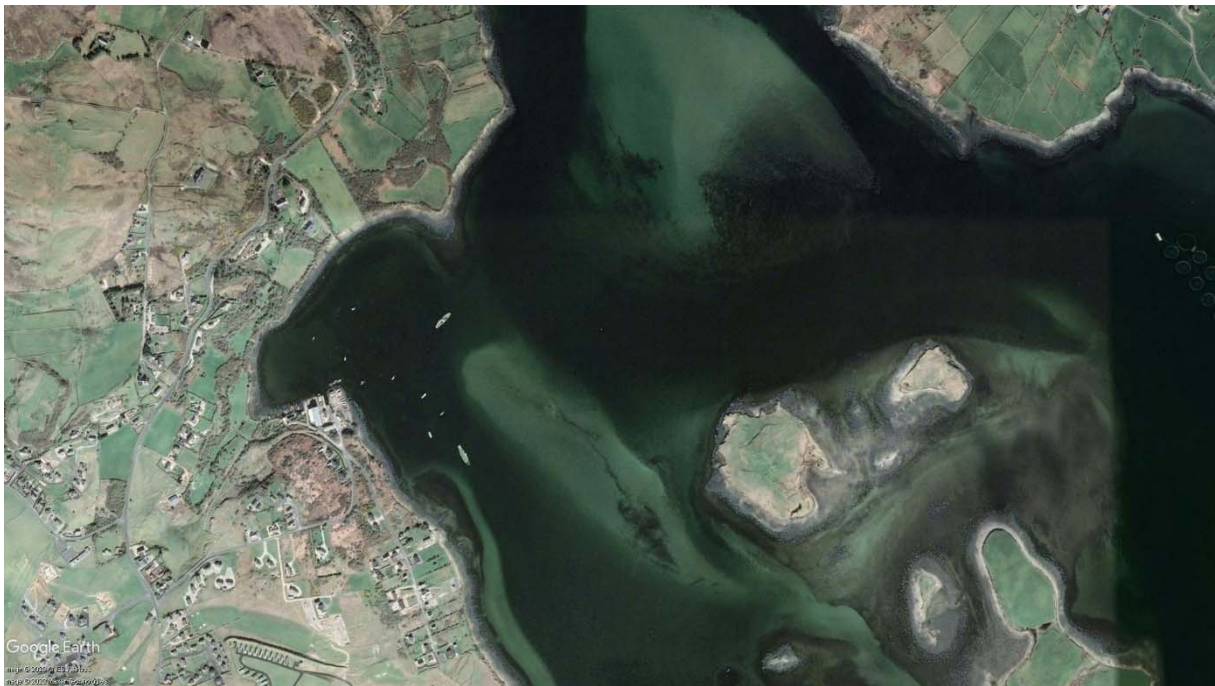




**Comhairle Contae
Dhún na nGall**
Donegal County Council



Mevagh Pontoon Coastal Assessment



April 2020

Mevagh Pontoon Coastal Assessment

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Glasgow

Craighall Business Park
 8 Eagle Street
 Glasgow
 G4 9XA
 +44 (0)141 341 5040
info@envirocentre.co.uk
www.envirocentre.co.uk

Aberdeen

Banchory Business
 Centre
 Burn O’Bennie Road
 Banchory
 AB31 5ZU
 +44 (0)1330 826 596

Inverness

Alder House
 Cradlehall Business Park
 Inverness
 IV2 5GH
 +44 (0)1463 794 212

Edinburgh

Suite 114
 Gyleview House
 3 Redheughs Rigg
 Edinburgh
 EH12 9DQ
 +44 (0)131 516 9530

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1 INTRODUCTION

1.1 Terms of Reference

Donegal County Council have appointed EnviroCentre to undertake a desk based coastal assessment to establish the existing coastal processes within the vicinity of the proposed pontoon development at Mevagh Boatyard, Downings, Co. Donegal. The report will also provide a qualitative assessment of how the proposed development could impact the water environment and coastal processes.

1.2 Site Location

The proposed development site is located at Mevagh Boatyard, Downings, Co. Donegal, as shown in Figure 1-1. Mevagh Boatyard is situated on the southern shore of Fanny's Bay, a sheltered anchorage located on the western side of Mulroy Bay.

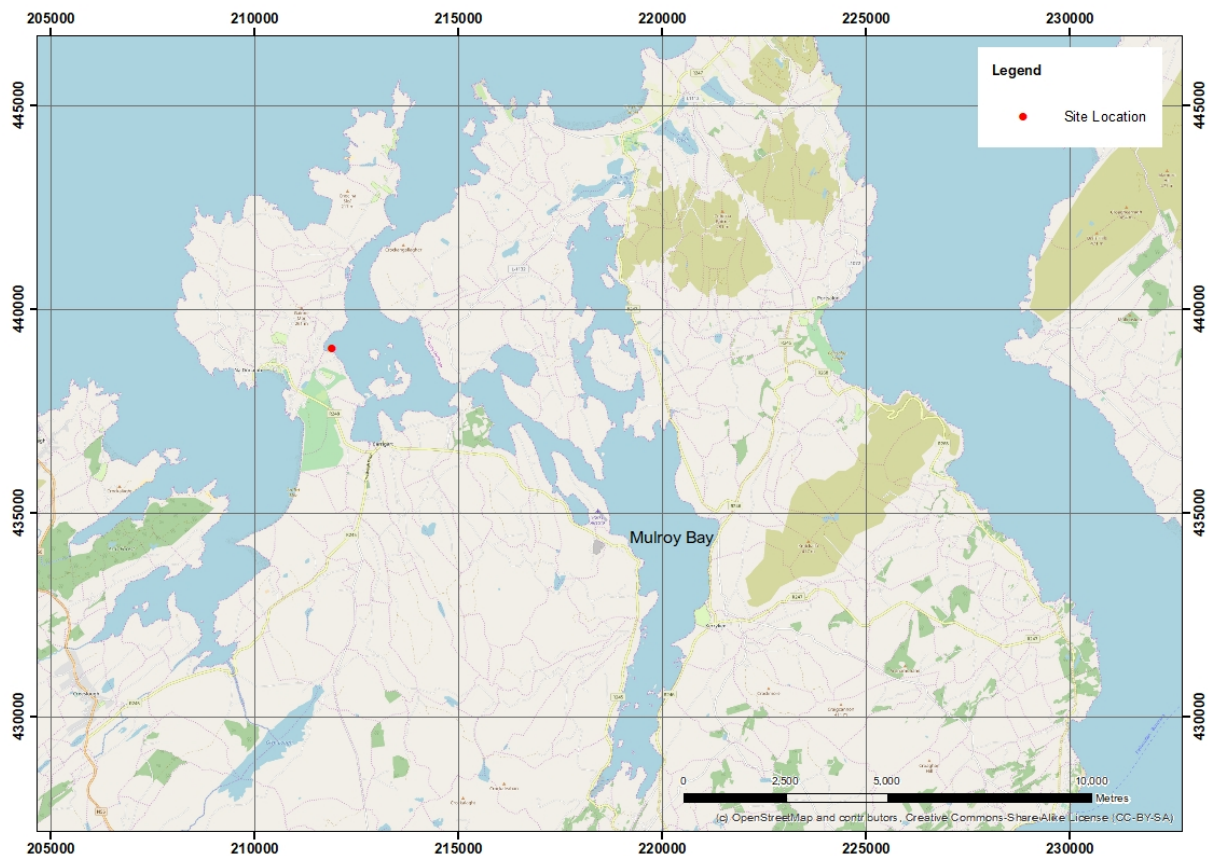


Figure 1-1: Site Location (Red dot)

1.3 Project Background

The development proposal consists of a floating pontoon, tide levelling gangway and access walkway which will extend north east from Mevagh Boatyard to 81m in length. The proposed design is outlined in the design drawings in Appendix A. A pre-application was made to Department of Housing, Planning, Housing and Local Community for a Foreshore License in December 2019 which has been granted. An application for a full Foreshore License is now underway.

An assessment screening report was carried out by Greentrack Environmental Consultants in November 2019, to establish whether the proposed development would have any likely significant effects on any Natura 2000 sites. The report concluded that:

“Following the assessment as detailed in this AA Screening Report, it is concluded that the proposed Project, either individually or in combination with other plans or projects, is not likely to have a significant effect on any European Site”.

This report has been produced to provide the necessary information to assess the impacts of the proposed development on the hydrodynamic, coastal processes and sediment transport in the vicinity of the proposed development, as requested by the Marine Planning/Foreshore at the Department of Housing, Planning, Community & Local Government:

“The hydrodynamic studies/modelling should be used to confirm the sedimentation transport/siltation patterns at the proposed pontoon development site and in particular to determine the potential impacts from the proposed development on nearby coastal systems, other existing structures or on-going activities (e.g. fishing/aquaculture/boating/marine leisure etc. if relevant).”

1.4 Methodology

The following methodology has been employed within this assessment:

- Review of the proposed pontoon development design in the context of the water environment, specifically coastal processes;
- Baseline study to establish existing coastal processes in the vicinity of the development, including a literature review of the coastal processes in Mulroy Bay;
- GIS based analysis of local bathymetry and topography;
- Qualitative assessment of the proposed development impact on coastal processes; and
- Reporting of the above findings.

This assessment has been undertaken with reference to the following guidance:

- Climate Change Sectoral Adaptation Plan – Flood Risk Management (Public Works, 2015)

1.5 Report Usage

The information and recommendations contained within this report have been prepared in the specific context stated above and should not be utilised in any other context without prior written permission from EnviroCentre. If this report is to be submitted for regulatory approval more than 12 months following the report date, it is recommended that it is referred to EnviroCentre for review to ensure that any relevant changes in data, best practice, guidance or legislation in the intervening period are integrated into an updated version of the report.

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2 BASELINE CONDITIONS

2.1 Bathymetry and Topography

Mulroy Bay is a marine lough, or fjardic system of elongated coastal inlets, connected to the North Atlantic by a series of narrow channels. The wider Mulroy Bay can be separated into four key areas, the Outer Bay, the Narrows, Broad Water and North Water, as shown in Figure 2-1. The lough extends around 22.5 km in length from the mouth of the Bay in the north, to Milford at the southern tip of Broad Water, with the development site at Mevagh Boatyard situated around 7 km south of the mouth, in the Narrows. The inlet of North Water extends around 6.5 km in length from the northern tip of Broad Water.

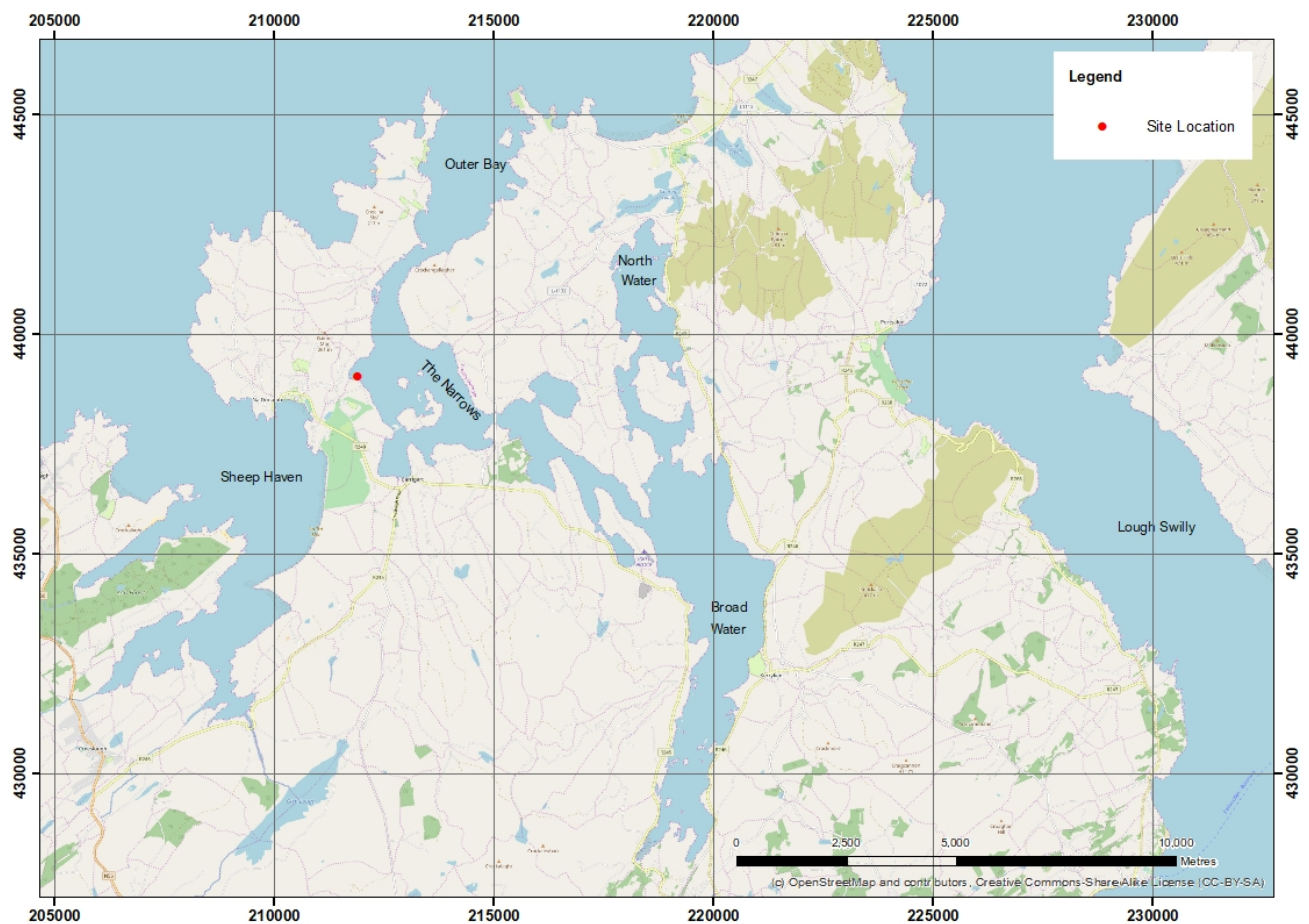


Figure 2-1: Mulroy Bay Areas

The following bathymetric and topographic survey data has been used within the assessment:

- Infomar bathymetry data – Mulroy Bay 10 metre resolution survey (2014);
- Admiralty chart soundings – Mulroy Bay; and
- Topographic survey of development area.

The Infomar bathymetry displayed relative to Lowest Astronomical Tide (LAT) is presented in Figure 2-2 and Figure 2-3 below. LAT is 2.67 m below Ordnance Datum Malin, as further described in section 2.3. The proposed development site is located in the shallows of Fanny's Bay on the western shore of the Mulroy Bay

narrows, with local seabed levels generally above -2.5 mLAT. The main tidal channel through the narrows is situated approximately 0.5 km west of the development site, with depths locally reaching in excess of -9 mLAT.

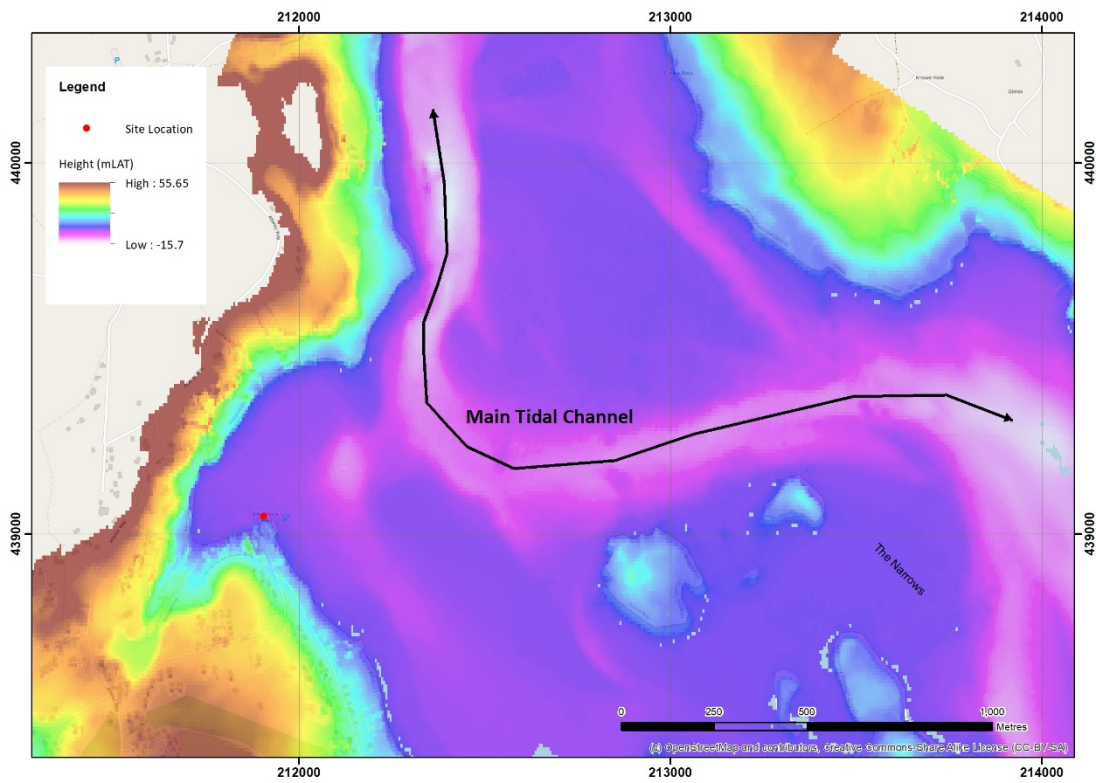


Figure 2-2: Bathymetry of Mulroy Bay in Vicinity of the Development Site

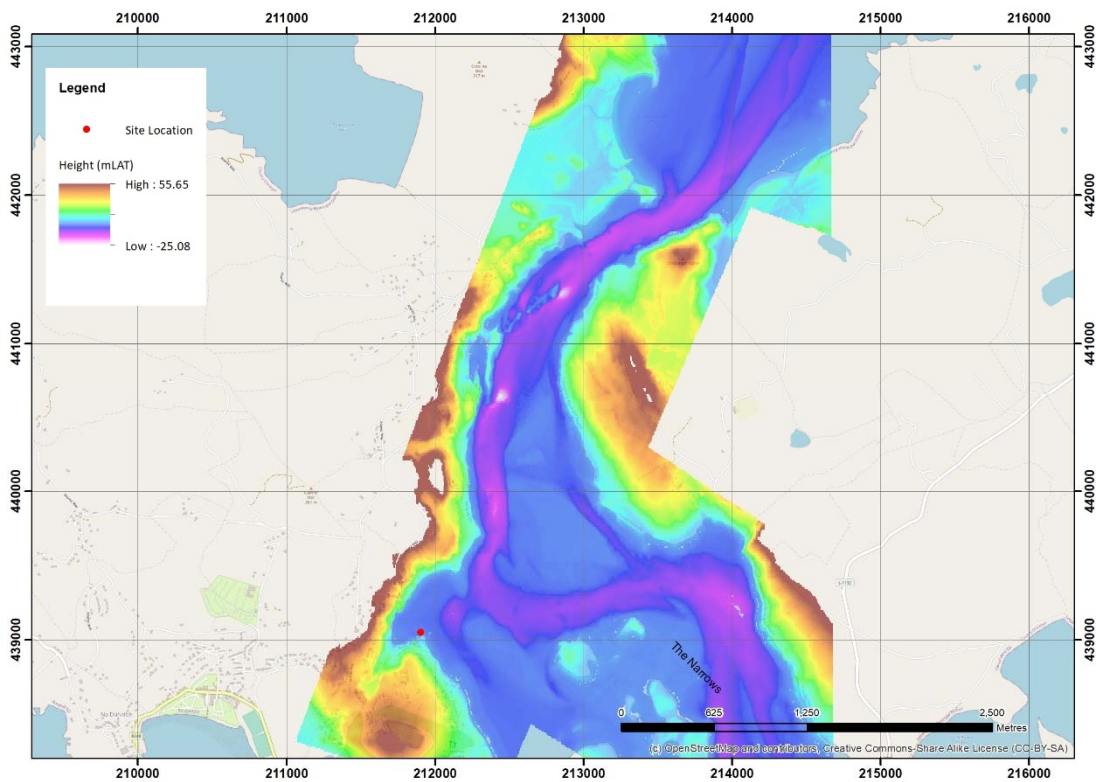


Figure 2-3: Bathymetry of Mulroy Bay Approaches

2.2 Geology

The proposed development is underlain by whitish quartzite from the Ards Quartzite formation and pebble beds. Adjacent terrestrial superficial deposits consist of till derived from metamorphic rocks, with blanket peat and windblown sand located further inland (Geological Survey Ireland, n.d.).

The seabed sediment within the vicinity of the proposed site is mainly comprised of mud and fine sand. Very coarse sand, gravel and rock is located seaward within the Narrows and Outer Bay (Navas, 2010a).

2.3 Tidal Water Levels

Water level data from the following sources has been used within the assessment:

- UK Admiralty Tide Tables (UKHO, 2020)

2.3.1 Astronomical Tides

The elongated nature of Mulroy Bay, and the presence of several narrow channels, means that the rate of tidal exchange with the open North Atlantic is restricted, with tidal backup occurring. As a result the tidal range within Mulroy Bay is reduced in comparison to the open coast.

Tidal water levels at Mulroy Bay (Fanny's Bay) are presented relative to Chart Datum (mCD), Ordnance Datum Dublin and Ordnance Datum Malin (mOD) in Table 2-1.

Table 2-1: Tidal Water Levels at Fanny's Bay, Mulroy Bay

	Chart Datum (mCD/mLAT)	Ordnance Datum Dublin (mOD)*	Ordnance Datum Malin (mOD)**
Mean High Water Springs (MHWS)	2.9	2.93	0.23
Mean High Water Neaps (MHWN)	2.2	2.23	-0.47

* Height of Chart Datum (m) relative to Ordnance Datum Dublin is 0.03mOD Dublin

** Height of Chart Datum (m) relative to Ordnance Datum Malin is -2.67mOD Malin

2.3.2 Extreme Tidal Water Levels

Extreme sea levels have been predicted around the Irish coastline and published by The Office of Public Works (OPW) (Public Works, 2014). These extreme levels include the effects of storm surge. The OPW derived extreme sea levels, predicted at the closest available point to Mevagh Pontoon, (NW37, located at the north of Mulroy Bay), are 3.11 mOD (Malin) for the 1 in 50 year return period event, and 3.29 mOD (Malin) for the 1 in 200 year return period event. Table 2-2 presents the range of predicted OPW extreme sea levels at Mulroy Bay.

Table 2-2: OPW Extreme Sea Levels at Mulroy Bay (Location NW37)

Return Period (Years)	Water Level (mOD Malin)	Water Level (mCD)
2	2.66	5.33
5	2.80	5.47
10	2.89	5.56
20	2.99	5.66
50	3.11	5.78
100	3.2	5.87
200	3.29	5.96
1000	3.51	6.18

2.4 Tidal Currents

Within Mulroy Bay the range of tidal currents can be effectively classified into two distinct regions: Broad Water and the Narrows. The Narrows and the Outer Bay have the highest maximum current speeds, ranging between 0.03 m/s to 1 m/s. Lower current speeds were identified in Broad Water ranging between 0.03 m/s to 0.2 m/s, which is likely a result of water backing up as it leaves the Narrows (Navas, 2010b). At Kindrum in the North Water the lowest current speeds have been identified (0.03 m/s), with this area experiencing periods of slack water (Telfor & Robinson, 2003).

The average surface and seabed tidal current speeds in the main channel of the narrows adjacent to the Mevagh Pontoon development are around 0.1 m/s and 0.09 m/s respectively (Telfor & Robinson, 2003). The position of proposed pontoon is however out with the main tidal stream at all times, with current speeds significantly lower, conducive to good anchorage conditions for yachts (eOceanic, n.d.).

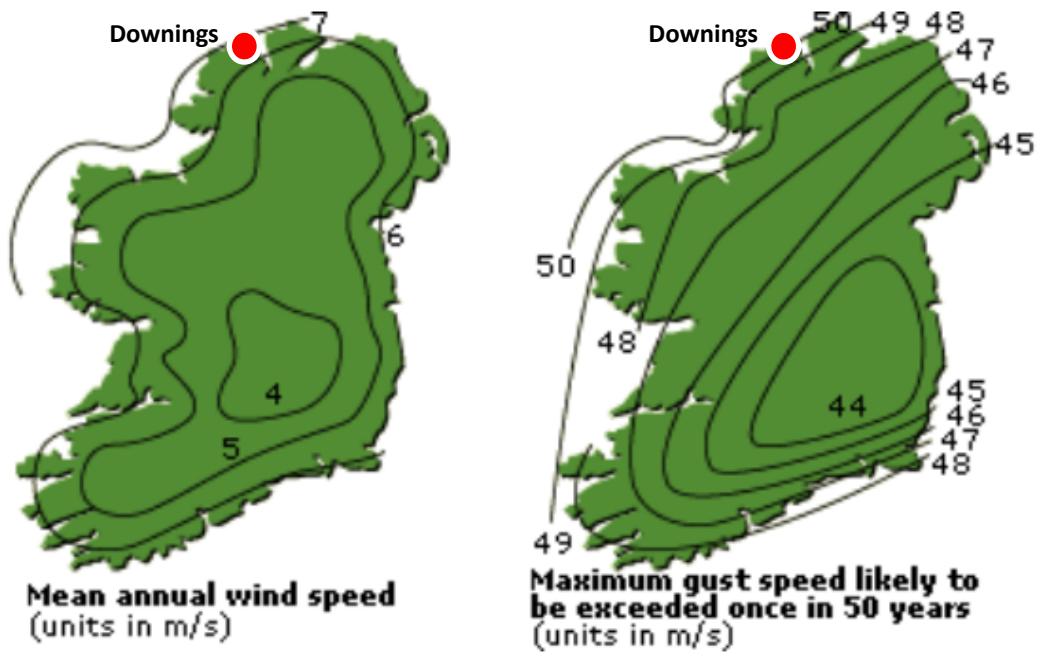
2.5 Waves and Wind

2.5.1 Waves

The narrow entrance and subsequent series of long channels within Mulroy Bay limit the potential influence from ocean swells. The narrow nature of the bay also means there is generally only small fetch distances over which wind driven waves can be generated, therefore limiting wave action in Mulroy Bay. Broad Water and North Water are also sheltered from the wind by low lying hills, further limiting wave action within these areas (Navas, 2010b).

2.5.2 Wind

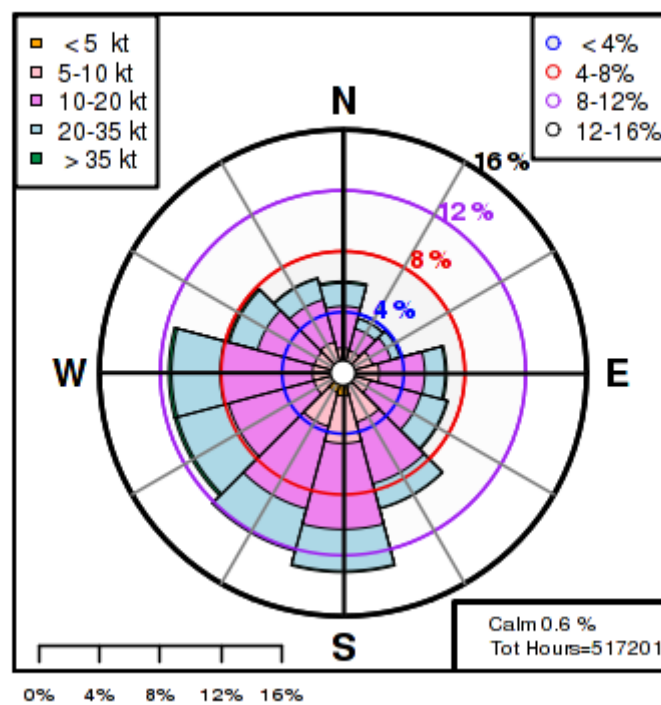
Wind data is available for the region from the Irish Meteorological Service, Met Eireann (Met Eireann, n.d.). Figure 2-4 presents contour maps showing mean annual wind speeds and 1 in 50 year return period maximum gust speeds for Ireland. This data suggests average wind speeds in the vicinity of Downings, and the nearby development site, of around 7 m/s, and 1 in 50 year gust speeds of around 50 m/s. Figure 2-5 presents a wind rose for Malin Head. Table 2-3 presents average wind speed statistics for Malin Head.



Source: (Met Eireann, n.d.)

Figure 2-4: Met Eireann Mean Annual Wind Speed and 1 in 50 year Return Period Maximum Gust Speeds

Windrose Malin Hd 1-Jan-1956 to 31-Dec-2014



Source: (Met Eireann, n.d.)

Figure 2-5: Met Eireann Wind Rose for Malin Head

Table 2-3: Met Eireann Malin Head 1981 – 2010 Averages Wind Speed Statistics

Wind Statistic	Wind Speed (m/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Monthly Speed	9.8	9.6	8.9	7.5	6.8	6.6	6.3	6.6	7.5	8.6	9.1	9.0	8.0
Max. Gust	46.8	44.2	46.3	36.5	35.0	31.9	38.1	31.9	43.7	40.1	47.3	49.4	49.4
Max. Mean 10-Minute Speed	33.4	29.3	34.5	26.7	25.2	21.6	28.3	22.6	31.4	29.3	31.4	34.5	34.5
Mean Num. of Days With Gales	11.8	10.3	8.7	3.6	2.1	1.0	0.7	1.1	3.0	6.5	8.0	8.5	65.3

Source: (Met Eireann, n.d.)

2.6 Morphology

Mulroy Bay is a drowned glacial system, with limited sediment input and minimal wave action. The sheltered location of the proposed development site, out with the main tidal stream, results in a low energy environment with no significant sediment transport. Sediment processes in the vicinity of the development site are limited to the deposition of fine sediment falling out of suspension.

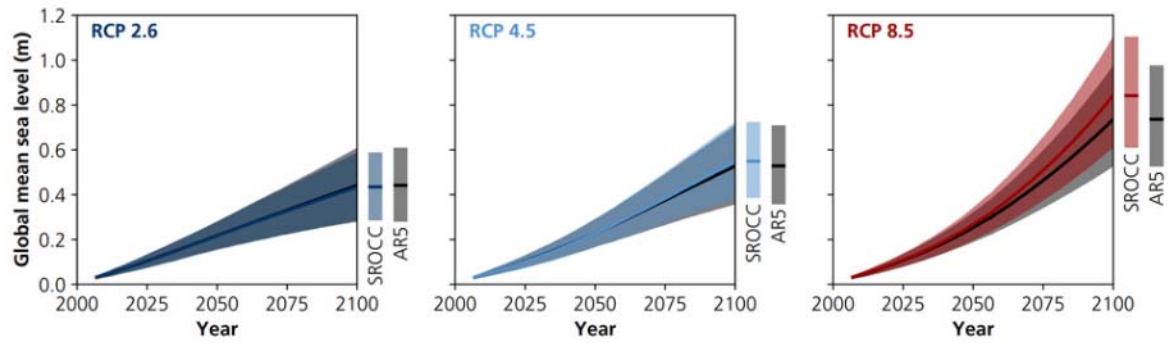
2.7 Future Climate

2.7.1 Wind Speed

Climate projections suggest that average wind speeds are not expected to change significantly, with slight decreases predicted by 2100, particularly in summer months where this decrease could be by around 4 – 5%. Predictions are for fewer storms to directly impact Ireland on this timescale, however rising temperatures will likely lead to more extreme storm events, and in turn more storm surge events (Public Works, 2015).

2.7.2 Tidal Levels

Existing Office of Public Works guidance (Public Works, 2015) remains in line with the most recent climate projections for sea level rise. Under the medium emissions RCP4.5 pathway, the latest projections are for between a 0.4 to 0.7 m rise in global mean sea level by the year 2100. Under the high emissions RCP8.5 pathway, mean sea level rise by 2100 could be as high as 1 m (Oppenheimer & Glavovic, 2019).



Source: (Oppenheimer & Glavovic, 2019)

Figure 2-6: Projected Change in Global Sea Level (m), relative to 1986 – 2005 average

2.7.3 Waves

The likely impact of climate change on wave height remains an area of significant uncertainty. Some recent studies suggest that a decrease in average significant wave height is possible over the next few decades (Public Works, 2015), however the predicted increase in extreme storm event intensity under future climate scenarios is likely to result in larger waves during these events. This increase is unlikely to affect the development site as it is located within an area of limited fetch for wave development and it has a lack of exposure to swell waves.

3 ASSESSMENT OF IMPACT

3.1 Development Footprint

As described in section 1.3 and Appendix A, the proposed development is a floating pontoon and associated tide-levelling gangway and access. The development as such will have a minimal footprint on the seabed, limited to several sets of tubular steel piles which will form the foundation structure. The remainder of the structure is raised or floating, attached to an already developed shoreface.

3.2 Coastal Processes

Mulroy Bay has a limited tidal range due to the narrow inlet and subsequent elongated channels resulting in tidal backup within the bay, as described in section 2.3. Section 2.4 outlines that the proposed development is situated within the sheltered Fanny's Bay, out with the main tidal stream of Mulroy Bay. As a result of the surrounding geography and bathymetry, the development site is sheltered from offshore swell waves, whilst there is limited fetch for the generation of wind waves. Sediment input to the wider Mulroy Bay is of small scale relative to the wider coastal system, whilst sediment processes in the vicinity of the proposed development are limited to the deposition of fine sediment from suspension.

3.3 Summary of Impact

Given the absence of significant coastal processes at the development site, and the small-scale footprint of the proposed development on the sea bed, it is considered that the development will have negligible impact on coastal processes within Mulroy Bay. As a result it is therefore considered that the development would also have negligible impact on nearby structures and associated activities.

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APPENDICES

A DESIGN DRAWINGS



Notes

1. Area of foreshore required: 196m²
2. Nearest adjacent town land: Kinnalargy
3. Irish Grid Reference for proposed pontoon facility: IGR 211981,439053

Name	[REDACTED]
Address	Donegal County Council
Signed	
Date	
Ref No	

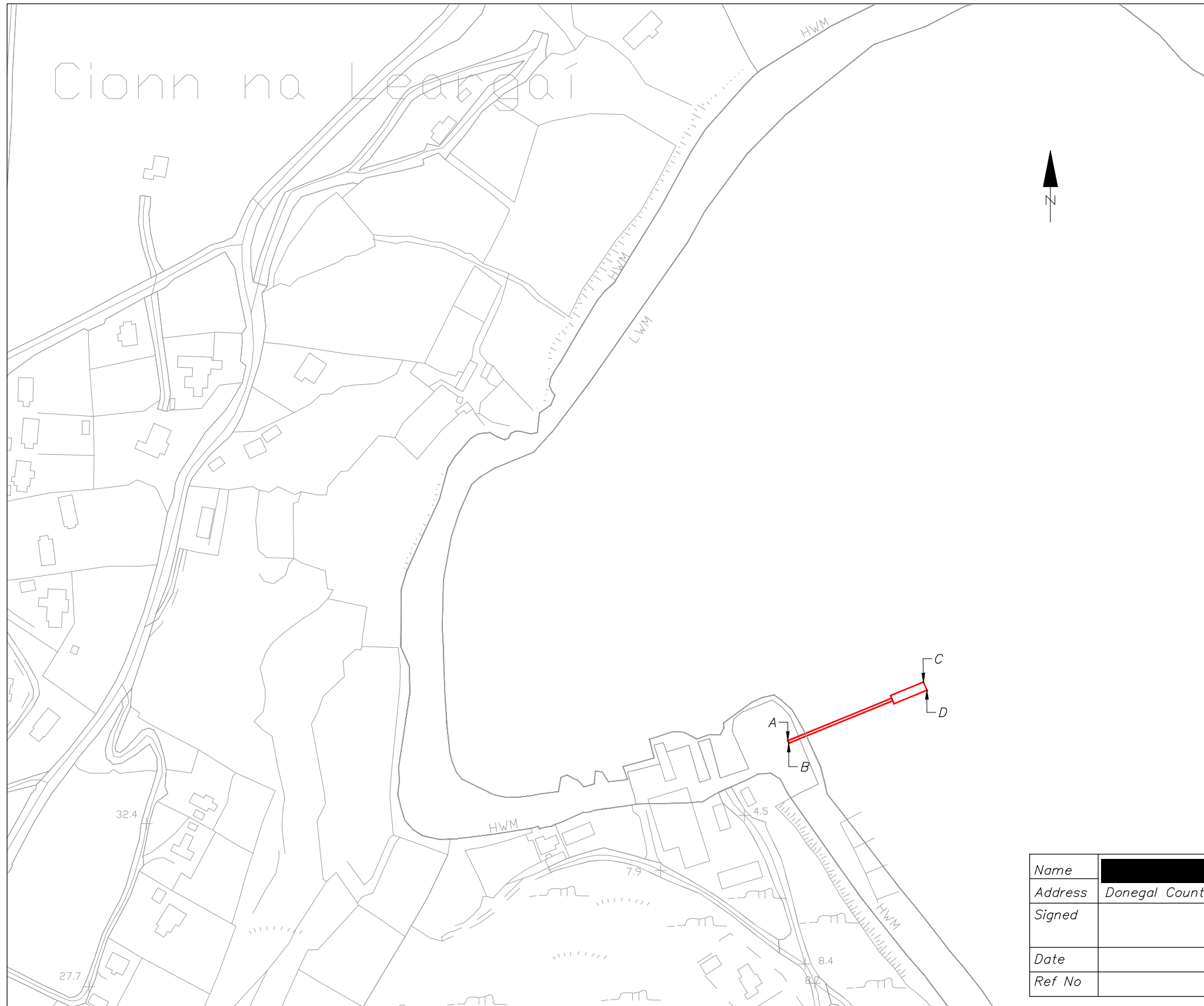


Norwood House
96-102 Great Victoria Street,
Belfast BT2 7BE
T 028 90333443
F 028 90235501
E mail@doran.co.uk
W www.doran.co.uk

Project Title: Pontoon Facility, Mevagh

Drawing Title: Site Location Map

Client/Architect:	Donegal County Council														
Drawn by:	[REDACTED]	Checked by:	[REDACTED]	Approved by:	[REDACTED]										
Date:	Feb 2017	Scales:	1:50000 @ A3												
Project Number:	161029	Orig.	DC	Zone.	—	Level.	—	Type.	SK	Disc.	C	Number.	001	Revision:	—



Overview Map
1:50,000 @ A3

Notes

1. Area of foreshore required: 196m²
2. Nearest adjacent town land: Kinnalargy
3. Irish Grid Reference for proposed pontoon facility: IGR 211981,439053

Legend

- Foreshore licence boundary
- LWM Low Water Mark
- HWM High Water Mark

IGR of foreshore licence extents

Point	Irish Grid Reference
A	211923, 439030
B	211923, 439028
C	211999, 439063
D	212001, 439058

Name	██████████
Address	Donegal County Council
Signed	
Date	
Ref No	

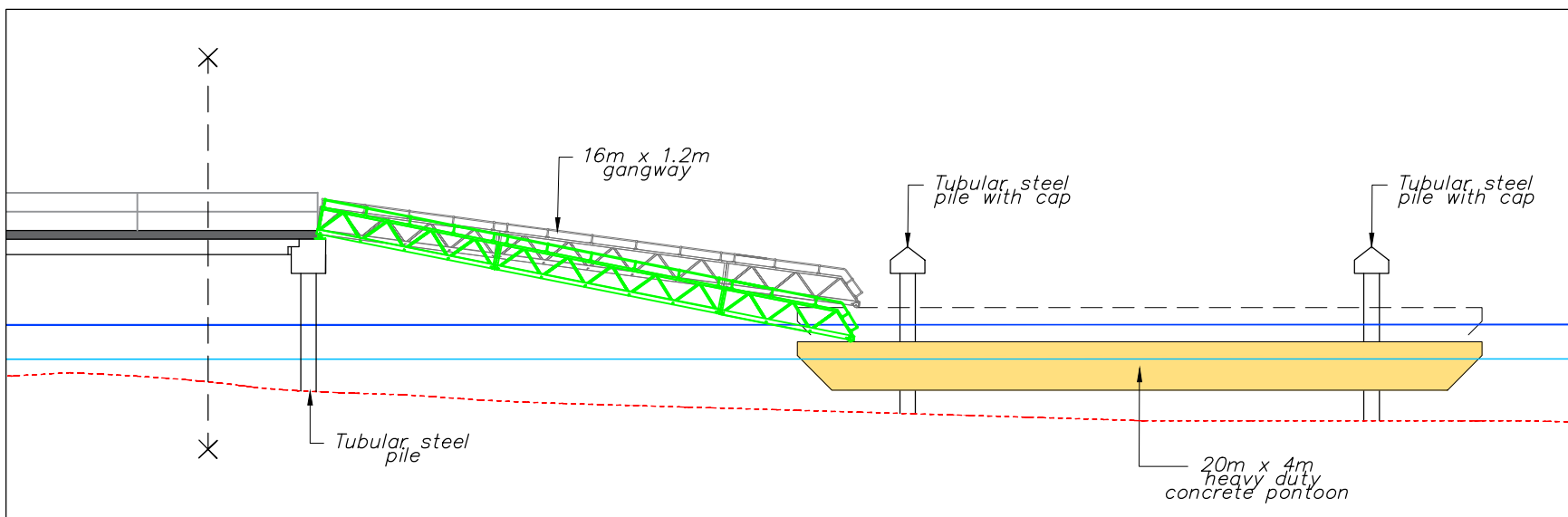
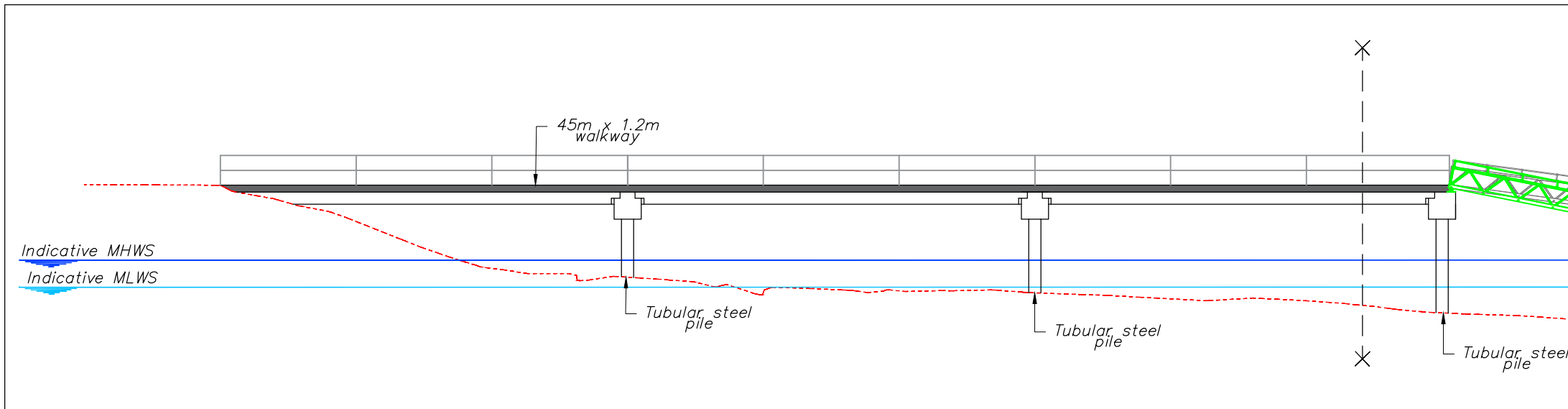


Norwood House
96-102 Great Victoria Street,
Belfast BT2 7BE
T 028 90333443
F 028 90235501
E mail@doran.co.uk
W www.doran.co.uk

Project Title:
Pontoon Facility, Mevagh

Drawing Title: Foreshore Licence Map

Client/Architect:	Donegal County Council														
Drawn by:	██████████	Checked by:	██████████	Approved by:	██████████										
Date:	Feb 2017	Scales:	1:2500 @ A3												
Project Number:	161029	Orig.:	DC	Zone.:	—	Level.:	—	Type.:	SK	Disc.:	C	Number.:	002	Revision.:	—



Notes

- Irish Grid Reference for proposed pontoon facility:
IGR 211981,439053
- Indicative MHWS and MLWS taken from admiralty chart No. 2811

Legend

- Existing ground profile
- MHWS (1.5mCD, -0.5mOD)
- MLWS (0.5mCD, -1.5mOD)

Name	
Address	Donegal County Council
Signed	
Date	
Ref No	



Norwood House
96-102 Great Victoria Street,
Belfast BT2 7BE
T 028 90333443
F 028 90235501
E mail@doran.co.uk
W www.doran.co.uk

Project Title:
Pontoon Facility, Mevagh

Drawing Title: General Arrangement

Client/Architect:	Donegal County Council							
Drawn by:		Checked by:		Approved by:				
Date:	Feb 2017	Scales:	1:200 @ A3					
Project Number:	Orig.	Zone.	Level.	Type.	Disc.	Number.	Revision:	
161029	DC	-	-	SK	C	003	-	

B MET EIREANN EXTREME WIND SPEEDS

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Highest 10-minute Mean Wind Speed (m/s) since 1942	36.4 (Hurricane Force) Limerick (Foynes Airport) 18 th 1945	33.3 (Hurricane Force) Galway (Mace Head) 12 th 2014	34.4 (Hurricane Force) Donnegal (Malin Head) 2 nd 1982	30.3 (Violent Storm) Clare (Shannon Airport) 23 rd 1947	28.3 (Storm Force) Donegal (Malin Head) 23 rd 2011	26.7 (Storm Force) Donegal (Malin Head) 24 th 1962	28.3 (Storm Force) Donegal (Malin Head) 25 th 1988	23.1 (Strong Gale) Donegal (Malin Head) 9 th 1973	33.9 (Hurricane Force) Donegal (Malin Head) 16 th 1961 <i>Debbie</i>	31.9 (Violent Storm) Cork (Roaches Point) 16 th 2017 <i>Ophelia</i>	32.5 (Violent Storm) Limerick (Foynes Airport) 12 th 1940	35.0 (Hurricane Force) Cork (Roaches Point) 24 th 1997
Highest Gust (m/s) since 1942	50.6 Limerick (Foynes Airport) 18 th 1945	47.8 Mayo (Belmullet) 9 th 1988	46.4 Donegal (Malin Head) 20 th 1986	45.8 Clare (Shannon Airport) 23 rd 1947	40.0 Mayo (Belmullet) 23 rd 2011	38.1 Donegal (Malin Head) 24 th 1962	38.1 Donegal (Malin Head) 25 th 1988	40.0 Mayo (Claremorris) 11 th 1999	50.3 Donegal (Malin Head) 16 th 1961 <i>Debbie</i>	49.4 Wexford (Rosslare) 24 th 1995	47.2 Donegal (Malin Head) 6 th 1996	49.4 Donegal (Malin Head) 26 th 1898