NOVA SCOTIA

MARINE RENEWABLE-ENERGY DEMONSTRATION PERMIT

Province of Nova Scotia
Marine Renewable-energy Act

PERMIT HOLDER:	Sustainable Marine Energy (Canada) Ltd.
PERMIT NUMBER:	2020-70-0002
EFFECTIVE DATE:	March 16, 2020
EXPIRY DATE:	March 16, 2025
LAST AMMENDED ON:	_____

Pursuant to Section 36 of the *Marine Renewable-energy Act*, as amended from time to time, this Demonstration Permit granted to the Permit Holder is subject to the Terms and Conditions attached to and forming part of this Permit, for the following activities:

Construction, installation, operation, and decommissioning of two (2) in-stream tidal energy generators on a short-term demonstration basis with an aggregate nameplate capacity of seven hundred (700) kilowatts at Sustainable Marine Energy (Canada) Ltd. Permit Area located within and adjacent to the Grand Passage MREA.

For greater certainty, the activity authorized under this Demonstration Permit and its terms and conditions is subject to the *Marine Renewable-energy Act* and its regulations.

Derek Mombourquette
Minister

MAR 12 2020
Date Signed

MARINE RENEWABLE-ENERGY DEMONSTRATION PERMIT
TERMS AND CONDITIONS

Province of Nova Scotia
Marine Renewable-energy Act

PERMIT HOLDER:	Sustainable Marine Energy (Canada) Ltd.
PERMIT TYPE	Demonstration Permit (Connected Generator)
PERMIT NUMBER:	2020-70-0002
EFFECTIVE DATE:	March 16, 2020
EXPIRY DATE:	March 16, 2025
LAST AMMENDED ON:	_____

Terms and Conditions of License Approval
This approval is subject to the following conditions and obtaining all other necessary approvals, permits or authorizations required by municipal, provincial and federal acts, regulations and by-laws before constructing, installing, operating and decommissioning any device in the Sustainable Marine Energy (Canada) Ltd. Permit Area.

Permit

The following schedules are attached to and form part of this Permit:

- Schedule A – Sustainable Marine Energy (Canada) Ltd. Technical Description;
- Schedule B - Survey of Sustainable Marine Energy (Canada) Ltd. Permit Area;
- Schedule C - Project Plan; and
- Schedule D - Insurance Requirements.

The terms and conditions of this Permit document shall prevail over the Schedules.

Definitions:

Terms which are defined in either the *Marine Renewable-energy Act* or its regulations have the same meaning in these terms and conditions, unless otherwise provided.

In this Permit:

"Aggregate Name Plate Capacity" means the maximum installed capacity permitted under the demonstration permit of the units forming the Generation Facility;

"Application Document" means the marine renewable-energy permit application submitted by the Permit Holder to the Nova Scotia Department of Energy and Mines and deemed complete on December 17, 2019;

"Commercial Operation" means the completion of the design, construction and commissioning of at least one (1) device of the Generating Facility, and the Permit Holder has provided written notice to NSPI that they are ready for Commercial Operation. Commercial Operation must be reached on or before the Final In-Service Date;

"Commercial Operation Date" means the first day of the calendar month following Commercial Operation;

"Decommissioning, Abandonment and Rehabilitation Plan" means the decommissioning, abandonment and rehabilitation plan required by subsection 44(2) of the *Marine Renewable-energy Act* and provided to the Minister in accordance with sections 19 and 20 of the *Marine Renewable-energy General Regulations*;

"Deployment" means the placement of a device or associated equipment in position ready for use;

"Effective Date" means the date that this Permit is effective, as noted at the head of this document;

"Fee Regulations" means the *Marine Renewable-energy Fees Regulations*;

"Final In-Service Date" shall be three (3) years from the Effective Date;

"Generation Facility" means one or more device(s) described in the Project Plan and Schedule A, together with all protective and other associated equipment and

improvements as may be modified from time to time pursuant to the terms of this Permit;

"Generator(s)" as defined in the *Marine Renewable-energy* Act;

"Incremental Energy Rate" means the rate in $/MWh which is equal to NSPI's cost of generating or purchasing one more MWh of energy from sources other than the Generating Facility as calculated by NSPI averaged over the twelve (12) month period immediately preceding the relevant time and set out in the Power Purchase Agreement (PPA);

"Minister" means the Minister of Energy and Mines for the Province of Nova Scotia;

"MRE-Act" means the *Marine Renewable-energy Act*;

"Sustainable Marine Energy (Canada) Ltd. Permit Area" or "Permit Area" means the area of submerged land for which the specific location has been determined by survey by the Permit Holder as described in the Application document and as contained in Schedule B of this Permit;

"NSPI" means Nova Scotia Power Incorporated;

"Permit Holder" means Sustainable Marine Energy Canada Ltd.;

"Program Administrator" means a representative of the Nova Scotia Department of Energy and Mines who has been assigned to receive information on the Department's behalf with respect to this Permit;

"Project Plan" means the project plan attached as Schedule C;

"Regulations" means the *Marine Renewable-energy General Regulations*;

"Socio-economic Matters" include, but are not limited to, issues relating to employment, job-creation, and community relations;

"Technical Description" means the description of the technology contained in Schedule A of this Permit;

1.0 Scope of Approval

1.1 *Project Details.* This Permit is limited to the project as described in the Schedules attached to and forming part of this Permit.

1.2 *Project Technology*. The Permit for the project is limited to the technology as described in the Schedules attached to and forming part of this Permit and limited to the aggregate nameplate capacity first stated above.

1.3 *Permit Area.* The Permit Area is (15.86 hectares) as set out in Schedule B. Generator(s) authorized under this Permit shall be constructed, installed and operated within the Permit Area.

1.4 *Development and Operation.* The Permit Holder shall develop and operate the project as described in the Project Plan attached to and forming part of this Permit as Schedule C.

1.5 *Precedence of legislation*. In the event of a conflict between the *MRE-Act* and its regulations and the terms and conditions of this Permit, the *MRE-Act* and its regulations shall prevail.

2.0 General Terms and Conditions

2.1 This Permit is valid for a term of five (5) years form the Effective Date.

2.2 *Renewal eligibility*. This Permit expires on March 16, 2025. To be eligible to renew the term of the Permit, the Permit Holder must have fulfilled its obligations under this Permit, *MRE-Act* and its regulations and shall submit and receive written approval of a new project plan for the coming renewed term in accordance with the requirements and within the timelines of the *MRE Act* and its associated Regulations.

2.3 *Other Approvals, Permits and Authorizations.* This Permit is subject to the terms and conditions herein, as well as the Permit Holder obtaining and maintaining all other necessary approvals, permits or authorizations under municipal, provincial and federal acts, regulations and by-laws.

2.4 In accordance with Section 42(1C) of the MRE Act, the maximum aggregate of terms for this permit is 18 years.

3.0 Project Plan/Term of Permit

3.1 The Permit Holder shall, within three (3) years of the Effective Date, reach Commercial Operation on the project.

3.2 The full Generation Facility as described in the Technical Description (Schedule A) and Project Plan (Schedule C) shall be constructed and operational within three (3) years of the Effective Date of this Permit. This is also the Final In-Service Date. The Final In-Service date shall not be extended by the Minister.

3.3 Any proposal by the Permit Holder for changes to any aspect of the project from that described in an approved Project Plan shall be submitted to the Minister for review and approval.

3.4 This Permit is valid from the date of issuance, expiring on March 16, 2025.

4.0 Power Purchase Agreement

4.1 Energy produced by the Permit Holder will be paid in accordance with the Power Purchase Agreement (PPA) between the Permit Holder and NSPI.

4.2 The term of the PPA shall end on the earlier of:

a) the date on which the Demonstration Permit expires, or is revoked;
b) or 5 years after the Commercial Operation Date.

4.3 The Permit Holder shall be paid an energy rate of $500 per megawatt hour (MWh) of energy generated up to an annual cap of 944 MWh, then the Incremental Energy Rate above this cap, in accordance with the PPA.

5.0 Rent Payments

5.1 The Permit Holder shall pay the first annual rent payment of $252.02 no later than sixty (60) days after the Effective Date, and $317.20 on or before January 31 of each subsequent year during the term of the Permit. The rent payment is calculated on the basis of a calendar year and is equal to the greater of two thousand five hundred dollars ($2,500) per megawatt

(MW) of installed capacity under the Permit or twenty dollars ($20.00) per hectare in the Permit Area.

5.2 Rent payments shall be made payable to the "Minister of Finance" and are non-refundable.

5.3 If rent is not paid on or before the deadline for payment, the Permit Holder shall pay an additional late fee in an amount equivalent to 10% of the full owed.

If rent remains in arrears for more than 120 days after the deadline the Minister may suspend the Permit until rent owing is paid in full.

5.4 The Permit Holder shall notify the Minister in writing no later than sixty (60) calendar days before the next rent payment is due if the megawatts of installed capacity authorized under the Permit or the hectares of the Permit Area change such that it may impact annual rental fees.

6.0 Environmental Monitoring Plan

6.1 The Permit Holder shall not construct or install a new generator, cable or other equipment or structure in the Permit Area until the Permit holder has submitted, and the Minister has approved, an Environmental Monitoring Plan. The Permit Holder shall implement and adhere to the Environmental Monitoring Plan following approval.

6.2 Unless otherwise approved, the Permit Holder shall submit an Environmental Monitoring Plan to the Program Administrator for review and approval at least thirty (30) days prior to constructing or installing a generator, cable or other equipment or structure in the Permit Area.

6.3 The Environmental Monitoring Plan (EMP) must be developed using relevant baseline data and identify appropriate environmental effects indicators. The plan shall consider project effects on, but not limited to, the following:

- fish and lobster;
- marine birds;
- marine mammals;
- acoustics;
- physical oceanography;

- currents and waves; and
- benthic environment.

The EMP shall include contingencies to be implemented as alternative courses of action in the event mitigation and/or monitoring activities cannot be implemented, are not functioning as designed, or do not provide expected results.

6.4 The Permit Holder shall update and revise the EMP to reflect best available and economic practices, methods, and technologies respecting environmental monitoring; changes in the Project Plan and circumstances of the project; and changes in the knowledge of, or actual changes in the physical, ecological, and environmental circumstances and impacts of the project.

6.5 The Permit Holder shall submit an initial status report on environmental monitoring equipment functionality to the Program Administrator prior to turbine operation and shall notify the Program Administrator of any malfunction or non-functioning of the equipment within twenty-four (24) hours.

6.6 Environmental effects monitoring reports shall be submitted in writing to the Minister at a schedule to be determined by the Nova Scotia Department of Energy and Mines.

6.7 Upon knowledge of serious harm to marine mammals, fish, marine invertebrates, and marine birds, the Permit Holder shall, without unreasonable delay, notify the Program Administrator and the Department of Fisheries and Oceans Canada.

7.0 Engagement Requirements

7.1 *Mi'kmaq Engagement Plan.* The Permit Holder shall not construct or install a new generator, cable or other equipment or structure in the Permit Area until the Permit Holder has submitted, and the Minister has approved, a Mi'kmaq Engagement Plan. The plan shall outline ongoing and proposed engagement activities with the Mi'kmaq of Nova Scotia and shall include, as a minimum, a description and general schedule of activities under the authority of the Permit. The Permit Holder shall send a draft of this engagement plan to the KMKNO and allow adequate time for feedback to be incorporated prior to submitting to the Department for approval. The

Permit Holder shall implement the plan following approval. The plan shall be updated and resubmitted annually to the Minister for approval on or before January 31st throughout the term of this Permit.

7.2 The Permit Holder shall support the Province of Nova Scotia in its future and ongoing consultation processes with the Mi'kmaq of Nova Scotia related to this project, share information the Minister considers necessary or advisable, with the Mi'kmaq of Nova Scotia, and consider implementing mitigation and accommodation measures to address any issues raised through consultation.

7.3 *Stakeholder Communication and Engagement Plan.* The Permit Holder shall not construct or install a new generator, cable or other equipment or structure in the Permit Area before submitting a stakeholder communication and engagement plan to the Minister for approval. The plan shall outline ongoing and proposed engagement activities with stakeholders and shall include, as a minimum, a description and general schedule of activities under the authority of the Permit. The Permit Holder shall implement the plan following approval. The plan shall be updated and resubmitted annually to the Minister for approval on or before January 31, throughout the term of this Permit.

8.0 Reporting Requirements

8.1 *Deployment Notice.* The Permit Holder shall notify the Program Administrator at a minimum, thirty (30) days prior to the Deployment or the testing of new generator(s) or equipment under the authority of the Permit.

8.2 *Deadlines for Activity Reports.* The Permit Holder, throughout the term of the Permit, shall submit quarterly written reports ("Activity Reports") to the Minister detailing the activities carried on under the authority of the Permit:

a. by January 31, for activities between October 1 and December 31;
b. by April 30, for activities between January 1 and March 30;
c. by July 31, for activities between April 1 and June 30; and
d. by October 31, for activities between July 1 and September 31.

8.3 *Content of Activity Reports.* At a minimum, the Activity Reports shall include:

a. Detailed and up-to-date project schedule;
b. Status update on operational aspects of the project;

c. Operational capacity factor for each generator and calculation methodology;
d. Progress updates on the activities outlined in the project schedule;
e. Detailed and up-to-date procurement schedule;
f. Amended procurement deadlines;
g. Summary of any entities procured for goods/services;
h. Financial statements related to procurement, construction, operations, and monitoring activities, with audited financial statements included at least once per calendar year;
i. Data relating to socio-economic matters;
j. Engagement updates;
k. Lessons learned deemed beneficial to the sector; and
l. Any changes to the corporate structure of the Permit Holder or its major shareholders, including but not limited to changes of domicile, management, and corporate governance.

8.4 *Event notification.* The Permit Holder shall notify the Program Administrator within ten (10) business days upon reaching the following milestone(s):

a. Receipt of any federal, provincial, or municipal regulatory approvals;
b. Approval of additional funding or grants;
c. Completion of any NSPI grid interconnection activities;
d. Connection to the transmission or distribution grid;
e. Issuance of any manufacturing or fabrication contracts;
f. Installation of a generator and any cable or other equipment or structure used or intended to be used with a generator;
g. Reaching commercial operation under the power purchase agreement;
h. Achieving 5.5% capacity factor;
i. Achieving 22% capacity factor;
j. Exceeding 22% capacity factor;
k. Commencement of decommissioning activities; and
l. Completion of decommissioning and rehabilitation activities.

8.5 *Press release notification.* The Permit Holder shall notify the Program Administrator at least one (1) business day prior to any press release, social media post, or other public facing release, related to the activities authorized under the Permit.

8.6 *Officer's and Director's Certificates.* The Permit Holder, upon request from the Minister, shall provide an officer's or director's certificate attesting to

the truth, accuracy and completeness of any report and submission required under this Permit, or attesting to matters of compliance with this Permit.

9.0 Incident Reporting

9.1 The Permit Holder shall provide the Program Administrator, within seventy-two (72) hours, a report of any significant adverse environmental effects, accident or near miss, generator malfunction or impact to human health or safety together with a description of the response.

9.2 The Permit Holder shall notify the Program Administrator at least one (1) business day in advance of any public release or press-conference related to an incident or near-miss.

9.3 The Permit Holder shall ensure that:

a. Any incident or near-miss is investigated, its root cause and causal factors identified where possible and corrective action taken where applicable; and

b. Any incident or near-miss is investigated, its root cause, causal factors and corrective action taken must be submitted in writing to the Program Administrator no later than thirty (30) days after the day on which the incident or near-miss occurred.

10.0 Risk Management Plan

10.1 The Permit Holder shall not construct or install a new generator, cable or other equipment or structure in the Permit Area, until the Permit holder has submitted, and the Minister has approved a Risk Management Plan. The Permit Holder shall implement and adhere to the Risk Management Plan following approval.

10.2 Unless otherwise approved, the Permit Holder shall submit a Risk Management Plan to the Program Administrator for review and approval prior to taking any action authorized by this Permit.

10.3 The Risk Management Plan must be developed using relevant project information and shall contain all the information listed in Section 18 of the Regulations.

10.4 The Risk Management Plan shall be updated and resubmitted annually by the Permit Holder to the Minister on or before January 31, throughout the term of the Permit.

11.0 Decommissioning, Abandonment and Rehabilitation Plan

11.1 Unless otherwise approved, in accordance with Section 19 of the Regulations, the Permit Holder shall not construct or install a new generator, cable or other equipment or structure authorized by this Permit until the Permit Holder has submitted and the Minister has approved a Decommissioning, Abandonment and Rehabilitation Plan.

11.2 Unless otherwise approved, the Permit Holder shall submit a Decommissioning, Abandonment and Rehabilitation Plan to the Program Administrator for review and approval prior to constructing or installing a new generator, cable or other equipment or structure authorized by this Permit.

11.3 The Decommissioning, Abandonment and Rehabilitation Plan shall be developed using relevant project information and shall contain all decommissioning activities and all of the information listed in Section 20 of the Regulations.

11.4 The Permit Holder shall update and revise the Decommissioning, Abandonment and Rehabilitation Plan to reflect best available and economic practices, methods, and technology of decommissioning, abandonment and rehabilitation; changes in the Project Plan and circumstances of the project; and changes in the, or knowledge of the, physical, ecological, and environmental circumstances and impacts of the project.

11.5 Any proposal by the Permit Holder that proposes changes to any aspect described in an approved Decommissioning, Abandonment and Rehabilitation Plan(s) shall be submitted to the Minister for review and approval.

12.0 Financial Security and Insurance

12.1 *Insurance*. The Permit Holder shall provide proof of liability insurance to the satisfaction of the Minister prior to taking any action authorized by this Permit.

12.2 *Coverage*. The Permit Holder shall maintain its insurance coverage in full force and effect for the term of the Permit and shall meet or exceed the terms and conditions as set out in Schedule D.

12.3 The Permit Holder shall provide financial security on terms and conditions acceptable to the Minister and at a minimum, sixty (60) days prior to the construction or installation of a new generator, cable, or other equipment or structure authorized by this Permit. The Minister will provide written notice of the amount required, and any terms or conditions, prior to receiving financial security from the Permit Holder.

12.4 The Permit Holder shall provide financial security on terms and conditions acceptable to the Minister prior to the interconnection of platforms. The Minister will provide written notice of the amount required, and any terms or conditions, prior to receiving financial security from the Permit Holder.

12.5 The Permit Holder shall ensure that any security provided is kept in effect throughout the Permit term. Unless otherwise required, the Permit Holder shall renew security on an annual basis and provide proof of financial security annually on or before January 31, throughout the term of the Permit.

12.6 The Minister may determine the form, and for greater certainty the terms and conditions, in which financial security is provided, including any of the following forms:

a. Electronic transfer, cash deposit, or cheques made payable to the Minister of Finance, which the Province in its absolute discretion may cash at any time;
b. Government guaranteed bonds, debentures, term deposits, certificates of deposit, trust certificates or investment certificates assigned to the Minister of Finance; or
c. Irrevocable letters of credit, irrevocable letters of guarantee, performance bonds or surety bonds in a form acceptable to the Minister.

The Minister may impose additional terms and conditions for this financial security upon review and approval of the Decommissioning, Abandonment and Rehabilitation Plan.

13.0 Performance Requirements

13.1 The Permit Holder shall provide final as-constructed drawings of the Generation Facility and all associated infrastructure to the Program Administrator no later than ninety (90) days upon reaching Commercial Operation.

13.2 The Permit Holder is subject to the following performance targets:

a. Capability of deployed generators(s) to be operated and controlled with consistency following installation;
b. Deployed generators operating and being controlled consistently;
c. Capability of turbines, blades, and other spinning or moving components representing a risk to human or wildlife health of being stopped, halted and braked when and if required; and
d. Maintenance of an annual average capacity factor of at least 5.5% for each generator under the authority of the Permit.

13.3 The Permit Holder shall provide performance reports to the Program Administrator no later than January 31 of each year through the term of this Permit. At a minimum, the report must include the following for each generator installed:

a. Amount of energy generated;
b. Date(s) energy was generated;
c. Peak generation;
d. Capacity factor achieved and calculation methodology;
e. Number and date(s) of days deployed;
f. Number and date(s) of operating days;
g. Number and date(s) of maintenance days (planned and unscheduled);
h. The type of maintenance required; and,
i. A summary of operational issues impacting energy production or safe operation of the Generation Facility.

13.4 In the event any generator fails to meet the annual performance standard detailed in 13.2, the Permit Holder must submit a report to the Minister outlining a reasonable time-line and plan for restoration of the generator(s)

to either render it fully functional or provide details for removing the generator(s) from the Permit Area. The Permit Holder must implement the restoration as submitted; any change is subject to prior approval of the Minister. Unless otherwise approved, the Permit Holder cannot invoke this provision within three years of it being previously invoked, and not more than twice overall during the maximum term of this Permit.

14.0 Notice to Minister and Program Administrator

14.1 Notice, documents and other information required to be sent to the Minister of the Nova Scotia Department of Energy and Mines, shall be in writing and may be served by personal service, fax or electronically, addressed as follows:

Attention: Minister of Energy and Mines

Nova Scotia Department of Energy and Mines
Joseph Howe Building
1690 Hollis Street
PO Box 2664
Halifax, NS B3J 3J9

Phone: (902) 424-4575
Fax: (902) 424-0528

Email: energyminister@novascotia.ca

14.2 Notice and/or information required to be sent to the Program Administrator shall be in writing and sent via email to: marinerenewables@novascotia.ca

15.0 Notice to NSPI

15.1 In the event this Permit expires, is suspended or revoked, the Minister will provide written notice of this to Nova Scotia Power Inc.

16.0 Standards

16.1 The Permit Holder must comply with industry standards for marine renewable energy conversion systems as they exist at the time of the issuance of this Permit and as amended, which may include, but may not

be limited to, the International Electrotechnical Commission (IEC) Technical Committee (TC) 114.

16.2 At a minimum, the Permit Holder shall conduct itself with prudence and due diligence and with appropriate regard for matters of health, safety, and environment.

Schedule A – Technical Description

Grand Passage 700 kW MRE Permit Application

6.0 TECHNICAL COMPONENTS

6.1 DESCRIPTION OF GENERATOR AND MOORINGS

The project entails the first ever grid-connected deployment of PLAT-I technology and the first deployment of the second-generation PLAT-I 6.40. This will therefore see the Technology Readiness Level (TRL) of the PLAT-I concept advance from TRL 7 ("*full-scale, similar (prototypical) system demonstrated in relevant environment"*) to TRL 8/9 ("a*ctual system completed and qualified through test and demonstration / actual system operated over the full range of expected mission conditions"*). PLAT-I 4.63 was successfully tested and operated between February 2019 and May 2019 at Grand Passage. Engineering, operational and environmental monitoring data were collected and analyzed during the operating period. These data have been incorporated into modifications to PLAT-I 4.63 and the design of PLAT-I 6.40.

The system specification document ***SME-PLATI-DG-02297 4.63*** is attached, covering the PLAT-I 4.63 platform, mooring turret and mooring system under the current configuration of the system. Like PLAT-I 4.63, PLAT-I 6.40 pivots on a turret connected to a two-point catenary mooring spread and passively aligns with the natural flow of the tidal currents. The trimaran design of the platform has been designed to provide low resistance and enhanced stability, as well as full accessibility to the turbines. The structure, largely constructed from high tensile steel, is a fully modular design to allow for worldwide shipping and ease of assembly at site. Each hull unit is based on a standard ISO 40ft container and joined together either on dry land or while afloat.

The PLAT-I 6.40 will be equipped with six SCHOTTEL Hydro SIT250 turbines with 4m diameter rotors (see general arrangement drawings in document ***J18078-A01_r3 SME PLAT-I 6.40 Assembly - GA***, attached). Swing-up SIT Deployment Modules (SDMs) will allow maintenance to the SITs at the water surface for inspection and maintenance. Overload relief allows the turbines to kick-up to reduce loading on the platform and mooring spread in extreme conditions. The same kick-up system allows for trapped debris to be cleared and for protection of the turbines against ice impact.

The electrical power produced by the individual turbines will be conditioned onboard in the mid-section of the centre hull. An onboard transformer steps up the voltage before it is exported off the platform via the dynamic export cable running through the centre of the turret to the seabed. A simple slip ring on top of the turret will allow electrical and fibre optic cables to pass from PLAT-I to the export cable, preventing twisting of the export cable as the platform turns with each ebb and flood tide.

Technical specifications for PLAT-I 4.63, PLAT-I 6.40, and SIT 250 Turbine are provided below.

[redacted]

The SIT 250 turbine is rated at nominal capacity of 70kW at a current flow velocity of 2.7m/s (see figure at right). The power curve for the SIT 250 turbine is provided below for both 4m and 6.3m diameter rotors. This power curve has been validated throughout a series of laboratory and in-ocean tests including on board PLAT-I 4.63.

[redacted]

The power conversion ("water-to-wire") efficiency is approximately 37%, as measured during PLAT-I operation at Connel, Scotland in accordance with IEC standards. This measurement includes the rotor, mechanical and electrical losses. The capacity factor is a different measurement that takes into account the quality of the tidal resource (i.e., the speed of the currents) and the turbine

power curve. Based on flow measurements and power production levels during the first phase of testing at Grand Passage, the capacity factor is calculated to be 22%.

For further information, please see the document ***SHY-00290-rev6_TS-Electrical_System_PLAT_I_1*** included with this application which provides a detailed overview of the PLAT-I electrical system.

The PLAT-I tidal energy technology is entirely owned by Sustainable Marine Energy Ltd – both in terms of Intellectual Property as well as the physical asset PLAT-I 4.63 prototype. Please see the document ***PLAT-I_Proof of Ownership_25082018***. This document contains brief extracts from a Grant Offer Letter issued from Scottish Enterprise to Sustainable Marine Energy Ltd in June 2017. The Grant Offer Letter clearly states that grant funding has been awarded to the company to support the build and testing of a first PLAT-I prototype, as opposed to any ownership in the device.

3.1.1 Mooring Spread

The deployment at Grand Passage will entail the use of drag embedment anchor technology. The technical specification for the embedment anchor is provided in the figure below. The anchor and the intended installation methodology are described further in the overall project plan. The mooring spread for the PLAT-I 6.40 will be consistent with that currently installed for the PLAT-I 4.63 at Grand Passage, consisting of two drag embedment anchors, a mooring chain and rope connected to each anchor and attached to the turret at the bow of PLAT-I.

This mooring layout allows PLAT-I to rotate 360 degrees unhindered as well as having minimal impact on the seafloor. Only one mooring chain is taut at once, with the downstream line being slack and the anchors will be either fully or partially embedded into the seafloor. The drag embedment anchor typically requires 10m to 15m of seabed for dragging and penetrating the seabed to mobilize the required capacity. These dimensions have been taken into account during the siting of the device.

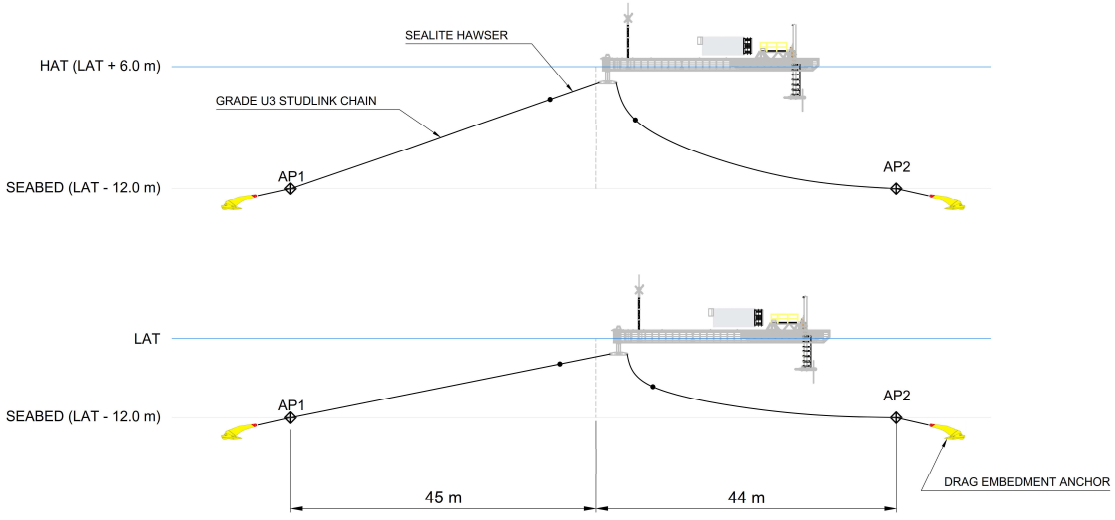


Figure 1: Mooring Spread

3.1.2 Anchors

The drag embedment anchors will be Vryhof Stevshark Rex anchors or similar, as shown in the figure below. These anchors are an established commodity product from one of the world's leading anchor manufacturers and are widely used within the offshore oil & gas industry. The specifications of a typical drag embedment anchor are provided in the figure below. The exact anchor size is being confirmed, therefore the dimensions provided are approximate.

The anchor installation will be performed by a small multicat vessel or self-propelled barge, sourced locally where practicable. Multicats and self-propelled barges from 23 to 27m LOA have been used for this application with sufficient space and lifting capabilities for handling the anchor and associated equipment. Alternatively, a specialist anchor handling tug may be used to install or adjust the anchors and moorings.

Specification of Anchor:
Type: DRAG EMBEDMENT ANCHOR (E.G. VRYHOF STEVSHARK REX)
Design MBL: 100 TONNES
Max Length x Width x Height: 5.0m x 5.4m x 3.0m
Construction: STEEL
Weight in Air: 8000KG
Installation Depth: 2m – 3m (TBC)
Upstand above Seabed: 1m or less (TBC)
Est. Installation time : 2 to 3 HRS

To install the embedment anchors, each anchor is initially pulled into the seabed by the installation vessel. A pre-determined pulling load (Bollard Pull) is then applied to each anchor in turn to fully set / embed and prove the load holding capacity required of each anchor. If the anchors have been laid using a multicat type vessel then a specialist device called a "Vryhof Stevtensioner" can be deployed to apply the proof load to the anchors. If an anchor handling tug is used the vessel can apply the proof load using its deck winches connected directly to the anchors. The anchor installation operation is expected to be completed within one or two days (i.e., 2 tidal cycles).

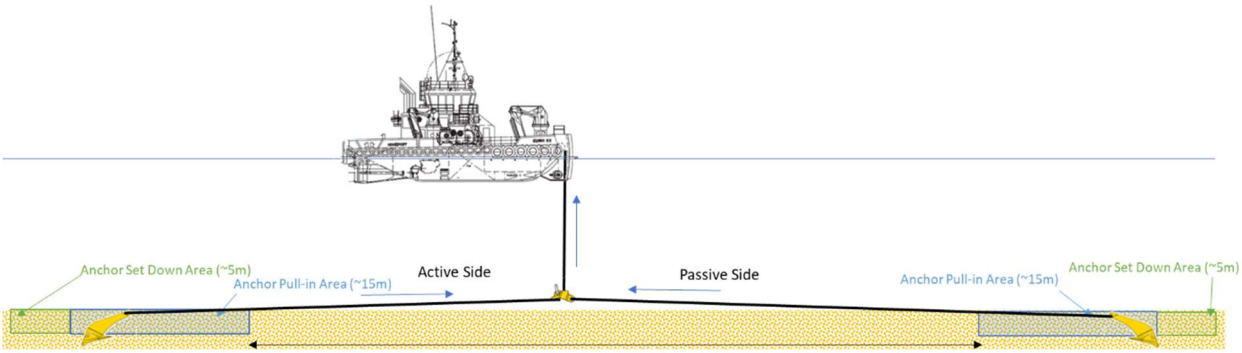


Figure 2: Embedment Anchor Installation

When the anchors have been installed, the mooring chains will be attached to buoys and left on the seabed, with sufficient separation to avoid entanglement with each other. Following the installation of the anchors, a visual inspection of the mooring spread will be conducted. Connection of the PLAT-I 6.40 will take place within 72 hours to reduce the length of time that the buoy lines are in place, potentially presenting an entanglement hazard for marine life. The configuration of the anchor system following installation and prior to PLAT-I installation is shown in the figure below.

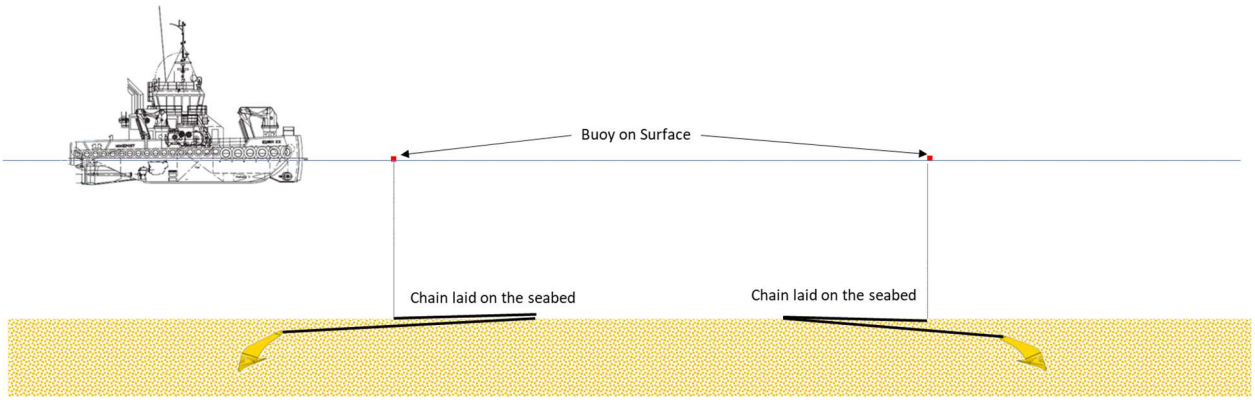


Figure 3: Embedment Anchor Tensioning

PLAT-I is designed to be easy to construct, assemble and to maintain. The key feature of the PLAT-I system in this regard is that the SIT 250 turbines are mounted upon retractable support structures. This enables the SITs to be entirely removed from the water for ongoing access and maintenance. Additionally, in this transport / maintenance mode, once the SITs have been removed from the water, the loadings on the overall system are greatly reduced.

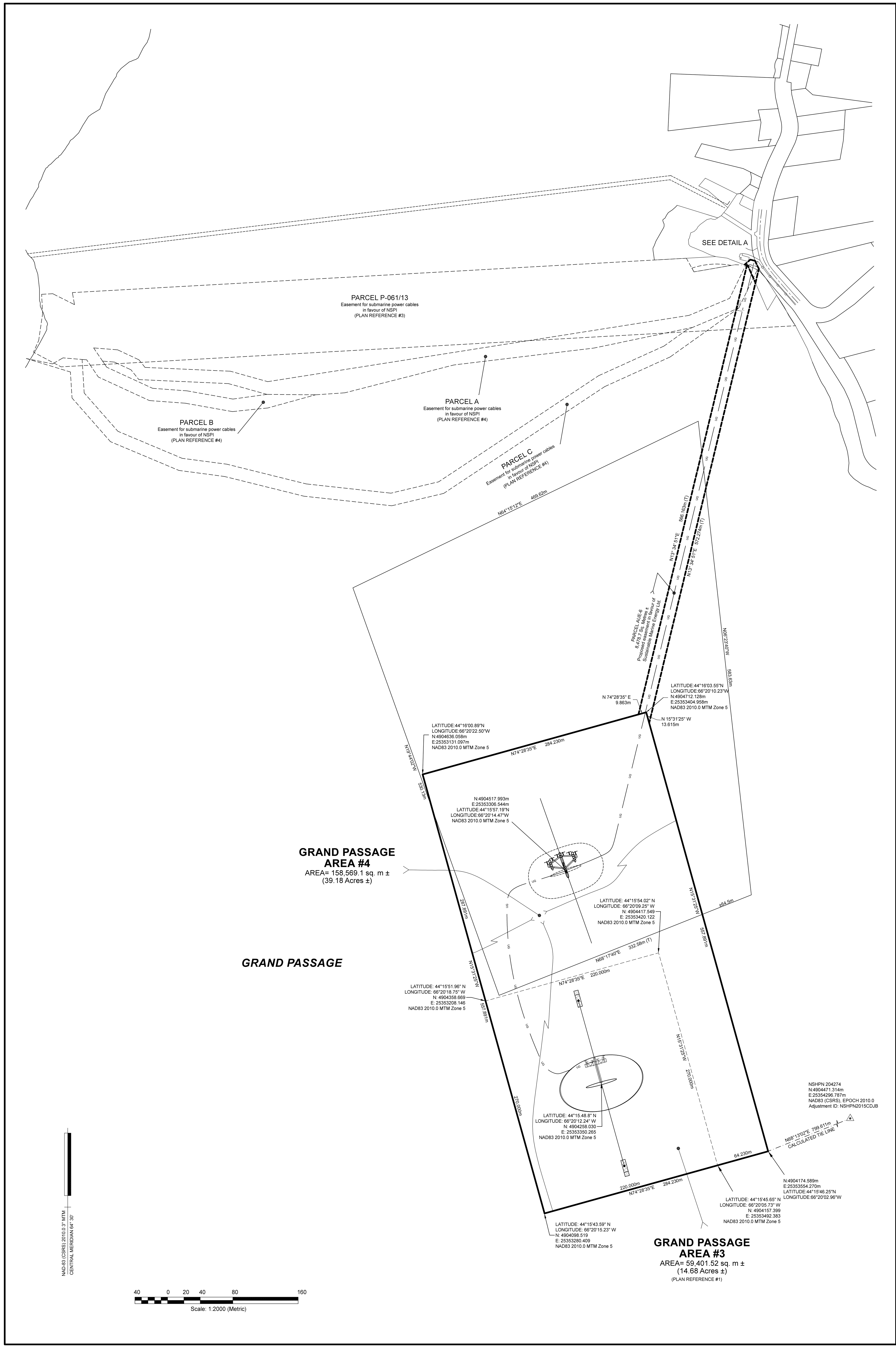
The prototype PLAT-I 4.63 has been on station in Grand Passage since September 2018, with the exception of a brief period when it was removed for repair and modification in June/July 2019. PLAT-I 4.63 remained on station and was unaffected by Hurricane Dorian, which passed through Nova Scotia on September 7, 2019. The trimaran design provides a low ratio of hull-water

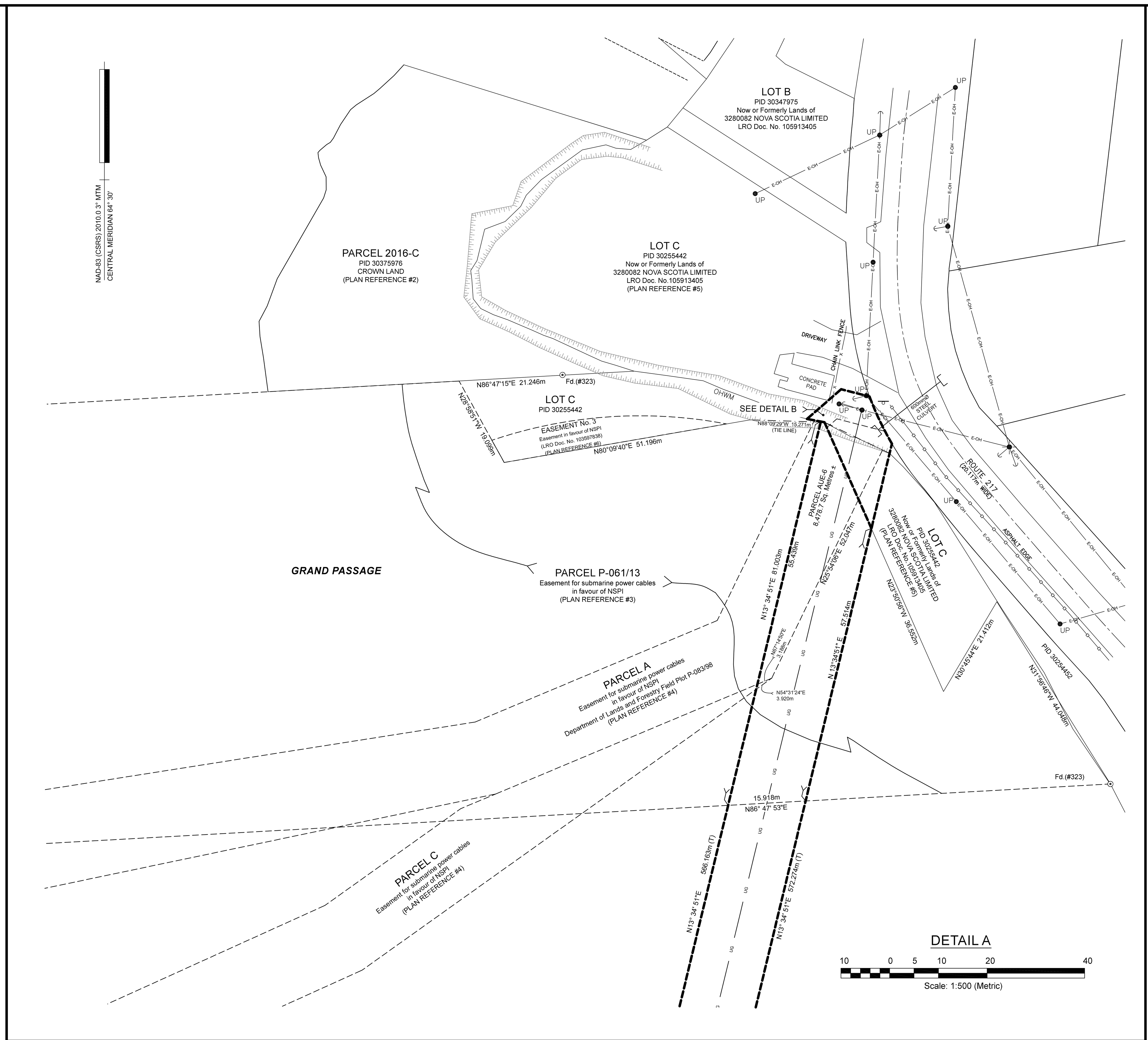
interaction, and the ability to remove the turbines from the water adds to the overall resilience and survivability of the platform.

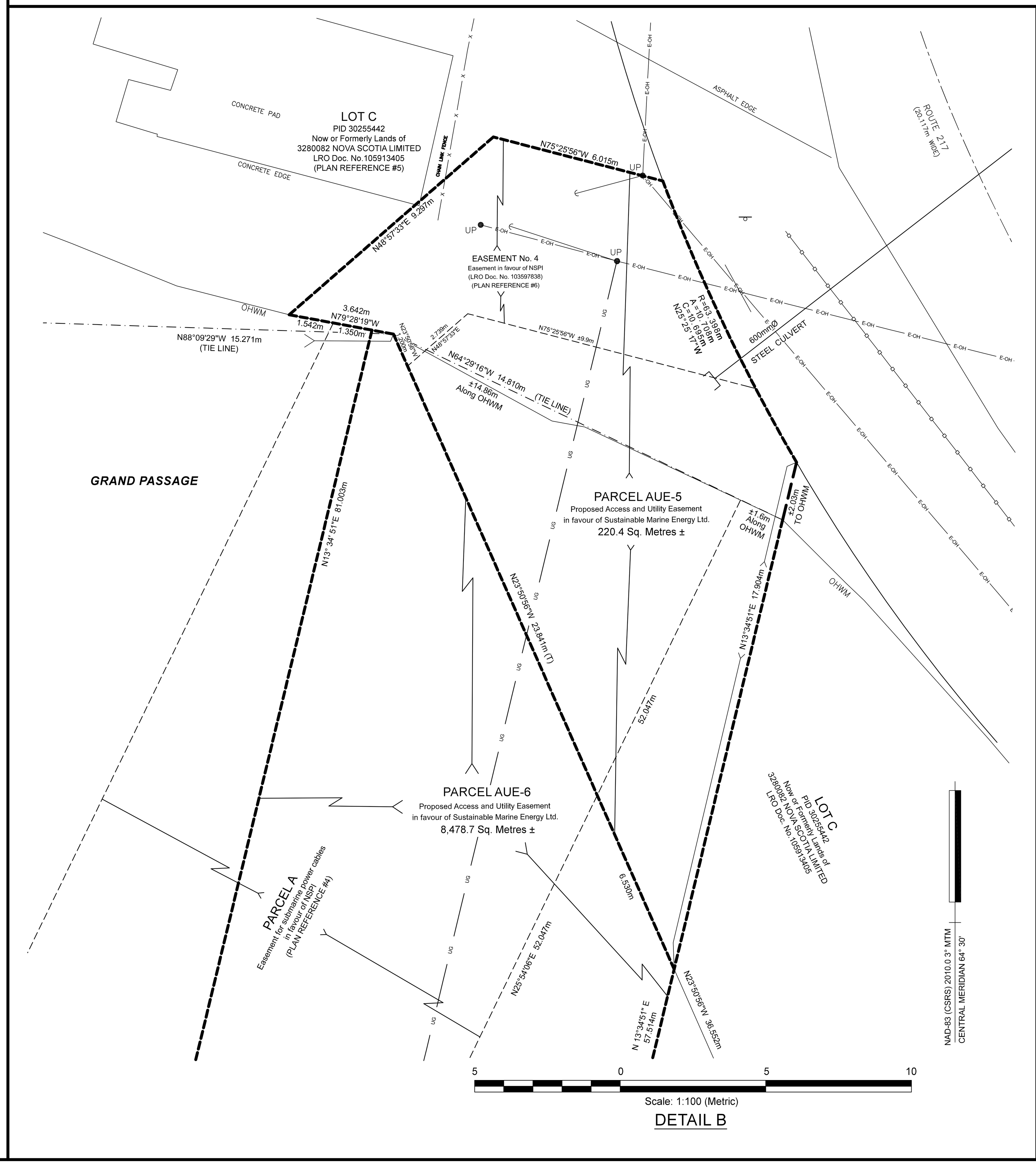
6.2 DESCRIPTION OF OTHER EQUIPMENT AND STRUCTURES

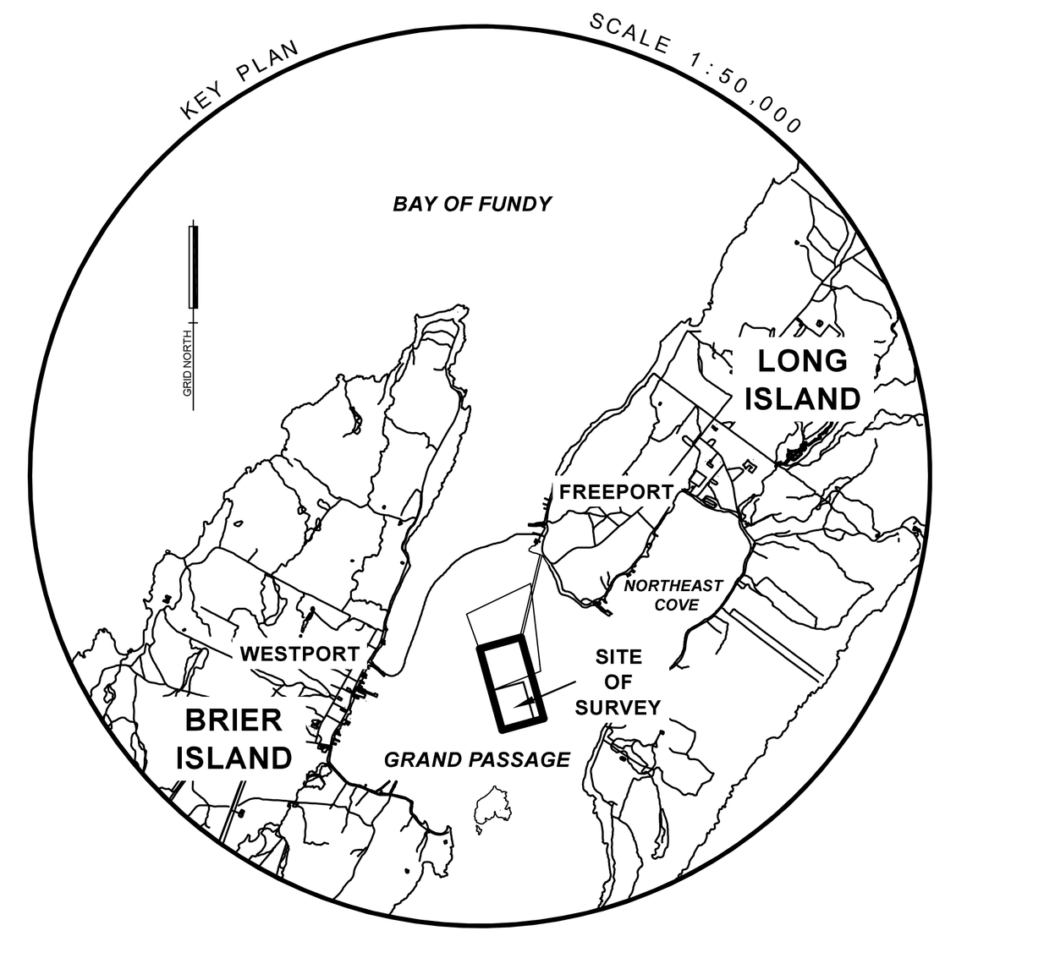
The grid connection infrastructure associated with the project will consist of a cable connecting the platforms to a subsea junction, subsea cable to shore, on-shore switching gear and pad-mounted electrical transformer. No other on-shore structures are anticipated. The makes and models of components will be confirmed following completion of the interconnection study with Nova Scotia Power, however all components are anticipated to be off-the-shelf products.

Schedule B – Survey of Permit Area









LEGEND:

(heavy solid line)	LANDS DEALT WITH BY THIS PLAN
(solid line)	OTHER LANDS
(dash-dot line)	CALCULATED TIE LINE
(dashed line)	EASEMENTS
(long dashed line)	PREVIOUS LOT LINES
(hatched line)	TOP AND BOTTOM OF ARMOUR ROCK
(line with squares)	GUARDRAIL
(long-short dashed line)	CONSTRUCTED ROAD CENTRELINE
E-OH	OVERHEAD POWER LINE
(long-short dashed line)	CONSTRUCTED ROAD CENTRELINE
UG	PROPOSED CABLE ROUTE
⊙	PLACED SURVEY MARKER
⊙ Fd.	FOUND SURVEY MARKER
● UP	UTILITY POLE
(arrow line)	GUY WIRE
(symbol)	UTILITY POLE WITH LIGHT
(symbol)	SIGN
○ UM	UNMONUMENTED POINT
PL.	PLACED
Fd.	FOUND
(C) ; (M) ; (S)	CALCULATED ; MEASURED ; SET
(P) ; (D) ; (T)	PLAN OF PREVIOUS SURVEY ; DEED ; TOTAL
LRO	LAND REGISTRATION OFFICE
NSLS	NOVA SCOTIA LAND SURVEYOR
OHWM	ORDINARY HIGH WATER MARK
PID	PROPERTY IDENTIFICATION NUMBER
(U)	UNIDENTIFIED
(#323)	EVERETT B. HALL NSLS #323

ALL BEARINGS AND DISTANCES ARE GRID DERIVED FROM NRTK GNSS OBSERVATION TO NSHPN 204274, REFERENCED TO THE NOVA SCOTIA 3° MODIFIED TRANSVERSE MERCATOR PROJECTION, ZONE 5, CENTRAL MERIDIAN 64°30' W; BASED ON THE HORIZONTAL REFERENCE FRAME NAD83 (CSRS), EPOCH 2010.0.

FIELD SURVEYS WERE CARRIED OUT ON MARCH 12, 2019.

ALL DISTANCES SHOWN ARE METRIC GRID DISTANCES UNLESS NOTED OTHERWISE. GROUND DISTANCES MAY BE DETERMINED BY APPLYING A COMBINED SCALE FACTOR OF 0.999836 (AT SITE OF SURVEY).

FIELD MEASUREMENTS HAVE NOT BEEN ADJUSTED.

PLAN REFERENCES:

1. SKETCH PREPARED BY DESIGNPOINT ENGINEERING AND SURVEYING LTD. CERTIFIED BY KEVIN C. BROWN, NSLS, DATED JUNE 26, 2017 (NOT RECORDED AT LRO).
2. PLAN OF SURVEY SHOWING 2016-B AND 2016-C. CERTIFIED BY EVERETT B. HALL, NSLS. DATED NOVEMBER 18, 2016. LRO PLAN 113017546.
3. PLAN OF SURVEY SHOWING EASEMENT PARCEL P-061/13. CERTIFIED BY EVERETT B. HALL, NSLS, DATED APRIL 3, 2013. DEPARTMENT OF LANDS AND FORESTRY FIELD PLOT P-061/13.
4. PLAN OF SURVEY OF PARCEL "A" PARCEL "B" AND PARCEL "C". CERTIFIED BY STEPHEN D. VAUGHN, NSLS, DATED AUGUST 27, 2004. DEPARTMENT OF LANDS AND FORESTRY FIELD PLOT P-083/98. LRO PLAN 92873265.
5. PRELIMINARY PLAN PREPARED AND CERTIFIED BY EVERETT B. HALL, NSLS, DATED MAY 26, 1982. LRO PLAN 1007.
6. SKETCH SHOWING EASEMENT NO. 3 AND SKETCH SHOWING EASEMENT NO. 4. ATTACHED TO LRO DOCUMENT 103597838.

NOTES:

1. GRAND PASSAGE AREA #4 AND PARCEL DESIGNATORS AUE-5 AND AUE-6 ORIGINATE WITH THIS PLAN.
2. CORNERS HAVE NOT BEEN MARKED WITH ANY PHYSICAL FEATURES.

DRAFT

DESIGN POINT
ENGINEERING & SURVEYING

Sketch Showing
GRAND PASSAGE AREA #4,
being lands covered by water
INSIDE THE WATERS OF GRAND PASSAGE,
and
PARCEL AUE-5,
being Access and Utility Easement
Required over Lands of
3280082 NOVA SCOTIA LIMITED
and
PARCEL AUE-6,
being Access and Utility Easement
Required over
CROWN LAND COVERED WITH WATER

ROUTE 217
FREEPORT
COUNTY OF DIGBY
PROVINCE OF NOVA SCOTIA

DATE: MARCH 20, 2019
DWG NO: 19-026-SV-L1

Schedule C – Project Plan

Grand Passage 700 kW MRE Permit Application

12.0 SUPPORTING DOCUMENTS

Project Overview

Sustainable Marine Energy (Canada) Ltd. (SMEC) is proposing an electrical grid-connected tidal energy project at Grand Passage, located between the communities of Westport and Freeport in Digby County, Nova Scotia. The project will begin with the connection of the PLAT-I 4.63 tidal energy platform (outfitted with 4 tidal turbines) that is currently installed at Grand Passage to the Nova Scotia electrical grid in spring 2020 (shown in Figure 1). This will be followed by the installation of a second PLAT-I device near the current location of PLAT-I 4.63. The second device, a PLAT-I 6.40, will be similar in size to PLAT-I 4.63 with 6 tidal turbines and a larger generating capacity. Both devices will be connected to the electrical grid via a subsea cable grid. The proposed demonstration will be the first electrical grid-connection of the PLAT-I technology in the world.

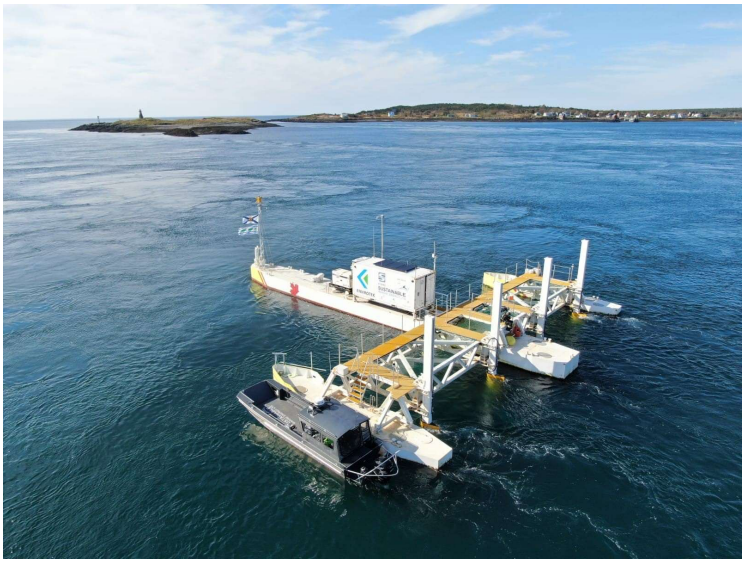


Figure 1: PLAT-I installed at Grand Passage with SMEagol Service Vessel

SMEC proposes to install the two PLAT-I devices at the locations shown on the map (Figure 2). This location has the great advantage of having strong tidal currents but also allowing easy access to the platform. The easy access will help technicians and engineers monitoring the device and allow SMEC to provide tours to stakeholders.

The PLAT-I system consists of a single, slender hull with a perpendicular bridge located near the stern and supported by two outriggers. The PLAT-I 4.63 unit is equipped with four 6.3m-diameter turbines, and a PLAT-I 6.40 unit is equipped with six 4.0m-diameter turbines. The turbines are located along the bridge, mounted on retractable turbine support structures. This innovative feature allows rapid, cost-effective access to the turbines at site for routine inspection and maintenance.

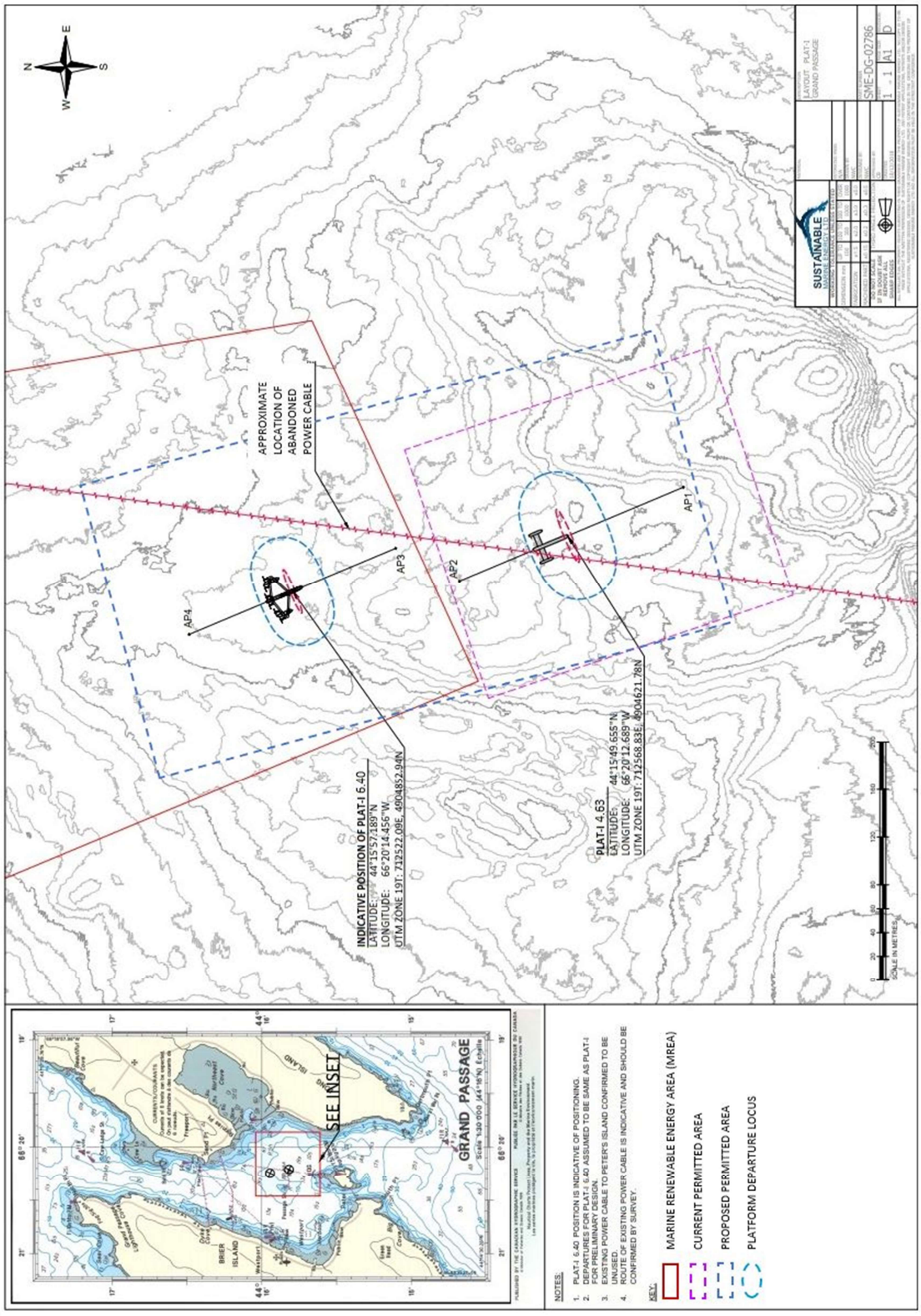


Figure 2: Map showing proposed project layout

Within the tidal energy industry, floating tidal energy platforms offer lower operating and maintenance costs when compared with seabed-mounted concepts. This is due to both the accessibility of the turbines and electrical systems (less downtime, easier preventative maintenance, lower repair costs and increased operational hours), and the practical design (fewer repairs, easier maintenance).

Through this project SMEC intends to continue its progressive development of community and utility-scale floating tidal energy devices that can be installed in rivers and tidal currents around the world to provide clean, renewable electricity for remote communities, industrial facilities, and utilities.

TECHNOLOGY

PLAT-I 4.63

The PLAT-I 4.63 is 32m long, with a beam (width) of 27m, and hosts four SIT250 turbines. The platform's modular design can be broken down for shipping and assembled close to site, the shallow draft configuration also permits launch and tow out with limited port infrastructure. The trimaran design of the platform was designed to provide low resistance and enhanced stability.

A mooring turret located near the bow of the PLAT-I allows the platform to passively rotate 360 degrees with the natural water currents and align with the flow. The turbines have been configured for maximum power extraction in shallow water channels and have a swing-up mechanism that allows easy access for maintenance.

PLAT-I 6.40

The PLAT-I 6.40 is 30m long trimaran with a beam (width) of 27m. Like the PLAT-I 4.63, the PLAT-I 6.40 pivots on a turret connected to a two-point mooring spread and passively aligns with the natural flow of the tidal currents. The structure is largely constructed from high tensile steel and modular to allow for easy assembly.

The mooring system for PLAT-I consist of two drag embedment anchors. Stud link mooring chains are connected to each anchor and to the base of the turret at the bow of the platform. The mooring spread holds the turret in a geostationary position while simple aluminium bronze bearings allow the platform to freely yaw around the turret and align with the flow.

PLAT-I 6.40 is equipped with six SIT250 turbines with 4m diameter rotors and is rated at 420kW electrical power in 2.7m/s of tidal current. Swing-up SIT Deployment Modules (SDMs) allow maintenance to the SITs at the water surface for inspection and maintenance. Overload relief allows the turbines to kick-up to reduce loading on the platform and mooring spread in extreme conditions. The same kick-up system allows for trapped debris to be cleared and for protection of the turbines against ice impact.

The electrical power produced by the individual turbines is conditioned onboard in the mid-section of the centre hull. An onboard transformer steps up the voltage before it is exported off the platform via the dynamic export cable running through the centre of the turret to the seabed. A simple slip ring on

top of the turret allows for electrical and fibre optic passes from the PLAT-I 6.40 to the export cable and prevents twisting of the export cable as the platform turns with each ebb and flood tide.

Grid Connection

Cables from both devices will be connected to a subsea cable via an underwater junction. The subsea cable will convey electrical energy to switching gear housed in an on-shore cabinet and then to a pole-mounted electrical transformer and the Nova Scotia electrical grid.

ENVIRONMENTAL EFFECTS MONITORING PROGRAM

PLAT-I's Environmental Effects Monitoring Program (EEMP) is a fundamental part of SMEC's project. The EEMP for this project will build on the results of the demonstration undertaken by SMEC at Grand Passage in late 2018 and early 2019. SMEC will continue to monitor turbine performance and marine animal activity in the vicinity of the device, while working with Nova Scotian and international researchers to test new technologies and methods for evaluating marine animal behavior around tidal energy devices. The fact that the PLAT-I is a floating platform means that sensors can be easily accessed, which is a great advantage for research and development of effective environmental monitoring systems. The results of this work will be openly provided to regulators, indigenous groups, fishers, and the public.

PARTNERS

Prior to installation, Nova Scotia companies will be engaged in site assessment, permitting and planning for the project. This will include professional services such as mechanical and electrical engineering, marine geoscience, permitting, and legal and financial services. Local companies will be engaged in all aspects of this work including various trades contractors in the assembly and testing of the PLAT-I, and marine services companies in marine operations.

Throughout the project SMEC will maintain its Halifax-based team and augment that team with field technicians who will be stationed at Grand Passage to operate, monitor and maintain the platform.

More than 30 Canadian companies have been contracted by SMEC since its inception in 2013, and many have approached SMEC about getting involved. This project will contribute to the training of highly qualified personnel in specialized areas related to tidal energy. As further PLAT-I units are built and installed in additional locations, many jobs will be created in Canada with the fabrication of the platforms, marine operations, maintenance of the platforms and in overall management positions.

SCHEDULE

SMEC proposes to connect the PLAT-I 4.63 that is currently installed at Grand Passage to the electrical grid in spring 2020. Meanwhile, fabrication of PLAT-I 6.40 will begin in early 2020, with launch, installation and commissioning taking place in mid-2020.

Schedule D – Insurance Requirements

Commercial General Liability:

Commercial General Liability in an amount not less than $5,000,000 inclusive per occurrence against bodily injury, personal injury and property damage and including liability assumed under this agreement and this insurance must:

(a) include "Her Majesty the Queen in Right of the Province of Nova Scotia" as an additional insured
(b) be endorsed to provide the Province with 30 days advance written notice of cancellation or material change; and
(c) include a cross liability clause.

Automobile Liability:

Automobile Liability on all vehicles owned, operated or licensed by the Agreement Holder in an amount not less than $5,000,000 per occurrence.

Professional Liability:

Professional Liability in an amount not less than $5,000,000 per claim, insuring the Agreement Holder's liability resulting from errors and omissions in the performance of professional services under this agreement and this insurance must be endorsed to provide the Province 30 days advance written notice of cancellation.

Environmental Impairment Liability:

Environmental Impairment Liability (Pollution Legal Liability) insuring against bodily injury, property damage, and cleanup expenses (including removal and/or transit and disposal of contaminants) arising from gradual or sudden pollution events arising from the performance of this agreement by the Agreement Holder in an amount not less than $5,000,000, and this insurance must include "Her Majesty the Queen in Right of the Province of Nova Scotia" as an additional insured for its vicarious liability as land owner, project owner, or party to this agreement, and be endorsed to provide the Province with 30 days advance written notice of cancellation or material change. If this insurance is written on a claims-made basis it must include the option to purchase an extended reporting period of 24 months beyond the date of cancellation or expiry of this agreement.

Watercraft Liability:

Watercraft Liability insurance on all watercraft operated or used in the performance of this agreement by the Agreement Holder (including rented watercraft), in an amount not less than the limits of liability imposed by the *Marine Liability Act* and in any event not less than $5,000,000 inclusive per occurrence, and this insurance must:

(a) include "Her Majesty the Queen in Right of the Province of Nova Scotia" as an additional insured
(b) be endorsed to provide the Province with 30 days advance written notice of cancellation or material change; and
(c) include a cross liability clause.
(d) include coverage for marine towing operations.