissioning works.

A Transportation Audit Sheet (TAS) will be submitted within 14 days of the end of any calendar month where decommissioning is carried out.

In addition, we will provide information for the Kingfisher fortnightly maritime safety bulletins.

Table 8-2 provides an overview of the communications strategy for the M100 decommissioning works.

Table 8-2: Overview of M100 decommissioning communications strategy.				
Organisation	1 month prior to commencement	During active construction work		Within 1 month of completion
		Weekly	Monthly (within 14 days of end of month)	
UKHO	Direct notification in writing (by email)	Ensure Notices to Mariners live and accurate	n/a	Notify in writing, confirm detail and coordinates of decommissioned equipment.
MS-LOT			Transportation Audit Reports	Confirm completion date in writing, submit audit report.
CES			n/a	Notify in writing.
SIC				De-activate notifications
Notices to Mariners list	Issue Notices to Mariners			

Kingfisher Bulletin	Provide information for Bulletin			
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Source: Nova Innovation, 2023

## 8.6 Post-decommissioning

Following full decommissioning of the three M100 turbines and cables, a post-decommissioning report will be submitted to MS-LOT, SIC and BEIS.

The scope and content of this report will be agreed with MS-LOT, SIC and BEIS, but will include the following information:

- Evidence that all infrastructure that was due to be removed, according to the agreed Decommissioning Programme, has been removed. This might include photographic evidence of infrastructure out of the water, or survey footage of the seabed.
- References to compliance with all decommissioning and other project licence obligations.
- Comparative analysis of predicted and actual costs of decommissioning. NB this information will be confidential in nature, so Nova would request this information is not shared publicly.

## **9 Health, Safety and the Environment**

### **9.1 Overview**

The work will be conducted in compliance with Nova Innovation's HSE policy. All staff and personnel involved in the project will be fully briefed and trained and will exercise good health and safety and environmental work practices. This document should be read in conjunction with the Decommissioning Environmental Monitoring and Mitigation Plan. (DEMMP). Hard copies of all relevant Health and Safety and environmental protocols and codes of practice, along with project licences and associated documents are located at Nova's Cullivoe Pier office and shared with all personnel involved in operations.

### **9.2 Pollution prevention measures**

There are no hazardous substances contained in the turbines. All exposed steel surfaces are painted with standard marine-grade paint. There will only be less than twenty litres of hydraulic fluid in each device, contained within a sealed unit which itself is contained within the watertight nacelle.

### **9.3 Biosecurity measures**

Nova has a biosecurity plan for the Shetland Tidal Array, detailing measures to avoid contributing to the spread of invasive marine non-native species within the Shetland area. All specialist equipment to be used in decommissioning will be free from biofouling. Temporary moorings (e.g., chains) will either be sourced from Shetland or will be pressure washed or air dried prior to use in Bluemull Sound. Attempts will be made to use locally based boats for offshore operations where it is practical to do so.

Further detail on measures to avoid introducing or spreading Invasive Non Native Species (INNS) during decommissioning activities are outlined in the DEMMP, following recommendations in *A Biosecurity Plan for the Shetland Islands* (NAFC 2015).

### **9.4 Measures to avoid disturbance to marine wildlife**

All vessels engaged in decommissioning will to adhere to the Scottish Marine Wildlife Watching Code during all offshore activities. Copies of the code kept in site files at Cullivoe, and Nova offices and onboard all vessels engaged in decommissioning works. This requirement will also be included in all site briefings. Further detail on measures to avoid disturbance to marine wildlife during decommissioning activities are outlined in the DEMMP.

### **9.5 Change management**

Significant changes to the schedule or methods outlined in this Decommissioning Method Statement will be communicated to MS-LOT and the project team. This document will be updated as appropriate. Nova's internal quality and change management procedures will be adhered to at all times.

## 10 Vessel Management Plan

The vessels to be used for decommissioning operations will be determined in advance of the operation depending on availability. The size and operational capability of vessels will be as follows:

- 1) Surveying: small local boat or Multicat vessel
- 2) Equipment recovery from the seabed and transport to shore: Multicat vessel

Only one of these project vessels will be on site at any given time. The equipment deployment and recovery tasks to be carried out are of the same sort that Nova has been carrying out routinely in this area since 2014. The local harbour master and other users of Cullivoe and Belmont Pier are familiar with these operations, as are the identified vessel providers. No special vessel management arrangements are required.

The harbour master, Shetland Ports and Harbours and Shetland CGOC will be advised in advance of all operations (see Section 8.5). All quayside and harbour works will be undertaken in compliance with the direction of the harbour master.

All vessels involved in the decommissioning will comply with all aspects of the International Regulations for Preventing Collisions at Sea (COLREGS)<sup>3</sup>. All vessels used will carry all equipment as required under the vessels' registration, e.g., the Code of practice for the safety of small workboats and pilot boats<sup>4</sup>.

Notices to Mariners will be used to inform stakeholders of offshore operations. During all offshore operations we will adhere to the good practice guidelines associated with the Scottish Marine Wildlife Watching Code, hard copies of which are kept in Nova's office at Cullivoe Pier and onboard all vessels engaged in operations.

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<sup>3</sup> Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGS) (as amended)

<sup>4</sup> <https://www.gov.uk/government/publications/small-craft-codes>