Tow Plan

From:	Elsa Ramirez	Project:	MAGALLANES EMEC
		Date:	07 March 2018
To:	Florence Ungaro		
Cc:	Rupert Raymond, Douglas Leask, Olly Bethwaite	Memo No.	LSK-10159-OP03-TN01-R02
Subject:	**Tow Plan: Shapinsay-Fall of Warness**		

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1. INTRODUCTION

Magallanes is installing a 2MW floating tidal device at EMEC tidal test site in the Fall of Warness in a water depth of 49m (LAT). Magallanes platform will be carrying two tidal turbines.

The device has been built in Spain and will be towed to Shapinsay Sound (East of Kirkwall) for commissioning. The device will then be installed onto its preinstalled mooring system in the Fall of Warness.

Figure 1- Mooring location: Shapinsay and Eday

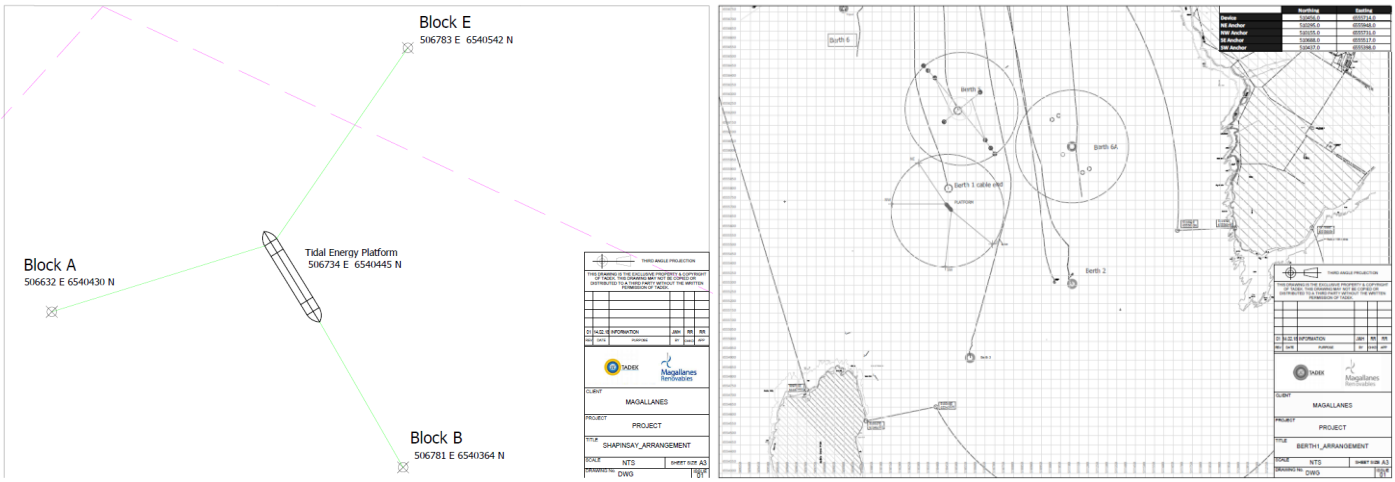

Figure 2- Left: Mooring Location at Shapinsay; Right: Mooring Location at Eday

1.1 Document Objective

This document presents the towing plan for Magallanes tidal device from Shapinsay Sound to EMEC tidal test site located on Fall of Warness.

2. VESSELS

The vessel that will collect the Floating platform from Shapinsay and tow to Fall of Warness will be either of Leask Marine Multicat Vessels the C-Fenna or C-Odyssey.

LEASK MARINE

MV C-FENNA

Specifications

General

Type of vessel	Neptune Eurocarrier 2611
Year built	January 2013
Category	MCA Cat 1
	Up to 150miles *(from safe haven)*
Passengers	12 *(plus 3 crew)*
Flag state	UK
Port of registry	Kirkwall
Classification	B.V.
Official Number	922340
IMO	9675963
Call Sign	MBAH3
MMSI	232008023

Dimensions

Overall Length	26.48m
LPP	23.65m
Beam	11m
Depth	3.5m
Draught	2.61m
Freeboard	847mm
Free Deck Space	145m²
Maximum Deck load 100te (6t/m²)	
Gross tonnage	160.78t
Net Tonnage	76t

Tank Capabilities

Fuel Oil	106m³
Fresh Water	43m³
Lub Oil	5.7m³
Hydraulic Oil	1.9m³
Dirty oil	2m³
Gearbox oil	1.9m³
Bilge Water	8m³
Ballast	34m³
Sewage	4m³

Propulsion System

Main engines	2 x Cummins QSK38-M
Total Output	2 x 1400 bhp at 1800 opm
Gearboxes	Reintjes WAF 364L 4.92:1
Propulsion	2xF.P. Ø 1630mm

Bow Thruster

360° 280kw

Auxiliary Equipment

Generator Sets	Caterpillar C9, 2 x 200kW, 250 kVA
Fuel Oil Separator	Westfalia 1740, L/H, OTC-3-02-137

Deck Equipment

Deck Cranes - FWD Heila HLRM 230-4SL, Fixed hook SWL 10.3te at 16.5m winch SWL
- AFT Heila HLRM 140-3S; Fixed hook SWL 10te at 12.17m winch SWL

Winches
- 1 x Anchor Handling Winch 100te
- 1 x Towing Winch 50te
- 4 x Tugger Winches 15te *(Fwd Port, Fwd Stbd, Aft Port, Aft Stbd)*

Towing Hook	1 x Mampaey 30te SWL
Towing pins	2 x Hydraulic + wire catcher
Anchor	2 x 265kgs
Chain	110m x 17.5mm
Anchor winch	1 x 17.5mm hydraulic heeling motor:
140bar-60 ltr./min	
Bow roller	6m

Performance

Speed	10 knots
Bollard Pull	35.6 ton

Accommodation

Heated and air-conditioned living spaces for 10 persons, consisting of 5 double crew cabins, a galley and mess and sanitary facilities.

Nautical Equipment

1 x X-band ATA Radar + ARPA, JRC type JMA-5212
2 x VHF radio telephones THRANE & THRANE type SAILOR RT 6222
1 x MF/HF radio telephone THRANE & THRANE type SAILOR 6300
2 x INMARSAT-C satellite communication systems THRANE & THRANE type SAILOR 6110
1 x Echosounder JRC type JFE-380/25
1 x Universal AIS JRC type JHS-182
1 x Auto Pilot ALPHASEAPILOT MFA
1 x Navtex JRC type NCR-333
1 x Satellite Compass JRC type JLR-21
1 x Magnetic Compass CASSENS & PLATH
1 x DGPS global positioning system JRC type JLR-7800
1 x EPIRB, MCMURDO type E5
1 x SART, MCMURDO type S4
1 x Speed log JRC type JLN-205
1 x GSM/UMTS system
1 x Bridge Navigational watch alarm system ALPHATRON

2 x portable VHF Radiotelephones GMDSS SAILOR type SP3520

www.leaskmarine.com

6 Crowness Road, Hatston Industrial Estate, Kirkwall, Orkney, KW15 1RG
T:+44 (0) 1856 874725 E: info@leaskmarine.com

3. MAGALLANES FLOATING PLATFORM SPECIFICATIONS

	Value	Unit
Overall Length	45	m
Beam	6	m
Operational Draught	23.4	m
Weight	644.2	Te

Table 1- Principal particulars of Magallanes device

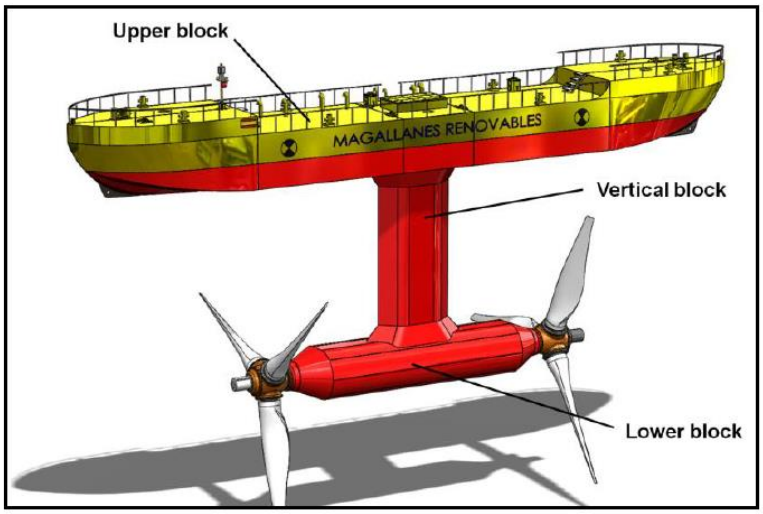

Figure 3- Magallanes- Offshore Tidal Energy Platform

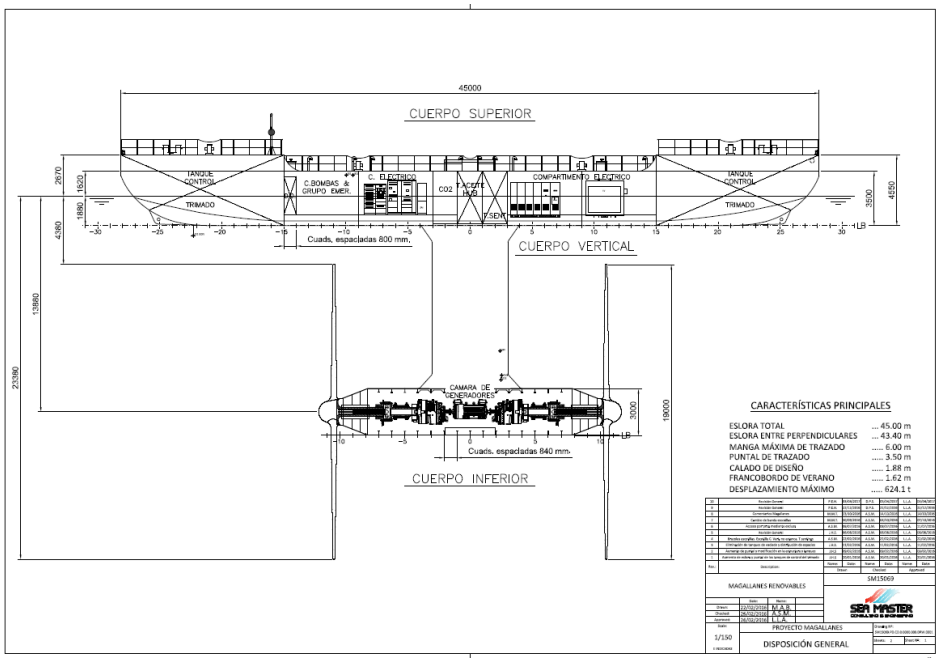

Figure 4- Device General Configuration

4. TOWING ARRANGEMENT

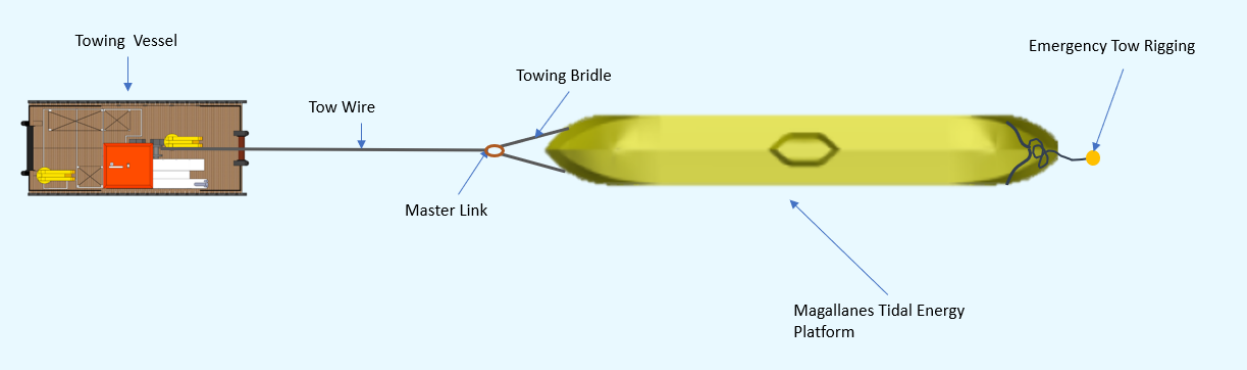

Figure 5- Tidal Energy Platform Tow Arrangement

The towing arrangement has been designed considering a speed of 7 knots.

Component	Type	SWL	MBL
Tow Eye Shackle	2x 35t Bow Shackles	35t	105t
Tow Bridle + Master Link	2x 4.6m wire	20t	60t
Tow Line	Length TBC		
Connecting Shackle	35t Bow Shackle	35t	

Table 2- Towing arrangement components specifications

In order to perform the towing operation, Leask Marine has proposed to mount the blades of the device in "bunny ears down" position which allow a minimum water depth of 18.6m.

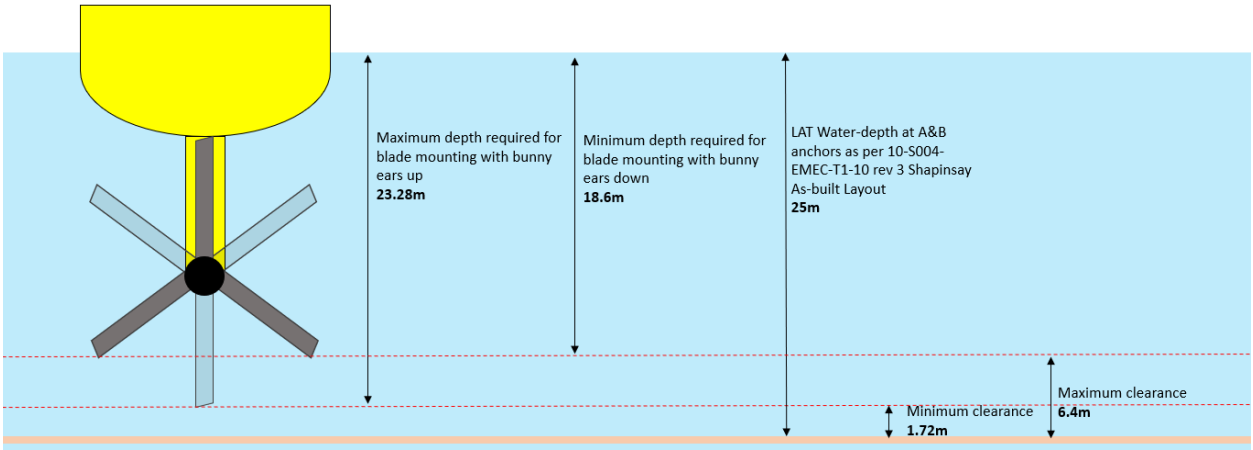

Figure 6-Device blades position for towing operation

5. TOWING ROUTE

The device is to be collected from Berth 1 at Shapinsay site and towed to Berth 1 at the Fall of Warness.

Taking into consideration a minimum water depth of 20m and a towing speed of 4 knots Leask Marine proposed the following towing route.

Based on this tow route the minimum clearance (at LAT) to the blades would be 1.4 m

In case of bad weather conditions, vessel to return to Shapinsay, by agreement of all parties.
Clear 48 hrs weather forecast prior operation.

	EASTING	NORTHING
Shapinsay: Route Start	506668.6	6540323.3
Fall of Warness: Route End	510456.0	6555714.0

Table 3- Towing Route, start and ending point coordinates.

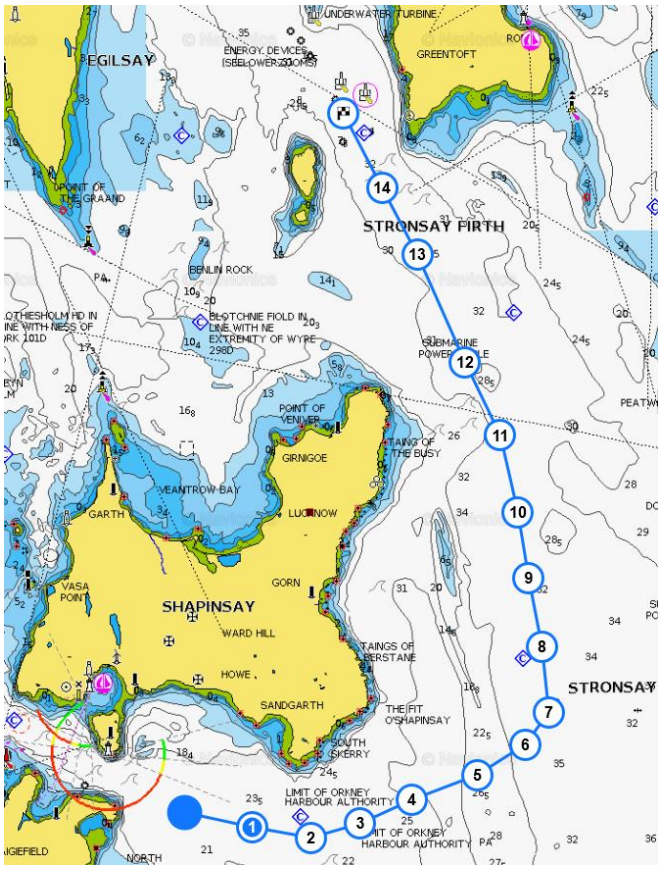

Figure 7- Proposed Towing Route