MARINE RENEWABLE-ELECTRICITY PERMIT

Province of Nova Scotia
Marine Renewable-energy Act

PERMIT HOLDER:	BigMoon Canada Corporation
PERMIT NUMBER:	2018-002
EFFECTIVE DATE:	April 5, 2018
AMENDED:	June 5, 2019
EXPIRY DATE:	October 31, 2019

Pursuant to Section 38 of the *Marine Renewable-energy Act*, a Permit granted to the Permit Holder is subject to the Terms and Conditions attached to and forming part of this Permit, for the following activity:

Construction, installation, operation and decommissioning of one (1) unconnected generator with an aggregate nameplate capacity of 20 kilowatts (kW) at BigMoon Canada Corporation Permit Area within the Fundy Area of Marine Renewable-electricity Priority.

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

Derek Mombourquette
Minister

June 27/19
Date Signed

MARINE RENEWABLE-ELECTRICITY UNCONNECTED GENERATOR PERMIT TERMS AND CONDITIONS

Province of Nova Scotia
Marine Renewable-energy Act

LICENCE HOLDER:	BigMoon Canada Corporation
LICENCE NUMBER:	2018-002
EFFECTIVE DATE:	April 5, 2019
AMENDED:	June 5, 2019
EXPIRY DATE:	October 31, 2019

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 BigMoon Canada Corporation Permit Area.

Permit

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

- Schedule A – Survey of BigMoon Canada Corporation Permit Area;
- Schedule B – Technical change description submitted by BigMoon Canada Corporation on June 3, 2019;
- Schedule C – Project Plan as submitted by BigMoon Canada Corporation on June 3, 2019;

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.

In this Permit:

"Amended Date" means the date that this Permit was amended and re-issued, as noted at the head of this document;

"BigMoon Canada Corporation 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 Project Plan, and is contained in Schedule A of this Permit;

"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;

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

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

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

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

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

"Permit Holder" means BigMoon Canada Corporation;

"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;

"Prototype Assembly" means the generator(s) described in the Technical Description, 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;

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

"Risk Management Plan" means the written plan prepared in accordance with Section 18 of the *Marine Renewable-energy General Regulations* for identifying, assessing. Managing and mitigating risks associated with actions to be carried on under a permit;

"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 B of this Permit as submitted June 3, 2019.

1.0 Scope of Approval

1.1 *Project Details*. This Permit is limited to the project as described in Schedules B and C, which form part of this Permit;

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

1.3 *Permit Area*. The BigMoon Canada Corporation Permit Area is **3426** hectares as set out in Schedule A. Generator(s) authorized under this Permit shall be constructed, installed and operated wholly within the Permit Area;

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

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 *Renewal and extension eligibility*. To be eligible to renew or extend the term, 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;

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

3.0 Rent Payments

3.1 The Permit Holder shall pay the first annual rent payment of $1,016.55 no later than sixty (60) days after the Amended Date. The rent payment is calculated on the basis of a calendar year and is equal to $48.08 for every week of the Permit and a pro-rated daily rate;

3.2 Rent payments shall be made payable to the Minister of Finance and are non-refundable;

3.3 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 amount stated in 3.1;

If rent remains in arrears for more than 30 days after the deadline the Minister may suspend the Permit until rent owing is paid in full.

4.0 Term of Permit

4.1 This Permit is valid from the date of issuance and expires on October 31, 2019.

5.0 Environmental Monitoring Plan

5.1 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;

5.2 Unless otherwise approved, the Permit Holder shall submit an EMP to the Program Administrator for review and approval at least thirty (30) days prior to deployment. The Permit Holder must implement and adhere to this approved EMP;

5.3 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. When the EMP has been updated, the Permit Holder must submit it to the Program Administrator for approval by the Minister;

5.4 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 environmental monitoring equipment within twenty-four (24) hours;

5.5 Environmental effects monitoring reports shall be submitted in writing to the Minister The plan shall be updated and resubmitted as requested throughout the term of this Permit or upon a modified schedule as approved under the EMP;

5.6 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.

6.0 Engagement Requirements

6.1 *Mi'kmaq Engagement Plan.* The Permit Holder shall not construct or install a 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 implement the plan following its approval. The plan shall be updated and resubmitted as requested throughout the term of this Permit;

6.2 The Permit Holder shall support the Province of Nova Scotia in its future and ongoing consultation processes with the Mi'kmaq of Nova Scotia, 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;

6.3 *Stakeholder Communication and Engagement Plan.* The Permit Holder shall not install any generator, including any cable or any other equipment or structure owned by the Permit Holder and used or intended to be used with the generator, 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 as requested throughout the term of this Permit.

7.0 Reporting Requirements

7.1 *Deployment Notice.* The Permit Holder shall notify the Program Administrator at least 7 days prior to the Deployment or the testing of generator(s) or equipment under the authority of the Permit;

7.2 *Deadlines for Activity Reports.* In accordance with Section 13 of the Regulations, the Permit Holder shall submit a final written report ("Activity Report") to the Minister detailing the activities carried on under the authority of the Permit by November 30, 2019;

7.3 *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. Progress updates on the activities outlined in the project schedule;
d. Detailed and up-to-date procurement schedule;
e. Amended procurement deadlines;
f. Summary of any entities procured for goods/services;
g. Financial statements related to procurement, construction, operations, and monitoring activities, with audited financial statements included at least once per calendar year;
h. Data relating to socio-economic matters;
i. Lessons learned deemed beneficial to the sector; and
j. 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.

7.4 *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. Issuance of any manufacturing or fabrication contracts;
d. Installation of a generator and any cable or other equipment or structure used or intended to be used with a generator;
e. Commencement of decommissioning activities; and
f. Completion of decommissioning and rehabilitation activities.

7.5 *Press release notification.* The Permit Holder shall notify the Program Administrator at least one (1) business day prior to any press release related to the activities authorized under the Permit;

8.0 Incident Reporting

8.1 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;

8.2 The Permit Holder shall notify the Program Administrator in advance of publicly sharing any statements related to an incident or near-miss;

8.3 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 a report to the Program Administrator no later than thirty (30) days after the day on which the incident or near-miss occurred.

9.0 Risk Management Plan

9.1 Unless otherwise approved, the Permit Holder shall submit a Risk Management Plan to the Program Administrator for review and approval at least thirty (30) days prior to installation of a generator, cable or other equipment or structure authorized by this Permit;

9.2 The Permit Holder shall not construct or install a generator, cable or other equipment or structure authorized by this Permit, 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;

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

9.4 The Risk Management Plan shall be updated and resubmitted throughout the term of the Permit.

10.0 Decommissioning, Abandonment and Rehabilitation Plan

10.1 Unless otherwise approved, the Permit Holder shall submit a Decommissioning, Abandonment and Rehabilitation Plan to the Program Administrator for review and approval at least thirty 30 days prior to installation of a generator, cable or other equipment or structure authorized by this Permit;

10.2 In accordance with Section 19 of the Regulations, the Permit Holder shall not construct or install a 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;

10.3 The Decommissioning, Abandonment and Rehabilitation Plan shall be developed using relevant project information, shall contain all of the information listed in Section 20 of the Regulations;

10.4 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. At the time the Permit Holder updates and revises the Decommissioning, Abandonment and Rehabilitation Plan, the Permit Holder shall submit it to the Program Administrator for approval.

11.0 Financial Security and Insurance

11.1 *Insurance.* The Permit Holder shall provide proof of liability insurance to the satisfaction of the Minister prior to construction or installation of a generator, cable or other equipment or structure authorized by this Permit;

11.2 *Coverage.* The Permit Holder shall maintain its insurance coverage in full force and effect for the term of the Permit;

11.3 The Permit Holder shall provide financial security on terms and conditions acceptable to the Minister at least thirty (30) days prior to installation of a generator, cable or other equipment or structure authorized by this Permit;

11.4 The Permit Holder must contact the Department to ensure all mandatory terms required by the Department are included in the terms of the security instrument;

11.5 The Permit Holder shall ensure that any security provided is kept in effect throughout the Permit term. If applicable, the Permit Holder shall renew security on an annual basis and provide proof of financial security for the duration of the Permit;

11.6 Permissible forms of security include:

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.

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

12.0 Officer's and Director's Certificates.

12.1 The Permit Holder 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.

13.0 Project Milestones

13.1 The amended Project Plan will be used to track material progress relating to project development. The Permit Holder shall adhere to and implement the following schedule for construction, installation and deployment of the generators:

13.2 The Permit Holder shall notify the Program Administrator within ten (10) business days following completion of project milestones in the amended Project Plan.

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 to:

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.

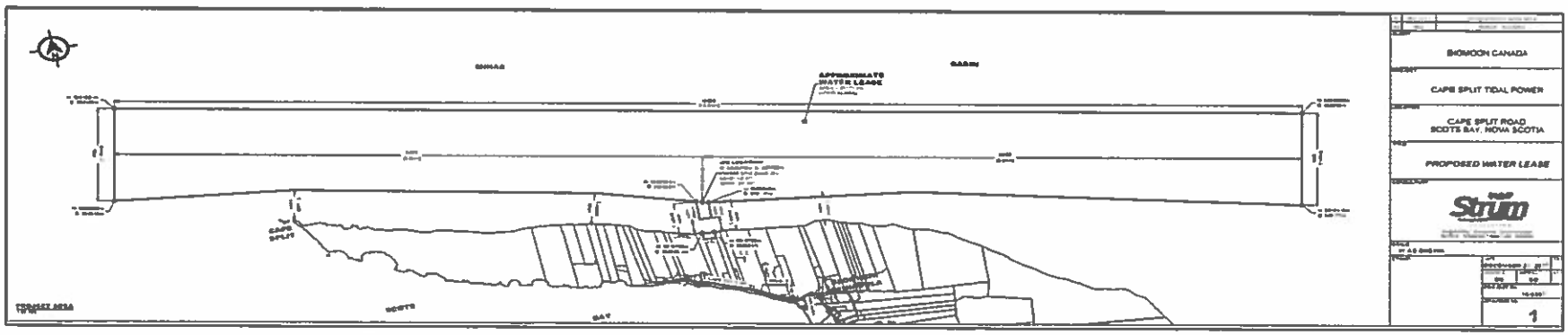
15.0 Standards

15.1 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, such as, but not limited to the International Electrotechnical Commission (IEC) Technical Committee (TC) 114;

15.2 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 – Big Moon Canada Corporation Permit Area

Beginning at a point BMP1 having a northing of 5020230 meters and an easting of 398556 meters;
THENCE South a distance of 1.85 kilometers to a point with a northing of 5018418 meters and an easting of 398177 meters;
THENCE West a distance of 18.52 kilometers to a point with a northing of 5022208 meters and an easting of 380049 meters;
THENCE North a distance of 1.85 kilometers to a point with a northing of 5024021 meters and an easting of 380428 meters;
THENCE East a distance of 18.52 kilometers to point BMP1.



The above described Big Moon Canada Permit Area contains an area of 3426 hectares.

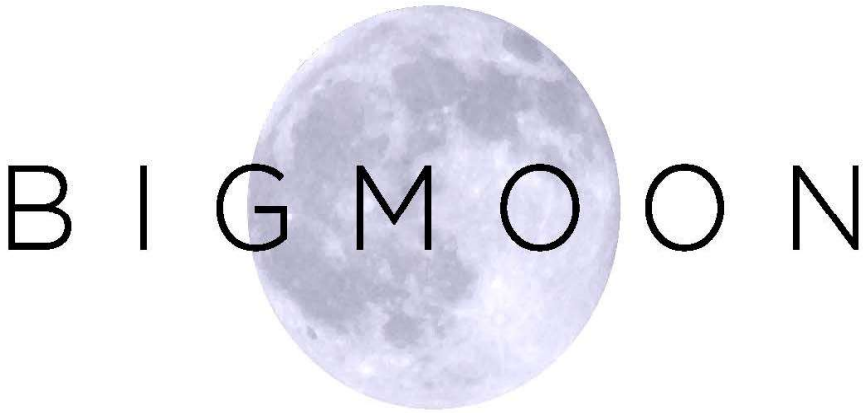
NOVA SCOTIA
Energy and Mines

1690 Hollis Street
Joseph Howe Building, 11th Floor
PO Box 2664
Halifax, Nova Scotia, Canada B3J 3P7
902-424-4575 T 902-424-3265 F
novascotia.ca

Schedule B – Technical Description (attached)

NOVA SCOTIA

Schedule C – Project Plan



Nova Scotia Marine Renewable Energy Permit Technology Change v1

Submitted By: Big Moon Canada Corporation.

1.0 PROJECT DESCRIPTION

1.1 Overview

BigMoon Power Canada is a Tidal Power company that has developed a low-cost method of converting the power of the ocean tides into electricity. Over the past 3 years, BigMoon has tested and demonstrated its technology in the Minas Basin with ocean deployments each year in 2016, 2017, and 2018. BigMoon has been granted a permit to produce power and designated a Crown Lease Area in the Minas basin.

Based on the years of testing and discussions with stakeholders and the Nova Scotia Department of Energy, BigMoon has developed an updated version of its NiroKinetic technology that operates in a much smaller footprint and requires much less cabling than the previous versions of the technology. This this latest version of BigMoon's technology builds on the previous design and has proven successful in scaled lab and river tests at BigMoon's testing facilities. It incorporates the same buoyancy structure and elements of the drag panel as the previous versions. It also incorporates a rotating drum with paddles attached as part of the method of capturing energy.

BigMoon will be conducting ocean deployment and testing of its TurboKeel Technology in the Minas Basin. This test will consist of a 20kW unit deployed for continuous testing. Incremental pretesting and Harbour Trials will be conducted to ensure the safety of all personal during operations and to do a thorough evaluation of all electrical and mechanical systems.

1.2 Site Evaluation

BMCC did not consider other sites for the 20kW prototype testing. The public engagement and permitting process is advanced at the Blomidon Peninsula site, therefore BMCC determined that this was the best location to test the 20kW prototype. With the 20kW prototype test being a full simulation of the future commercial devices, the site characteristics meet the required for this prototype test.

1.3 Project Consultation

This submission includes information about the technology that BMCC will be deploying, BMCC has conducted extensive engagement with the local community, First Nations, and Fishers and has taken the comments from these groups. BMCC has reviewed and concerns raised and has made changes to our project based on the concerns raised. BMCC also understands that there is an opportunity to have a positive socio-economic effect on the local communities and the province overall. BMCC has developed an innovative approach to producing marine renewable energy that will have minimal impact to the environment and will be able to decrease the levelized cost of energy at a significant rate.

BMCC has been consulting with various parties since November of 2016 and these groups include local fishers in the Bay of Fundy which took place between November 2016 and May 2017. Contact was made with over 100 Fishers, fisheries organizations, First Nations and other fisheries-related persons. The Fish and Science Research Society conducted consultations in the following communities: Cheverie, Kentville, Wolfville, Truro, Parrsboro, Stewiacke, Alma and Digby.

BMCC has also been consulting directly with the First Nations since January of 2017 this consultation, on behalf of BMCC, has included meetings with Acadia, Bear River, Annapolis, Glooscap, Sipekne'katik, Millbrook, Paqtnkek, Pictou Landing First Nations Bands. BMCC has

also consulted with various First Nations interest groups such as the KMK, Maritime Aboriginal Peoples Council, Native Council of Nova Scotia, and Membertou Geomatics.
Consultation was also conducted with the local community of Scots Bay, and BMCC is in the process of planning a public open house in the local area to consult with the surrounding areas outside of Scots Bay and any interested parties in Nova Scotia. It is anticipated that the open house will be conducted in the Canning – Wolfville area.
Big Moon has worked closely with relevant stakeholders on the introduction of a paddlewheel as part of a Kinetic Keel prototype testing. We have consulted with Darren Fisher as the head of or Fishers' liaison group, who has worked to keep fishers informed and BigMoon up to speed on any issues or questions that have arisen as a result of this change. No objections or issues have been raised by Mr. Porter. BigMoon also gave a full update to the community liaisons for the project, Joel and Ann Huntley of Scott's Bay. The Huntley's have done a tremendous job of keeping the community informed of BigMoon activity and support for BigMoon in the community couldn't be higher. Big Moon held a sit down meeting with our First Nations partner to walk through all of the aspects of the technology change and to provide them with an update on the project plans and timeline. This meeting ended with a full understanding of the technology change and no objections or issues raised as a result.

1.4 20kW Prototype Test

BMCC has completed a survey of the bathymetry to identify the seabed consistency and to identify the best location for the clump weight mooring system to be placed. BMCC will contract the clump weight deployment and retrieval to Atlantic Towing which will use their vessel the Atlantic Teak, which is a 2250 BHP Home trade I & II tug, for the marine operations. The plan is to mobilize all equipment out of Saint John, New Brunswick. The clump weight with the deployment cable will be loaded on to the Atlantic Teak in St John, NB. The cable will have a deployment buoy attached to the opposite end of the retrieval cable. The buoy will be sized based on the weight of the deployment and retrieval cable with have enough reserve buoyancy to ensure that the cable will always be accessible during slack tide. The cable and all connecting shackles will be sized to allow for a 2 times safety factor over engineering calculations. This will ensure that there is no risk of the cable breaking free from the clump anchor. The Atlantic Teak will sail from Saint John to the BMCC prototype test site. The sail will take approximately eight hours. The arrival of the Atlantic Teak at the test site will be coordinated to so that the arrival coincides with the low slack tide and to allowing enough time to arrange the deployment set up and alignment at the deployment site.

When the tidal flow is at or below 2 knots the clump weight attached to the cable and buoy will be deployed from the aft deck of the Atlantic Teak using the deck winch. Based on the speed of the winch the deployment at slack tide will take approximately 10 minute and is planned so that the clump weight will land on the ocean floor as the current stops flowing. During the deployment operation the buoy end of the deployment cable will be securely attached to a bollard on the aft deck of the Atlantic Teak. Once it is determined that the clump weight is on the ocean floor and there is no current flowing, the buoy end of the cable will be released. It will then be in a position to attach to the 20 kW TurboKeel prototype. The TurboKeel will be towed to the test site and during the low tide slack it will be attached to the deployment/retrieval cable. This operation will be completed after the clump weight deployment is completed during a separate work period.

2.0 TECHNICAL COMPONENTS

2.1 Overview

A technical description of the 20kW BMCC TurboKeel Tidal Energy System and components are explained below.
The BMCC TES is currently at a technical readiness level of TRL 6: *(Full description of TRL 6 as per US DOE document DOE G 413.3-4 - Engineering-scale models or prototypes are tested in a relevant environment. This represents a major step up in a technology's demonstrated readiness. Examples include testing an engineering scale prototypical system with a range of stimulants.*

Supporting information includes results from the engineering scale testing and analysis of the differences between the engineering scale, prototypical system/environment, and analysis of what the experimental results mean for the eventual operating system/environment.
TRL 6 begins true engineering development of the technology as an operational system.
The major difference between TRL 5 and 6 is the step up from laboratory scale to engineering scale and the determination of scaling factors that will enable the design of the operating system.
The prototype should be capable of performing all the functions that will be required of the operational system.
The operating environment for the testing should closely represent the actual operating environment.)
We base our TRL assessment on the following previous, current and upcoming testing completed

2.1.1.1 Previous Testing

2.1.1.1.1 Laboratory Environment Testing
The technology has been tested in BigMoon's hydraulic flume. This flume consists of a 40 ft long by 4 ft wide flume that can pass approx. 1,350 gpm of flow. These scaled models were tested for concept and basic geometries were tested.

2.1.1.1.2 Open River Environment Testing
The technology was moved to a river location where it could be tested in an open environment exposed the variables that could not be simulated in a lab setting. After weeks of this testing an updated permanently installed system was installed in a river environment. This system is fully automated with instrumentation for monitoring and data logging.
This permanent river installation is also equipped with the power conditioning equipment that allows the power to be connected to the grid. This demonstration unit has been operational since its commissioning and is connected to the grid and currently producing power.

2.1.1.2 Current & Upcoming Testing

Both of the below units are equipped with instrumentation and data logging equipment that allows BigMoon to log power levels and other important engineering metrics including tension forces and torque. Both units demonstrate the BigMoon technology out of the laboratory setting in in the true open environment that the commercial units will experience. The BigMoon technology works by converting the energy of moving water into electricity. Because of this the natural environments for the demonstration of this technology are rivers and ocean locations with high tidal flows.

2.1.1.2.1 Open River Environment Testing

The grid connected River Environment demonstration unit is under continuous operation and monitoring at this time.

2.1.1.2.2 Open Ocean Environment Testing

An ocean demonstration unit based on the river model is currently undergoing commissioning testing and once this permit is approved the device will be placed into continuous operation in an ocean environment with extreme tidal flows. This unit will operate in the same ocean waters that larger commercial units will operate in following this demonstration.

It is BMCC's plan to progress the technology to a TRL 9: (*The technology is in its final form and operated under the full range of operating mission conditions. Examples include using the actual system with the full range of wastes in hot operations).* by the time the first 1MW TES device completes its commissioning phase of operation.

The following information will provide insight into the system components and how they interact and connect to generate electricity from the current flow of the Bay of Fundy. The BMCC Tidal Energy System is a proprietary technology that is wholly owned by BMCC. BMCC has submitted

the patent submission for IP protection in countries where we may do work including Canada. Cadwalader, our patent attorneys in New York are expediting the publishing of this patent. If the province needs an indication from Cadwalader or our local council Cox &Palmer that the application has been filed, we are happy to do so.

2.2 20kW Installation Technology Overview

BMCC's 20kW TurboKeel TES Prototype consists of the following components: the TurboKeel is a self-contained floating power generation unit with the electrical generation equipment mounted on an unmanned, passive pontoon barge. In general, throughout this document, TurboKeel shall refer to both the power generation equipment and the and the barge on which it is mounted. The following sections detail the main components which comprise the 20 kW TurboKeel Prototype.

2.3 Lab and River Test Results

2.3.1 Lab Testing

Lab Testing was performed to measure the flow acceleration effect of the BigMoon technology. Flow speeds were measured upstream of device before acceleration and at various points within and after the flow passed through the BigMoon device.

2.3.2 River Testing

BigMoon has been testing at a river location in Utah for the past 5 months. The results thus far have been in the following areas

2.3.3 Testing Results

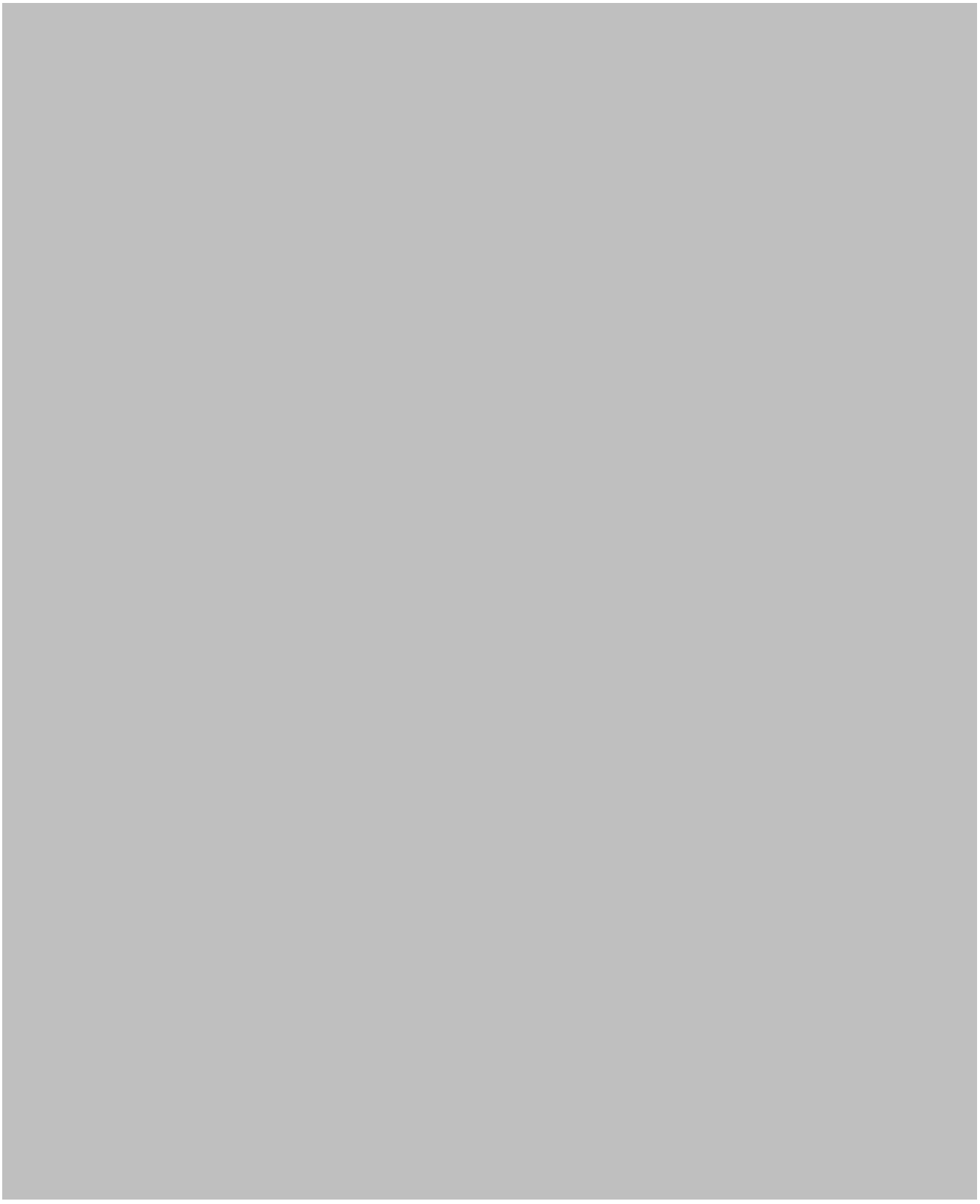
Continuous Operation - This prototype has been operational continuously. A close look at the power production data will show some downtime while the unit was modified or updated. This continuous operation is possible due to the level of automation BigMoon has achieved for this unit.

Automation - Full automation of the system enables BigMoon to monitor and control the operation remotely. All data from the instrumentation is being logged. Operation of the system in this real-world environment has led to multiple improvements and created a usable software and automation system to take to the ocean.

Grid Connection - The River unit is connected to the local power grid. This represents a step forward in demonstrating the power production ability of the system as well as proving the power conditioning equipment needed to meet local grid requirements.

Engineering Equations - The basic power and drag equations for sizing and designing the system were matched up to lab results published at Southampton University in the UK. BigMoon has been working with the leading professor at Southampton in the design and testing of these prototypes.

Data - BigMoon has collected power production data during this period using the automation software developed for this test.



2.4 TurboKeel (Power Generator and Barge)

To harness the energy of the tide, BMCC's 20kW TurboKeel Prototype will mounted on an 8.5-meter long by 7-meter-wide, passive, unmanned pontoon barge. The and pontoon barge are fabricated from steel and painted with a marine grade coating. The device is a floating structure with a 3 meter draft. It is located on the water surface; the anchor is located at the seafloor. An anchor line spans the water column from the seafloor to the surface where the barge is located.
The moving parts of the system are as follows:
In Water - The move in the direction of the flow but at a slower speed. The speed varies with the speed of the water remaining at approximately the water speed.
Out of Water - Winches on deck: Winches move on the deck to adjust the harness length. These move at approx. .
Drivetrain - the drivetrain is also out of the water. The main shaft rotates in the direction of flow at the same RPM as the The Drivetrain then increases the Rotational speed before connecting to the generators. The Drivetrain is a

The design of the TurboKeel will consider all pertinent regulations. The vessel will be a temporary installation and will meet all marine safety regulations.
The operation will comply with the Navigable Waters Protection Act with respect to identification, marking of area of operation and warning signals and notification to other vessels.
The barge will transmit an AIS signature so that local mariners will know the location. The following general arrangement drawing indicates the architecture of the Prototype Kinetic Keel as it is mounted to the barge.

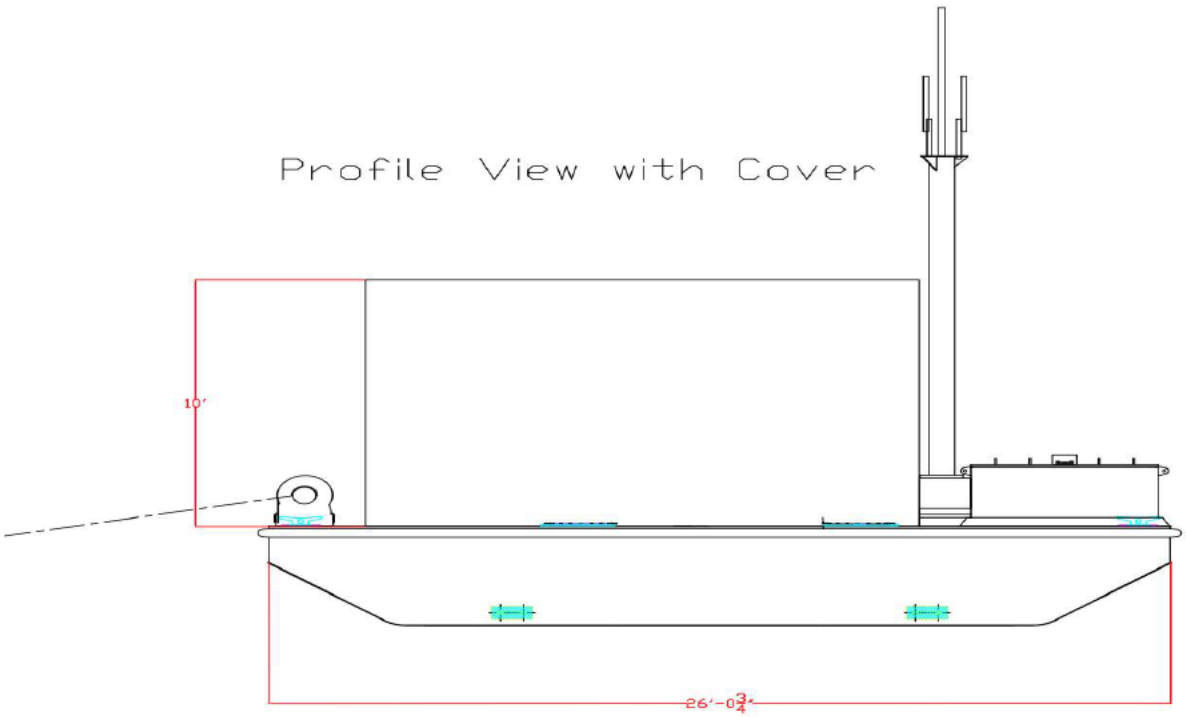


Fig. 6 - Profile View with Covers

2.4 Generators

The BMCC 20kW prototype will have [redacted] generators built in the system consisting of [redacted] Xinda Green Energy [redacted] generators. [redacted] For example, BMCC will test at 20kW with [redacted] or be able to test [redacted] entire tidal cycles.
This is a similar setup to testing carried out in BMCC's April 2016 Minas Basin Test.

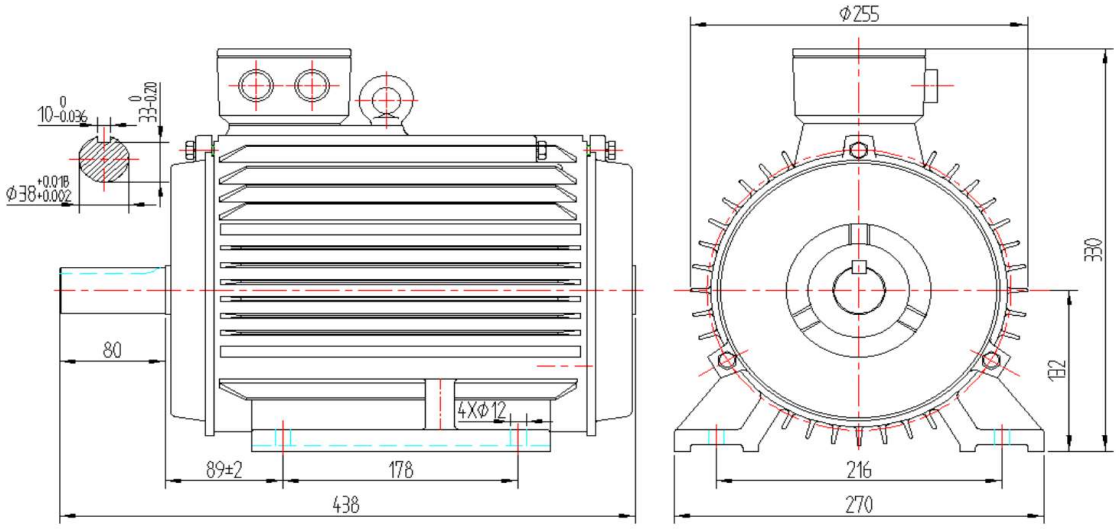


Fig. 7 - Xinda Green Energy 5kW Motor

The Xinda green energy 100kW motor is a [redacted] generator with the following features:

[redacted]

2.5 TurboKeel Mooring Arrangement

The 20kW TurboKeel will be moored in place with an 18-ton (minimum) clump weight that will be positioned at Latitude North 45°20'49.0" and Longitude West 64°27’45.3". The clump weight will be connected to the 20kW prototype through a steel cable. The steel cable will also be used to deploy and retrieval the clump weight. The working load of the clump weight assembly will be 10,000 lbs (minimum). which is a safety factor of 2. The main advantage of using this arrangement is that it will be deployed in one operation during 1 slack tide cycle. It does not require any divers or ROV operations as part of the work and by always having access to the deployment cable it will be easily retrievable at the end of the testing period. The mooring arrangement will have swivel shackle at both ends of the cable which will enable the clump weight to fall to a natural landing position when deployed and no subsea operations will be required to position the clump weight.

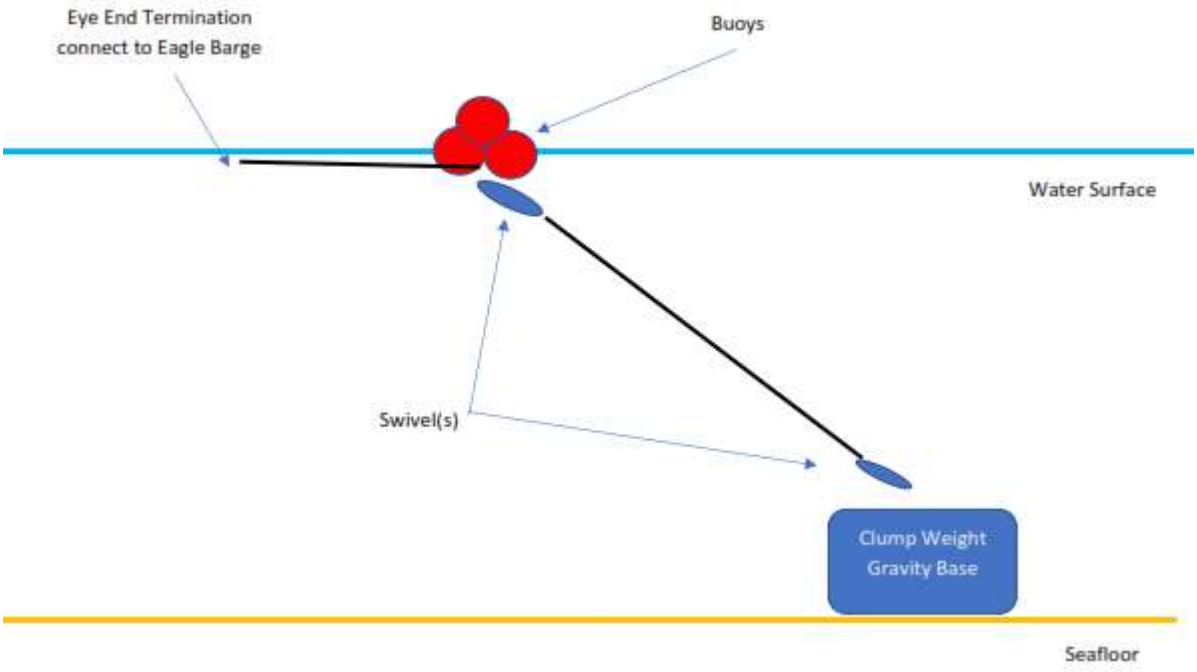


Fig. 8 – Layout of TurboKeel Mooring Arrangement

2.6 Control Room

The Control and monitoring equipment will be located in a temporary purpose-built building that will allow for 24-hour control and monitoring of all the environmental and equipment/performance monitoring. The control room will also maintain communication with the TurboKeel which will allow for remote manual control of the key mechanical and electrical equipment on the TurboKeel on the shall be configured within a temporary steel building to protect them from the elements. This building will have a footprint of 7m by 4m. The control room will be located at the land-based project site at 1233 Cape Split Rd, RR3, Scotts Bay, B0P 1H0. BMCC Personnel will also have visual line of site from the control room to the TurboKeel and will be able to monitor any activity in and around the TurboKeel.

2.7 Generated Power Distribution

The power generated of the 20 kW Prototype will be fed into batteries and any excess power generated will be discharged through a load bank. The load bank is manufactured by Load Banks Direct (Model LS-DC2500-600-5, Outdoor Resistive Load Bank). The power production will be monitored and recorded to validate the ability for the system to consistently generate electricity over multiple tidal cycles without interruption. The energy stored in the batteries will also be used to power all electrical systems onboard the TurboKeel. Data will be recorded showing both constant power production throughout the cycle (demonstrating efficiency) and varying power level production (demonstrating control).

This is an increase to the efficiency of previous design of the Kinetic Keel. With the of this.
Ocean testing will be performed to demonstrate these higher energy conversion efficiency numbers.

2.8 Safety and Monitoring Systems

Ensuring Safety in the BigMoon Design Process

BigMoon believes that safe new technology comes from innovative thinking, consulting with experienced industry experts, and most of all shop and field testing. BigMoon has retained local industry experts to support the safe execution of the 2019 TurboKeel prototype testing program. Beyond that BigMoon has invested in computer modeling and field data collection to understand the tides and large forces inherit in tidal energy. BigMoon is continuously innovating and testing ideas in their hydraulic flume in their shop as well as validating designs at field locations in Idaho. Further prototyping and field testing has taken place in the Puget Sound 2015, Minas Passage 2016, Minas Basin 2017 and Minas Passage 2018 as well as harbor trials along the way. Preliminary river testing of the TurboKeel has been ongoing for the past 6 months.
The monitor systems installed on the TurboKeel will ensure complete control and safe operation of the device. These systems will ensure that the TurboKeel works efficiently, data is collected for all systems and operating conditions, control is maintained, and that environmental interactions are monitored to ensure there are no adverse impacts to the environment or marine life. Below is a list of the control and safety monitoring systems that will be installed.

Equipment/Performance Monitoring:

- Power (Volts, Amps, kW)
- 3 Cameras:
    1. Overview Camera on Mast
    2. Underwater Camera by Paddles
    3. Monitoring Systems Camera Inside electrical room
- Flow Speed (Knots)
    1. Nortek Aquadopp 1: On Side of Barge
    2. Nortek Aquadopp 2: In middle of Catamaran
- System Status Monitoring PLC
- Anchor system Tension (lbs)
- Drivetrain Torque (ft-lbs)
- Battery Charge Levels (Volts)

- Data Logging of all Measurements
- Environmental Monitoring Equipment (as per EEMP)

Safety Systems

- Navigation Lights (Red/Green LED)
- Operational Lights (White LED)
- Double Containment vessels for hydraulic fluid onboard iv. Backup Anchoring System
- GPS location Monitoring
- Solenoids to electrically disengage generators in the event of over-torque

Device survivability and reliability strategies;

The following strategies are being used in the 20 kW TurboKeel prototype unit. The demonstration phase will highlight additional measures that will be implemented on future commercial units.

Simplicity

- The very nature and simplicity of the design contributes the most to the device's survivability and reliability.
- Only moving part submerged in water is a Metal

Redundancy and Factors of Safety

- FS = 1.5 on above water design
- FS= 2 or 3 on anchor and underwater design

Protection from Elements

- The drivetrain is out of the water and housed in an enclosure above deck.

Monitoring

- Being a demonstration unit, this device will be monitored continuously
- Cameras provide a live feed of unit
- Multiple meters monitor the unit including toque and tension levels

3.0 Commercial Buildout

Big Moon plans to install the 20kW TurboKeel prototype at the project site in the second quarter of 2019 and the first system during the fourth quarter of 2019. When nearing completion of this build, the long lead time components will be ordered for the remaining . The build will continue from the second quarter of 2020 upon successful operation of the first deployment. The full plan is to consecutively install the remaining full TurboKeel devices over a staggered build out and operating in the MRE Permit area. .

4.0 Decommissioning

The decommissioning of the 20kW prototype is scheduled for July of 2019, prior to installation of the first commercial system. When the TurboKeel prototype testing period is over the buoy will be reattached to the deployment/retrieval cable and the TurboKeel will be released and prepped for towing back to harbour. The operation to retrieve the clump weight after the testing is completed will follow the same steps as the deployment but in the reverse order. BMCC will contract Atlantic Towing to retrieve the clump weight. The buoy will be grappled for and pulled on to the aft deck of the Atlantic Teak and attached to the same bollard used in the clump weight deployment and then the clump weight will be winched back onboard the Atlantic Teak and once on board, the vessel will sail back to Saint John and decommission the clump weight cable and buoy.