PacWave

# Pre-Proposal Conference for Request for Proposals 2021-003847

# Subsea Power Cable Manufacture, Delivery, and Installation

October 21, 2020

## AGENDA

| | | |
|---|---|---|
| **Introduction** | Hanna Emerson | OSU Procurement, Contracts & Materials Management |
| **Project Overview** | Dan Hellin | PacWave |
| **Documents & Data** | Dan Hellin<br>Carl Barrett | <br>3U Technologies |
| **Q&A** | Justin Klure | PacWave |

## PROJECT TEAM

**PacWave**

- Burke Hales — Chief Scientist
- Justin Klure — Project Manager
- Dan Hellin — Deputy Director
- Diane Baldwin — Administrative Manager
- Kim Calvery — Research Program Officer

**3U Technologies**

- Carl Barrett
- Larry Mackey

***OSU Procurement, Contracts & Materials Management***

- Hanna Emerson
- Ben Baggett

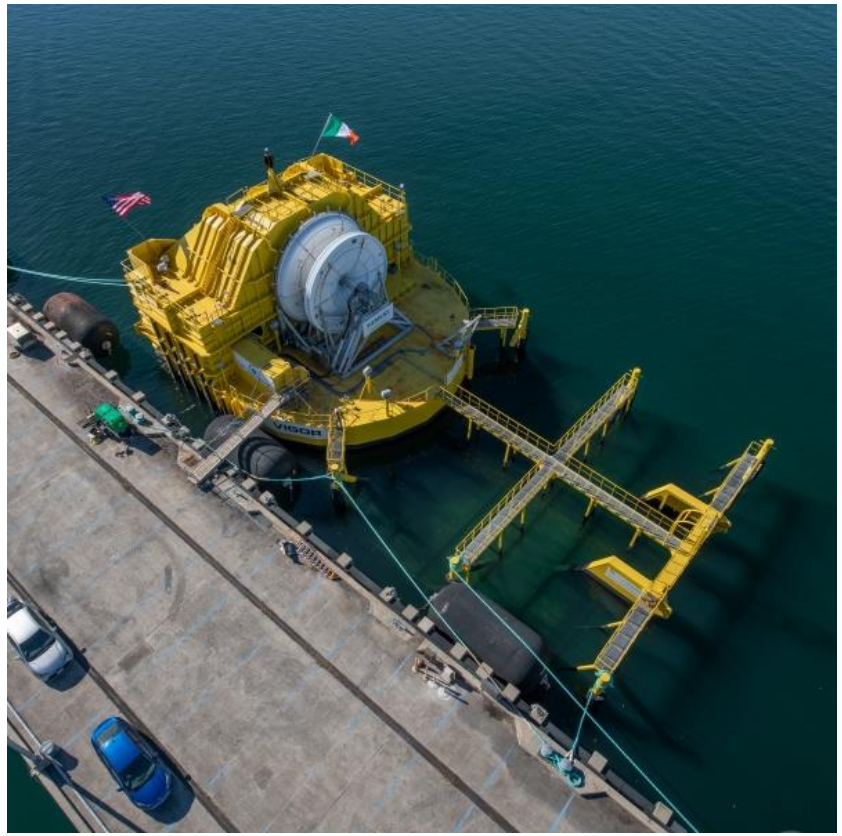
Oregon is at the epicenter of the emerging wave energy. Oregon State University (OSU) has been supporting marine energy technology development and research for the past 20 years.

- Global marine energy market is projected to reach nearly **$700 billion** by the year 2050, and the World Energy Council estimates that **10 percent of the worldwide electricity** demand could be met by harvesting ocean energy
- Oregon has a **tremendous wave energy resource**
- OSU has the experience and expertise to develop and operate PacWave, and has pulled together a **world class development team to build PacWave**
- PacWave is supported by U.S. Department of Energy, the State of Oregon, OSU, and a number of public and private organizations
- There is strong support in Oregon for testing activities associated with the marine energy industry

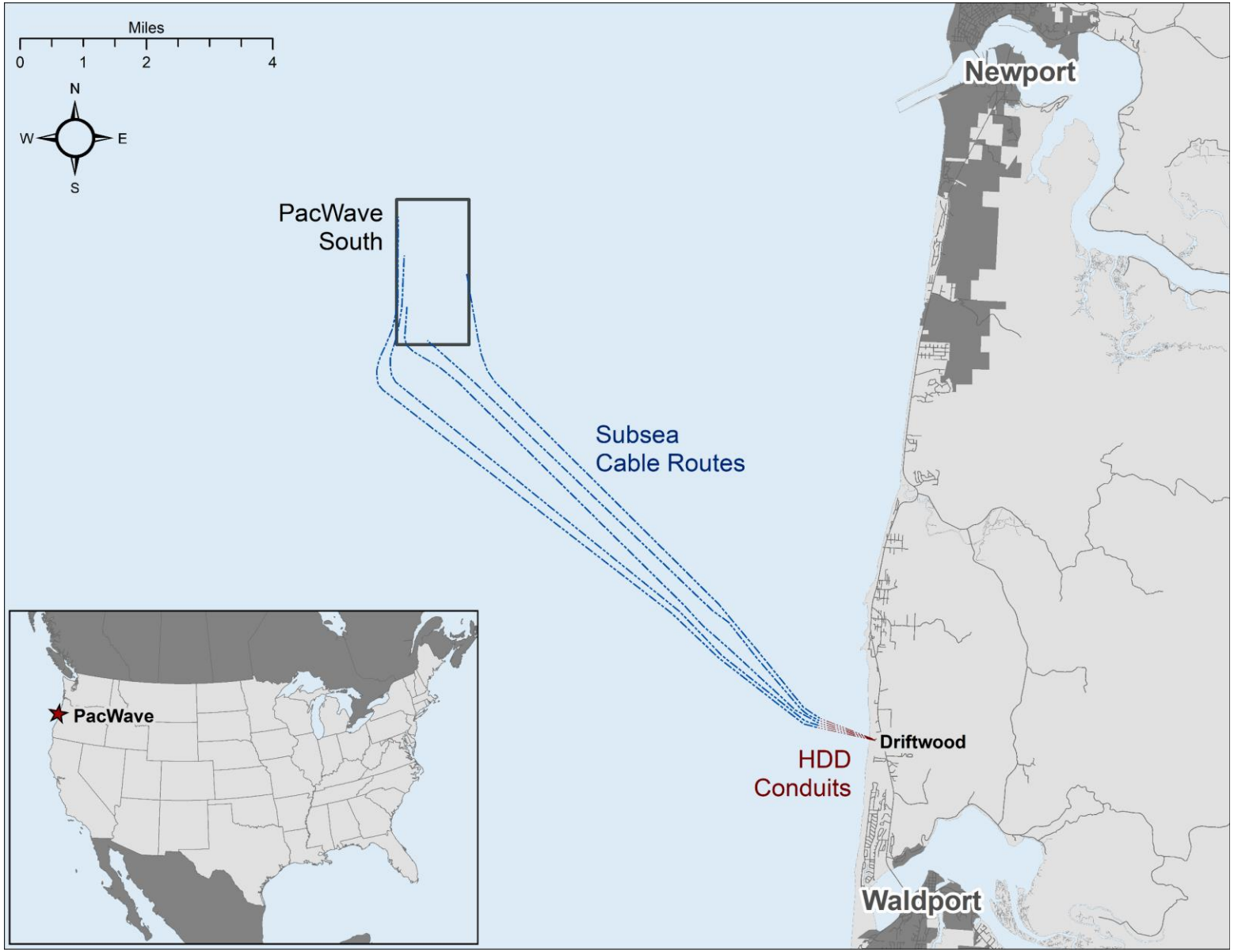
A globally recognized, open ocean, wave energy test facility based at OSU.

**Project Primary Purpose** - To provide wave energy converter (WEC) clients the opportunity to:

- Optimize WECs and arrays to increase their energy capture
- Improve their survivability and reliability, and decrease their levelized cost of energy
- Refine deployment, recovery, operations, and maintenance procedures
- Collect interconnection and grid synchronization data
- Gather information about potential environmental effects, and economic and social benefits



- **Location:**
  Off Newport, Oregon, USA on the Outer Continental Shelf
- **Distance from shore:**
  7 miles (11.3 km)
- **Maximum depth:**
  260 feet (80 m)
- **Nearest deepwater port:**
  Newport (~9.5 miles, 15 km)
  Controlling depth of 40 feet
  www.portofnewport.com
- **Cable lengths:**
  ~9.5 to 12.5 miles (15 to 20 km)
- **Individual cable weight (in air):**
  Max. ~305 US tons (277 tonnes)




# Facts & Figures

## RFP Scope of Work includes:

- Detailed cable design
- Cable manufacturing
- Supply and factory termination of cable dry mate connectors
- Shipping to site
- Shore landing of cables via back haul into pre-installed conduits
- Mechanical termination in pre-installed, underground vault
- Cable lay to site
- Deployment of offshore connector and quadrant assembly
- Bury cable along route
- Cable testing

- Five independent power and data cables
- AC power transmission per circuit
  - 1 MW maximum at 12kV - 3 phase AC
  - 5 MW maximum at 30kV - 3 phase AC
- IEC Voltage Rating 18/30(36) kV
- Optical fiber connectivity
  - Dry mate connector - 12 single mode fiber connectors per berth circuit
  - Cable - 24 each total Large Effective Area Fiber (LEAF), Single Mode (SM) fibers
    - Two each (minimum) fiber tubes per cable

- Design life – 25 years continuous operation at rated power and operating voltage

# Cable Specifications

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## Offshore Dry Mate Connectors

- Each cable outfitted with subsea power and fiber optic, dry mate connector systems allowing short duration, at sea connection/disconnection (<6 hours preferred).

## Semi-dynamic Offshore End

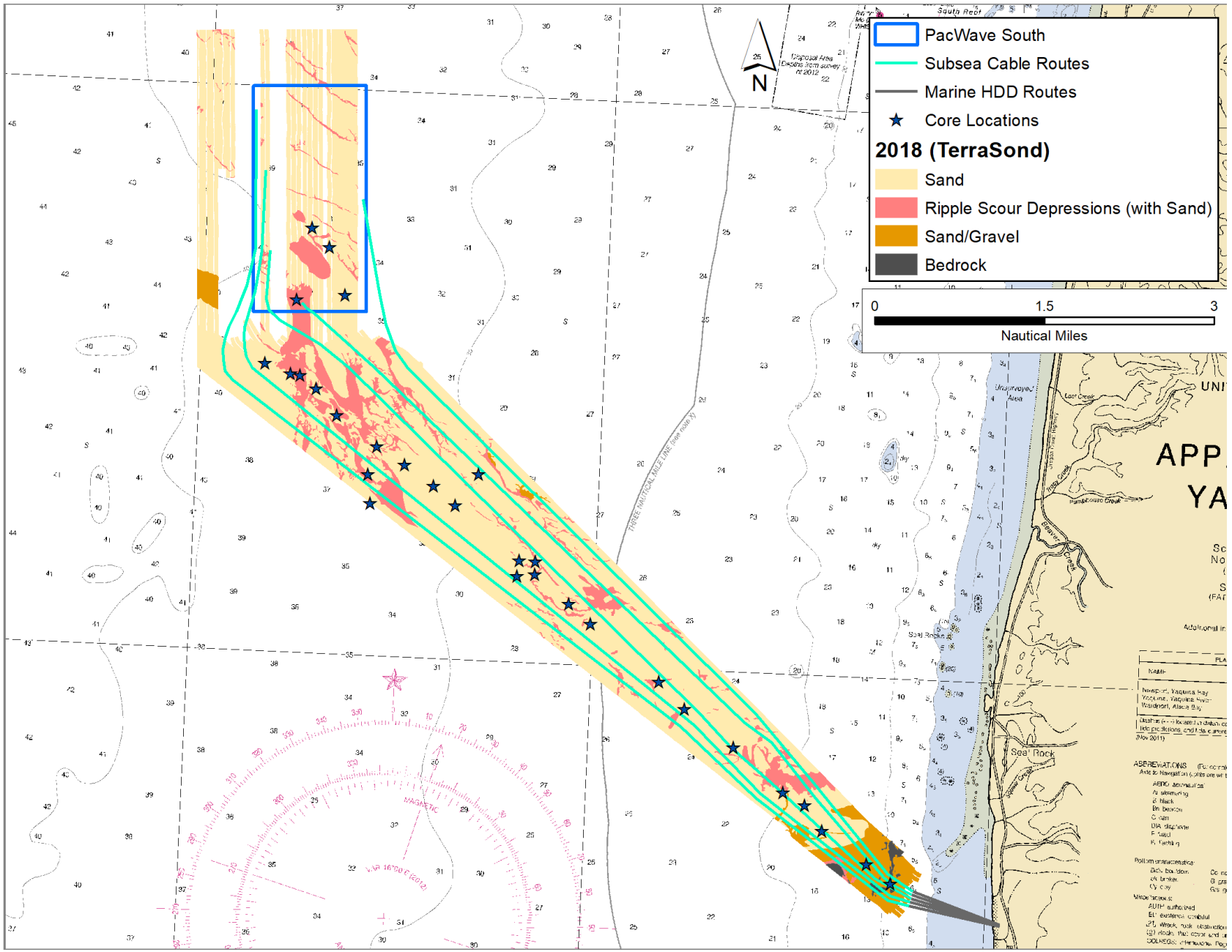
- Dynamic durability of the offshore end of the subsea cables is a key criterion due to repeated mate and de-mate operations.
- Suitable for a minimum of 10 mate/de-mate cycles under significant sea conditions.
- NOTE: the semi-dynamic end of the cable with the dry mate connector will NOT serve as the umbilical/dynamic riser connection to the WEC. The umbilical will be supplied by the testing client.

## Shore Landing Pull In

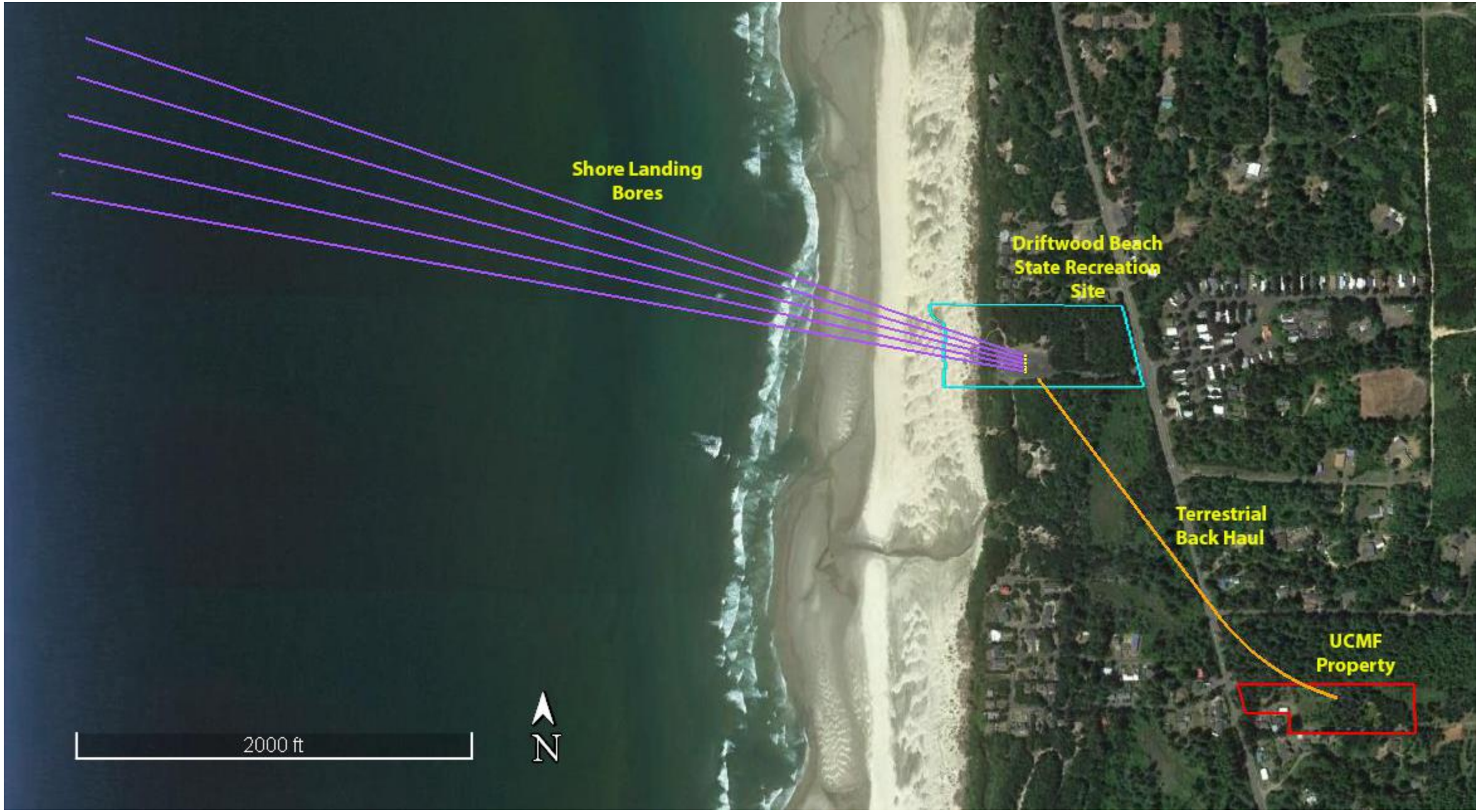
- Installation in the shore landing conduit is a critical requirement.
- Shore landing conduits will consist of 5,300 ft (1.6 km) of steel pipe with a clear ID of 6.46 inches.
- Pull in of subsea cables through these conduits is a significant issue - requires cables with high strength to weight, low friction outer covering and compact pulling termination.

**Burial Depth:**

- Target depth of 1 meter
- Up to 3 meters possible over much of the route
- Nearshore areas may limit burial and require additional armoring due to exposed hard bottom




# Geophysical & Geotechnical Data




# Nearshore & Terrestrial Infrastructure

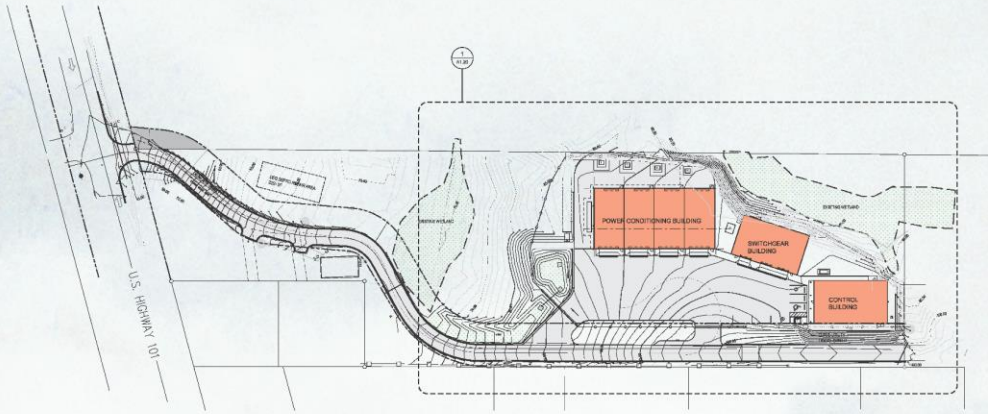
PacWave


# Shore Landing

Oregon State University

PacWave
TESTING WAVE ENERGY FOR THE FUTURE

HGE ARCHITECTS
333 S. 4TH STREET
COOS BAY, OREGON 97420
P: 541.269.1166
www.hge1.com




OVERALL SITE PLAN


POWER CONDITIONING BUILDING


SITE ENTRY PERSPECTIVE

The PacWave Utility Connection and Monitoring Facility, or UCMF, located off Highway 101 on the Oregon Coast, will be the power and data center for Oregon State University's world leading wave energy test site, PacWave South. The UCMF comprises of three buildings: the Power Conditioning Building, which receives power from the offshore test site via five underground cables, a Switchgear Building that transfers the wave-generated electricity to the grid, and the Control Building, which is the data, communications and monitoring center of PacWave. The buildings are arranged on the site to accommodate existing habitat and steep grades, resulting in a stepped elevation between each of the four bays of the Power Conditioning Building and the adjacent buildings. Colors and materials were selected for their durability, daylighting qualities and to blend with the natural surroundings.

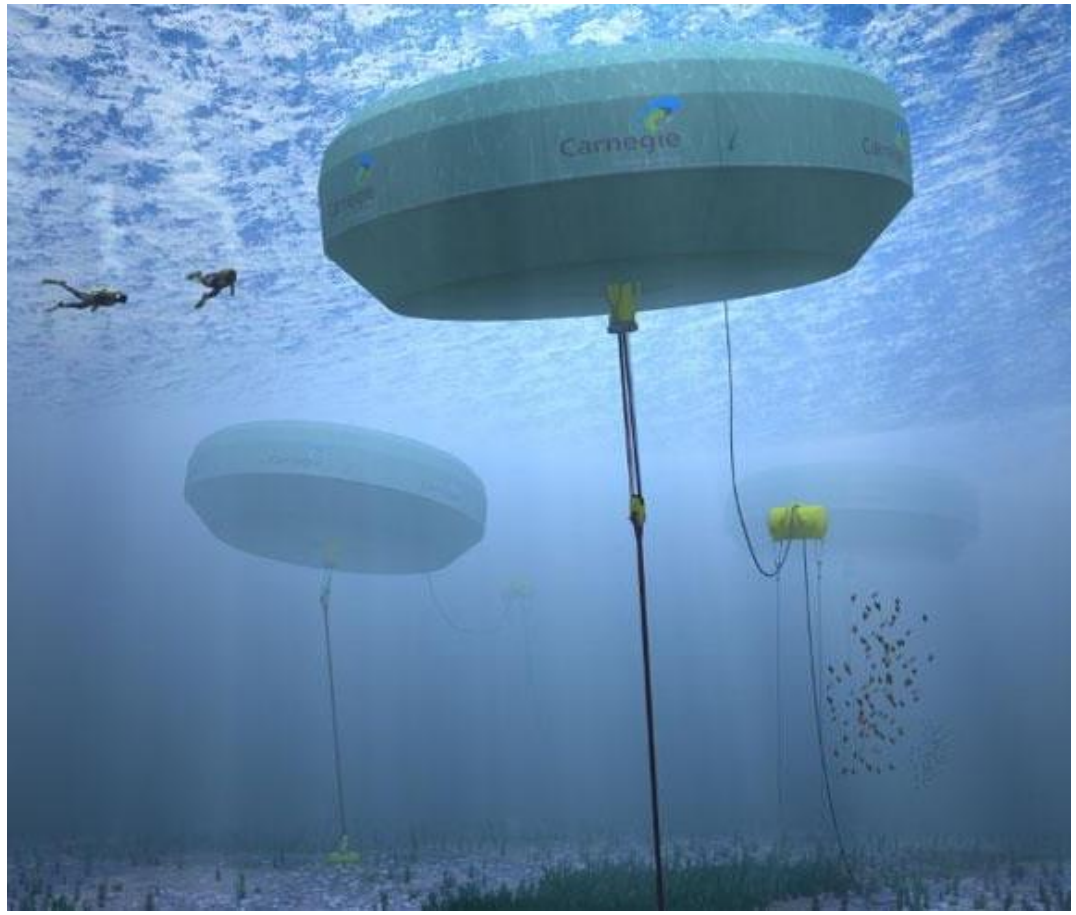

SWITCHGEAR & CONTROL BUILDINGS

# Utility Connection & Monitoring Facility

PacWave

## Estimated Overall Project Schedule

| | |
|---|---|
| October 15, 2020 | Issue RFP |
| October 21, 2020 | Pre-Proposal Conference |
| October 30, 2020 | Question Deadline |
| November 5, 2020 | Final Addendum Issued |
| **December 2, 2020** | **Proposals Due** |
| December 10, 2020 | Notification of Finalists |
| December 18, 2020 | Interviews |
| December 29, 2020 | Notice of Intent to Award |
| **January 15, 2021** | **Contract Execution** |
| *February – September 2021* | *HDD Conduit & Vault Installation* ***- not part of this Scope of Work*** |
| Spring/Summer 2022 | Subsea Cable System Install |
| **September 1, 2022** | **Completion of Final, Post-installation Testing** |



## Scope of Work Documents:

- DOC-1004-10300 36 KV SUBSEA POWER TRANSMISSION CABLE SPECIFICATION – REV G – 201013
- DOC-1008-10300 36 KV SUBSEA POWER FIBER CONNECTOR SPECIFICATION – REV C – 200922
- DOC-1029-10300 PACWAVE 36 KV SUBSEA CABLE INSTALLATION SPECIFICATION – REV D – 201013

## Appendices to the Scope of Work Documents and Data:

### Cable System Diagram

- DWG-1001-10300, PACWAVE EXPORT CABLE DIAGRAM, REV D, 190829

### Cable System Short Circuit Analysis

- PacWave Short Circuit Memorandum 20200914

### Dry Mate Connector Pinout

- DWG-1027-10300, 36 KV SUBMARINE POWER CONNECTOR PIN OUT - REV A – 200916

### Marine Survey

- PacWave Marine Geophysical Geotechnical Survey Report 03142019
- PacWave Marine Geophysical and Geotechnical Survey 2018 [ZIPPED DATA]
- PacWave Marine Geophysical Survey Report 10302014
- PacWave Nearshore Geophysical Survey Report 12282018
- PacWave Marine Geotechnical Survey 2019 [FOLDER]
- PacWave Nearshore Bathymetry [FOLDER]

**Sea Conditions**

- PacWave_Resource_Assessment_2020
- PacWave_Resource_Assessment_Data [ZIPPED DATA]

**Shore Landing HDD Conduit Pull in Analysis**

- DOC-1063-10300, SHORELANDING CONDUIT CABLE PULL REPORT, REV O 190823
- DWG-1022-10300, CABLE PULL CALC NO ERROR, REV A 190823
- DWG-1024-10300, CABLE PULL CALC HORIZONTAL BEND ERROR, REV A 190823

**Submarine Cable Route Engineering**

- DOC-1017-10300 PACWAVE SITE ROUTE RPL - REV E – 190826
- DOC-1070-10300 PACWAVE SUBSEA CABLE ROUTE ENG REV B 190903
- PacWave Survey and Route Back Scatter
- PacWave Survey and Route Bathy
- PacWave Survey and Route

# Q&A

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All questions should be sent to: constructioncontracts@oregonstate.edu

*Please include RFP Title in the subject line*

Follow up information will be posted at: https://bid.oregonstate.edu/opportunity/view/23783