Criteria for Site Selection of Tidal Power In Stream Devices: Importance of Geological Environment



Atlantic Marine Geological Consulting Ltd.



Intro. I:

 Tidal power development at the FORCE site within the Bay of Fundy began over six years ago.

Criteria for TISEC site selection:

- Water Depth/Flow,
- Seabed Characteristics (stability, material properties & sediment transport potential),
- Cable Routes
- Environmental Concerns.

At deployment stage: Tidal In-Stream Devices (TISEC), Seabed Cables, Environmental & Engineering Monitoring Devices.

Intro. II:

 FORCE requested a Data Assessment as part of the TISEC site selection.

Data Assessment: Involved reprocessing and interpretation of all geoscience data available.

Focus of Data Assessment:

- To understand and quantify observed changes to seabed characteristics.
- Identify potential hazards to deployment of turbine and cable infrastructure.



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Area of Interest: FORCE - Crown Lease Deployment Area & Cable Routes





Data Sets I:

Multibeam Bathymetry:

- 2007 2012; four (4) surveys 0.4m to 5m grid size.
- Multibeam Backscatter:
 - 2011 & 2012; two (2) surveys 0.25m grid size.

Sidescan Sonar:

2008 & 2011; three (3) surveys

Subbottom Profiler:

2008; one (1) survey – IKB Seistec (boomer)

Data Sets II:

Current Profilers – ADCP:

2011 & 2012; five (5) deployments. (Oceans Ltd.)

Seabed Photos & Video:

 2008 & 2009; 337 stations with at least one image. (Envirosphere Consultants Ltd.)

Grab Samples & Water Samples:

3 grab samples & 3 water samples





Data Assessment Results:

Areas of Observed Change:

- Scour / Accumulation
- Gravel-wave Fields

Scarps & Slumps

TISEC Site D





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Summary:

- Majority of seabed is a stable relict surface. More boulders that previously known.
 - Areas of change confined to:
 - Two areas of scour areas
 - One area of accumulation
 - Gravel-wave crests move 10-30m on a tidal cycle.
 - Two time cycles of change
 - No change on scarp and slump areas. Slumps are composite.
 - Very high resolution of understanding of seabed stability and characterisation.
 - Any infrastructure needs to be designed to be flexible to cope with a variety of seabed conditions.