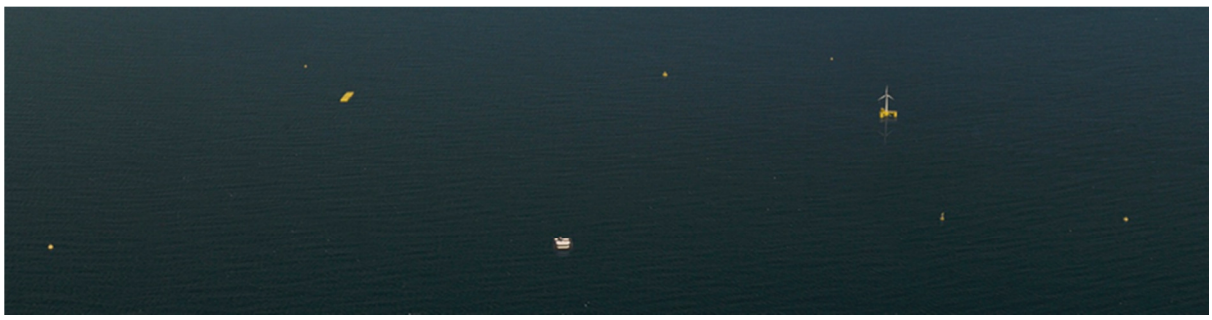
Galway Bay
Marine and Renewable Energy Test Site

Foreshore Lease Application

Marine Safety Statement

February 2016



Marine Institute
Foras na Mara

seai SUSTAINABLE ENERGY AUTHORITY OF IRELAND

SMARTBAY IRELAND

Marine Safety Statement

1.1. Introduction

The Marine Institute are proposing to upgrade the existing ¼ scale wave energy test site located off the coast of Spiddal, Co. Galway. The existing wave energy test site has been in existence for ten years. The site is demarcated by four cardinal marks, one at each corner of the test site. The test site is marked on all navigation charts as an "ocean energy test site" (Figure 1).

The proposed Galway Bay Marine and Renewable Energy Test Site will be at the exact same location, and of the same dimensions, as the existing test site. Nonetheless, ocean energy converters and other marine technologies will be placed in the test site. Deep sea shipping, fishing vessels and pleasure craft routinely operate in the environs of Galway Bay, and in this context there is a potential for interaction with the test site.

1.2. Description of the Project

The Galway Bay Marine and Renewable Energy Test Site is located at the existing ¼ scale ocean energy test site on the north side of Galway Bay (Figure 2). The test-site is located 2.4 km southeast of the village of Spiddal. Spiddal is located 19 km west of Galway City. The coordinates of the test site are provided in Table 1

The area of the Galway Bay Marine and Renewable Energy Test Site will be the same as the existing site, at 37 hectares and located in water depths of 21-24 metres. Its east-west extent is approximately 670 m and its north-south extent approximately 560 m.

The test site area is demarcated by four cardinal marks, one at each corner. A fibre optic telecommunications and power cable was installed from the test site to shore in April 2015 under Foreshore Licence No. 2014/02786.

The upgrade will allow for the deployment and testing of a wide range of prototype marine renewable energy devices, innovative marine technologies and novel sensors. The facility will also provide access to a subsea observatory allowing researchers and scientists to conduct research in the marine environment.

Table 1: Coordinates of Galway Bay Marine and Renewable Energy Test Site

Location	Longitude	Latitude
1 North West	53° 13.90' N	9° 16.15' W
2 North East	53° 13.90' N	9° 15.55' W
3 South West	53° 13.60' N	9° 16.15' W
4 South East	53° 13.60' N	9° 15.55' W

It is proposed that the upgraded test site will operate for up to 35 years, with devices on site intermittently throughout the year. The site will be structured into three berths for testing

of ocean energy prototypes. The fourth berth will be for the Cabled Observatory and related projects.

The upgrade of the site will involve deploying a range of supporting infrastructure to the site, including:

- An acoustic array for monitoring underwater sound;
- A 'Sea Station' to provide power to, and dissipate power from, ocean energy devices;
- Buoys for testing of marine technologies and scientific sensors;
- A Waverider buoy for wave measurements;
- Interlocking modular gravity foundations;
- A variety of scientific sensors and instruments;
- Cables to connect the instruments, sensors, and ocean energy devices;
- Upgraded cardinal marks to allow for safe navigation.

Upgrading the site will enable a maximum of three devices of the following types to be deployed at the test site for a period of testing no greater than 18 months in any one instance:

- Surface ocean energy converters;
- Sub-surface ocean energy converters;
- Seabed ocean energy converters;
- Prototype floating wind turbines;
- Novel marine technologies and scientific sensors.

1.3. Existing Environment

1.3.1. Introduction

This section presents general information on the existing environment in the area with respect to shipping and navigation.

1.3.2. Port & Harbours

The closest ports to the test site include the commercial port of Galway to the east and the fisheries harbour at Rossaveal to the west as shown in Figure 3. Rossaveel is also used by non-fishing vessels working from the port, and passenger ferries to the Aran Islands.

There are also a large number of smaller harbours, piers and slipways dotted along the coast in the area. A number of these are used by smaller fishing vessels, leisure craft and small ferries serving islands. The locations of these berthing facilities are presented in Figure 4.

1.3.3. Routing Measures

Two traffic separation schemes for ship navigation are in place in Galway Bay, located on the southern side of Galway Bay, presented in **Error! Reference source not found.** All vessels entering and leaving Galway port are obliged to follow these schemes.

1.3.4. Aids to Navigation & other navigation aids

There are a number of AtoN, lighthouses, marker buoys and other navigation lights in the vicinity of test site in Galway Bay shown in Figure 6.

1.3.5. Wrecks

The shipwreck inventory noted four vessels being lost near Spiddal. No evidence of any of these vessels or their remains was noted in the vicinity of the test site location. Admiralty charts for the area close to the test site location also have no record of the presence of wrecks.

1.3.6. Oil & Gas Infrastructure

There is no oil and gas infrastructure in the surrounding area close to the location of test site.

1.3.7. Dredging Activity

There is no dredging activity in the surrounding area close to the location of test site.

1.3.8. Exercise Areas

There are no military exercise areas in the surrounding area close to the location of test site.

1.3.9. Bathymetry

The receiving environment at the test site comprises 0.375km^2 in area, 2.4km to the southeast of Spiddal Pier in water depths of 20-25m (Figure 7). The seabed of the test site is relatively flat and featureless. In the near vicinity of the test site, the marine geomorphology comprises rock reefs to the North, along the Connemara coastline. From 10m depth the seabed is generally sandy extending southwards.

1.3.10. Fishing Grounds

Most of the fishing activities (mainly potting) takes place along the northeast shore of Galway Bay. The distribution of various fishing and aquaculture activities in Galway Bay is shown in Figure 8.

There is high seasonal fishing effort in the coastal waters off Furbo and Spiddal which comprises several boats (6 - 10m in length). Pots are set along rocky areas and over

stretches of sand in water depths of up to 22m usually in strings of 20-30 pots. Each vessel operates between 200 and 500 pots. Vessels are based at Spiddal and Barna and most of the fishermen are members of the Galway Bay Inshore Fishermen's Association (GBIFA).

Shrimp fishing takes place mainly in late Autumn, Winter and Spring and is particularly active from August to January. There is a closed season for shrimp fishing over a three month period between May and August. Lobster and velvet crab fishing is usually carried out in the Summer months from June to October with no closed season for catching these species.

Line fishing for mackerel and pollack takes place in the Summer months from small inshore boats and from the shore at various locations between Furbo and Spiddal. Some inshore boats also use trammel nets (bottom anchored net) to catch wrasse, pollack and edible crab over rocky reefs.

Some limited bottom trawling for Dublin Bay prawn (Nephrops norvegicus) and demersal fish species such as plaice, haddock and cod is carried out by a few small trawlers (10 to 15m) just to the west of test site. Further to the west in deeper waters off Inverin and in the central parts of Outer Galway Bay larger trawlers operate occasionally.

1.4. Maritime Traffic

The assessment of maritime traffic includes all the vessel types found in the area. It takes into account seasonal variation in traffic patterns and fishing operations.

Traffic beyond the 10 nautical mile, 10 NM, horizon from an offshore installation is normally considered not to have any effect nor to be affected by the same installation. In view of this, the traffic analysis is therefore usually limited to the area within a 10 NM radius from the site.

For the Galway Bay Marine and Renewable Energy Test Site area a smaller limit was chosen for the assessment. All maritime traffic that may potentially interact with the test site area is constrained between the north and south shores of Galway Bay, a distance of approximately 5NM.

The Area of Interest where the traffic assessment was carried out covers a minimum of 5 NM from any point on the boundary of the test site as shown in Figure 9.

1.4.1. Automatic Identification System (AIS)

AIS enables vessels and Coast Guard shore stations to transmit and receive information regarding identity, position, course and speed of vessels. AIS transmissions and information is broadcast over VHF radio and is freely available to those with AIS monitoring equipment. AIS is compulsorily carried by commercial vessels of more than 300 gross tonnes but can be used by small craft as an additional safety feature.

AIS is a very accurate method of detecting a vessels location and the track they are travelling. There was no restriction to the range from the Galway Bay Marine and Renewable Energy Test Site in which AIS data could be recorded thus vessel tracks recorded by AIS are available for the entire Area of Interest around the test site and beyond. AIS data was provided by the Coastguard.

The AIS data was analysed for the months of January 2013, July 2014, January 2014 and July 2014. Figure 10 and Figure 11 show all AIS vessel positions identified during the winter months of January 2013 and January 2014 respectively, both months colour-coded based on vessel type. Figure 12 and Figure 13 show all AIS vessel positions identified during the summer months of July 2013 and July 2014 respectively, both months colour-coded based on vessel type.

It is clear from the January 2013 and January 2014 AIS data in Figure 10 and Figure 11 that the majority of traffic through Galway Bay consists of tanker and cargo traffic transiting to and from the Port of Galway along with fishing vessels.

The summer months of July 2013 and July 2014 (Figure 12 and Figure 13) show a greater diversity of vessel activity in Galway Bay, including increased sailing vessel activity.

In winter and summer only one vessel of any type interacted with the test site area. This was the Marine Institute research vessel RV Celtic Voyager undertaking authorised scheduled maintenance operations at the test site. All vessels in Galway Bay observed the cardinal marks demarcating the test site area.

1.4.2. Vessel Monitoring System (VMS)

The Vessel Monitoring System (VMS) is a system which processes information passed by Irish registered fishing vessels using onboard satellite communications regarding their position, effort and catch. All fishing vessels over 12 metres have a VMS system.
These systems are used primarily in the Fishery Monitoring Centre (FMC), onboard Naval Service ships and onboard Air Corps Maritime Patrol Aircraft on fishery protection duties.

The Vessel Monitoring System in use by the Fisheries Monitoring Centre was originally installed in 2000 and it provides a visual display of all fishing vessel . There are approximately 400 vessels active in Irish waters each day.

VMS data were provided by the Irish Naval Service and processed by the Marine Institute according to methods outlined in Gerritsen and Lordan (2014). VMS data was aggregated on a grid of 0.010 degrees longitude x 0.005 degrees latitude over the period 2006-2014 to give an annualised average representation of fishing activity in Galway Bay over the past ten years.

As part of the assessment, fishing activity (Figure 14) and streaming time (Figure 15) was determined in Galway Bay. Both sets of data show that there was no interaction of fishing vessel activity within the demarcated limits of the test site area.

1.5. Risk Assessment

The assessment of maritime traffic near the site indicates that the shipping activity within Galway Bay was relatively high, but that all vessels transiting through Galway Bay have observed the cardinal marking scheme denoting the safe navigation routes around the test site area.

The UK's Department of Trade and Industry (DTI) guidance in relation to navigation risk assessment for offshore windfarms states that the scope and depth of any risk assessment, together with the tools and techniques necessary to carry this out, should be proportionate to the scale of the development and the magnitude of the risks.

As a result, the Galway Bay Marine and Renewable Energy Test Site development is a 'low risk, small scale development ... a development in an area where the potential risks are low, and/or a small scale development' for the following reasons:

- the location of the test site on the northern shore of Galway Bay outside commercial shipping routes;
- the existence of the test site for the past ten years;
- knowledge of the site location within the local fishing community;
- the cardinal marking scheme demarcating safe passage routes around the test site;
- the inclusion of the test site on all Admiralty Charts for navigation purposes/

The risks associated with the operation of the test site when ocean energy convertors are on site are:

- The risk of a vessel under control making contact with a device on site;
- The risk of a vessel not under command or drifting making contact with a device on site;
- The risk of a vessel towing fishing equipment snagging the subsea cable causing the vessel to founder or capsize;
- The risk of mooring failure of a device causing it to leave the test site area and enter open waters;
- The risk of accidents caused by transfer to/from servicing vessel to a device on site requiring SAR response;
- The risk of a service vessel requiring SAR and /or emergency response;
- The risk of a person in the water requiring rescue.

1.6. Site management

1.6.1. Introduction

The Galway Bay Marine and Renewable Energy Test Site will be operated in accordance with the accredited HSEQ Management System. The system is accredited to ISO 9001 (Quality), ISO 14001 (Environment), and OHSAS 18001 (Occupational Health & Safety).

The HSEQ Management System is based on the BSi Occupational Health and Safety, the ISO International Standards Quality and Environmental Management Systems taking into account recommended Offshore Wind and Marine Energy Health and Safety Guidelines, International and National maritime safety and environmental regulations, codes and guidelines.

The HSEQ Management System comprises of the following parts:

- Tier 1 Manual Describes the HSEQ Management System, in three Parts A, B & C.
    - Section A: Policies, Administration and Risk Management.
    - Section B: HSEQ Project Management.
    - Section C: Offshore & Shore Based Hazards and Activities.
- Tier 2 Manual Detailed Company Procedures.
- Tier 3 Registers Risk Assessments, Method Statements.
- Tier 4 Register Forms.

1.6.2. Site Management

On-going site management arrangements take into account the need to address issues such as:

- Tracking personnel between vessels and onshore areas;
- Shift work, and potentially lone working;
- Housekeeping, including the need to maintain clear access routes, and waste disposal at the shore interface;
- Storage and movement of materials, possibly including use of temporary storage areas;
- Maintenance and security of data nodal sites where cables come ashore;
- Maintenance and security of long range RF data link equipment and broadband connections;
- Response to severe weather, including storms and winter conditions;
- Emergency response, either relating to an incident in the port, on the offshore site, or an external emergency event.

Ports and shore-based contractors will have their own safety management systems; bridging documents are needed in order to manage the interface with the OREI operator's systems, in normal operation and emergency situations. Common arrangements will be put in place for the management of visitors and contractors who are not normally on the site, such as specialist repair technicians.

Harbour Authorities marine coordination functions play a key role in managing the use of the port. This includes planning all vessel movements, in conjunction with any construction contractors / port facility operations when planning logistics support, which possibly involves Vessel Traffic Systems control (VTS) or Harbour Masters and pilots who control vessel movements where harbour authorities operate such systems. Harbour Masters have

a statutory obligation to direct traffic within their port limits and so have the right to pass instructions to vessels.

With responsibility for the management of marine energy test site, there is a legal obligation to ensure that planned changes to the site are notified to authorities responsible for navigation marks including lights that warn shipping.

Given the wide range of requirements and associated mitigation actions, early dialogue with port authorities, existing users, onshore contractors and workforce representatives is beneficial to establishing safe and efficient port operations.

1.6.3. Risk & Hazards

SmartBay subscribes to the principals and practice of Risk Management. The objectives of the HSEQ Management System are to ensure safety ashore and at sea, prevention of human injury or loss of life, and avoidance of damage to the environment and to property.

The HSEQ Management System procedures are based on Safe Systems of Work which include:

- Hazard Operability (HAZOP);
- Hazard Identification;
- Risk Assessment;
- Risk management controls including Permits to Work;
- Method Statements;
- Accident / Dangerous Occurrence Reporting;
- Accident / Dangerous Occurrence Investigation and corrective actions;
- Audits, Inspections and Review;
- Continuous Improvement through Monitoring, Analysis and Preventive Action;
- Ownership by all personnel through participation and consultation;
- Compliance with all regulations, codes and industry guidelines;

The purpose of Risk Management is to reduce, eliminate or transfer the risk by identifying hazards, assessing the consequences, likelihood and determination of controls that reduce eliminate or reduce the risks to acceptable levels for business activities to be carried out safety and without harming the environment.

Risk Assessments (RA) are conducted for the purposes of reducing risk to its employees and other interested parties. Risk Assessments are conducted in accordance with detailed procedures. Relevant Risk Assessments are reviewed prior to each activity where risks to human health and safety or damage to the environment are identified. Competency to complete RA is based on expertise that currently exists at all levels, which has been passed on through a mentoring process; they may be completed by any competent member of the

staff and approved or authorized by the manager. Further training in this area may be necessary as the safety systems continue to evolve.

Hazard Operability studies of test sites are conducted and updated, and the processes related to projects for the purposes of identifying hazards associated with the overall management and maintenance of the marine sites and their operation. An analysis of the findings provides information useful in the Hazard Identification process (HAZID).

An essential element of any OH&S Risk Assessment is Hazard Identification or “HAZID” process, identifying hazards which could cause harm. Hazards associated with each step of a work process are identified and transposed into the relevant Risk Assessment. Each hazard is assessed for its consequence, severity, likelihood and existing controls. It is important that other activities do not conflict with the intended work thereby creating additional hazards. Such potential conflicts are also risk assessed and if the additional hazards cannot be eliminated or controlled then alternative means of conducting the work should be found.

Method Statements are developed for work activities during the Project Planning process and for any activity where Hazards have been identified. The Method Statement is documented and is supported by the HAZID, Risk Assessments and Permits to Work where required. The Method Statement forms the basis for the “Tool Box Talk” which is conducted between the persons actively involved, supervisors and any contractors and any other persons who may be engaged in activities that could conflict with the work described in the Method Statement.

Potential emergency scenarios are analysed as part of the organization’s risk management processes. A review of the analysis of potential hazards or circumstances that could lead to an emergency may provide opportunities to prevent an incident or at least mitigate the consequences through both improved preparedness and response actions.

When assessing the controls to eliminate or reduce risk where the consequences might lead to an emergency the findings are applied to both the Method Statement and the emergency contingency plans respectively thus the safe systems of work encourage should become effective in mitigating risk as part of the HSEQ lifecycle

1.6.4. Vessels

Before any operation involving vessels takes place it is compulsory to carry out a pre-cruise inspection to the vessel.There are a number of objectives to achieve during this inspection, including:

- Vessel documentation;
- Safety tour;
- Induction, emergency briefing including life saving appliances and fire alarms systems;

- In smaller vessels, i.e. below 15 metres length, check out the VHF, fire extinguishers, EPIRB and SART, where assistance in an emergency might be necessary;
- Inspection of vessel equipment that may be required for the task and conditions of use;
- Inspect working conditions;
- Tool-Box briefing with the boat crew, to cover the intended tasks;
- Discuss passage plan with the Master/Skipper;

Vessels are not fully compliant and up-to-date with their regulatory certifications and applicable maritime standards will not be used

Updated documentation is requested on an annual basis for passenger boats used as workboats and any other class of boat up to 24 metres. Workboat certification is maintained on a spreadsheet supported by scanned/photographed documentation including at least the following (if relevant):

- Passenger Safety "Licence" Certification under Merchant Shipping (Passenger Boat) Regulations1 displayed onboard with an expiry date not exceeding 2 years. It is a criminal offence to operate a passenger boat without a licence. Passenger boats must be inspected by an authorized person on behalf of the Irish DTTAS Marine Survey Office;
- Load Line Certificate, which includes freeboard and intact stability survey requirements;
- Insurance Certificate in respect of injury, loss or damage to passenger or property on the vessel, or to a person or property not on the vessel, caused by or arising out of the operation of the vessel;
- Master's Certificate of Competency;
- Workboat condition and equipment inspections, pre hire.

Periodic Second Party Audits of charter boats are conducted to verify compliance.
For vessels in excess of 24 metres, carrying 12 or less passengers the following certification is requested and held on record with periodic checks for continued verification:

- International Load Line Certificate;
- Cargo Ship Safety Certificate;
- Cargo Ship Safety Construction Certificate;
- Cargo Ship Safety Equipment Certificate;
- Certificate of entry to P&I Third Party Insurance Certificate;
- Details of equipment likely to be used for SmartBay work such as deck cranes.

Larger vessels which are subject to the ISM Code, i.e. > 500 gross register tonnage (GRT) or less for which there is a valid Safety Management Certificate (SMC) under a voluntary system are not audited. However copies of relevant certification are obtained, and a safety tour of inspection conducted and the findings recorded if deemed necessary. Vessel certification is verified on an annual basis.

1.6.5. Infrastructure

All aspects of design, operation, maintenance and performance in terms of the effects that infrastructure has in the provision of safe, clean and effective resource are considered.

Infrastructure consists of *(inter alia):*

- Buildings and associated utilities;
- Equipment including hardware and software;
- Workshops, tools and plant;
- Buoys, cables and other offshore equipment;
- Transport including marine craft;
- Information and communication technology;
- Instrumentation;
- Hired in equipment such as surveying / measuring devices;
- Sub-sea cable and observatory.

Note: Hired in craft such as RIBs or workboats supplied with a skipper / crew are a resource and should be fit for purposes in every respect.

1.6.6. Safe working conditions

Procedures for safe working on the test site using shore based workboats have been developed. These procedures take in account, at least the following:

- Weather conditions and weather forecasts covering the period from prior to departure by boat, during the passage and on site and for the return passage back to a safe berth plus one day;
- Tidal conditions including heights of tides, tidal stream rates;
- Sea conditions taking in account that predicted wave and swell conditions are serious affected by “wind over tide” which increases wave height and reduces the pitch of the waves making them steeper and more likely to break. When the tide runs opposite to the wind the sea state is affected by the equivalent of 1 notch on the Beaufort Scale or additional 2-3 metres/second. These conditions can result in lower boat speeds with smaller vessels throttling back from e.g. normal cruising speed to 5 knots to avoid damage and less discomfort for crew.

1.6.7. Emergency Preparedness and Response

In accordance with statutory maritime regulations an "Emergency Response Plan" in accordance with the Offshore Renewable Energy Installations (OREI) guidelines has been developed.

Adequate plans and procedures to be taken in the case of an emergency or serious imminent danger including medical emergencies and actions to assist others in distress are prepared and updated as required.

In developing, maintaining and improving Emergency Response Plans account is taken of the following explicit duties in addition to general duties:

- Establishing procedures in the event of serious and imminent danger to persons during emergency response – taking into account the balance of risk in saving life;
- Nominating sufficient number of competent persons to implement those procedures;
- Restricting employee access to danger area;
- Informing persons exposed to serious and imminent danger as to nature of the hazard and steps taken/to be taken to protect them from it;
- Enable persons to stop work and immediately proceed to a place of safety in the event of their being exposed to serious, imminent and unavoidable danger;
- Prevent persons from resuming work in any situation where there is still a serious and imminent danger following an emergency incident;
- Implement dynamic Risk Assessment when considering emergency actions. Reviewing or assessing residual risk following any Emergency situation;
- Ensuring any necessary contacts with external emergency services are arranged, particularly as regards first-aid, emergency medical care and rescue work;

The Emergency Response Plan is required to address specific regulatory requirements and/or the findings of Risk Assessments preformed, include, but are not limited to:

- Confined Spaces (including Entry to Enclosed Spaces);
- Construction, installation, maintenance activities;
- Electrical repair installation, repair, maintenance and decommissioning;
- Diving;
- Fire;
- Hazardous substances;
- Lifting operations;
- Marine personnel transfer;

- Vessels;
- Working at height;
- Man Over Board (Unintentionally);

The Emergency Response Plan shall be maintained in an up to date form including the internal and external emergency response contact details (landline, mobile telephone, email address and alternative numbers). External contact details include:

- Gardaí / Fire & Rescue / Coast Guard;
- Local affiliated rescue services;
- Marine Rescue Coordination Centre (MRCC);
- Harbour Masters;
- Salvage / Towing / workboat contractors;
- Diving companies;
- Oil / Chemical spillage emergency responders.

1.7. Impact of the development

During the operational phase of the test site the presence of vessels on site and the additional vessel movements to and from the main ports of Rossaveel and Galway will pose an additional navigational risk. Marine Notices will be issued advising of deployments and recovery operations for all ocean energy devices. All vessels employed in relation to the development will comply with all statutory regulations and will be of sufficient size to cope with the works and the adverse weather conditions.

1.7.1. Worst Case Scenario

The impacts of the Galway Bay Marine and Renewable Energy Test Site project have been assessed under the following worst case scenario deployment of items at the test site in **Table 2**

Table 2: Navigation worst case scenario

Permanent	Recurring	Devices
4 x cardinal marks	Data buoy	1 x OWC
Subsea observatory	Acoustic Array	1 x Attenuator
Waverider	ADCP	1 x Floating Wind Turbine
SeaStation	Cabling	
9 x gravity bases		

1.7.2. Impacts on fishing vessels

Based on data collected, and discussions with the local fishing communities, the impact on vessels avoiding the test site is minimal as there is sufficient sea-room to the north and south of site area to transit to and from fishing grounds. The local boats have become familiar with the navigational rules governing the test site cardinal marks since its establishment ten years ago. No fishing activity (predominantly potting) has been carried out within the test site.

1.7.3. Impacts on commercial vessels

Commercial shipping routes in and out of Galway Bay are located to the south of the test site, therefore the impact on commercial vessels is negligible. The marking of the test site on Admiralty charts minimises the risk of collisions.

1.7.4. Impacts on recreational vessels

Based on information from local sailing clubs, the test site has had, and will continue to have, negligible impact on the recreational vessel activity in the area. The marking of the test site on Admiralty charts minimises the risk of collisions.

During the operational phase of the test site the presence of vessels and the likely additional vessel movements to and from the main ports of Rossaveel and Galway will pose an additional navigational risk. Marine Notices will be issued advising of deployments and recovery operations for devices on site.

1.8. Mitigation

1.8.1. General

- Control measures for frequent users of the area around the test site are defined and managed.. This includes measures such as defining and agreeing a procedure with fishermen a procedure for retrieving any fishing gear that enters the site.
- Position monitoring of devices and buoys to ensure stationary position.
- A separate device-specific risk assessment outlining the hazards associated with the devices will be prepared by the device developer before devices are installed. The device-specific risk assessments will conform to the guidelines of the SmartBay HSEQ Management System.

1.8.2. Operational phase

- Notices to be issued in advance of installation or decommissioning of any device.
- All vessels employed in relation to the development will comply with all statutory regulations. They will be of sufficient size to undertake the works and ambient weather conditions in accordance with the HSEQ management System
- The installation and decommissioning of devices will be planned and managed to ensure the safety of those involved and of other maritime users in this area in accordance with the HSEQ management System

- A reliable inspection, maintenance and casualty response regime conditions in accordance with the HSEQ Management System will be implemented. This will ensure that the required reliability targets for navigation aids (as specified by IALA standards) are met
- The RNLI and other emergency services will be notified of the layout and workings of the site and are involved in emergency exercises for the site. Search & Rescue should also be included in each device-specific risk assessment.
- Personal protective equipment will be compulsory for all personal on site to ensure safety, in accordance with the HSEQ Management System

1.9. Conclusions

Information on local ports and harbours, standard sailing routes, existing Aids to Navigation, existing navigation aids, known navigation hazards, industry activity, sea conditions, bathymetry, fishing grounds and fishing activity was gathered relating to navigation in the area to support the assessment. On assessment of the existing environment, no significant impact on navigation was identified.

To minimise risks to vessels navigating in the area and the devices to be deployed at the test site, it would appear appropriate that the test site area be re-designated as an Area to be Avoided (ATBA) on all navigation charts. An Area to be Avoided (ATBA) is a routeing measure comprising an area within defined limits in which either navigation is particularly hazardous or it is exceptionally important to avoid casualties and which should be avoided by all ships or certain classes of ships.

To avoid confusion from multiple navigation lights & warning/hazard lights within the confines of the test site area, priority will be given to the primary conspicuity of the cardinal mark lights. It is planned that the only marking lights denoting the presence of the test site will be those of the statutorily sanctioned cardinal marks. No devices deployed on site will carry marking lights, other than any floating wind turbine which must comply with aviation lighting as specified by Irish Aviation Authority.

Details of individual devices are unknown at this stage. However the marking and lighting of each device installed in the site will be in accordance with the IALA standards and agreed with CIL, the Marine Survey Office, and Galway Harbour Master.

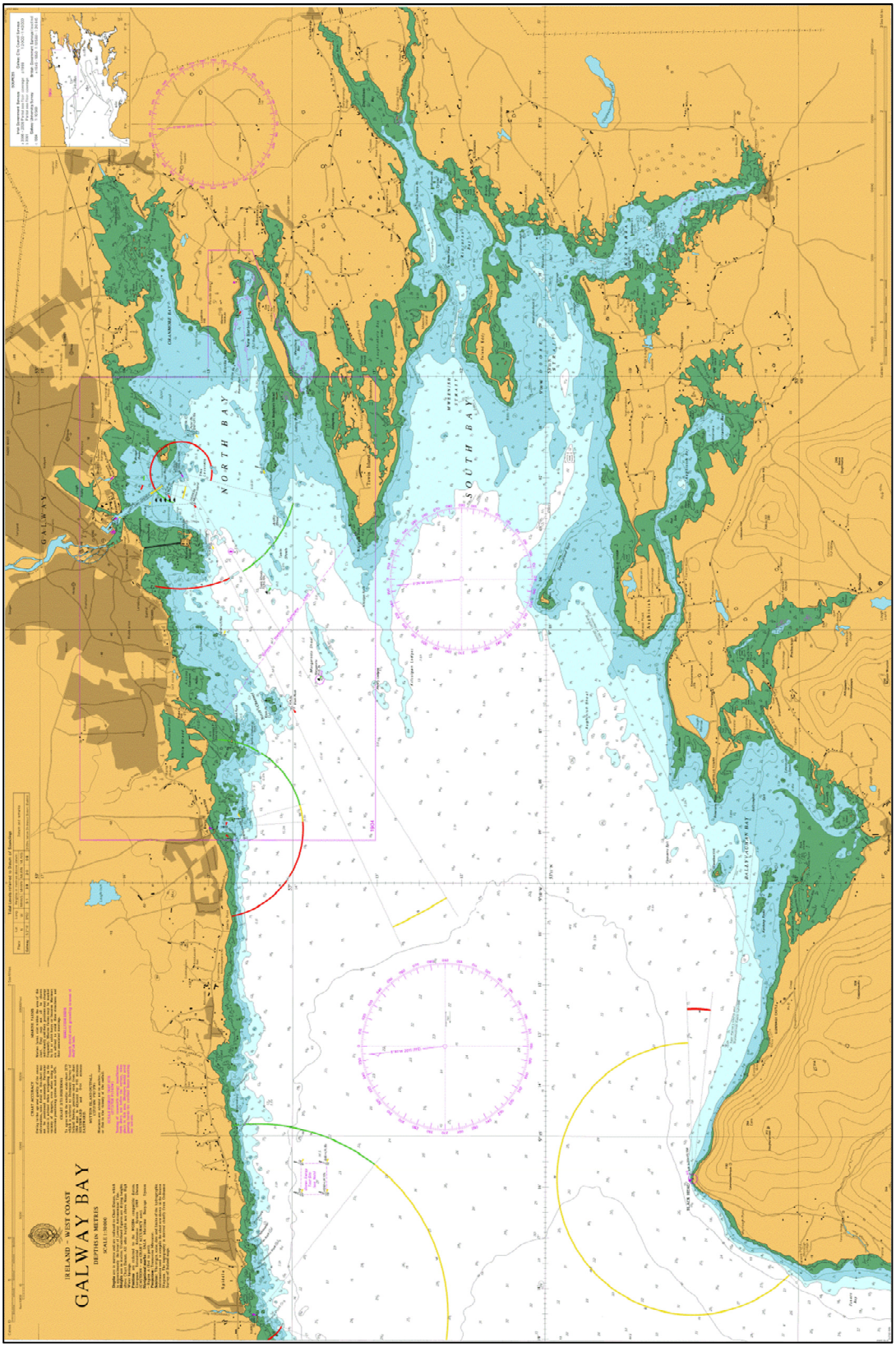


Figure 1: UK Hydrographic Office Admiralty Chart 1984 © Crown Copyright and/or database rights. Reproduced by permission of the Controller of Her Majesty's Stationery Office and the UK Hydrographic Office (www.ukho.gov.uk).

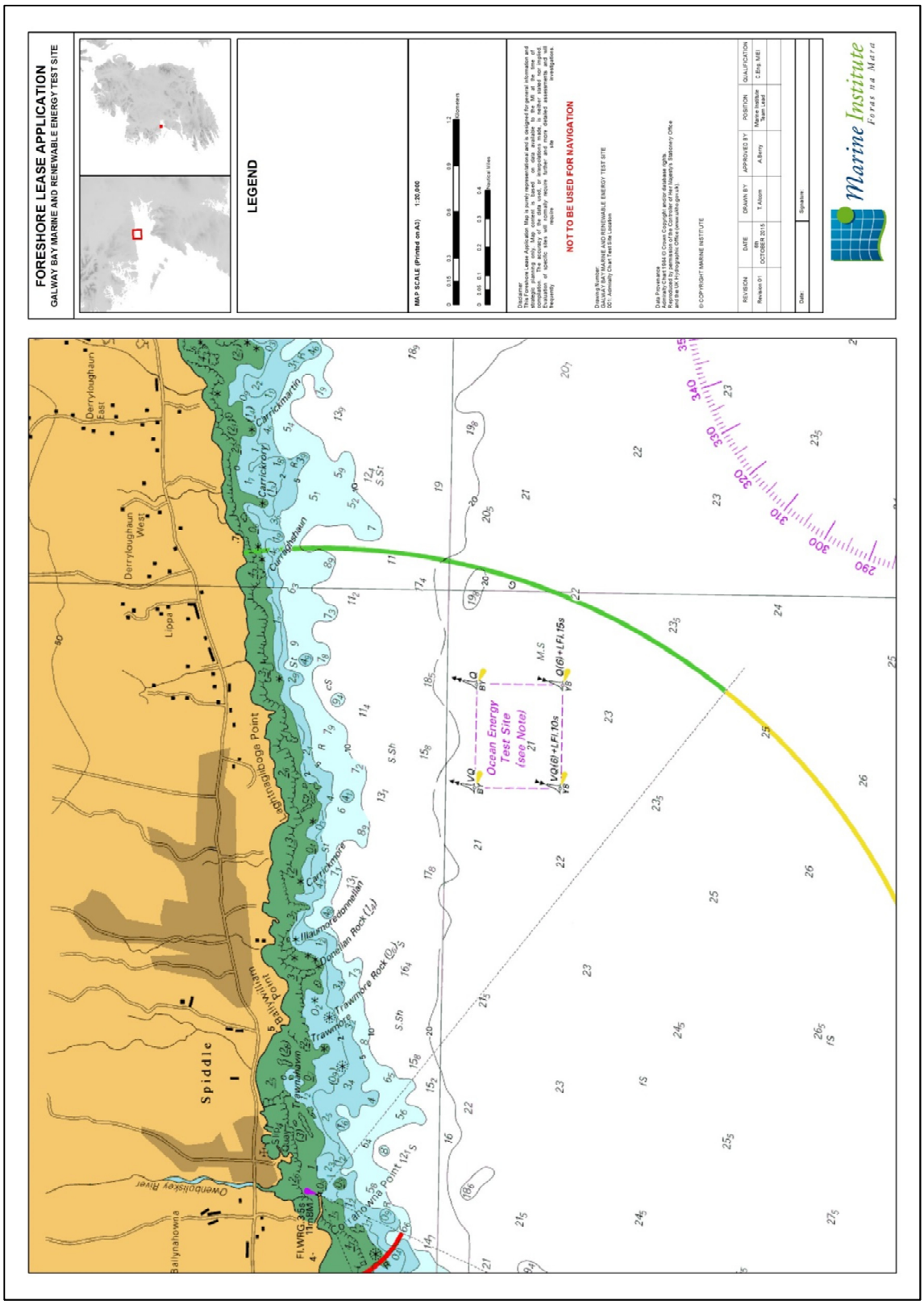


Figure 2: UK Hydrographic Office Admiralty Chart 1984 : Location of existing ocean energy test site, and location of proposed Galway Bay Marine and Renewable Energy Test Site.

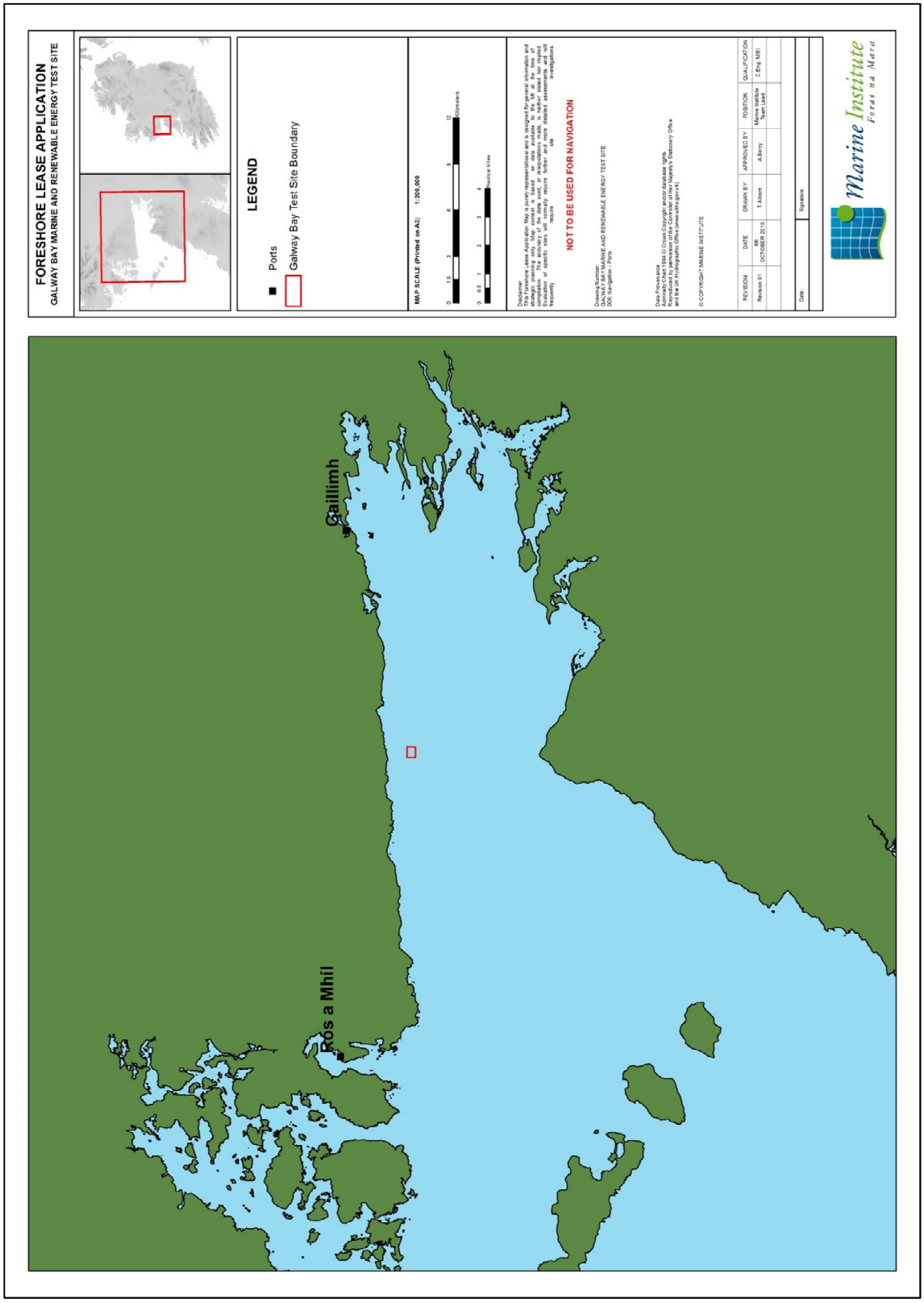


Figure 3: Location of commercial ports and fisheries harbours in the vicinity of the test site.

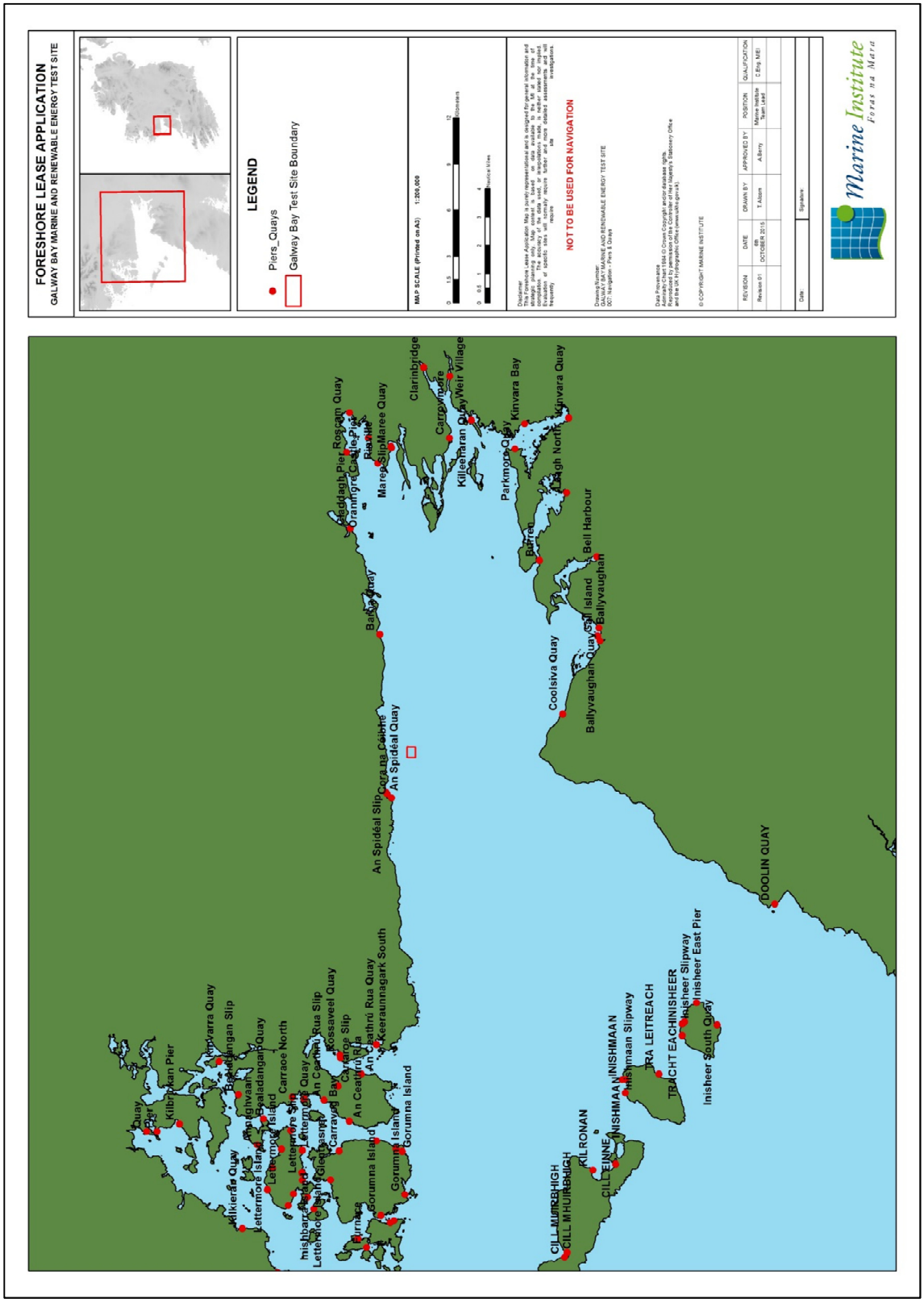


Figure 4: Location of small harbours, piers and slipways in the vicinity of the test site.

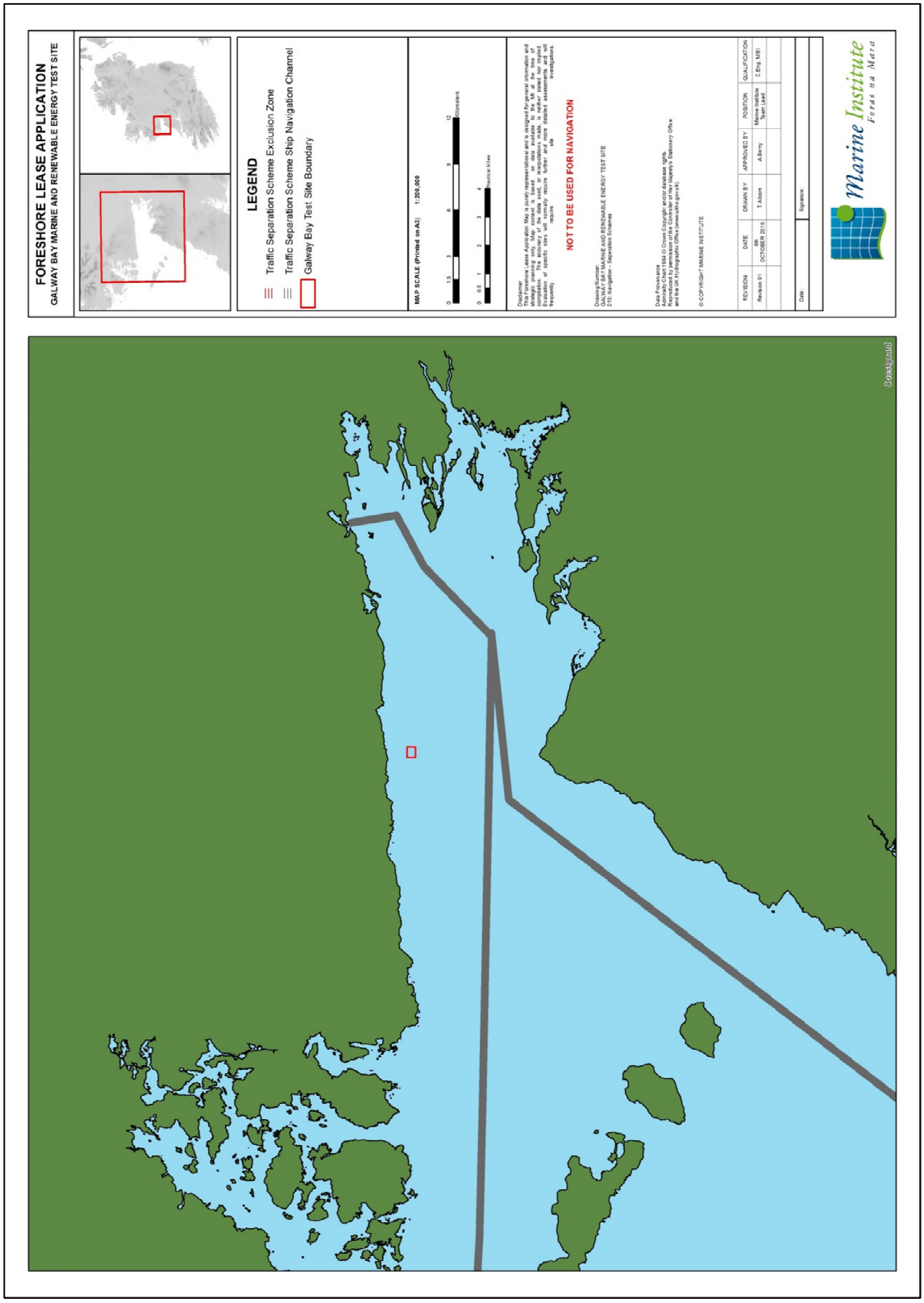


Figure 5: Maritime traffic separation scheme in the vicinity of the test site.

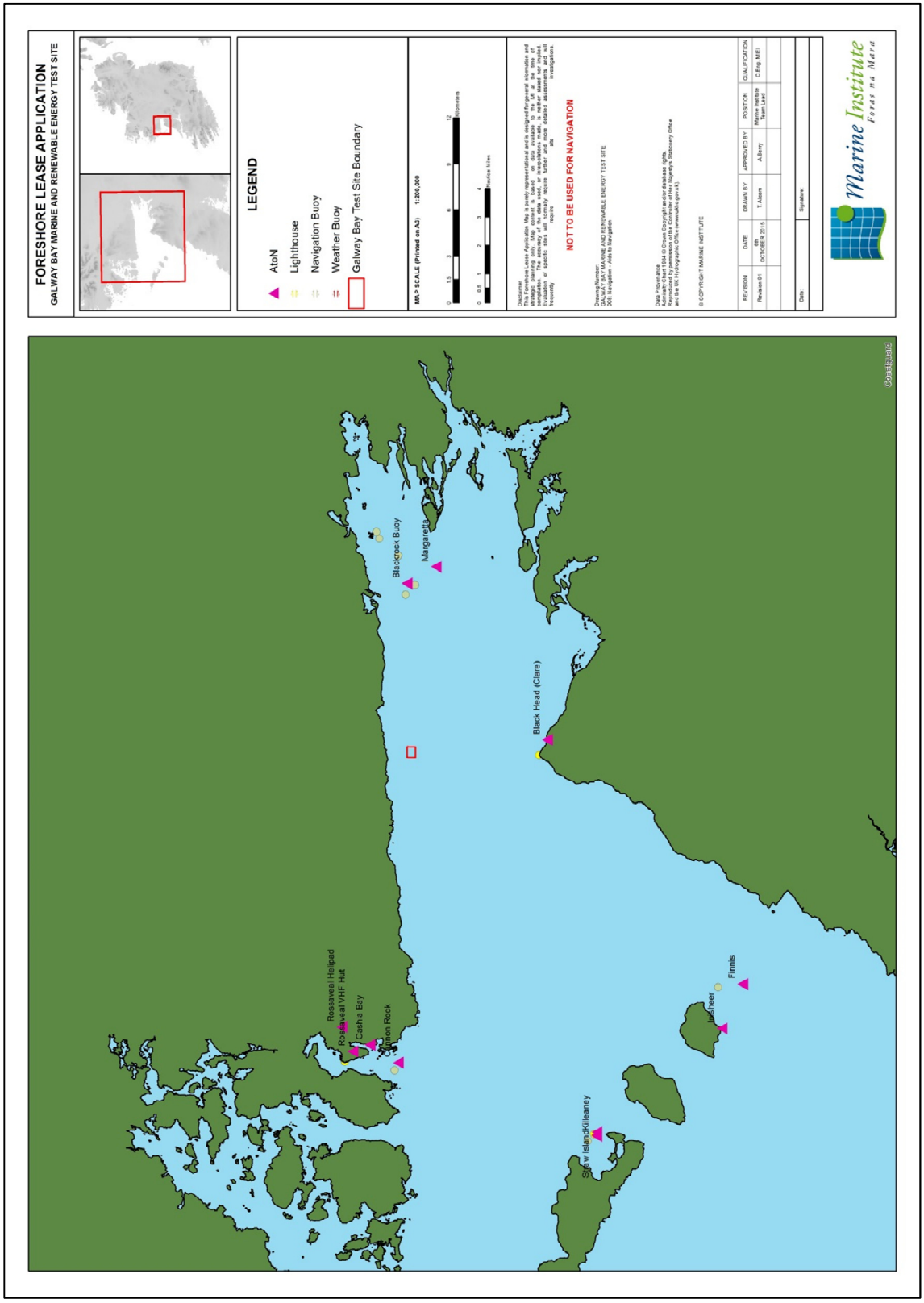


Figure 6: Aids to Navigation and other Navigation Aids in the vicinity of the test site.

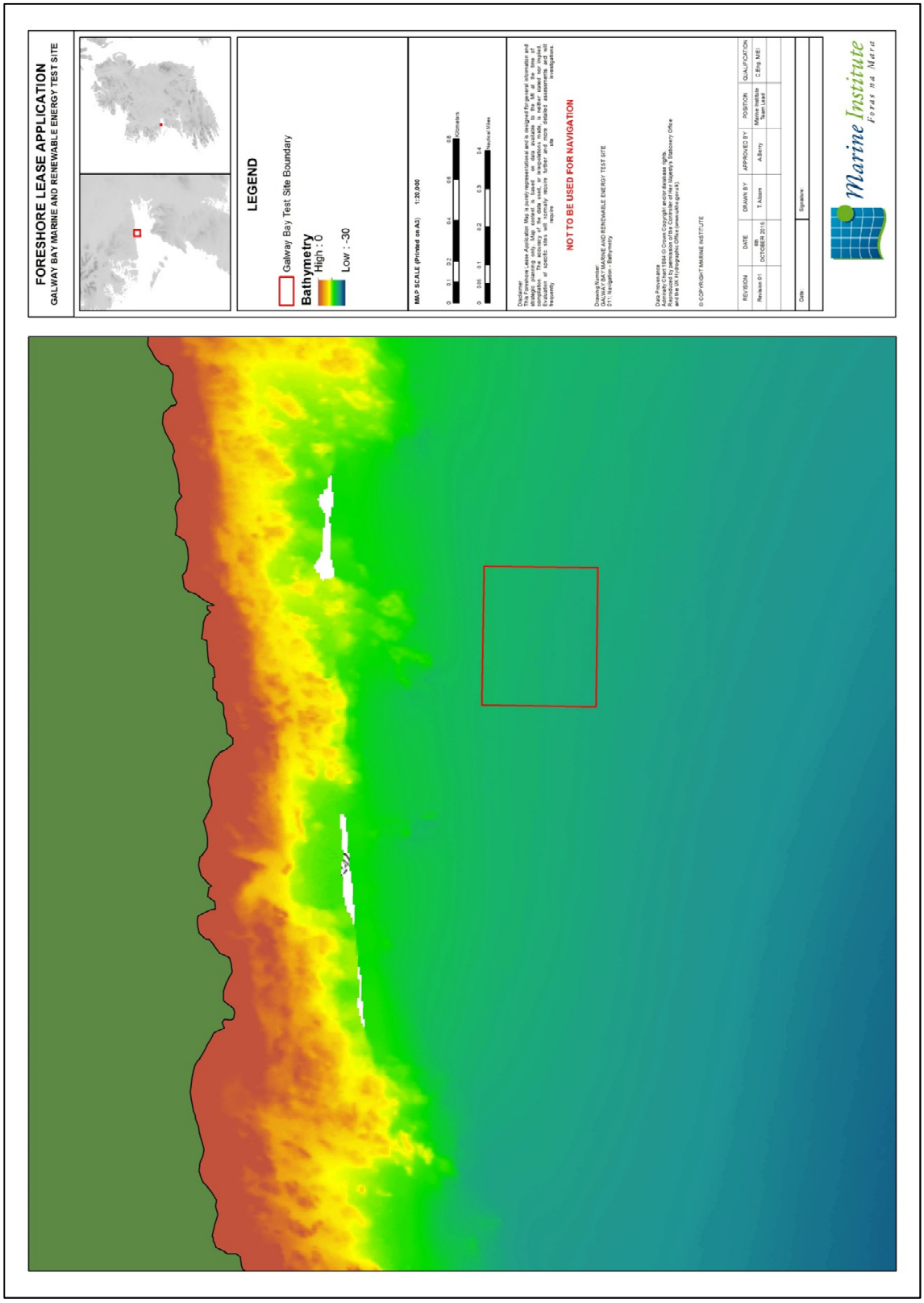


Figure 7: Seabed bathymetry in the vicinity of the test site.

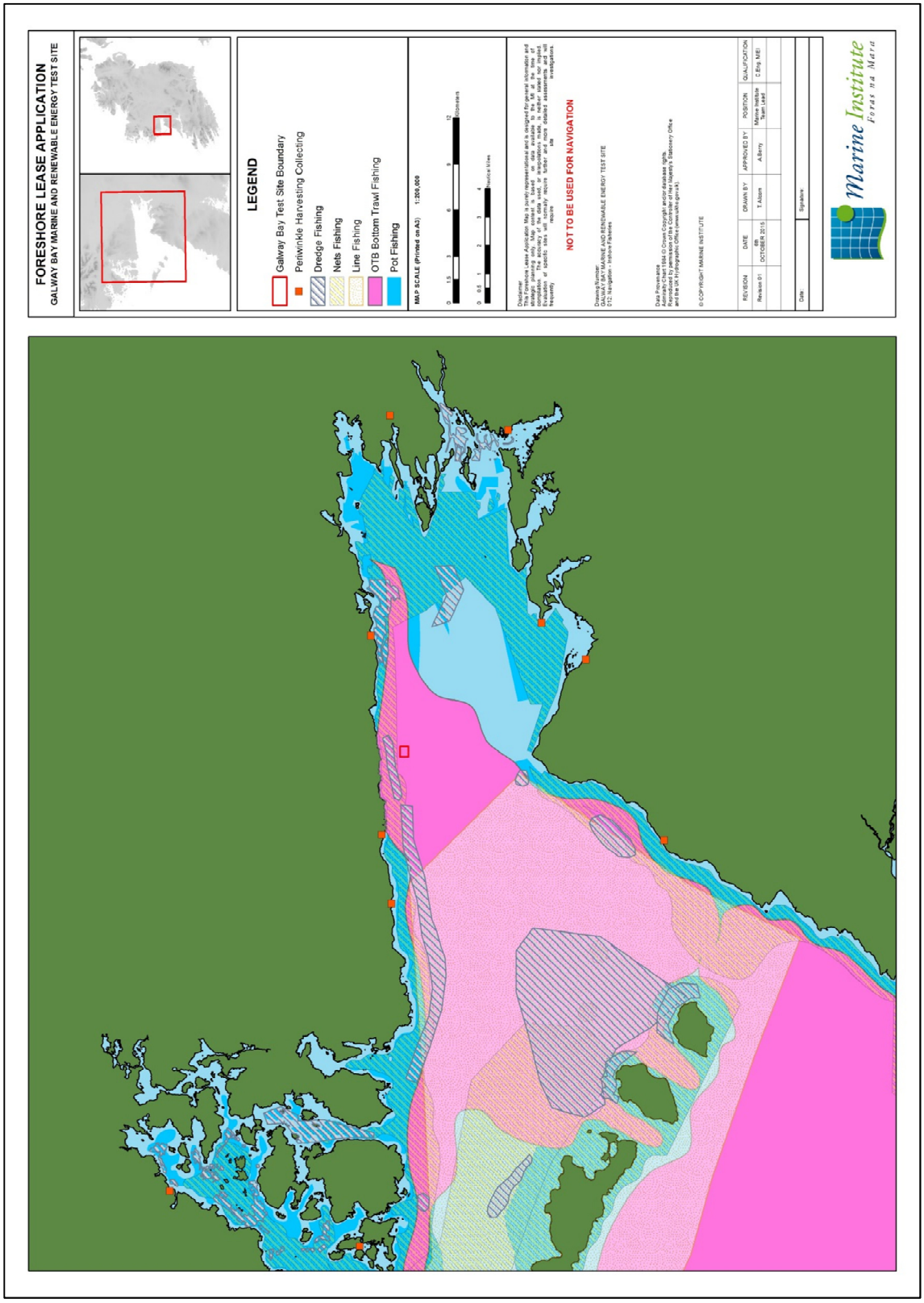


Figure 8: Inshore fishing grounds in the vicinity of the test site location.

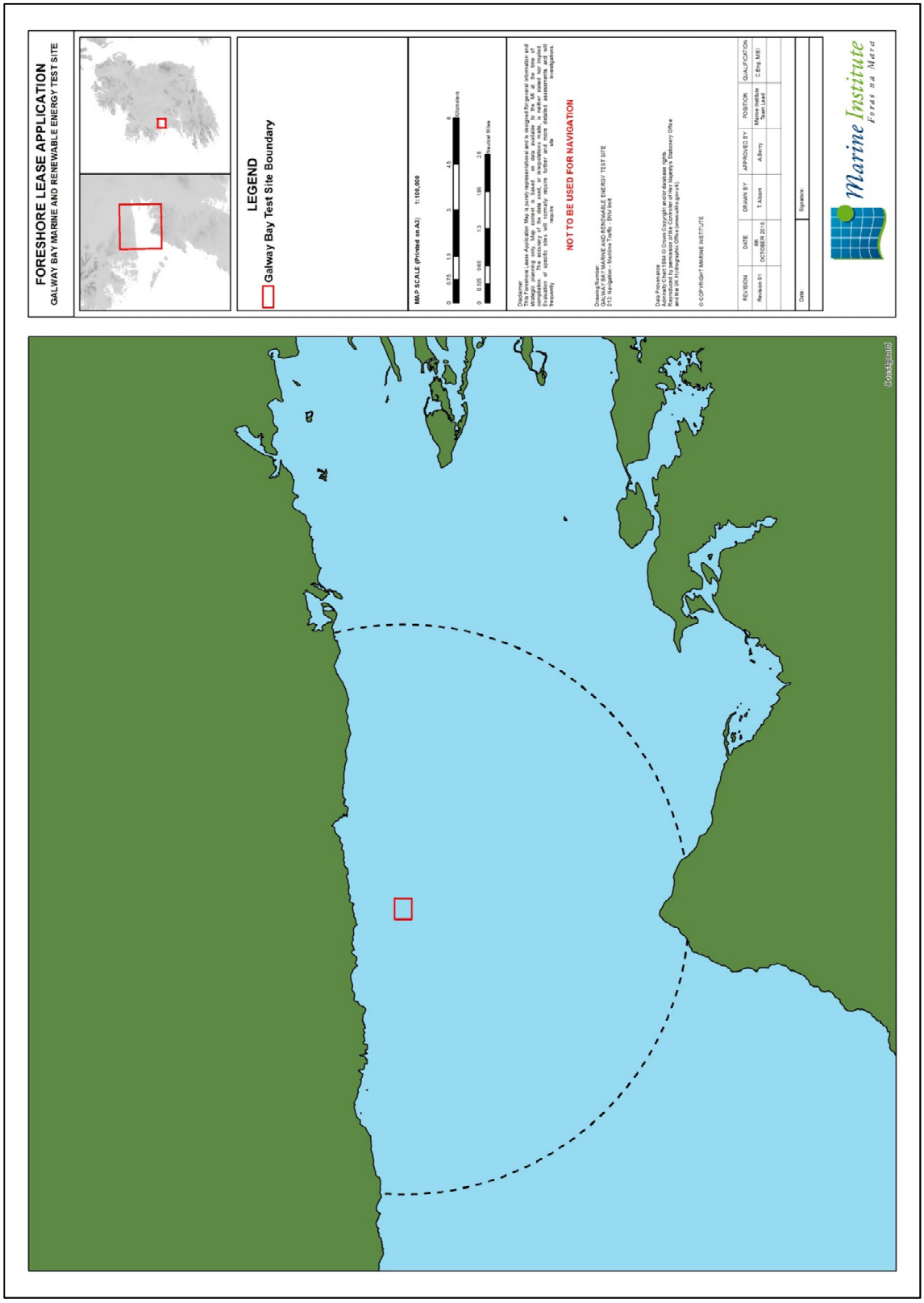


Figure 9: Maritime traffic 5NM limit of assessment.

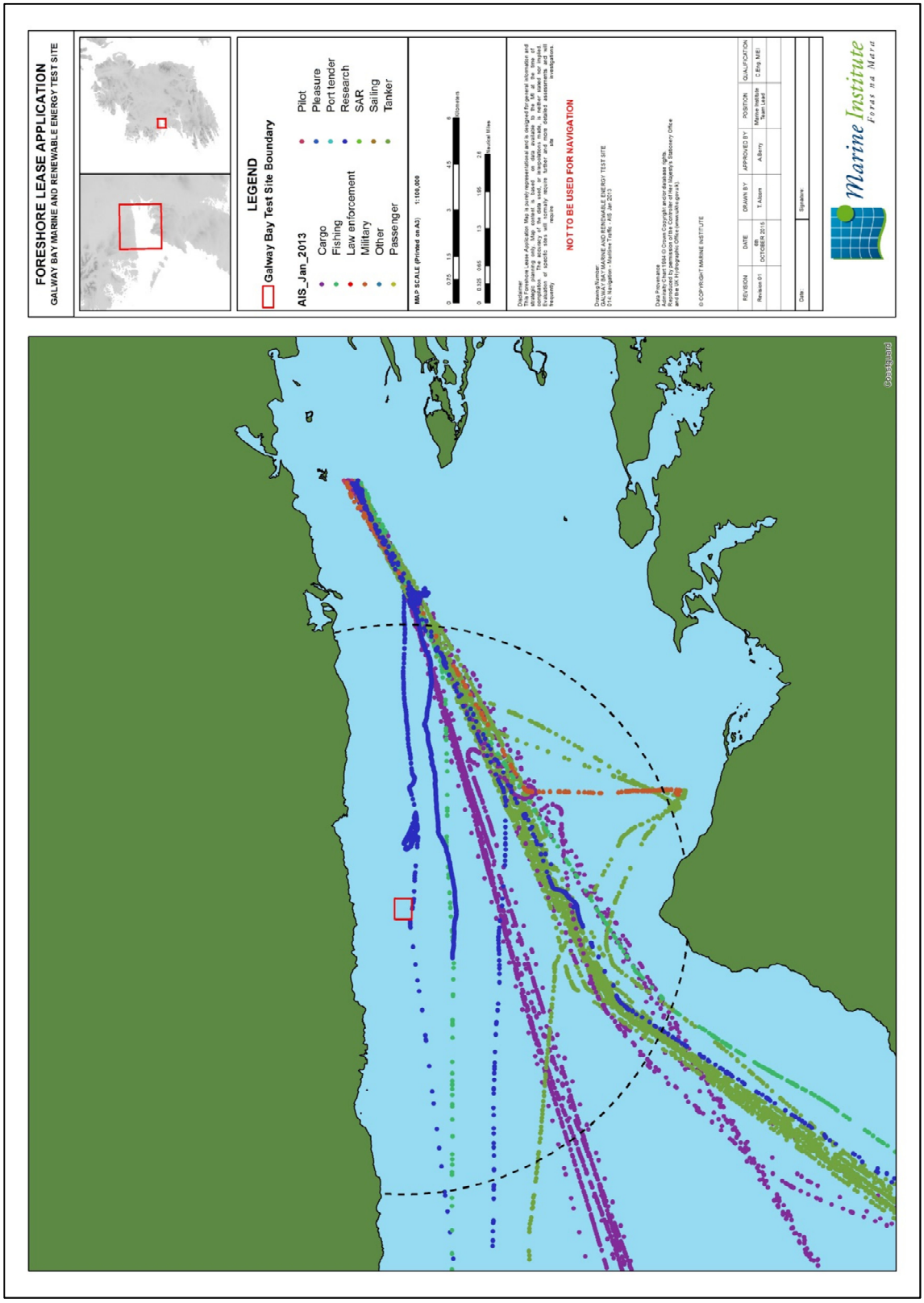


Figure 10: AIS records from January 2013 in vicinity of test site.

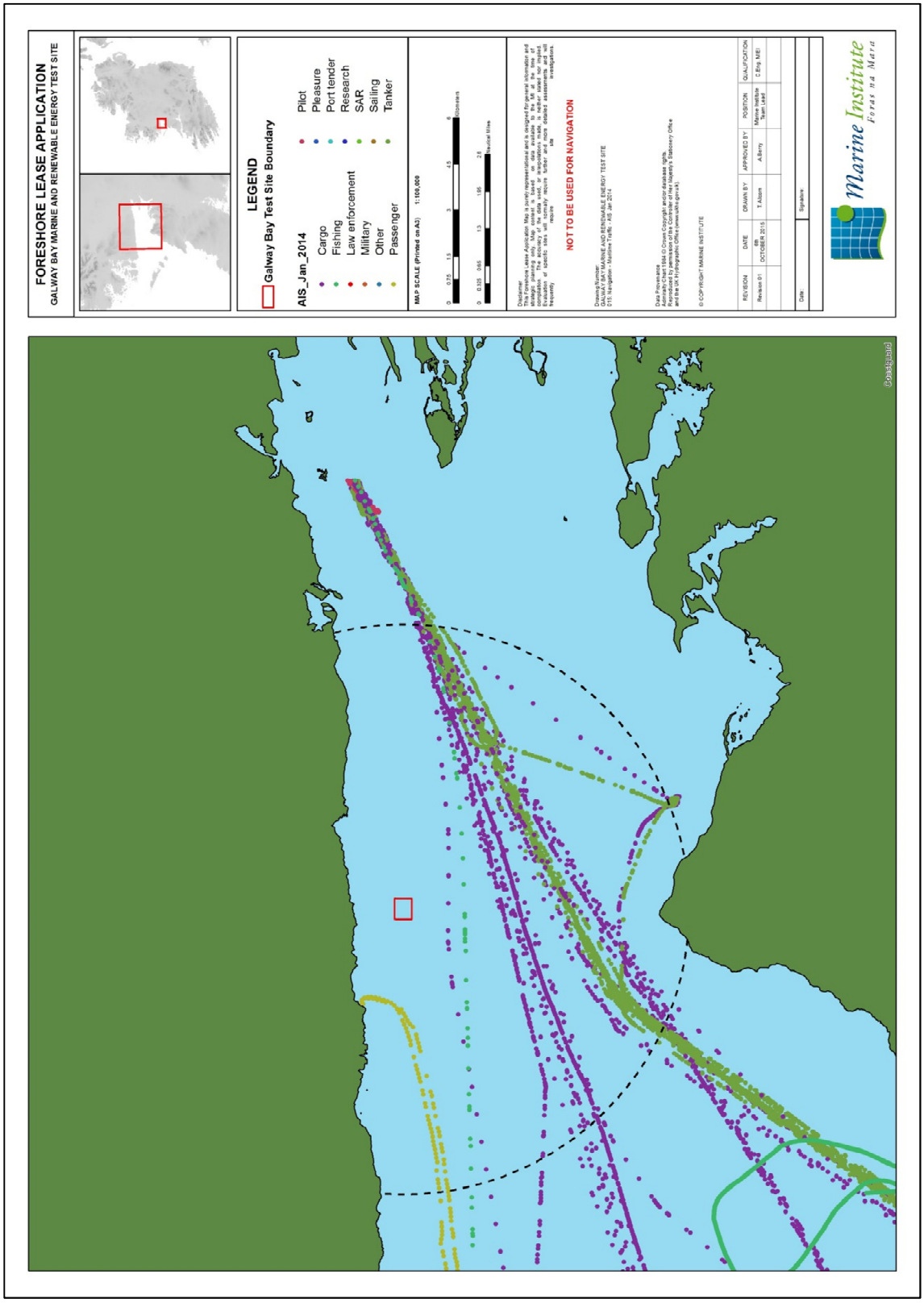


Figure 11: AIS records from January 2014 in vicinity of test site.

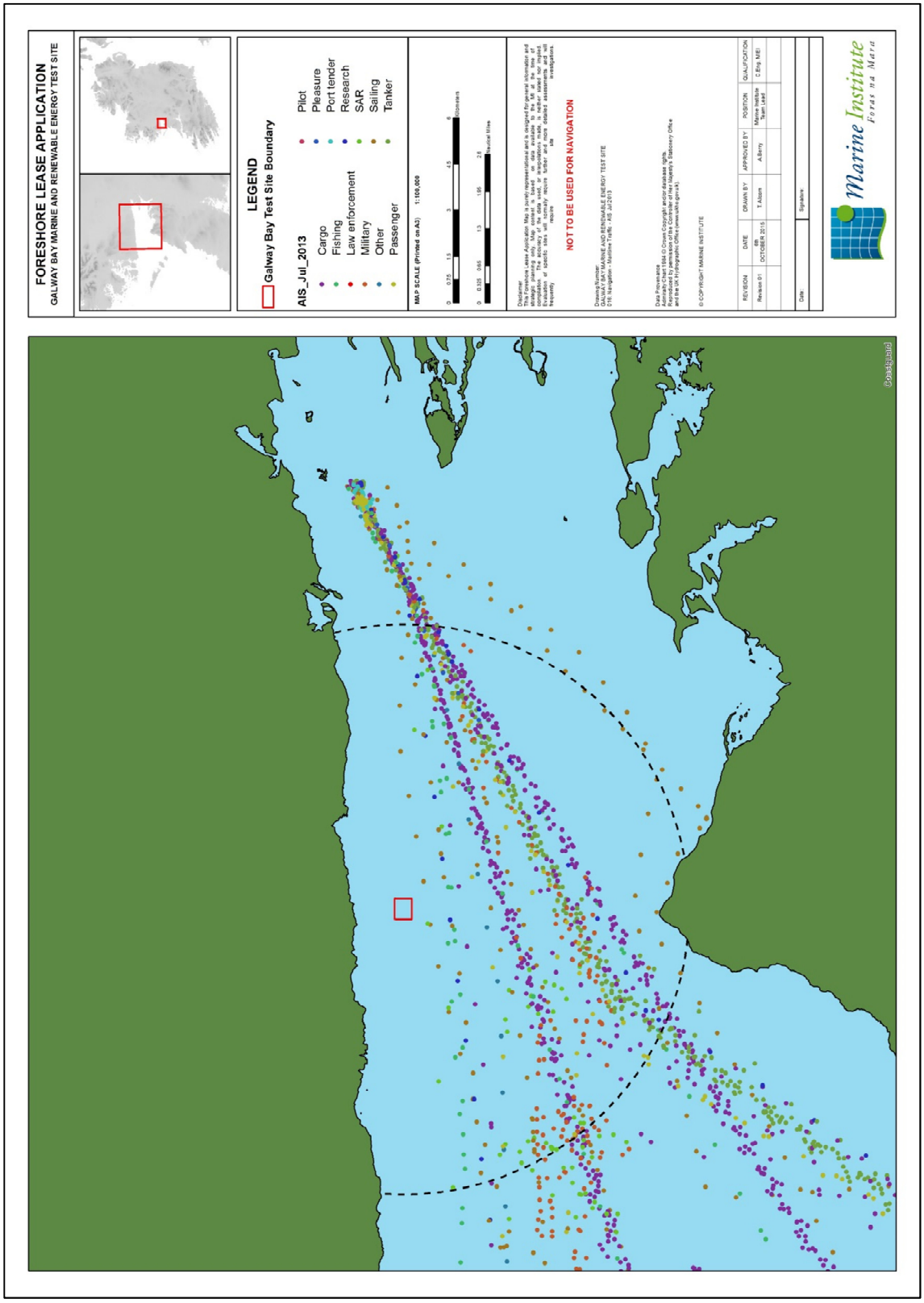


Figure 12: AIS records from July 2013 in vicinity of test site.

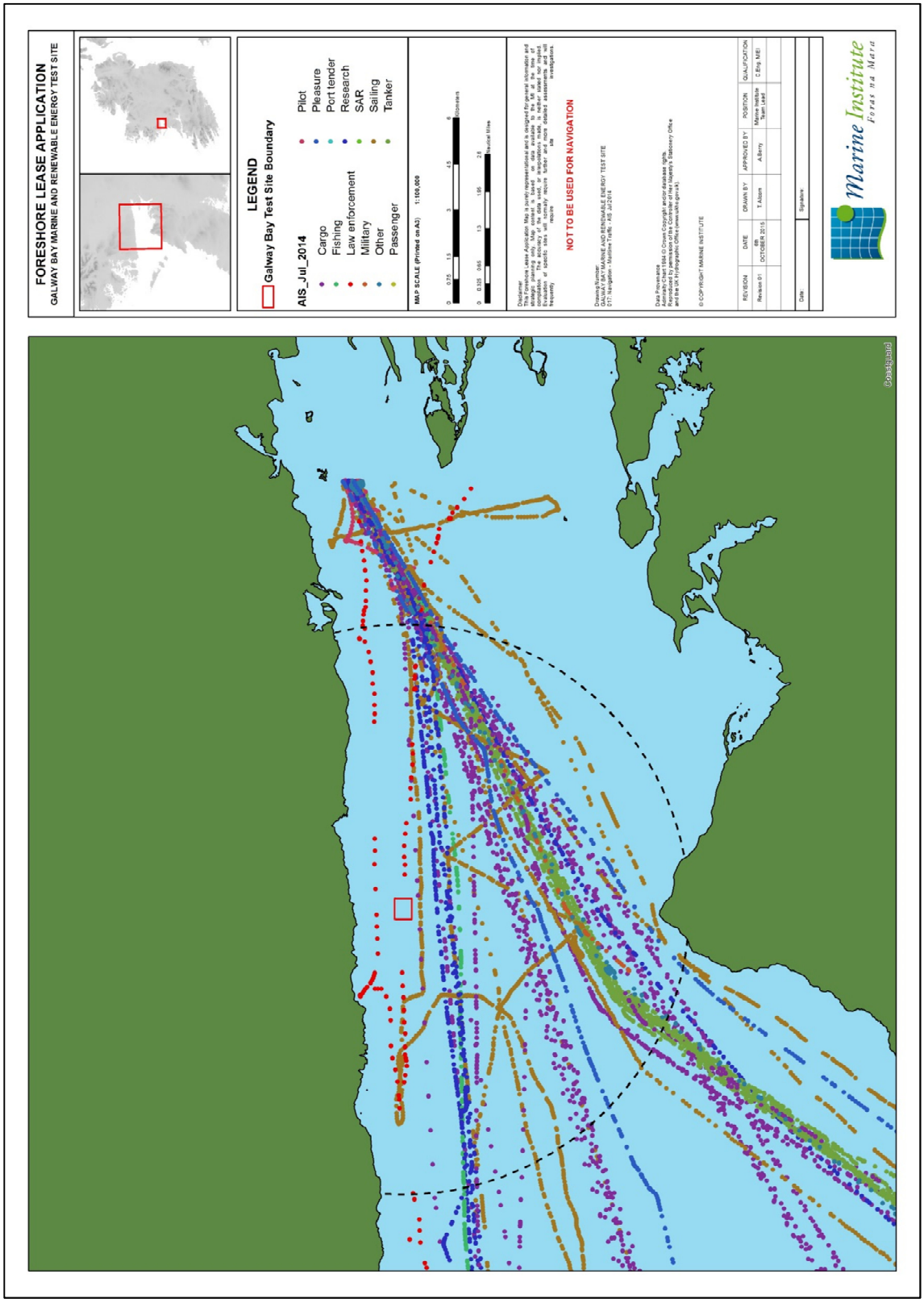


Figure 13: AIS records from July 2014 in vicinity of test site.

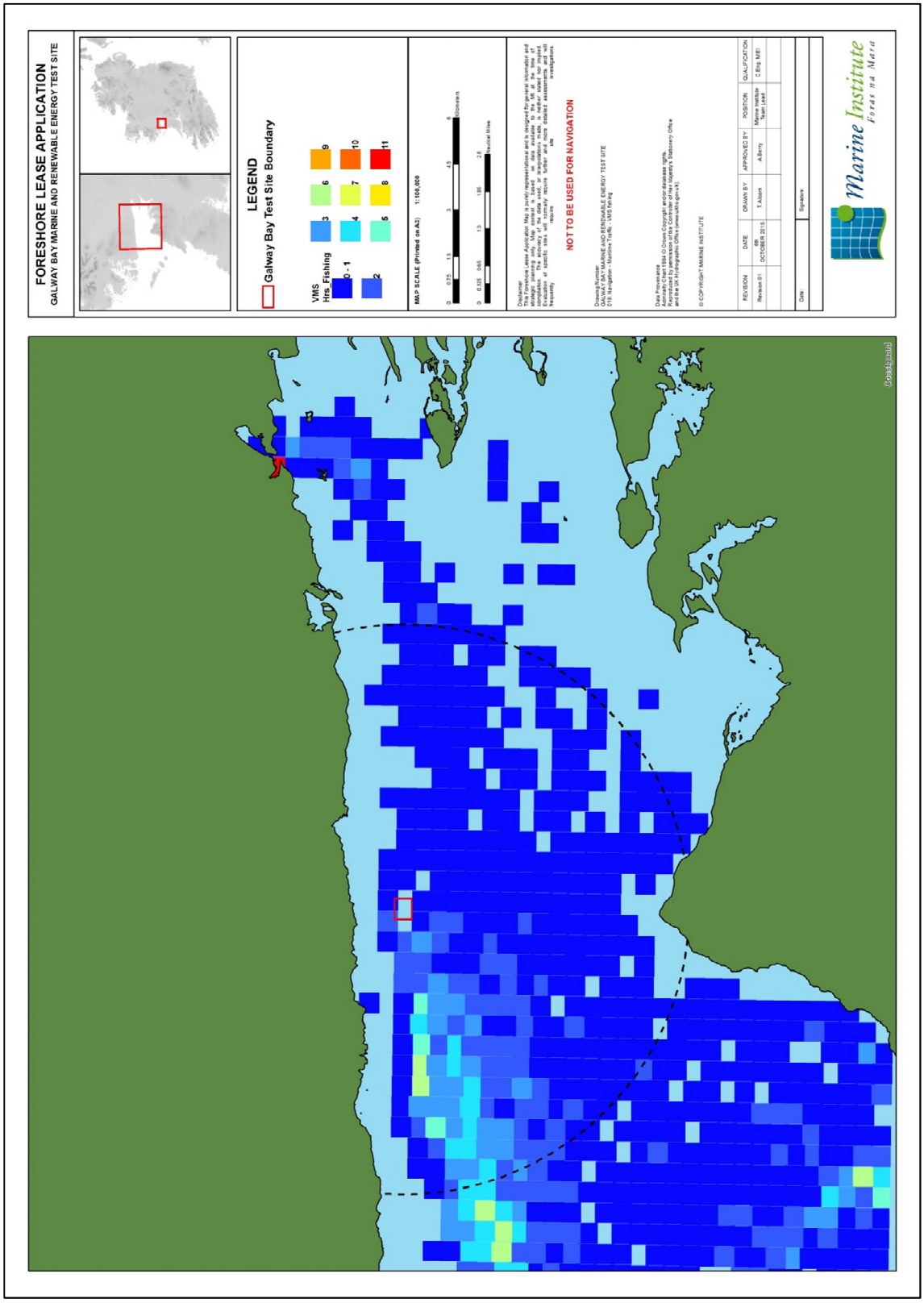


Figure 14: VMS records of fishing activity in vicinity of test site. (annualised average 2006-2014)

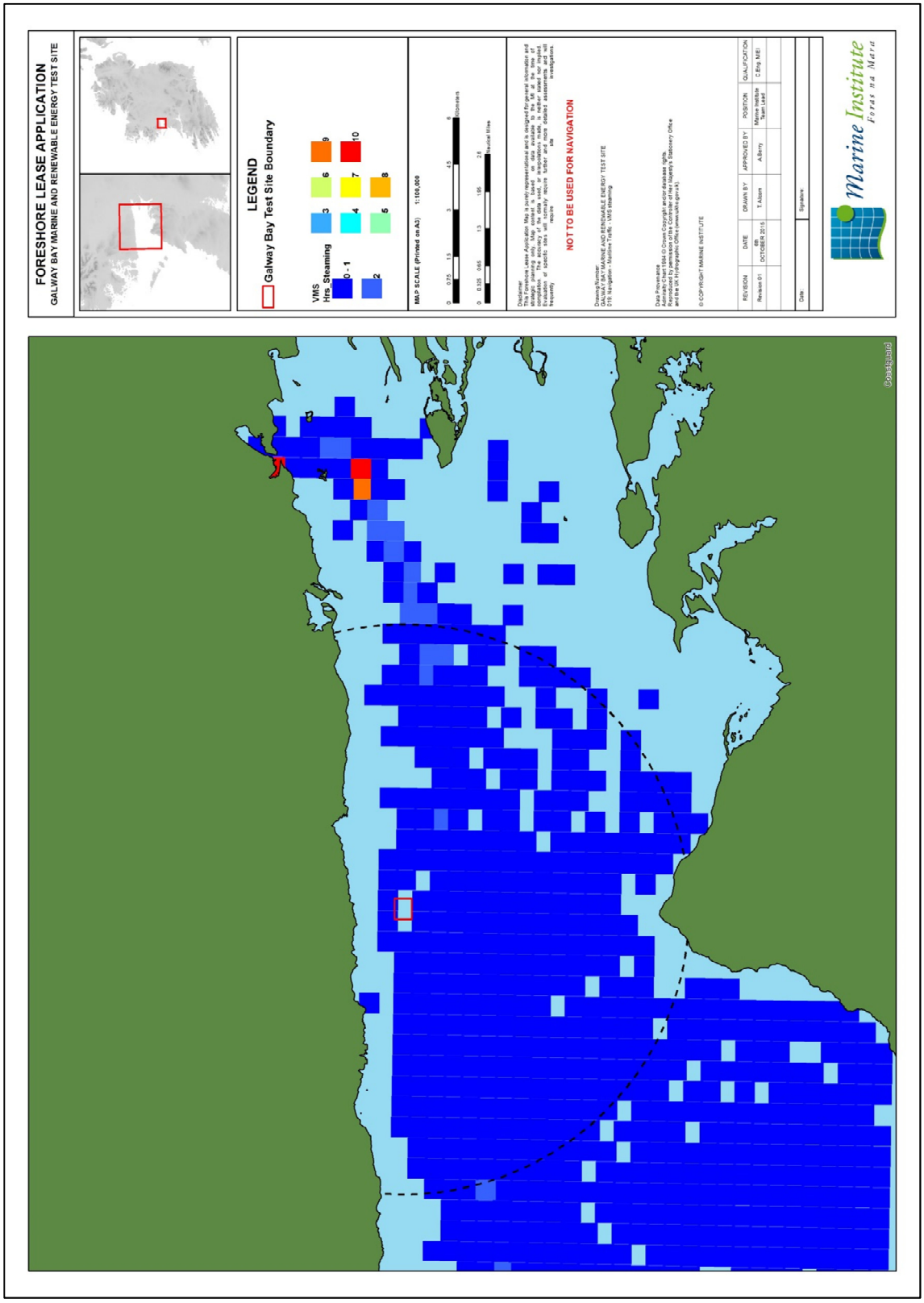


Figure 15: VMS records of fishing vessels underway in vicinity of test site. (annualised average 2006-2014)