



# **Appendix 4.2**

## **Outline**

### **Operation Environmental Management Plan**

# **The Tidal Lagoon Swansea Bay Project**

## **Outline Operational Environmental Management Plan (Outline OEMP)**

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## A: INTRODUCTION

### 1. The Tidal Lagoon Swansea Bay Project

1.0.0.1 Tidal Lagoon (Swansea Bay) plc (TLSB) proposes to construct and operate a new tidal-powered generating station, with a nominal rated capacity of 240MW, on land in Swansea Bay and adjacent to Swansea Docks, between the dredged channels of the Rivers Tawe and Neath (the Project). The Project involves the construction of a c. 9.5km long u-shaped seawall impounding an area of some 11.5km<sup>2</sup> of seabed and foreshore to create a Lagoon. The water impounded in the Lagoon provides the head - or build-up - of water needed to store kinetic energy that can be turned into electric power. Electricity will be generated as water flows through the bi-directional turbines when the Lagoon fills and empties after a holding period to create the head required. The electricity generated will be fed into the National Electricity Transmission System (NETS) at an existing substation in Baglan Bay via an underground cable.

1.0.0.2 The Project comprises three main elements:

#### **Offshore**

- Seawalls with road
- Turbine and sluice gate housing structure with Operation and Maintenance (O&M) facilities
- Offshore visitor centre with O&M facilities

#### **Western and eastern landfall**

- Western landfall building with O&M facilities and seawall access control
- Car parking
- Hardstanding area for boats
- Dunes and beach
- Recreational space including play area
- Grassland and saltmarsh area

#### **Grid connection**

- Underground cable connection from western landfall to substation at Baglan Bay

1.0.0.3 This document has been prepared for and on behalf of TLSB in relation to the construction of the Project. It forms part of the suite of application documents supporting an application by TLSB to the Secretary of State for Energy and Climate Change for authority to construct operate and maintain the Project (the Application). It is an important and relevant consideration in the determination of the Application and will be secured by a requirement attached to the development consent order (DCO) sought by TLSB pursuant to the Application.



1.0.0.4 The Project site (or Application site) for the purposes of the outline OEMP is defined as shown on the land and works plans relating to construction of the Project and where physical works are carried out. This is shown edged in red at Figure 1.

## **2. The purpose and aims of the outline OEMP**

2.0.0.1 The purpose of this outline OEMP is to set out in general terms the mitigation measures required for the operation of the Project so as to protect the environment. The outline OEMP covers legislative requirements and compliance with regulatory and best practice requirements. It also defines mitigation measures set out in the Environmental Statement (ES) which accompanies the Application. The provisions of the outline OEMP will be required to be adhered to as a requirement of the DCO. TLSB and any contractor employed in operating the Project will be required to comply fully with the terms of the outline OEMP.

2.0.0.2 During the operational phase of the Project, the O&M team will work in a manner that maximises the opportunities to enhance the environment whilst reducing any negative environmental impacts of the Project. The outline OEMP sets out a framework to secure provisions for the management, mitigation and monitoring of environmental effects during operation of the Project. Monitoring strategies will be secured under an Adaptive Environmental Monitoring Plan to provide data that will ensure environmental procedures are adhered to and supported operationally.

2.0.0.3 Section B of this outline OEMP addresses general operational matters. Section C deals with matters secured as environmental mitigation.

2.0.0.4 During periods when the turbines or sluices are in operation, there will be significant water flows through the concrete structures, resulting in high flow velocities. A 500m safety zone will be in place both inside and outside of the structure to ensure that people and small vessels will not be pulled into the structure.

2.0.0.5 It is proposed that video cameras are placed, possibly on the Offshore Building, with good visibility on the safety zones (both on the inside and the outside of the Lagoon), and that monitoring screens are present within the operational control centre in the Offshore Building. The control centre will be permanently manned during day-time hours. This will ensure that in case of accidents where a person or a small vessel has entered the safety zone, then the turbines and sluices can be stopped immediately.

2.0.0.6 A rescue vessel will be available at the boating centre that can be alerted in case of accidents and that can provide assistance where needed.



### **3. Waste management Turbine operation**

3.0.0.1 A Waste Management Plan will be developed for day-to-day operations at the Lagoon. This will include both the operation of the turbines and sluice gates, as well as the seawall and the general public areas. The plan will be designed to assist the TLSB Team to ensure that waste streams are identified, dealt with appropriately and documented accordingly. The waste management plan will be reviewed regularly to ensure that issues are considered at the appropriate juncture and that it reflects actual arrangements.

3.0.0.2 The purpose of the waste management plan will be to ensure that any waste material will be collected and can be disposed of in a controlled manner without causing any spillage of waste material into the sea or the Lagoon, as well as to identify all potential waste streams during the operational phase of the works, to enable an assessment to be made to assist in identifying the potential for:

- Eliminating waste at source through design, specification, size etc.;
- Classification of waste materials and the European Waste Codes;
- Understanding exemptions from the Waste Management Licensing Regulations;
- Tracing the origins of materials used for Compound Construction materials;
- Re-use and recycling off site –Identification of waste carriers; and
- Identification of landfill sites, transfer sites, re-cycling facilities.

3.0.0.3 Waste management contractors will be assessed for competence including that of arrangements for confirmation of transfer between parties, their arrangements for re-use, recycling or forms of treatment, record keeping etc. Records will be retained on site.

3.0.0.4 Along the Lagoon wall and at the public facilities, there will be waste bins that will be regularly emptied and cleaned, probably requiring a dedicated small waste collection vehicle. Cleaning at the fishing spots along the Lagoon wall will require regular attention.

3.0.0.5 Beach areas will be regularly cleaned by collecting any rubbish that has washed ashore. Similarly, cleaning operations along the Lagoon seawalls may be required on a regular basis.

### **4. Public Access Control**

4.0.0.1 The public use of the Lagoon facilities will be actively encouraged. For this reason, walkways and cycle paths are included all along the seawall. It is expected that public access will be possible during most sea and weather conditions, especially along the more protected sections of the seawall.



- 4.0.0.2 During severe conditions (during storm winds coupled with high tides and water levels), relatively high levels of overtopping can be expected. At such times, and during hours of darkness, public access to some or all parts of the Project may be restricted.
- 4.0.0.3 A strategy for controlling public access to the Project will be developed. This will include checking the presence of people on the seawalls when severe weather is expected, and possibly a system of emergency phones at specific locations along the seawalls or shelter at regular intervals.
- 4.0.0.4 At this stage it is expected that a means for controlling public access to the seawalls will be required at the turbine and sluice gate housing structure and at the Eastern and Western landfalls of the seawall.

## 5. Health and Safety requirements

- 5.0.0.1 Health and Safety requirements are important considerations during the design stages for the project. A Health and Safety risk workshop was held during early January 2014, during which these aspects were discussed and documented.
- 5.0.0.2 Operational H&S issues are related to:
- Provision of handrails
  - Provision of fire fighting equipment
  - Provision of life saving buoys
  - Provision of escape ladders to get out of the water.
  - Sign posting.
  - Etc.
- 5.0.0.3 The above facilities will be provided and maintained on a regular basis to keep these in proper working order.

## 6. Maintenance dredging

- 6.0.0.1 The sedimentation study estimated that some 570,000 to 920,000 m<sup>3</sup> of material will annually settle inside the Lagoon, and that this is deposited mainly within the areas of the Lagoon closer to the shoreline. Outside the active water volume in the Lagoon (the water that moves in and out through the turbines), there is some 25 million m<sup>3</sup> of volume that can be filled without reducing the active volume and without reducing the generation capacity. It is expected that only a smaller fraction of the sedimentation material will settle out in this “active” area.
- 6.0.0.2 It is anticipated that maintenance dredging within the Lagoon will not need to start until 10 to 15 years after the completion of construction and then be performed approximately every two years. This would require the mobilisation of a small mobile cutter dredger and try to move this muddy material to the deeper portion of the bay, or towards the turbines and sluice gate so that this can be flushed out of the lagoon during ebb tide. Alternatively, the accumulated sediment would be dredged, pumped to a split



barge positioned on the seaward side of the seawall, which is filled and then deposits the material at the licensed offshore disposal site.

- 6.0.0.3 Such maintenance dredging work would be undertaken by a reputable dredging contractor, and this contractor will need to work according to acceptable industry standards with respect to limiting environmental disturbance during the dredging. For the dredging and for the disposal of the accumulated material, permits will have to be applied for.

## **7. Operation of the offshore building**

- 7.0.0.1 It is proposed that the management and operation of the Offshore Building will be carried out by an independent company in contract to Tidal Lagoon Swansea Bay. This company will have to prepare an operational strategy for the acceptable running of the visitor centre. Access measures will provide that:

- a. visitors to the Centre can either use a bus to the Centre or can walk or cycle;
- b. cycle stands will be provided at the Centre; and
- c. supplies will be brought to the visitor centre once per day by car/truck.
- d. waste will be collected and disposed of off-site.

## **8. Operation of the Western Landfall Building**

- 8.0.0.1 Similarly, it is proposed that the management and operation of the Western Landfall Building will be carried out by an independent company in contract to TLSB. This company will have prepared an operational strategy for the acceptable running of the Western Landfall building/ boating centre.

- 8.0.0.2 The Lagoon would be used for regular events like boating and sailing races, and triathlons. During such events, operational plans need to be in place to control traffic, parking as well as safety plans for the users of the Lagoon. For example, it is proposed that the rescue boat will be deployed in the water during popular events, so that this vessel can lend assistance when and where required.



## **B: CONTENTS OF THE OUTLINE OEMP**

Methodologies will be secured in the final version of the OEMP (or other documents) to secure the following items. In each case, the management measure will be informed by monitoring pursuant to the AEMP.

### **1. Coastal processes, sediment transport and contamination**

- 1.1. Intervention beach/dunescape profiles by nourishment in respect of new and existing beaches and/or dunescapes, where appropriate.
- 1.2. Implementation of maintenance dredging; (a) in navigation channels where appropriate; and (b) within the Lagoon.

### **2. Marine water quality**

- 2.1. Development of a water quality strategy to include: (a) an advanced warning system providing for liaison between Dwr Cymru Welsh Water and TLSB in respect of potential performance issues at the Swansea Bay Waste Water Treatment Works (WWTW) which may affect water quality within the Lagoon; (b) measures to regulate use of the Lagoon for water contact activities in the case of storm events or WWTW issues; (c) management of exclusion areas relating to the long sea outfall within the Lagoon; and (d) liaison with City and County Council of Swansea.

### **3. Ecological receptors**

- 3.1. A Lagoon Warden will be retained, with a remit including coordination of ecological monitoring and management of relevant ecological habitats and liaising with local ecological groups, landowners and statutory Nature Conservation Bodies in the area.
- 3.2. Recreational activities within the Lagoon will be discouraged in designated areas, with "quiet areas" identified elsewhere to minimise impacts on birds within the Lagoon.
- 3.3. A capture and release procedure to be implemented in circumstances where a marine mammal accesses the Lagoon through a sluice gate or turbine.
- 3.4. Routine surveillance to be undertaken for marine mammal carcasses and liaison with the UK Cetacean Strandings Investigation Programme (CSIP) concerning existing shoreline surveillance in key areas.
- 3.5. Nourishment of new dunescape delivered as part of the Project to mitigate wind driven sand losses.
- 3.6. Vegetation management on the new beach(es) and dunescape(s) to: (a) create areas of bare sand; and (b) physical intervention to create blow outs.
- 3.7. Public access restrictions to sensitive habitats shall be put in place, with signing away from Crymlyn Burrows SSSI, and other elements of visitor management undertaken to



minimise adverse impacts and focus visitor pressure to managed areas of the new dunescape and beach areas.

- 3.8. A sympathetic lighting regime will be instituted throughout operation of the Project to minimise adverse impacts on bats.

#### **4. Navigation**

- 4.1. A scheme relating to navigational safety in respect of the Project to be put in place, including:
- 4.2. Promulgation of information to mariners regarding operation of the Project;
- 4.3. Provision and maintenance of additional aids to navigation where necessary and appropriate;
- 4.4. Procedures for adverse weather conditions;
- 4.5. Coordination with event organisers to ensure provision of site support vessels during events and other busy periods;
- 4.6. Quick response emergency shutdown procedure for turbines from a manned facility on the turbine and sluice gate housing structure;
- 4.7. Enforcement of use of life jackets for sporting activities within the Lagoon; and
- 4.8. Implementation of Emergency Response Co-operation Plan (ERCoP) to incorporate the requirements of all on and offshore first responders, to be prepared in consultation with the Marine and Coastguard Agency.
- 4.9. A protocol will be established dealing with infractions of the safety zone associated with the turbine and sluice gate housing structure.

#### **5. Hydrology and flood risk**

- 5.1. A flood response plan, prepared in consultation with Natural Resources Wales, to be implanted, including preparation of flood warning plan and flood warning area.

#### **6. Contamination**

- 6.1. Operating measures, such as speed limits and road markings, and procedures during delivery or movement of materials to be implemented to prevent risk of spill of contaminating materials.
- 6.2. Commercial uses and landscaping maintenance on site shall adhere to statutory and best practice waste regulations, and would adhere to safety protocols, plans and procedures, in respect of the storage of all fuels, chemicals and waste.



## Tidal Lagoon Swansea Bay plc

- 6.3. Storage of any chemicals required for use within the Project, such as for landscaping or general maintenance, will be in designated areas, with no direct pathway to the sewer system or watercourses.