**Why Aberthaw?**

The Aberthaw-Minehead tidal barrage location has five inherent benefits. This makes the location ideal for a 4,000 megawatt 'green' tidal power generating capability.

**(1) Electrical-power Generation**

The magnitude of the potential electrical-power generation capability is proportional to the product of the tidal height and the mass of water passing through a water-turbine. The Bristol Channel / Severn Estuary has the second highest tidal range in the world.

At Lavernock Point the tidal range reaches about 14.5 metres in the Spring.
At Aberthaw the tidal range reaches about 11.0 metres in the Spring.

The magnitude and cyclic timing of the world’s tides are principally determined by the orbital path of the moon and the rotation of the earth. The gravitational forces produced during its transit cause any mass of water that is free to rise to do so and to attempt to move in the direction of the moon’s orbit. A narrowing west-to-east orientation of the channel into which it flows, such as the Severn Estuary, magnifies the resulting increase in level. The time taken for each tidal cycle varies. It is typically about 12 hours 20 minutes.

Land-based hydro-generation often either replaces or works alongside waterfalls. The height through which the water falls dominates. In a choice of location, it is usually visually obvious where the maximum power generation potential exists. In tidal generation the tidal height changes simultaneously with the magnitude of the accompanying flow. The maximum power generation potential for a particular location is not immediately obvious.

The volume of water that passes over the Aberthaw-Minehead barrage line as it flows back to the sea is much greater than that passing over the Lavernock Point to Brean Down barrage line. The area covered upstream of the Aberthaw barrage is more than 14.5/11.0 greater than that upstream of a Lavernock barrage. Combining the tidal height during electricity generation and the associated flowrate shows a barrage between Aberthaw and Minehead has the maximum potential for generating electricity in the Bristol Channel / Severn Estuary.

**(2) Structural Height**

A reduction in structural height of approximately $14.5 - 11.0 = 3.5$ metres compared with a barrage between Lavernock Point and Brean Down is a considerable cost advantage even when an increase in barrage length is included.

Aberthaw to Minehead is the best location for power generation.
(3) Seismic Events

All the large structures in the Bristol Channel must be designed to avoid unacceptable consequences that may arise from seismic events in the future. The Bristol Channel floor is, on occasion, subject to strong earth tremors.

Earthquakes in or affecting the Bristol Channel - Severn estuary***

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Depth km</th>
<th>Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swansea</td>
<td>17.02.2018</td>
<td>7.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Bristol channel</td>
<td>20.02.2014</td>
<td>3.0</td>
<td>4.1</td>
</tr>
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<td>Newport</td>
<td>25.02.1974</td>
<td>-</td>
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<td>Swansea</td>
<td>27.06.1906</td>
<td>13.0</td>
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<td>Carmarthen</td>
<td>02.11.1893</td>
<td>24.0</td>
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<td>Pembroke</td>
<td>18.08.1892</td>
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<td>Channel Islands</td>
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<td>Channel Islands</td>
<td>30.07.1926</td>
<td>18.0</td>
<td>5.5</td>
</tr>
</tbody>
</table>

*** Data source: - The British Geological Survey, Centre for Ecology & Hydrology, Wallingford

The foundations and related structures of the barrage must absorb seismic movement. Displacements along the length of barrage (ie shore to shore) are met with by providing adequate flexibility in structural steel cross member design. The shorter distance across the MFU is held rigid by a low-level beam to protect the crane rails from unacceptable separation.

An Aberthaw Tidal Power Station with suspended water-turbine/generators can accommodate tremors up to Richter Scale 6.0.

(4) National Grid and Rail Access

The Aberthaw coastline already supports electricity power generation.
Aberthaw A opened in 1963, was decommissioned in 1995 and removed.
Aberthaw B 1,580MW opened in 1972. Closure has not yet been agreed.

A high-voltage connection from Aberthaw B to the National Grid pylon electricity distribution network exists. Upgrading and making use of this network simplifies the support structure requirements for the Aberthaw Tidal Power Station considerably.

A legacy of past coal usage is a rail terminal that links Aberthaw B to the main rail network.

An Aberthaw to Minehead barrage is in the best location for Grid and rail access.
(5) Sea and Road Access
The deep-water channel down the Severn Estuary is particularly favourable to Aberthaw. Using a dockside where offloading is directly onto the barrage has many advantages. In particular delivering very large turbine-generators, cranes and structural steelwork for the barrage during construction. The M5 road direct connection to Avonmouth, and an existing dockside equipped with heavy loading facilities, simplifies delivery by ship.

![An Aberthaw-Minehead tidal-barrage ship dock](image)

Each of the two Shipping Channels can change function to become a ship dock. Raising the two bascule arms as shown forms a stationary waterway along the length of the shipping transit channel. The level can be adjusted and kept constant at a desired level by appropriate pumping. It is free from local currents, estuary waves and the worst ravages of Atlantic storms. Choosing to use the dock facility when the channel is closed during a four-hour tidal power electricity generation period makes economic sense.

A link road between the M4 (junction 34) and A48 (near to Cardiff Wales Airport) is under consideration. In 2018 the choice between two routes was the subject of formal public consultation. On completion this will make visitor access to Aberthaw Tidal Power Station very simple.

**An Aberthaw to Minehead barrage is in the best location for sea and road access.**

**CONCLUSION**
Aberthaw to Minehead is the best location for a tidal power generation barrage.