

# Parnell Baths Tidal Flow Generation Project

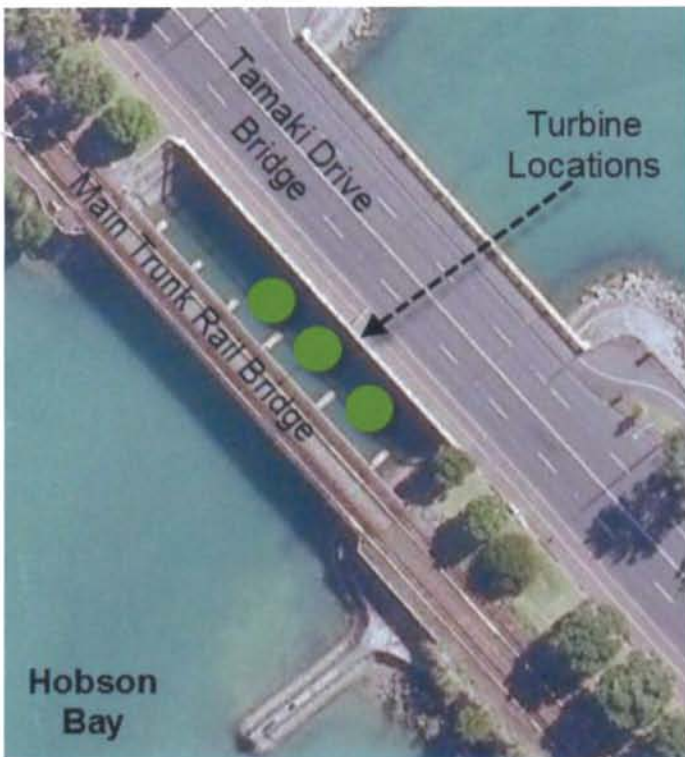
## The Project

Community Leisure Management Limited (CLM) manages the Parnell Baths on behalf of Auckland Council.

CLM proposes to install three small turbines on floating pontoons at the outlet from Hobson Bay to generate electricity and help reduce the energy required to operate the pool.



The three turbines are proposed to be installed on floating pontoons located between the road and rail bridges on Tamaki Drive at the northern end of Hobson Bay.



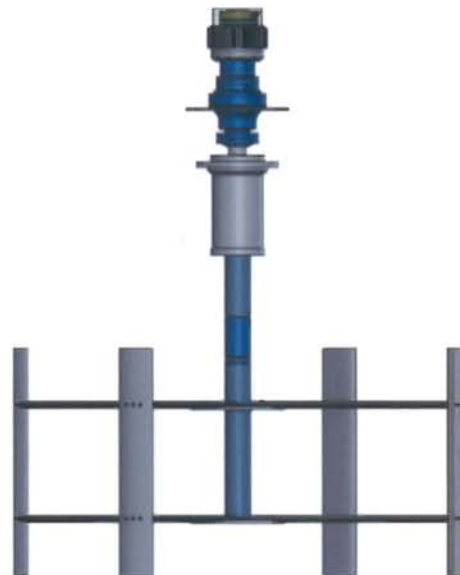
The causeway site is a less than 325 m from the Parnell Baths complex. The design would include a free-standing, enclosed, generator control panel near the tidal causeway, with an underground cable along the Tamaki Drive road reserve, then rising above ground and passing under the wooden pedestrian rail over-bridge en-route to the plant room on the south-west corner of the baths

Access to all the mechanical and electrical equipment is relatively easy since all the equipment is above the water line and this provides for the maintenance or safe removal of various sub-assembly components.

The Parnell Baths Marine Energy Project is anticipated to be generating useable electricity by December 2012 subject to getting resource consent.

## Turbines

The Project will utilise New Energy 'En-Current' hydro-marine submersible turbines which have been used for over five years in Canada and Alaska at a number of sites. The 'En-Current' turbine consists of a series of aerodynamically shaped blades mounted parallel to the vertical shaft and held in a concentric arrangement. Typically three to five blades are connected via radial support arms to a central shaft which then connects with a gear box and generator.



The channel arrangement at Hobson Bay provides an opportunity for the placement of three small scale cross-flow tidal turbines, leaving two of the sections under the bridge for navigational passage as necessary. As shown in the adjacent drawing the proposed configuration involves two larger turbines (approx 8m diameter) and one smaller turbine (approx 5m diameter). Each turbine is approximately 6m long, and will operate in depths of 2.5 - 4.0m.



New Energy Ltd advises that the 'low flow' 25kW vertical axis turbines mounted on an overhung cradle support should prove to be best for the Tamaki Drive causeway channel.

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## Project Location – Hobson Bay

### General

Hobson Bay is the largest bay in the Auckland Isthmus and comprises the area to the west of the railway embankment bounded by the Parnell, Remuera and Orakei landforms, by Tamaki Drive at its seaward extent, and is bisected by the rail embankment and the Hobson Bay Sewer.

The natural form of the Hobson Bay shoreline has been heavily modified by urban development, including a number of reclamations along the southern shoreline and at the Outboard Boating Club marina.

### Marine Environment

The marine environment of Hobson Bay comprises an extensive, relatively sheltered area of intertidal mudflat, dissected by low tidal channels. The closing of the bay entrance when Tamaki Drive was constructed reduced the wave energy environment. Overall, this change, coupled with the reduced tidal exchange, created a sheltered environment that has promoted sedimentation and reduced the rate of cliff erosion from wave action.

At low water the majority of the seabed in the Bay is exposed, except for localised deep areas adjacent to the connections to the Waitemata Harbour to the north, and through the railway embankment at the centre of the Bay. Two well defined channels within the intertidal flat have formed from the Newmarket Stream and stormwater/catchment discharge at Portland Road.

At the Tamaki Drive Road and Rail Bridge, the maximum high tide depth experienced is 3.8m, with low and high tide channels having cross sectional areas of 42.2 and 127.1 m<sup>2</sup> respectively (excluding pile areas), a difference of 84.9 m<sup>2</sup>.

Tidal velocities are at their maximum during flows on the outgoing tide ranging from 0.9 to 1.1 m/s. Peak velocity for flows on the incoming tide was 0.6 m/s.

### Ecology

The dominant marine habitat type present in Hobson Bay is intertidal sand/mud flats with significant areas of mangrove habitat and some hard shore habitat (predominantly man made, e.g. railway embankment, Tamaki Drive). The communities of marine fauna present in these habitats are similar to those found throughout the Waitemata Harbour.

Hobson Bay is utilised by a range of birdlife, including a number of migratory wading species and at least three species of birds considered to be of conservation interest (i.e., the Pied Shag, caspian tern and white-faced tern).

The wider Hobson Bay area is likely to provide feeding habitat for a wide variety of harbour fish species that typical use sheltered, shallow embayments that prevail throughout the Waitemata Harbour.

Kaimoana species, such as cockles and oysters, are present but are of limited harvestable size.

There is no record of use of Hobson Bay by marine mammals.

### Environmental Effects

The RMA requires that in making an application for resource consent, an applicant must include an assessment of environmental effects in such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

A limited range of effects are anticipated as a result of turbine deployment. These are as follows:

- Occupation of coastal waters resulting in issues of access.
- Effects on fish / bird species such as mechanical injury as a result of blade impingement, and avoidance resulting in animals refusing to pass a moving structure.
- Water quality effects due to sediment deposition / resuspension as a result of a reduction in water velocities immediately downstream / upstream of the turbines.

These effects are expected to be no more than minor due to the following:

- Use of the channel beneath the Tamaki road and rail bridges by water borne vessels is very limited. Due to the confined nature of the access only highly manoeuvrable vessels such as kayaks or small runabouts would be able to use this location close to high tide. In any event only a part of the channel is proposed to be occupied by the turbines in the centre of the channel leaving the margins free. Access to and from Hobson Bay can also be gained via the Railway embankment bridge.
- Unpublished research undertaken by independent scientists involving release of fish in a narrow channel containing an 'En-Current' turbine found no injuries to fish and evidence that fish are able to actively avoid the turbine.
- It is likely that any minor changes in water velocities experienced would not result in sediment deposition. If any were to occur, sediment deposited downstream of the turbines would be immediately resuspended on the next tide. In any event, Hobson Bay is a depositional environment dominated by fine sand / muds, and the waters within the Bay are turbid. Overall, it is anticipated that any changes as a result of the turbines would not be observable.

All environmental effects will be addressed in consultation with Auckland Council, local iwi Ngati Whatua and other stakeholders in relation to the resource consent programme for the Project.



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