

Copyright reserved by the State
 No. 2007/100/12

Part 1: Proposal Details (Attach additional documents as required)

<p>1.1</p>	<p>Provide background information on the project including reason and objectives of the site investigations, the site selection process and any proposals for future works at the site.</p> <p>CETO Wave Energy Ireland (CWE Ireland), an Ireland based subsidiary of Carnegie Wave Energy Limited (Carnegie), has been developing the CETO Ireland Project over the last two years, including completion of a detailed site assessment study, conceptual project design and commencement of key stakeholder consultation. To further assess the potential for a 5MW pre-commercial CETO wave facility, CWE Ireland wishes to formally apply for an Investigative Foreshore License, with option to lease, over an offshore site between Liscannor Bay and Mal Bay, County Clare (see attached chart).</p> <p>This application is for a licence to conduct initial investigations only, required to assist with optimum siting, detailed design and to derive an environmental baseline as part of a full Environmental Impact Assessment (EIA). Such investigations will inform and guide the next steps in the development of a CETO wave energy facility which will be the subject of subsequent and separate foreshore, environmental and planning applications.</p> <p>Securing a foreshore licence over the Clare site will provide CWE Ireland with the confidence to invest the time and resources to further develop the Project and encourage the development and introduction of Ocean Energy in Ireland.</p> <p>Specifically, the Investigative Licence would allow CWE Ireland to:</p> <ul style="list-style-type: none"> • Conduct marine hydrographic surveys over the investigative licence area to characterise bathymetry and seabed properties. Indicative hydrographic equipment would include multibeam echosounder, side scan sonar, sub-bottom profiling using seismic refraction (sound source and streamer) and magnetometer. • Conduct ecological and archaeological surveys. Survey techniques would include drop down video surveys, sediment grab sampling, surface visual observations (for example marine mammal observations) and passive acoustic monitoring to detect and monitor cetacean (whale, dolphin and porpoise) vocalisations. • Deploy a combined wave and current metocean monitoring buoy at one or both of the two locations marked on the attached chart subject to the analysis of geophysical survey data.
<p>1.2</p>	<p>Possible MW output of final development:</p> <p>5MW</p>
<p>1.3</p>	<p>Type of surveys proposed (e.g. geophysical, geotechnical, archaeological or benthic).</p> <p>Geophysical, geotechnical, archaeological, ecological</p>
<p>1.4</p>	<p>Survey methodologies and equipment to be used for each survey type proposed:</p> <p>General. Details of the vessel(s) and specific instrumentation to be used for this investigation will not be confirmed until award of contracts. Co-ordinates shall be given in National Grid references supported by latitude and longitude.</p>

Track plots shall be superimposed onto a locational chart. All geophysical survey/interpretation shall be carried out by suitably competent personnel.

Marine hydrographic surveys. Indicative hydrographic equipment would include multibeam echosounder, side scan sonar with a line spacing of 50m (such as Klein 3000 system or Edgetech 4200FS with an operation frequency of 410/500 kHz), sub-bottom profiling using continuous marine seismic refraction (for example Geometrics StrataVisor NZXP, 24 channel hydrophone array, Bolt 2800LX Airgun 5cu chamber) and a magnetometer (Proton or caesium) used in tandem with side-scan sonar.

Ecological and archaeological surveys. Survey techniques would include drop down video surveys (approximately 20 to 30 locations informed by geophysical surveys) to characterise substrata and the enumeration and identification of fauna and flora, sediment grab sampling (approximately 20 to 30 locations) to characterise sediment properties, infauna and calibrate side scan sonar acoustic character, surface visual observations (for example marine mammal observations) and passive acoustic monitoring to detect and monitor cetacean (whale, dolphin and porpoise) vocalisations. The Archaeology Unit of the Department of Arts, Heritage and the Gaeltacht will be consulted in advance of any surveys regarding specific archaeological survey requirements including the requirement for a licence from the National Monuments Service. Archaeological surveys will be conducted by approved and qualified marine Archaeologists.

Metoccean monitoring buoy. A directional wave monitoring buoy and acoustic current meter will be deployed in 25m of water (LAT) at one or both of the locations indicated on the attached map and chart. The buoy will be on a specialised mooring suited to the buoy configuration including compliant section, stainless steel compression fittings, polypropylene line, trawl float, chain and ~300kg anchor. The metoccean monitoring buoy will gather site specific data to quantify the wave energy resource and local currents in support of the detailed design of a potential CETO wave energy project. Such systems are widely used in marine environmental monitoring, an example of which is the Triaxys Directional Wave Buoy currently used by Carnegie (see attachment). The monitoring buoy will be operational for a minimum of 12 months and a maximum of 24 months.

1.5	<p>Describe the nature and scale of any structure to be erected on the foreshore for testing the suitability of the site. Is the structure proposed to be temporary or permanent?</p> <ul style="list-style-type: none"> • A temporary wave monitoring buoy is to be deployed in approximately 25m (LAT) of water on a specialised mooring to gather data to quantify the wave energy resource in support of a potential CETO wave energy project. An example of such a system is the Triaxys Directional Wave Buoy (see attached document) which is 1.1 meters in diameter, yellow in colour and fitted with a flashing yellow light visible to two (2) nautical miles and with a flashing sequence of FL (5) Y.20s. • A temporary acoustic current meter, such as an ADCP (Acoustic Doppler Current Profiler), will also be deployed at the same site(s) either on the seabed or on the wave monitoring buoy to provide direct measurement of currents required to support project design. • Geophysical acoustic surveys will be carried out to assess bathymetry and both surface and subsurface seabed properties from the beach down to approximately the 40m (LAT) depth contour. These will be conducted in accordance with the Code of Practice for the Protection of Marine Mammals during National Acoustic Seafloor Surveys in Irish Waters or as advised by the National Parks & Wildlife Service. • Conduct ecological and archaeological surveys to characterise substrata and the enumeration and identification of fauna and flora. Survey techniques would include drop down video surveys, sediment grab sampling, surface visual observations (for example marine mammal observations) and passive acoustic monitoring (PAM) to detect and monitor cetacean (whale, dolphin and porpoise) vocalisations.
1.6	<p>Provide information on proposed mooring, marking and lighting arrangements for any proposed deployment of instrument arrays.</p> <p>The survey work and metocean monitoring buoy will be of a temporary nature. The buoy will comply with CIL (Commissioners of Irish Lights) standard Navigational Safety requirements with regard to lighting, marking, positioning and mooring. An example of the mooring configuration is given in the attached.</p>
1.7	<p>Has the applicant held or does the applicant hold any previous Foreshore Licences, Leases or applications over the area sought or over any other area? (Give details including Department's file reference number(s)).</p> <p>No</p>
1.8	<p>Indicative timing of the investigation works: (i) Start date (ii) Duration (iii) Any other information relevant to timing.</p> <p>(i) Start date: Approx: Spring 2013 subject to suitable weather windows (ii) Duration: Surveys will be of limited duration coincident with suitable weather windows. Marine hydrographic surveys will be of approximately 2 months duration, ecological and archaeological surveys of approximately 1 month duration overlapping with the geophysical surveys. The wave and current meter mooring will be operational for a minimum of 12 months and a maximum of two years at one or both of the identified sites (see attached chart). (iii) Other information: Timings are contingent on suitable weather windows.</p>

<p>1.9</p>	<p>Describe any likely interactions with activities of the public or other foreshore users during the investigative works (e.g. fishing, aquaculture, sailing, and surfing). Describe any measures proposed to minimise inconvenience to other users.</p> <p>Interactions:</p> <ul style="list-style-type: none"> • Overall fishing activities will not be adversely affected by the surveys. Trawling for nephrops and whiting, and potting for crustaceans occurs in the adjacent area. There is also a large area to the west of Spanish Point (approximately 2km further west from the site investigation area) which is used for bottom set gill nets for Gadoids (cod and hake) and Spurdog (Dogfish). There are no commercial fishing ports or harbours within or adjacent to the study area. • Fin fisheries will not be adversely affected by the surveys • No impact on water sports, pleasure boating and sailing is anticipated. Water sports, including surfing and other seaside activities have grown in popularity at the various beaches surrounding Miltown Malbay, particularly at Spanish Point beach. <p>Mitigation Measures:</p> <ul style="list-style-type: none"> • The surveys and investigations will be of limited extent and duration. • In advance of commencing marine surveys, CWE Ireland will publish local Marine Notices through the DTAS Marine Safety Directorate and Sea Fisheries Protection Authority providing a description of survey operations, locations and dates for commencement and completion. • CWE Ireland will ensure that all vessels taking part in the survey / investigation works will comply with full certification requirements.
<p>1.10</p>	<p>Describe any consultations undertaken to date with other foreshore users.</p> <p>CWE Ireland has completed an Environmental Scoping Study, through RPS Consulting Engineers, which identified no significant issues with the proposed investigative works. To date CWE Ireland has not consulted directly with other foreshore users given the early stage of project development. CWE Ireland proposes to further consult with other foreshore users as the project develops.</p>
<p>1.11</p>	<p>Describe any consultations undertaken to date with other consent authorities e.g. planning authority, Commission for Energy Regulation etc.</p> <p>Stakeholder management and engagement is a critical part of a project implementation philosophy and starts from day zero. CWE Ireland has been investigating the potential for a CETO pre-commercial project in Ireland for the last two years. During this time Carnegie has consulted extensively with a number of key stakeholders including the Department of Environment Heritage and Local Government (DEHLG) – Foreshore Unit, Marine Licensing Vetting Committee, Department of Communications, Energy and Natural Resources (DCENR), Sustainable Energy Authority Ireland (SEAI) and Clare County Council (March 2012).</p>

<p>1.12</p>	<p>Describe briefly any consultations undertaken with relevant authorities (e.g. county council, port/harbour authority etc) or State Agencies e.g. National Parks & Wildlife Service (NPWS), National Monuments Service (NMS) of Department of Arts, Heritage and the Gaeltacht:</p> <p>Carnegie has consulted extensively with SEAI, through the Ocean Energy Development Unit (OEDU). Carnegie has also consulted with the International Development Agency (IDA), Clare County Council, Department of Environment Heritage and Local Government (DEHLG) – Foreshore Unit, Marine Licensing Vetting Committee, and Department of Communications, Energy and Natural Resources (DCENR). Carnegie has also had a formal meeting with the National Parks and Wildlife Service.</p> <p>In addition, as part of the Environmental Scoping study (see attached), consultation scoping letters and information packs on the proposed project were sent out to selected consultees to establish potential environmental issues to be considered in planning for the proposed development of the CETO technology. The list below demonstrates the consultees contacted:</p> <ul style="list-style-type: none"> • Department of Environment Heritage and Local Government (DEHLG) – National Parks and Wildlife Service (NPWS) • Department of Environment Heritage and Local Government (DEHLG) – Foreshore Unit • Department of Communications, Energy and Natural Resources (DCENR) • Department of Agriculture, Fisheries and Food – Aquaculture and Foreshore Management Division • Geological Survey of Ireland • Environmental Protection Agency – Office of Climate, Licensing & Resource Use • Marine Institute • Commissioners of Irish Lights • Maritime Safety Directorate • Clare County Council – Environmental Services • Limerick Clare Energy Agency
<p>1.13</p>	<p>Describe briefly any support received or under application with the Sustainable Energy Authority of Ireland (SEAI) or other State Agency:</p> <p>Carnegie completed a detailed site evaluation and conceptual design study of a proposed 5MW CETO commercial demonstration project in Irish waters. The value of the study was €150,000, 50% funded by the Sustainable Energy Authority of Ireland (SEAI) under the Ocean Energy Prototype Research and Development Programme.</p>

Part 2: Proposed Site. (Attach additional documents as required)

2.1	<p>Delineate the proposed site in red on a latest edition map at a scale of 1:10 000 or larger scale if more appropriate and available, indicating:</p> <p>(i) the entire area; (ii) the hectareage involved below the line of high water of medium tides clearly marked in RED and (iii) the area of foreshore involved in metric measurements (i.e. hectares, metres squared or square kilometres etc).</p> <p>The overall area is approximately 885 Hectares below the line of high water of medium tides. See attached map.</p>																																								
2.2	<p>Geographic co-ordinates of the area under application, where the area can also be identified on the Ordnance Survey map, specify Ordnance Survey co-ordinates also.</p> <p>See attached map.</p> <table border="1" data-bbox="344 815 1289 1137"> <thead> <tr> <th>Number</th> <th>ING Easting</th> <th>ING Northing</th> <th>Long</th> <th>Lat</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>103051.8952</td> <td>179359.9614</td> <td>-9.439442</td> <td>52.856479</td> </tr> <tr> <td>6</td> <td>102702.6815</td> <td>179358.7709</td> <td>-9.444625</td> <td>52.856405</td> </tr> <tr> <td>5</td> <td>101541.7692</td> <td>178680.2883</td> <td>-9.461651</td> <td>52.850099</td> </tr> <tr> <td>4</td> <td>100190.5152</td> <td>178831.5271</td> <td>-9.481750</td> <td>52.851209</td> </tr> <tr> <td>3</td> <td>100283.2169</td> <td>180859.7495</td> <td>-9.480994</td> <td>52.869447</td> </tr> <tr> <td>2</td> <td>101024.5917</td> <td>182210.0107</td> <td>-9.470398</td> <td>52.881714</td> </tr> <tr> <td>1</td> <td>103312.9433</td> <td>181474.6104</td> <td>-9.436195</td> <td>52.875524</td> </tr> </tbody> </table>	Number	ING Easting	ING Northing	Long	Lat	7	103051.8952	179359.9614	-9.439442	52.856479	6	102702.6815	179358.7709	-9.444625	52.856405	5	101541.7692	178680.2883	-9.461651	52.850099	4	100190.5152	178831.5271	-9.481750	52.851209	3	100283.2169	180859.7495	-9.480994	52.869447	2	101024.5917	182210.0107	-9.470398	52.881714	1	103312.9433	181474.6104	-9.436195	52.875524
Number	ING Easting	ING Northing	Long	Lat																																					
7	103051.8952	179359.9614	-9.439442	52.856479																																					
6	102702.6815	179358.7709	-9.444625	52.856405																																					
5	101541.7692	178680.2883	-9.461651	52.850099																																					
4	100190.5152	178831.5271	-9.481750	52.851209																																					
3	100283.2169	180859.7495	-9.480994	52.869447																																					
2	101024.5917	182210.0107	-9.470398	52.881714																																					
1	103312.9433	181474.6104	-9.436195	52.875524																																					
2.3	<p>Delineate proposed site on relevant Admiralty Chart.</p> <p>See attached chart</p>																																								
2.4	<p>Relevant Local Authority:</p> <p>Clare County Council</p>																																								
2.5	<p>Location name and nearest townland name:</p> <p>Between Freagh Point and Spanish Point. Nearest townland, Fintra Beg</p>																																								
2.6	<p>Distance from nearest other developments, including any offshore renewable energy developments on the foreshore:</p> <p>There are no developments or infrastructure on the sea-bed within or adjacent to the investigation area.</p>																																								
2.7	<p>Distance from shore:</p> <p>The investigation area is adjacent to the shore and extends approximately 3km offshore. The distance from shore to the centre of the investigation area is approximately 1.5km.</p>																																								

2.8	<p>Distance from nearest aquaculture operation:</p> <p>The nearest aquaculture operation is approximately 45km north in Kilkieran Bay, Galway.</p>
2.9	<p>Distance from any other sensitive location e.g. fish spawning ground, designated Shellfish Growing Waters,</p> <p>At a distance of approximately 5.5km further offshore from the proposed investigative licence area is a haddock nursery. A whiting spawning ground is known in an area approximately 5.0km further north in Liscannor Bay.</p>
2.10	<p>Any other site details considered relevant:</p> <p>CWE Ireland commissioned RPS Consulting Engineers to undertake an Environmental Scoping Study of the site (see attached). The scoping exercise concluded that there are no internationally, nationally or locally protected environmental designations within the potential CETO deployment areas between Liscannor Bay to Mal Bay. The area is not heavily fished or trafficked by either recreational or commercial vessels, does not contain any known heritage features or shipwrecks, and is not in close proximity to areas of high population density.</p>

Part 3: Nature Conservation Considerations (Attach additional documents as required)

<p>3.1</p>	<p>Distance from nearest Natura 2000 sites (i.e. Special Protection Area (SPA) or Special Area of Conservation (SAC):</p> <p>An SPA and SAC are adjacent to the southernmost edge of the investigation area and approximately 1.8 km from centre of investigation area.</p>
<p>3.2</p>	<p>Name and location of Natura 2000 sites in or around the project area:</p> <p>SAC - CARROWMORE POINT TO SPANISH POINT AND ISLANDS 1021 THE SAC extends along the Clare coastline from Spanish Point (3 km west of Milltown Malbay), in a south-south- westerly direction to Carrowmore Point and is a site of international importance.</p> <p>SPA - MID-CLARE COAST 004182 The SPA extends along the Clare coastline from Spanish Point down to Carrowmore Point. The SPA now known as the Mid-Clare Coast SPA consists of an amalgamation of two pre-existing SPAs: Mutton Island (Site Code 004070) and Mattle Island (Site Code 004071).</p> <p>(See Figure 8 in the accompanying document)</p>
<p>3.3</p>	<p>Describe potential impacts of the site investigations on Natura 2000 sites.</p> <p>The marine surveys will be of limited extent and duration and will not take place within Natura 2000 sites. Given the nature of the proposed marine surveys, and implementation of the code of practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters to seismic, multibeam and side-scan sonar surveys, no significant impacts on Natura 2000 sites are expected.</p>
<p>3.4</p>	<p>Describe any measures proposed to mitigate possible impacts on Natura 2000 sites and other key marine receptors.</p> <p>All work will comply with Department of Environment Requirements, including implementation of the code of practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish waters. Such measures include minimising sound source levels and varying frequencies minimise potential impacts on sensitive species, use of marine mammal observers, and pre-start and soft start procedures. Aspect of marine surveys that potentially affect sensitive species (vessel movements, noise associated with survey operations) will be transitory at any given location and involve only very temporary and localised potential exposure. The monitoring buoy mooring will not be slack moored thereby minimising the potential for entanglement. Direct adverse physiological effects are extremely unlikely given the above mitigation measures, hence potential disturbance to key marine receptors would be minimised.</p>

3.5	<p>Describe any other projects or plans for the area, anticipated or developed, that in combination with this proposal, may have a significant effect on a Natura 2000 site:</p> <p>The purpose of the marine surveys are to provide an environmental baseline against which potential impacts of a proposed CETO wave energy project will be assessed as part of a full EIA. The wave energy project will be the subject of separate Foreshore licencing, planning and environmental approvals.</p>
------------	---

Part 4: Navigational Safety Considerations.

4.1	<p>Distance from shipping lanes at nearest point. Illustrate on the appropriate marine charts accompanying the application.</p> <p>The nearest shipping lane is over 12km west from the centre of the investigation area.</p> <p>CWE Ireland commissioned RPS Consulting Engineers to undertake a conceptual design, site assessment and environmental scoping study for a CETO wave energy facility in Ireland, focussing on Clare. The largest harbour in the study area is the local ferry port at Doolin, which runs a service to Inisheer, although there are also smaller slips and quays at Liscannor, Lahinch, Travaun, Quilty, Seafield and Doonbeg. The closest major shipping route is approximately 10km offshore from the proposed licence area. This shipping route runs from the south west of Loop Head, through South Sound to Galway Bay. Due to the many reefs and rocky shorelines near the proposed licence area, combined with the exposure to Atlantic swells, it is unlikely that the immediate area would be heavily trafficked with recreational or commercial vessels, however on calmer days the area may be visited by angling boats.</p>
4.2	<p>If a safety zone for passage of shipping (including fishing and leisure boats) is sought, supply details and give reasons.</p> <p>The proposed marine surveys are of limited extent and duration. In advance of commencing marine surveys, CWE Ireland will publish Marine Notices through the DTAS Marine Safety Directorate and Sea Fisheries Protection Authority providing a description of survey operations, locations, and dates for commencement and completion. Approaching vessels will be asked to keep a safe distance from operating surveys vessels and the mooring in accordance with maritime regulations. All vessels involved in marine survey operations will have appropriate navigational lighting and will be equipped with sophisticated navigational aids and competent crew maintaining a constant watch for other vessels.</p> <p>The wave and current monitoring buoy will comply with International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), Marine Survey Office (MSO) and Commissioner of Irish Lights (CIL) standard navigational safety requirements regarding marking, positioning and mooring.</p>

4.3

If an temporal /spatial restrictions are sought on the use of any type of fishing gear or leisure activity within the area, provide details and justification for such restrictions and indicate location(s) on appropriate marine charts.

The proposed marine surveys are of limited extent and duration. In advance of commencing marine surveys, CWE Ireland will publish Marine Notices through the DTAS Marine Safety Directorate and Sea Fisheries Protection Authority providing a description of survey operations, locations, and dates for commencement and completion. Approaching vessels will be asked to keep a safe distance from operating surveys vessels and the mooring. All vessels involved in marine survey operations will have appropriate navigational lighting and will be equipped with sophisticated navigational aids and competent crew maintaining a constant watch for other vessels.

Declaration and Consent:

The details provided here are correct to the best of my knowledge.

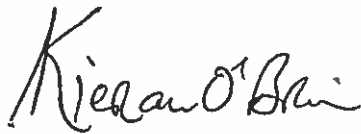
I understand that no works will be commenced, by me or my agents on the proposed site, without the prior written consent of the Minister.

I agree that on completion of the investigative works, all environmental data that is not commercially-sensitive shall be provided within a reasonable timeframe to the Marine Institute; the format and timeframe to be agreed with the Marine Institute. I understand that the Marine Institute may make this information available to individuals and organisations in line with its data access policy.

The granting or refusal of any foreshore investigation licence will not give rise on the part of the applicant to any expectation whatsoever for, right or entitlement to a grant of any future foreshore permission in respect of all or any part of any area of foreshore.

I give consent to the Minister and his servants to copy this application and to make it available for inspection and copying by the public. This consent relates to this application and to any further information, submission, objection provided by me or on my behalf.

Signed for and on behalf of the applicant:



Name of Signatory (block letters):

KIERAN O'BRIEN

Position Held:

DIRECTOR

Date 15 DECEMBER 2011

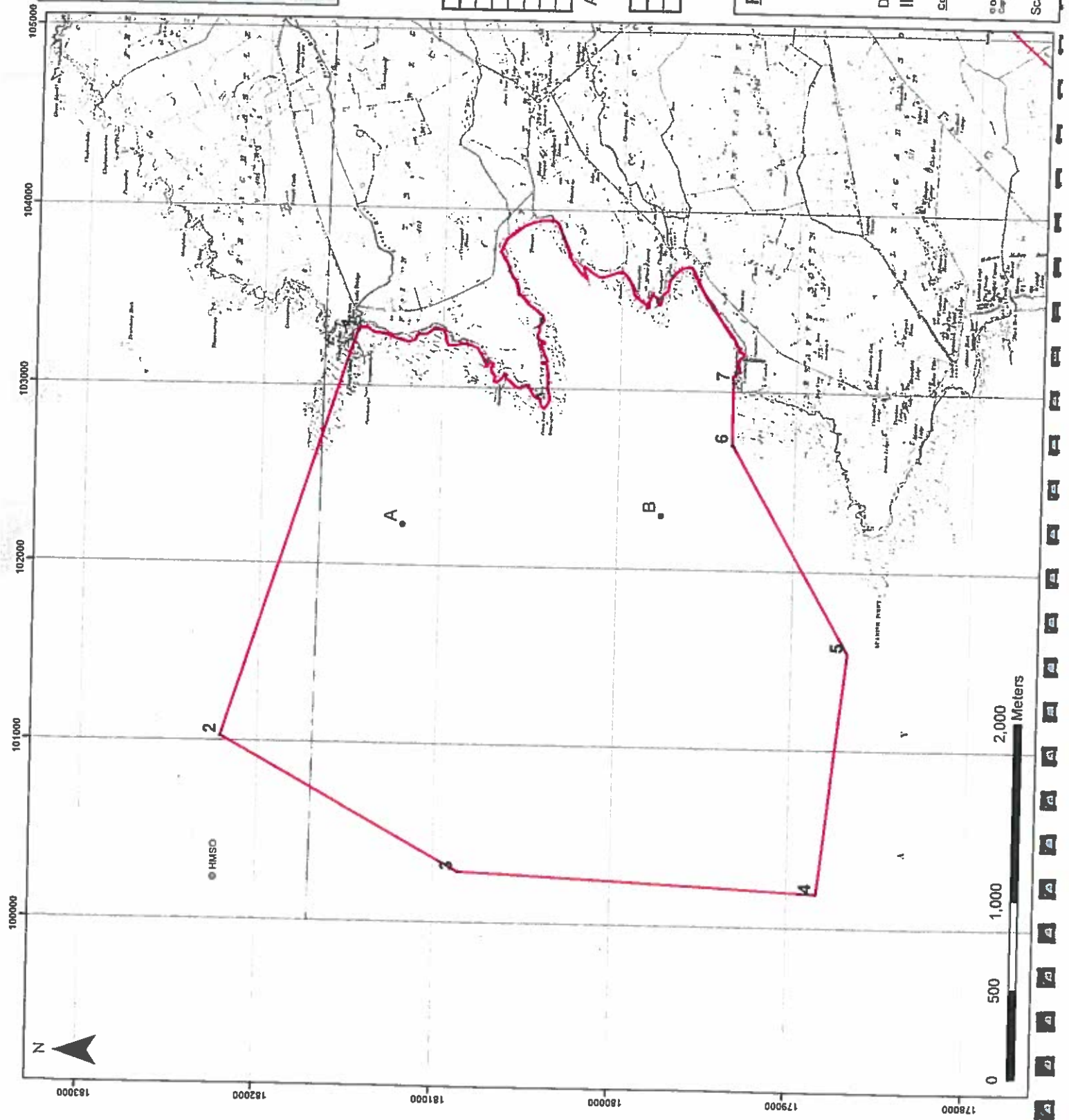
Return completed applications to:

Mr. Robert Hickey
Marine Planning and Foreshore
Department of the Environment, Community and Local Government
Newtown Road
Wexford

Enquiries to: Mr. Robert Hickey at (053) 9117365
Email a copy of application documents: Foreshore@environ.ie

Attached Documents

1. Investigative Foreshore Licence Area (Ordnance Survey Map and Admiralty Chart)
2. Triaxys wave and current monitoring buoy specification
3. RPS Clare Environmental Scoping Study



LEGEND

- Foreshore Area
- Deployment Point A
- Deployment Point B

Number	ING Easting	ING Northing	Long	Lat
7	103051.8952	179359.9614	-9.439442	52.856479
6	102702.8815	179358.7709	-9.444625	52.856405
5	101541.7692	178680.2883	-9.461651	52.850099
4	100190.5152	178831.5271	-9.481750	52.851209
3	100283.2169	180859.7495	-9.480994	52.869447
2	101024.5917	182210.0107	-9.470398	52.881714
1	103312.9433	181474.6104	-9.436195	52.875524

Area = 8.8354 km² (883.54 Ha)

Buoy	ING Easting	ING Northing	Long	Lat
A	102225.9760	181207.4486	-9.452804	52.873213
B	102298.3572	179752.0554	-9.451278	52.860152

FORESHORE LICENCE MAP



Drawing No.:
IBE0506-01 Rev.1

Copyright
Ordnance Survey
National Mapping Agency
© Ordnance Survey Ireland / Government of Ireland
Copyright Permit No. IP 0004072

Scale on A3: 1:20,000

RPS
RPS Consulting Engineers
Elmwood House
74 Boucher Road
BT12 6RZ Belfast

Drawn By: AG
Checked By: NS

Approved By: Adrian Bell
Site C EOP PASE FRI MICE KSBUC/E
Terminal Director

Date: 23/04/2012



LEGEND

- Foreshore Area
- Deployment Point A
- Deployment Point B

Number	ING Easting	ING Northing	Long	Lat
7	103051.8952	179359.9614	-9.439442	52.856479
8	102702.6815	179358.7709	-9.444825	52.856405
5	101541.7692	178680.2883	-9.481651	52.850099
4	100190.5152	178831.5271	-9.481750	52.851209
3	100283.2169	180859.7495	-9.480994	52.869447
2	101024.5917	182210.0107	-9.470398	52.861714
1	103312.9433	181474.6104	-9.436195	52.875524

Area = 8.8354 km² (883.54 Ha)

Buoy	ING Easting	ING Northing	Long	Lat
A	102225.9760	181207.4486	-9.452804	52.873213
B	102299.3572	179752.0554	-9.451278	52.860152

FORESHORE LICENCE

MAP

RPS

RPS Consulting Engineers
 Elmwood House
 74 Boucher Road
 BT12 6RZ Belfast

Drawn By: AG
 Checked By: NS
 Approved By: Adrian Bell
 BSC-C Eng RAE PFI MCE MSHUDE
 Technical Director

Carnegie
 wave energy

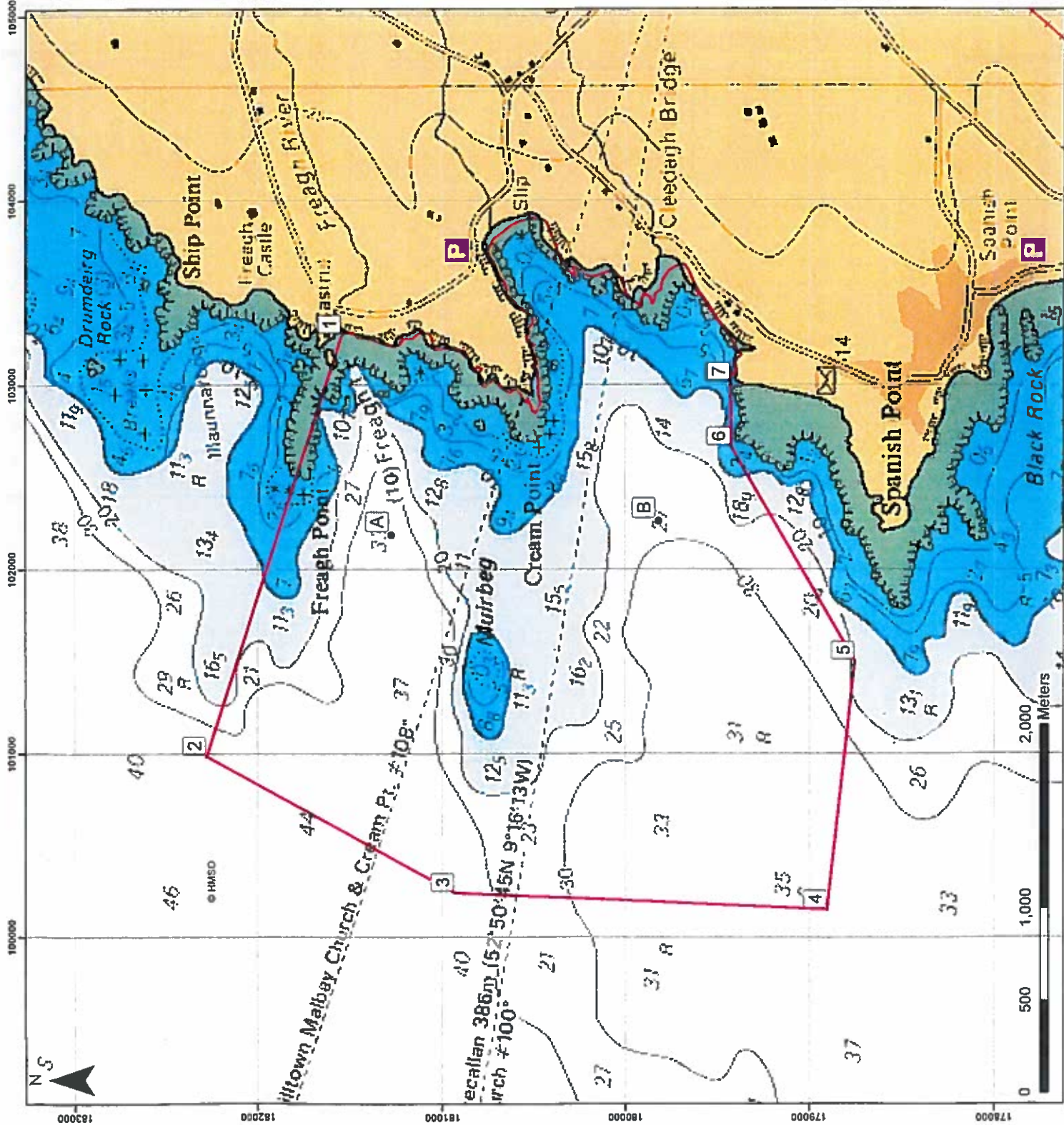
Drawing No.:
IBE0506-01 Rev.1

Copyright

Admiralty chart reproduced from Chart No. 3338-0
 © UKHO - Not for Navigational Use

Scale on A3: 1:20,000

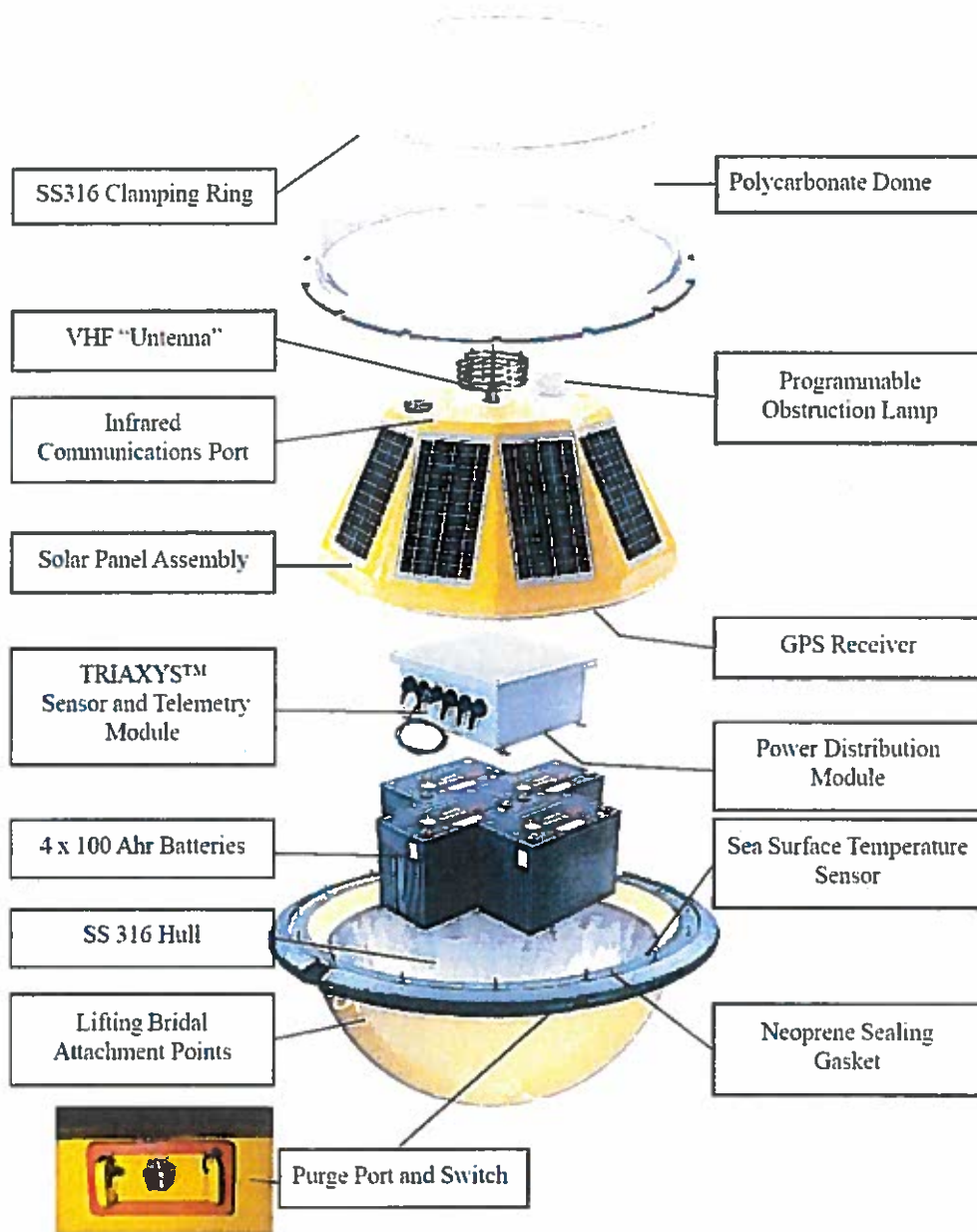
Date: 23/04/2012



Triaxys Directional Wave Buoy Systems Specifications

Item	Specification		
Physical Description			
Diameter:	1.10m (43.5 inches) Outside diameter		
	0.91m (36 inches) SS hull		
Weight (including four batteries)	197 kg (435 lb)		
Weight (excluding batteries)	90 kg (199 lb)		
Obstruction Free	Anchor TFD source. Programmable flow sequence. Three mile visibility.		
Purge Post Plug	1/2" 16 UNF torqued to 20 N-m (14.5 ft-lbs)		
TORQUE SPECIFICATION: Dome Retaining Nuts	SS 316. M8 nylocks torqued to 18-22 N-m (13-16 ft-lbs)		
Materials			
Hull	Stainless steel		
Dome	Polyethylene Texon 52 (tested to ASTM D1763 and ISO 6612 impact specifications)		
Solar Panel Assembly	Fiberglass over foam		
Clamping Ring	Stainless steel		
Sensors/Processor			
Water Temperature	Thermistor composite network		
Accelerometers	Flexure suspension verto (Range = 2g)		
Rate	Piezoelectric vibrating gyroscope (Maximum angular velocity = 50°/s)		
Compass	Microprocessor controlled fluxgate (Accuracy = 0.5°)		
A/D and sampling frequency	8 channel 14 bit at 4 Hz		
Microprocessor	PC 164 and 80C552		
GPS	12 channel		
Resolution/Accuracy			
	Range	Resolution	Accuracy
Heave	±20m	0.01m	Better than 2%
Period	1.5 to 33.2 seconds		
Direction	0 to 360°		±1°
Water Temperature	-5 to +50 °C	+0.1°C	+0.5°C
Power System			
Operational system voltage	11.0 to 14.1 VDC		
Batteries	4 (2 GNB SunLite 5000X 12 volt, 100 amp hr battery)		
Solar Panels	10 (2 6 watt Siemens SM6)		
Solar Charger	Sunriver-6		
External on/off switch	Turns buoy on when Magnetic Key is removed		
Telemetry			
20 to 50 MHz	Synthesized VHF transmitter (standard)		
Effective radiated output	0.5 watts		
Data format	Binary transmission		
Transmission rate	1200 Baud		
Maximum Range (VHF line of sight)	26 km (14 nautical miles) over water (less over land)		
Other Telemetry	Inmarsat D-, Iridium, Orconan, ARGOS, GSM, CDMA		
WatchCircle Descot.	Inmarsat D) or ARGOS		

Triaxys Directional Wave Buoy Components



Note, the Obstruction Lamp, or navigation light, characteristics will be Fl(5)Y.20s.

Triaxys Direction Wave Buoy Mooring Configuration

REVISIONS			
REV.	DESCRIPTION	DATE D/M/Y	BY
00	Original	03/30/02	RKK

Design Scope: 2.4:1 to 2.0-1

Max. depth 7-22m

Item	Axys Part Number
1	51308006 Swivel, 5/8(16mm) 5:1 3.2 Ton SS316
2	51213001 10m- Rubber, Cord
3	Dielectric Isolation Block Use when connecting directly to the chain.
4	51708002 Rope, Amsteel, 7/16" x 27m
5a	2458 Shackles, D. 1/2", SS316
5b	51308001 Shackles, Anchor, Galvanized, 1/2"
6	51708003 7m - Chain 1/2", Galvanized
7	51211004 Buoy, Trawl Float, 8", w/Centre Hole x 2
8	Anchor ~300 kgs (heavy chain) (~660 lbs)-supplied if required only

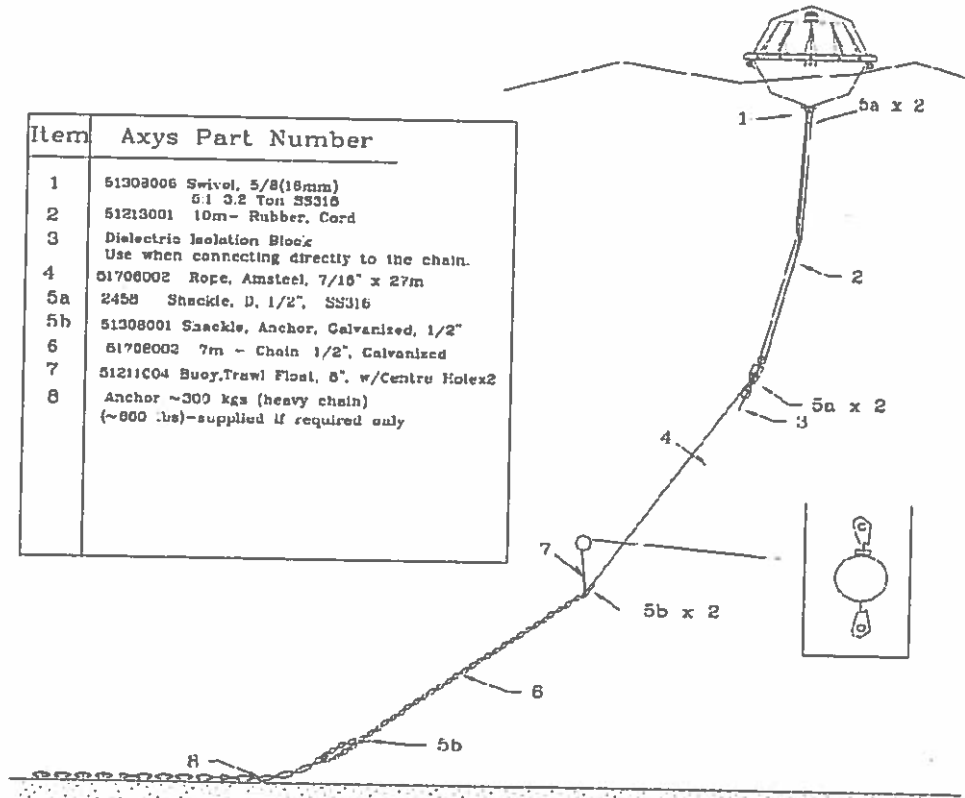


Table 1

WD	Amsteel Line Item 4 Length	Trawl Floats Item 4
7m	0m	1
15m	13m	1
22m	27m	1

Remove the Amsteel line for the 7m depth. For depths >9m, adjust the Amsteel length to allow total mooring scope of 2:1.

When printed, make sure you are using the most current revision of this document.

This document in its entirety contains proprietary information that shall not be disclosed to any third parties without obtaining prior permission from Axys Group Ltd. The bearer of this document shall take suitable precautions to prevent the disclosure of any information contained in this document to any parties that do not have the permission to receive that information.

DESIGNER ACE	QA	This drawing is controlled through O-PULSE	TEMPLATE # CT-C4-04-0C.dwg
DIMENSIONS IN METRES UNLESS OTHERWISE SPECIFIED. LINEAR DIMENSIONS ARE: ± 0.25% AS SHOWN ± 0.01% AS SHOWN ANGULAR DIMENSIONS ARE: ± 0.1% AS SHOWN			
TRIAXYS, Mooring 7-22m Deployment Depth		ARTS TECHNOLOGIES INC. FULBROOK 2218, 2243 WALS RD. SENECA, B.C., CANADA V0L 1S4 (250)835-2800 Fax: (250)835-2826	
DATE 10/03/02	SCALE NTS	DRAWN BY ACE	DATE 10/03/02
APPROVED 33812\03812005.dwg	ASSEMBLY DWG	SIZ A	DRAWING NUMBER 03812
			SD 00