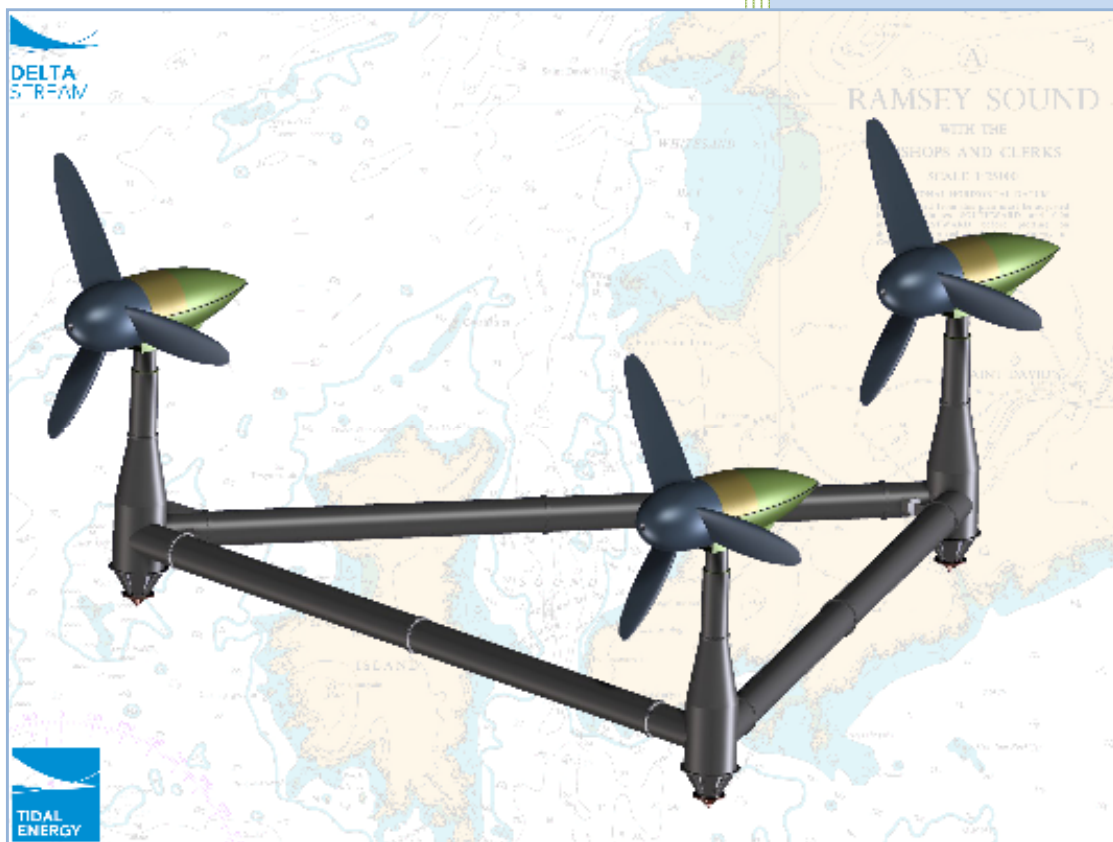


TIDAL ENERGY Limited

DeltaStream Demonstrator Project Ramsey Sound, Pembrokeshire



**Non-Technical
Summary
October 2009**



Introduction

This document is the Non-Technical Summary (NTS) of the Environmental Statement (ES) which has been prepared in support of applications made by Tidal Energy Limited (TEL) under the Food and Environment Protection Act (1985), Coastal Protection Act (1949) and Section 36 of the Electricity Act (1989), for a demonstration tidal stream energy device, DeltaStream, to be installed in Ramsey Sound off the Pembrokeshire coast, West Wales. Taken together these applications, the “offshore consent”, represent TEL’s bid for consent to install and operate DeltaStream in Ramsey Sound.

The application and supporting information has been prepared following consultation with the Department of Energy and Climate Change (DECC), Marine Fisheries Agency (MFA), Welsh Assembly Government (WAG), Pembrokeshire Coast National Park (PCNP), appropriate statutory and non-statutory bodies, as well as local interest groups and the public. The ES considers the potential impacts on the environment of the construction, operation, maintenance and decommissioning phases of the project and provides details of any mitigation required to address any impacts.

The Applicant

TEL is a private company located in Cardiff, South Wales. It was set up to develop DeltaStream. TEL has secured investment support from Eco2 Limited (“Eco2”), an experienced developer of renewable energy projects and also from Carbon Connections UK Limited (CCUK) an organisation which sponsors projects designed to make a measurable reduction in carbon emissions.

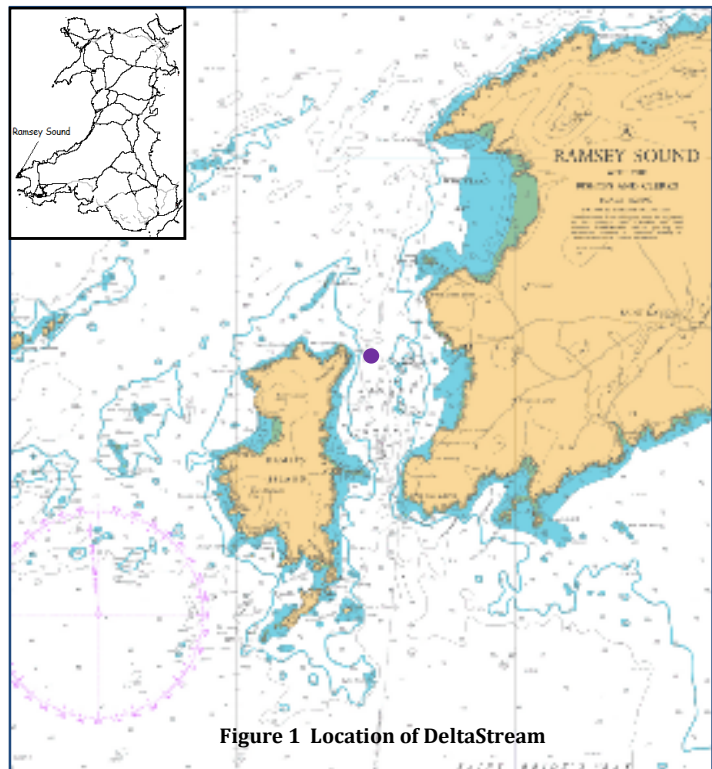
Description of the Project

Overview of the Proposed Development

DeltaStream is a tidal stream energy device which is to be located in deep water (at least 31.5m) approximately 1.2km from St Justinian’s, Pembrokeshire (Figure 1). The device will sit on the seabed generating electricity and will be connected to the distribution network at St Justinian’s for a trial period of 12 months. At the end of the trial DeltaStream and its supporting infrastructure will be removed.

Site Selection

Ramsey Sound was chosen as the best location for the project after an extensive site selection programme. Initially the investigation covered the whole of the UK and 24 potential sites were identified during this study. These sites were then short listed to 5, based on more specific conditions. Ramsey Sound was finally chosen due to it being sheltered from prevailing wind and wave conditions, having good water depths close to the mainland and a suitable grid connection. In addition no trawling occurs in the Sound, no commercial shipping passes through the Sound, and there are good port facilities nearby.



The location chosen for DeltaStream is a flat bedrock shelf in the north of Ramsey Sound. The height of DeltaStream’s turbine when operating means that there will be at least 11.9m of water above the blade tips at lowest tide level, so all boats that currently move around the Sound can continue to do so safely.

It has been recognised that Ramsey Sound is sensitive in terms of its ecology and is designated for a number of international and national conservation designations including Special Areas of Conservation (SAC), Special Protection Areas (SPA) and Sites of Special Scientific Interest (SSSI). Detailed assessments of potential effects of the device and infrastructure on the habitats and species protected by these designations have been carried out.

DeltaStream

The DeltaStream design is a simple robust tidal energy converter based on proven technologies. Its main distinctive features include its lightweight gravity base foundation, fixed pitch blunt blades and relatively slow rotational speed. Each DeltaStream device has 3 tidal stream turbines, made up of the nacelle, hub and blade (Figure 2). Initially a 12m diameter rotor will be installed onto DeltaStream and following successful testing of this rotor the device will be lifted from the seabed and a 15m diameter rotor will be installed. The 15m diameter rotor will allow testing of a full scale DeltaStream device.

When the rotors are turned by the tidal flow the combined generation capacity is up to 1.2MW of electricity, which would greatly contribute to the energy demand of a community like St David's. It also has a unique equilateral triangular foundation (each side 36m wide) which means that it can be securely placed on the seabed. DeltaStream can be removed from the seabed by a carefully developed lifting procedure and taken away when the project is finished.

Two sinkers (Figure 3) will also be used to aid the installation /decommissioning procedures. In this way, by anchoring the electric cable and lifting bridle to the seabed, they can be easily located for maintenance and decommissioning lifting activities.

In terms of offshore construction, a barge will be used to lift and place DeltaStream in the water (Figure 4) and a second one will be used to lay the subsea cables to shore. It is anticipated that the offshore works will take up to 7 days. A temporary safety zone will be requested around the working vessels for health and safety reasons. It is intended that this will not prevent the movement of vessels through the Sound as a whole.

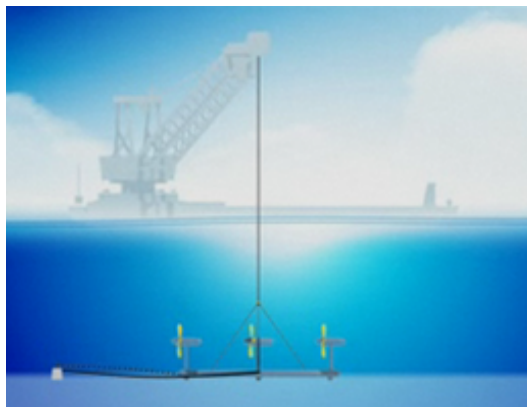
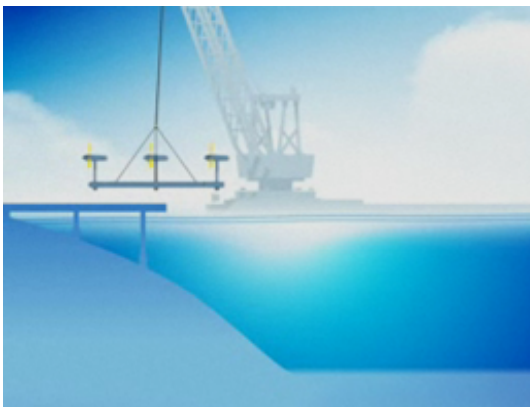


Figure 4 Installation Process. The crane barge lifts the device (assembled on quayside) by its lifting bridle (a) and mobilises to deployment site, where it is connected to the cable and positioned on the seabed (b).

For health and safety reasons during the 12 month operation period a safety zone which restricts underwater activities will also be requested. It is intended that this will not prevent vessel movement through the Sound. There will be one planned maintenance lift, during which time DeltaStream will be brought to the surface and the 12m diameter blades will be replaced with 15m diameter blades. As discussed previously, at the end of the 12 months operation period, it is proposed that DeltaStream and its supporting onshore and offshore structures are removed.

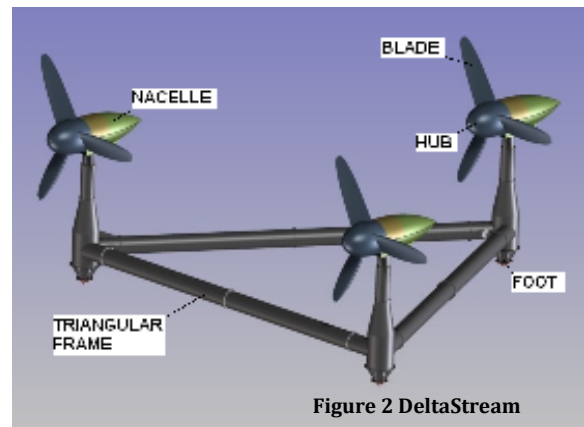


Figure 2 DeltaStream

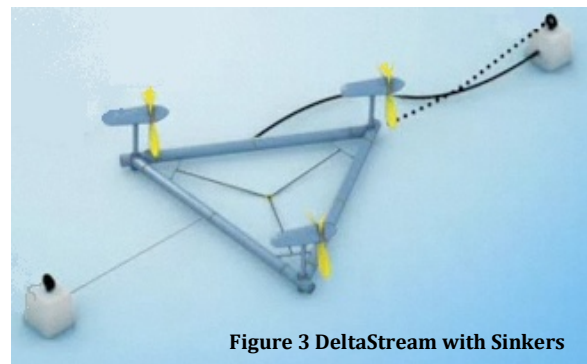
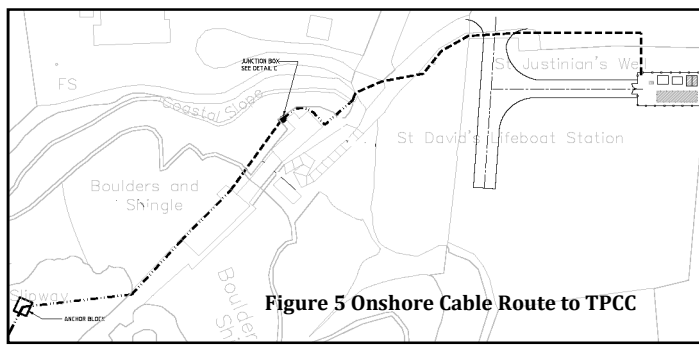


Figure 3 DeltaStream with Sinkers

Electricity will be brought ashore from DeltaStream by 3 subsea cables, which will be laid on the seabed as a single bundle. The cables will come ashore at St Justinian's lifeboat station slipway (Figure 5). Here the subsea cables will connect to the land cables at a connection box. These 3 land cables will be laid in the ground to the Temporary Power Conversion Compound (TPCC) in the nearby RNLI car park field. The TPCC is necessary to convert the raw generated power from the DeltaStream unit into 'clean' power suitable for connection to the electricity grid network.



The onshore aspect of the project was granted planning permission in October 2009 by the PCNP Authority, under the Town and Country Planning Act. It is proposed that the construction for the onshore works be undertaken in two stages to minimise disruption for local people and tourists using the area. In the coming winter (2009/2010), the initial ground works and laying of ducts for cables will be undertaken. Once the offshore consent for deployment and operation of DeltaStream is granted (likely timescale is spring 2010), the remainder of the works, namely installation of DeltaStream offshore, delivery of the TPCC components to site and, laying and connecting of the cable can be progressed. This second stage of works is anticipated to commence in autumn 2010. If for any reason offshore consent is not granted, the preparatory onshore ground works carried out this winter are reversible.

The Environmental Assessment for the Project

Environmental Assessment Findings

Oceanographic Environment

A study was undertaken to look at the possible effects of DeltaStream on the tidal flow (currents); waves; sediment in the water; the area of seabed affected; and water quality. As installation of DeltaStream and the cable would take a relatively short time, with barges on site for up to 7 days, the potential effects on the tide and wave conditions would be short in timescale and small in area and scale. In terms of sediment being lifted into the water currents, no digging of the seabed is required and this will minimise suspended sediments. Any coarse sediment lifted into the water when the various components come to rest on the seabed will settle quickly. All boats will follow recognised industry standards so that the potential risk to water quality can be reduced as far as is practically possible.

In terms of affecting the seabed, "bare rock" or "reef" is important in terms of the Marine SAC. The area of seabed that would be taken up by the various parts of the project (DeltaStream itself, sinkers, cables etc) would be about 0.00002% of the Marine SAC or (or approximately) 0.0002% of the total bare rock area within the Marine SAC (assuming 10% of the SAC is rock). Following the removal of the project, conditions would be expected to quickly return to those experienced now.

During operation there will be a minor reduction in tidal flow downstream but this effect is likely to be small compared to the existing turbulence that is present in this high energy environment. In terms of larger waves there will be a slight reduction of their ongoing height. However, this is likely to be insignificant due to the local water depth and the small nature of the DeltaStream structure sitting highest in the water column (the rotors' blade tips).

There will be small localised effects on the seabed through scour (washing away of loose sediment) around the base of the device, the temporary anchors, sinkers and the subsea cables. Overall, the total area potentially affected is small compared to the wider Ramsey Sound and, following removal of the device, conditions can be expected to rapidly return to those currently existing. Potential effects on water quality could be from accidental release of fluids (oils, lubricants or hydraulic fluid) from within the device. However, all fluids to be used in the device will be biodegradable.

The removing of the device is the reverse of the installation stage and, as such, the potential impacts on the oceanographic environment are considered identical.

The potential joint effect of other possible future developments has also been looked at. These are the construction of a new RNLI station; the Wave Dragon device near Marloes; and the EON tidal energy project. The latter two projects appear to be well outside DeltaStream's timetable and the possible impacts assessed appear minimal in terms of DeltaStream's contribution. The RNLI station may coincide with DeltaStream at some stage, and if so detailed discussions will be held with the RNLI to minimise impacts.

Marine Mammal Assessment

Information on marine mammals was collected from literature, data records and detailed surveys. The marine mammals which occur most often and in greatest numbers within Ramsey Sound are Harbour Porpoise and Grey Seal (Figure 6). Although, a number of other species do occur frequently in Pembrokeshire waters, these are rarely sighted inshore around Ramsey Sound. The marine mammal assessment looked at: increased disturbance from installation/removal marine vessels; interaction with the device during operation; loss of, disturbance to, or displacement from habitat; displacement of food source; underwater noise; DeltaStream acting as barrier to movement; potential water contamination during deployment, operation and retrieval and Electro-Magnetic Field (EMF) effects.

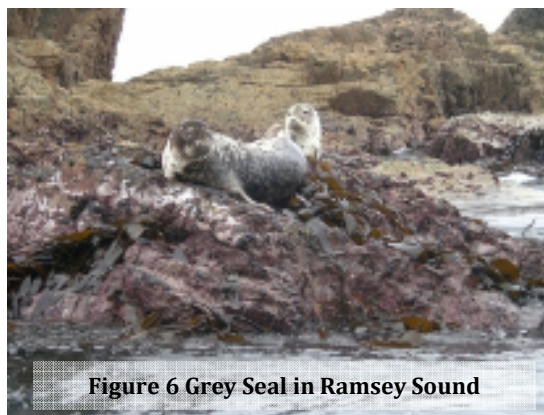


Figure 6 Grey Seal in Ramsey Sound

During construction and decommissioning, noise disturbance and possible collision risk to Grey Seal and Harbour Porpoise was assessed as insignificant due to the very short timescale, the slow moving barges and limited area of works. In terms of visual disturbance, the effect on Seals is assessed as insignificant as works will be very short term, the device is reasonably far from the main Grey Seal resting/breeding areas and the Seals appear to be acclimatised, to a certain degree, to regular visits by tourist boats. With regard to Harbour Porpoise, deployment will be well away from foraging zones, but as Porpoise tend to be shy of boats, it is anticipated that any visual disturbance impact would, at worst, be of minor adverse significance, which would be similar to the impact of any other boats using the area.

Once operational there will be some low noise from DeltaStream which should warn the marine mammals of its presence. Although Harbour Porpoise will probably hear the device from around 280m and Seals from up to 150m, and avoid it, this would not result in a barrier to movement in Ramsey Sound. The effect of noise from DeltaStream in operation is, therefore, considered to be at worst of minor significance to marine mammals. Displacement from habitat and food source is also assessed as minor adverse significance due to its distance from main foraging areas and the small footprint of the device base.

In terms of collision, the noise from the device will be an advance warning which is expected to lead to avoidance. For the tidal phases at or around slack water when Harbour Porpoise are most likely to be passing in the area of the device, blade rotating speeds are considerably slower than on peak flows, reducing any potential collision impact. There is also good clearance above the device for when marine mammals are travelling and undertaking shallow diving. As there is some uncertainty surrounding 'near-field' interactions of marine mammals with tidal stream devices, the risk of collision impact has been assessed as minor to minor moderate adverse significance and will therefore be monitored during operation.

In terms of potential water quality effects throughout all stages of the project, the device will be assembled onshore and it uses a gravity foundation. As such no oils will be added on site nor will seabed preparation be required. In terms of those oils/lubricants used within DeltaStream, these will be biodegradable and therefore the potential effects on marine mammals have been assessed as insignificant. All vessels used in the deployment/maintenance and decommissioning will adhere to the Pembrokeshire Marine Code of Conduct.

Finally as marine mammals are not considered to be electrosensitive species, as the electric cable distance is short and there is only a very small expected magnetic field associated with it (less than the Earth's own magnetic field) the impacts of EMF would be insignificant.

Birds Assessment

There are a number of international designated sites for birds surrounding or near to Ramsey Sound, and in addition Ramsey Island is a RSPB Nature Reserve. As such, detailed information on bird types and numbers was collected from existing data records and site specific survey. During land based survey between January and October 2009 a total of 21 seabird species were recorded in and around the Sound.

Of these 21 species, only four were “qualifying” species for the adjacent SPA’s, namely Lesser Black-backed Gull, Gannet, Razorbill and an unidentified Shearwater (which is most likely to be Manx Shearwater). As DeltaStream sits at depth, only those birds that dive would potentially be at risk. Of the SPA bird species these would be Gannet, Razorbill and Shearwater.

Potential effects from DeltaStream were identified as: disturbance to birds during construction from the presence of installation vessels; presence of DeltaStream resulting in loss of underwater foraging habitat; and presence of DeltaStream resulting in a collision risk to diving bird species. The most frequent bird species recorded in the survey area were surface feeding gulls, which would not be at risk from DeltaStream. The single recording of a Shearwater in the 9 months survey was assessed as not to be a threat to the SPA.

For the diving bird species the overall assessment concluded that each of these potential effects will be localised and short term. The installation vessels themselves should cause no more disturbance than other vessels using the Sound. During operation of DeltaStream, due to the low number of diving species recorded using the area, it is concluded that it should not result in a significant loss of foraging habitat for diving species, or pose a significant collision risk. Therefore no significant effect on the local, regional or international bird populations should be observed. However it is proposed that the bird survey work be continued throughout the period of installation, operation and decommissioning in order to monitor any changes in the bird usage of the Ramsey Sound.



Figure 7 Diving Birds on Rocky Outcrops

Intertidal and Subtidal Marine Ecology Assessment

An assessment of the possible effects of DeltaStream on the marine animals living underwater on the seabed and on the seashore at the cable landfall point was undertaken. No specific groups of, or individual animals (species) at the cable landfall point (St Justinian’s) were found to be very rare or unusual. The site is therefore not considered to be of any greater importance than other areas of the Pembrokeshire Marine SAC. It is also important to note that the RNLi slipway (which will be used for the cable route) is outside the Marine SAC boundary (protected area). In addition the types of marine animals found here have already been influenced by the presence of this man-made structure.

As far as the underwater area within Ramsey Sound is concerned, marine surveys suggest that the range of animals and habitat is quite varied but is not of any greater conservation importance than other areas of the Marine SAC. Additional marine surveys were undertaken at the DeltaStream site and along the cable route for the project. The information collected suggests that these areas are of moderate conservation value. More unusual groups or individual animals characteristically found in tidal rapids are said to possibly occur in the deeper tide-swept channel in the middle of Ramsey Sound. However, DeltaStream will be placed on a plateau to the east of this trench so the animals that may occur within the trench won’t be affected by the project. Deep beds of the Common Mussel were recorded along the cable corridor. These seem to be rather widespread in the area surveyed, and they do not seem to support a greater variety of animals than already exist on the surrounding seabed.

The possible effects on the seabed living animals were looked at for the different phases of the project (deployment, operation & maintenance, decommissioning). In terms of the cable route, it will be laid on the seabed (as opposed to being buried) and the alignment has been selected to avoid any sensitive areas. The residual impact of any effects on animals living there is assessed as negligible. The same is assessed for the cable coming on shore as the route will use the existing slipway. Underwater the small footprint of DeltaStream which will be placed on the seabed limits its potential effects. Once removed at the end of the 12months the area should return to its current situation.

Fish and Commercial Fisheries Assessment

The possible effects of DeltaStream on the marine fish and fisheries within Ramsey Sound were assessed. The different types and number of fish found in and around Ramsey Sound is relatively small, and overall Ramsey Sound is assessed to be of low to moderate conservation value as regards fish ecology. Some commercial fish species will be present, but the area does not seem to be suitable as a spawning area or a nursery. Lobster and Spider Crabs are found underwater in the rocky reefs of Ramsey Sound and edible crabs are found on the rocky shoreline. Due to strong tidal flow and rocky seabed conditions, commercial fishing for mid water and bottom living fish does not occur within Ramsey Sound. Local fishermen rely on potting for crabs and lobsters,

but data shows little activity in the proposed vicinity of the DeltaStream. Recreational fishing does appear to occur in Ramsey Sound, but the main areas appear to be away from the proposed DeltaStream location.

The potential effects on fish ecology and fisheries were identified for the different phases of the project (deployment, operation & maintenance, decommission). A safety zone will be requested during the project to prevent fishing above the device. As commercial and recreational fishing does not appear to happen at the chosen site there should be little or no effect. Ways in which the fish might be affected include short term disturbance by the work vessels or by cable laying; the movements of parts affecting fish as they swim by, fish being affected by noise or electric fields given off by the cable and the device making new places for fish to occupy. All effects are expected to have a negligible to low significance impact.

Navigation Assessment

A risk assessment was undertaken with respect to boats that use Ramsey Sound. Overall, as seen on Admiralty charts, Ramsey Sound is a hazardous area for navigation with its strong tidal flows and tidally submerged rocks. Commercial shipping traffic and larger vessels (over 300 gross tonne) therefore generally move to the West of Ramsey Island, whilst there is a tanker waiting area in St Brides Bay for Milford Haven. Within the Sound itself boat activity is low and boats tends to be smaller in size, with wildlife boat trips being the most frequent users. These boat trips generally operate from Easter and through the summer holidays. Other users of the area are kayakers and small leisure craft.

Potential risks to boats were assessed for all stages of development, including the presence of additional vessels on site and their activities during installation, maintenance and removal, the risk of vessel collision with the device whilst in operation, and failure of the device.

During construction/removal, whilst there would be some increased risks to other boats from any vessel operating in the Sound standard measures would be put in place to reduce these. A Notice to Mariners will be issued before works start and will be in place for the duration of the project. In addition to this a safety exclusion area will be requested around the working vessels and a safety boat will be on site to monitor this. Access through the Sound would be maintained at a safe distance. It is proposed that works would also be undertaken outside the main tourist season when boat numbers in the Sound are reduced.

Once operational, a safety zone will be requested above the device and along the cable route to restrict subsurface activities including fishing and anchoring. Existing boat activity should remain unrestricted as there will be at least 11.9m of water above the device at all states of the tide in good sea states. If in terms of a worst case scenario, components of DeltaStream break off the structure, they are designed to sink.

Throughout all stages of the project detailed discussions will be held with the RNLI to ensure that there are no effects on their operating regime.

Tourism and Recreation

An assessment was undertaken which investigated the potential effects of all stages of the development of DeltaStream on local tourism. Tourism plays an important role in the economy of Pembrokeshire as a whole, and there are around thirty coastal recreational activities practiced in the County. Of these six have the potential to be affected by the proposed project, with the main recreational activity in Ramsey Sound being wildlife/nature tour boat trips which operate from around Easter to October.

The temporary safety zones around the working vessels during installation/removal will restrict vessel movement in the immediate area of works, but not through the Sound as a whole. The construction of the TPCC and the laying of the cable ducts would also cause some temporary local onshore disturbance. However, it is proposed that the main works would be undertaken outside peak tourist season. In addition to this discussions will be held with the PCNP Access Officer with regard to coastal path access.

There would be some temporary visual impact to the local area (onshore) for the duration of the project, but all this work will be compliant with the Planning Authority's requirements. Additionally an information board would be provided to inform interested parties of the project as a whole. Consultation will be maintained with various recreational interest groups throughout the project. Overall the assessment identified that there could be some small temporary adverse effects on tourist activity in Ramsey Sound, but also some possible benefits to those interested in renewable technology.

Terrestrial Ecology

An assessment of the effects of onshore works on plants and animals, as well as ecological conservation designations, was undertaken. To minimise potential impacts, the land cables will follow a route outside the internationally designated areas and will use existing infrastructure (roads). The field chosen for the TPCC is currently used as a temporary car park by the RNLI and has limited plant and animal interest. Notwithstanding this, there will be a minor local adverse impact to the grassland but plans to reinstate it with the appropriate seed mix will negate this. As such potential impacts from construction are limited, and the proposed timing of works in the winter will prevent disturbance to nesting birds. The TPCC site will be removed and reinstated to former character following completion of the project. Taking such considerations into account, the assessment concludes that during the project it is not anticipated that there will be any other adverse ecological impacts.

Cultural Heritage Assessment

The cultural heritage/archaeology both on and offshore was assessed to identify the potential effects upon cultural heritage assets. The proposed development lies within an area of considerable archaeological significance. The terrestrial archaeology of the study area extends back as far as the Mesolithic period (8500BC – 4000BC) and it is evident that St Justinian's has been a place of considerable importance since the medieval period. In terms of marine archaeology, Ramsey Sound is the site of numerous known wrecks and of some which are unrecorded.

However, despite this significance, the proposed development is not predicted to have any effects on either marine or terrestrial heritage. The marine surveys indicate that no wreck sites are present within the area to be occupied by the DeltaStream device or the subsea cables, whilst the terrestrial footprint of the development is extremely small and has been designed to avoid all known heritage features. A watching brief is proposed for a short section of the cable route which affects a section of grass verge. No visual effects upon the setting of cultural heritage features are predicted during the short lifetime of the project.

Comments and Further Information

During November and December 2009 copies of the full Environmental Statement can be viewed at the following locations:

The Clerk St Davids City Council The City Hall High Street St David's SA62 6SD	Pembrokeshire Coast National Park Authority Llanion Park Pembroke Dock Pembrokeshire SA72 6DY	Pembrokeshire County Council County Hall Haverfordwest SA61 1TP
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Digital copies of the ES can be purchased on CD for £10 and paper copies for £150 from Tidal Energy Ltd. If you require further copies of this NTS, which are available free of charge, or if you require further information about the project, please contact Tidal Energy Ltd at the following address. Alternatively a copy of the NTS can be downloaded from www.tidalenergyltd.com. If you require a copy of the NTS in Welsh please contact TEL at:

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