# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary (English)</td>
<td>1</td>
</tr>
<tr>
<td>Summary (Welsh)</td>
<td>9</td>
</tr>
<tr>
<td>1.0 Introduction</td>
<td>17</td>
</tr>
<tr>
<td>1.1. Background</td>
<td>17</td>
</tr>
<tr>
<td>1.2. What is the Tidal Lagoon?</td>
<td>17</td>
</tr>
<tr>
<td>1.3. Planning context</td>
<td>18</td>
</tr>
<tr>
<td>1.4. Status and purpose of the Design and Access Statement</td>
<td>18</td>
</tr>
<tr>
<td>1.5. Report structure</td>
<td>19</td>
</tr>
<tr>
<td>1.6. Design team</td>
<td>19</td>
</tr>
<tr>
<td>2.0 Site and context appraisal</td>
<td>21</td>
</tr>
<tr>
<td>2.1. Introduction</td>
<td>21</td>
</tr>
<tr>
<td>2.2. Wider context</td>
<td>22</td>
</tr>
<tr>
<td>2.3. Site location and context</td>
<td>25</td>
</tr>
<tr>
<td>2.4. Development and planning context</td>
<td>49</td>
</tr>
<tr>
<td>2.5. Fabian Way Corridor Transport Assessment (2010)</td>
<td>53</td>
</tr>
<tr>
<td>2.6. Renewable energy context</td>
<td>53</td>
</tr>
<tr>
<td>3.0 Design principles and objectives</td>
<td>55</td>
</tr>
<tr>
<td>3.1. Introduction</td>
<td>55</td>
</tr>
<tr>
<td>3.2. The consultation process</td>
<td>55</td>
</tr>
<tr>
<td>3.3. The design process: an overview</td>
<td>56</td>
</tr>
<tr>
<td>3.4. Design objectives</td>
<td>61</td>
</tr>
<tr>
<td>3.5. Design principles</td>
<td>61</td>
</tr>
<tr>
<td>3.5 Project vision</td>
<td>61</td>
</tr>
<tr>
<td>3.6. Context and design studies</td>
<td>63</td>
</tr>
<tr>
<td>4.0 The Project</td>
<td>65</td>
</tr>
<tr>
<td>4.1. Introduction</td>
<td>65</td>
</tr>
<tr>
<td>4.2. Energy generation</td>
<td>65</td>
</tr>
<tr>
<td>4.3. Overview of project elements</td>
<td>65</td>
</tr>
<tr>
<td>4.4. Construction phase</td>
<td>80</td>
</tr>
<tr>
<td>5.0 Design development</td>
<td>83</td>
</tr>
<tr>
<td>5.1. Introduction</td>
<td>83</td>
</tr>
<tr>
<td>5.2. Design approach and concept</td>
<td>83</td>
</tr>
<tr>
<td>5.3. Design iteration</td>
<td>84</td>
</tr>
<tr>
<td>A. Lagoon shape</td>
<td>85</td>
</tr>
<tr>
<td>B. Access and movement</td>
<td>91</td>
</tr>
<tr>
<td>C. Masterplan configuration and public realm</td>
<td>111</td>
</tr>
<tr>
<td>D. Building and information point design and siting</td>
<td>147</td>
</tr>
<tr>
<td>E. Ecology strategy</td>
<td>183</td>
</tr>
<tr>
<td>F. Sports, recreation and water access strategy</td>
<td>185</td>
</tr>
<tr>
<td>G. Lighting strategy</td>
<td>195</td>
</tr>
<tr>
<td>H. Utilities strategy</td>
<td>199</td>
</tr>
<tr>
<td>I. Arts strategy</td>
<td>203</td>
</tr>
<tr>
<td>6.0 Sustainability</td>
<td>207</td>
</tr>
<tr>
<td>6.1. Introduction</td>
<td>207</td>
</tr>
<tr>
<td>6.2. Policy context</td>
<td>207</td>
</tr>
<tr>
<td>6.3. Flood risk and sea level change</td>
<td>210</td>
</tr>
<tr>
<td>6.4. Land and water quality</td>
<td>210</td>
</tr>
<tr>
<td>6.5. Building design</td>
<td>211</td>
</tr>
<tr>
<td>6.6. Public realm design</td>
<td>212</td>
</tr>
<tr>
<td>6.7. Lighting design</td>
<td>212</td>
</tr>
<tr>
<td>6.8. Transport</td>
<td>213</td>
</tr>
<tr>
<td>6.9. Green infrastructure and well being</td>
<td>213</td>
</tr>
<tr>
<td>6.10. Habitats</td>
<td>214</td>
</tr>
<tr>
<td>6.11. Approach to materials selection - public realm and engineering</td>
<td>215</td>
</tr>
</tbody>
</table>
INTRODUCTION

This Design and Access Statement (DAS) accompanies Tidal Lagoon (Swansea Bay) plc’s application for a Development Consent Order for a tidal range lagoon and supporting infrastructure, public realm, built facilities and cable route connection, in Swansea Bay, South Wales.

The DAS records and illustrates the design principles, rationale, the iterative design process and final Project design. The iterative design process has considered consultation feedback from statutory and non-statutory consultees, land owners, stakeholders and the public, which is recorded in the Consultation Report. The design process has also been subject to development of operational requirements, viability analysis, technical engineering design refinement, refinement of client aspiration and evolution of thinking, and the consideration of environmental issues through the Environmental Impact Assessment (EIA) process.

The DAS describes how the Project design responds to the physical, policy and social context in relation to the following:

- Use
- Extent
- Layout
- Appearance

This summary provides a brief overview of the DAS which is structured under the following headings:

- Section 1 – Introduction
- Section 2 – Site and context appraisal
- Section 3 – Design objectives and principals
- Section 4 – The Project
- Section 5 – Design development
- Section 6 – Sustainability
SITE AND CONTEXT APPRAISAL

The DAS demonstrates how the Project has responded to, and how it has been influenced by its context.

The Project lies within Swansea Bay which is surrounded on its coastal side by elevated ground comprising Mumbles Head to the west and Sker Point in the east. Swansea city centre lies to the north west, Mumbles to the south west, and Port Talbot to the east. The Bay is characterised by sandy beaches to the west and Crymlyn Burrows (a sandy dune and saltmarsh designated as a Site of Special Scientific Interest, SSSI), to the east.

The dredged navigation channels of the River Tawe and River Neath lie to the west and east of the Project respectively. The tidal range of the Bay (the difference between high and low water) is among the largest in the world, with an average of 8.5m and peak of 10.5m.

Fabian Way (A483) lies to the north of the Project and extends east from Swansea city centre to the M4 and is a dual carriageway. The Fabian Way ‘park and ride’ lies north of Fabian Way, opposite the proposed vehicular entrance to the Project.

The site of the Lagoon lies to the south of Swansea Port and Queen’s Dock and the Swansea University Bay Campus (SUBC, currently under construction).

The following baseline studies have been undertaken as part of the EIA in order to understand key sensitivities and environmental issues that have influenced the design of the Lagoon:

- Topography, bathymetry and land use
- Landscape and seascape character
- Hydrology and flood risk
- Water quality
- Coastal processes, sediment transport and contamination
- Biodiversity:
  - Intertidal and subtidal benthic ecology
  - Fish including recreational and commercial fisheries
  - Marine mammals
  - Coastal birds
  - Terrestrial ecology
- Transport, access and navigation
- Land quality
- Cultural heritage and archaeology
  - Marine archaeology
  - Terrestrial archaeology
- Visual context
- Socio-economics, recreation and tourism

The planning and energy context for the Project is set out in the Planning Statement which accompanies the Application.

DESIGN PRINCIPLES AND OBJECTIVES

Operational objectives for the Project have been identified. The Lagoon should be:

- Fit for purpose
- Environmentally sound
- Efficient
- Safe
- Reliable
- Socially responsible
- Compliant with regulatory requirements

The Project will be subject to a Construction Environmental Management Plan (CEMP) and an Operational Environmental Management Plan (OEMP) to maximise performance, control risks and impacts, manage habitats and provide a safe and attractive public realm.

The vision for the Project, founded on the design objectives and principles is to establish a new recreational coast line for Swansea between the city centre beachfront to the west and Crymlyn Burrows SSSI to the east, providing a destination location from a local through to a national and even international level.
Design objectives were established at the outset of the Project and informed subsequent design principles. Design objectives embodied in the Project comprise the following:

- To create a worthy legacy for Swansea and its residents
- To generate sustainable energy using natural processes
- To enliven sport, tourism and leisure within the Bay
- To provide a dynamic educational environment
- To act as a catalyst for ongoing economic development
- To provide new habitats and establish a new coastal landscape
- To develop the proposal having regard to its natural habitats and environment.

Design principles are outlined below and are the measures used to meet the design objectives. The Lagoon will:

- Build on Swansea’s rich cultural heritage
- Respond to place and create new environments
- Establish strong connections
- Celebrate sustainable energy production and create an exemplar educational resource for tidal power
- Create an international events destination
- Create a world class public realm and coastal experience
- Provide opportunities for different audiences

**THE PROJECT**

The Project is an offshore generating station with a nominal rated generating capacity of 240MW with supporting facilities for operation and maintenance (O&M) and related public realm, habitat areas and buildings. The Project comprises a 9.5km long seawall and turbine housing (including turbines and sluices) which impounds approximately 11.5km² of water with the average tidal range at 8.5m, peaking at 10.5m. This tidal range provides the opportunity to establish a head of water which can be released through the turbines at the optimum time, generating energy on the outgoing and incoming tide using bi-directional turbines, by effectively delaying the tidal movement within the impounded area.

The main features of the Project include:

- The Lagoon seawall comprising a wall constructed of sediment-filled geotextile tubes with a sediment core, connected to the land at landfalls adjoining Swansea Port and SUBC.
- Turbines and sluice gates comprising 13 to 16, 7m diameter, bi-directional turbines, and 6 to 10 sluice gates housed in a structure 410m long and 67.5m wide constructed on the seabed.
- Cable route connection comprising a 10km long cable extending from the turbine house, along the western seawall, and eastwards along the southern side of the Port and south of Fabian Way, through the Crymlyn Burrows and under the River Neath to connect to an existing substation at Baglan.
- Proposed buildings comprising: the Offshore Building (including O&M and visitor facilities) and the Western Landfall Building (including O&M, visitor orientation and sailing/boating facilities plus an oyster/lobster hatchery).
- A ‘Maritime Park’ with four defined character areas:
  - Landward Urban Park;
  - Broad Seaward Park;
  - Narrow Seaward Park; and
  - Landward Ecological Park.
- Highway and access routes comprising a main Lagoon access road connected to Fabian Way at an existing junction and extending to and along the Lagoon water front as a new coastal road, with a defined footpath and cycleway and associated links to existing and future cycle and pedestrian networks.
- A pontoon on the outside of the western seawall (adjacent to the western landfall) in support of future connection to a ‘water shuttle’ between the Project and the western bank of the Tawe and beyond (subject to viability).
- Mariculture proposals and new habitat areas comprising oyster spatting ponds, hatchery and associated laboratory, new saltmarsh, sand dune and coastal grassland habitat.
- Water quality enhancement works comprising two options: provision of UV disinfection improvements to the existing Waste Water Treatment Works located at the Port; or an extension to the existing waste water outfall that extends into the Bay, beyond the Lagoon seawall.
DESIGN DEVELOPMENT

The masterplan for the Project was developed as a flexible framework that could respond to ongoing environmental analysis, consultation, land negotiation and design iteration. The following aspects of the framework were identified:

- Connection
- Access
- Recreation
- Sport
- Adjoining uses
- Character
- Environment

The iterative process has impacted design development of nine key areas of the Project:

LAGOON SHAPE

The Lagoon shape has evolved as the understanding of the energy modelling, turbine design, cost model and environmental considerations have developed. The selected option was identified from approximately 15 designs, and balances environmental and navigational impact with technical requirements while responding to the consultation process. The design is based on the following principles:

- Energy output – primarily driven by volume of captured water.
- Viability – primarily driven by the ratio of length of seawall to area of seabed and therefore volume of water enclosed.
- Bathymetry – deep water requires a higher seawall and therefore greater cost.
- Construction method – Geotube® technology was always preferred for the seawall but multiple turbine housing options were considered. An in situ construction method is proposed.
- Turbine alignment and location – the alignment options were considered in the light of water quality and other impacts on Aberafan Beach from the River Neath.
- Dredged channels – the need to maintain the navigation channels of the River Tawe and River Neath was vital.
- Crymlyn Burrows and coastal processes – coastal modelling directed the Lagoon location outside of the SSSI and would reduce the potential impacts on coastal processes.

ACCESS AND MOVEMENT

A number of potential vehicular access options for car and bus/coach access, as well as construction traffic were considered via Fabian Way taking into consideration:

- Existing junction capacity
- Land areas to be crossed
- Appropriateness for construction and operational requirements
- The route to the Project (and especially the western landfall) and the need to minimise disruption to Port operations
- Potential additional benefits arising

The final proposed access lies to the south of the existing Fabian Way ‘park and ride’ at an existing traffic controlled junction that was formerly used by Swansea Port. The present Port access gate lies to the east of this location and may be used for aspects of the construction phase.

The routes for pedestrians and cyclists have been explored in parallel. The main connections secure a link to the west with Langdon Road (which extends through the SA1 regeneration area), and to the east to the Fabian Way cycle route (via the existing Port access to abut the SUBC).
**MASTERPLAN CONFIGURATION AND PUBLIC REALM**

The concept of the Maritime Park establishes a flexible masterplan that gives an identity to the Lagoon based on defined character areas. These character areas respond to the existing and developing context of the site, and to the opportunities afforded by the western and eastern landfalls of the Lagoon. To the east, the masterplan responds to the quiet, natural setting of the Crymlyn Burrows SSSI, the SUBC and shallow intertidal waters important for bird life. To the west, is the busier urban area, ideally located as a destination for recreation, sailing and water sports access, a link to the Offshore Building and potential city links. The Lagoon will provide a new visitor centre destination for the world’s first tidal power station, new public realm and a centre for water sports, all supporting the vision for a new waterfront for Swansea. The design for the Park developed over time and in conjunction with access considerations and the extents of habitat mitigation.

The layout of the Park provides for a sheltered focus at the western landfall. The form of the public realm is inspired by the concepts of a series of interwoven, naturalistic and curvilinear lines like a series of strings of a necklace. The lines also echo the ripples left in the sand of the intertidal area following retreat of the tidal waters.

**BUILDING AND INFORMATION POINT, DESIGN AND SITING**

A number of buildings/facilities were identified to meet the operational requirements of the Lagoon in conjunction with recreation, sport and visitor facilities. Consultee responses, operation and maintenance requirements, safety, visitor management, client brief/aspiration and technical matters have influenced the location and function of the buildings as well as their scale and form.

Tidal Lagoon (Swansea Bay) plc (TLSB) has met with the Design Commission for Wales on several occasions to discuss the proposals for the buildings and public realm. The buildings respond to the character areas within the Maritime Park. Two buildings are proposed along with one major information point (plus smaller, dispersed general information, associated with safety and orientation).

The Western Landfall Building incorporates visitor orientation (for arrivals by all modes of transport), O&M facilities (including emergency rescue facilities and first aid), staff welfare, sailing centre, catering facilities and oyster/lobster hatchery. The building comprises an elegant and simple, single storey, pitched roof structure clad in timber panels, punctuated by a glass hatchery structure of the same building form. The building draws reference from traditional timber coastal buildings, port storage structures and the attractive J’Shed building within the SA1 area. The building is orientated to provide a good relationship to the water’s edge and sailing facilities, and to be a strong marker on approach as a visitor.

The Offshore Building incorporates major visitor and O&M facilities, including staff welfare. The building lies some 3km into the Bay and is accessed along the Broad Seaward Park, adjoining the Turbine Housing. The building is designed as a destination and marker in the Bay. It comprises a series of interlocking rough textured concrete shells separated by vertical glass slots, with a smooth internal finish that draws reference from oyster shells and vertical fissures in a cliff face. The glass portions of the building are arranged to exploit views to various areas of the main land and coastline, and to provide good daylight penetration into the internal space.
ECOLOGY STRATEGY

Ecology considerations have been integral to the design of the Lagoon’s onshore and offshore environments. The ecology strategy includes the following measures:

- Creation of coastal grassland habitat to mitigate loss of existing grassland as a result of the Project;
- New sand dune habitat to integrate the eastern landfall of the Lagoon with the Crymlyn Burrows, with a gently-inclined rock armour to encourage development of rock pools at low tide;
- Creation of saltmarsh as additional habitat with a walkway into the waters of the Bay;
- Provision of an area of quiet water for birds within the Lagoon’s shallow intertidal area, distanced from water sports activities;
- Provision of bird roosts including areas for bird rafts/islands and kittiwake ledges;
- Oyster spatting ponds located in the intertidal area as part of the programme to return oysters to the Bay, in conjunction with the oyster hatchery at the Western Landfall Building;
- Establishment of rock pools in gently-inclined areas of rock armour in the intertidal water zone, and provision of ‘Bioreefs’ or ‘BioBlocks’; and
- Provision of herring spawning media to the outer face of the western Lagoon seawall.

SPORTS, RECREATION AND WATER ACCESS STRATEGY

A number of sporting activities have been provided for at the Lagoon following consultation. These include:

- Watersports/sailing
- Triathlon
- Running/walking/cycling

The development of the masterplan has sought to exploit the proximity of the Project to the water, making use of it as a resource. Water access includes water/intertidal sands access from the dunes and beach area, boardwalk access over the proposed saltmarsh area and soft slipway access at the western landfall.

LIGHTING STRATEGY

The lighting strategy ensures a cohesive lit environment across the Lagoon after dark, adding character, improving wayfinding and safety, reducing energy consumption and supporting surrounding habitats and ecology. The strategy has been specifically developed to ensure that the environmental impact of artificial light is minimised.

Architectural and landscape lighting will be combined with amenity lighting to create the overall lit effect for the Lagoon and each of the Parks.

UTILITIES STRATEGY

The utilities for the Lagoon, including electricity import, potable water, foul water drainage and telecoms will run within combined services corridors. All new import cables, ducting and pipes supplying the Western Landfall Building and Offshore Building will be routed along the Lagoon access road, south of the Queen’s Dock. A common services corridor will also be created under the footpath/cycleway between the western landfall and the Offshore Building.

ARTS STRATEGY

An arts strategy has been developed for the Lagoon and TLSB are working with Cape Farewell as their cultural partner to take the Strategy forward, addressing the potential the Lagoon has to change the lives of local communities, with a host of long-term economic and community benefits.

The range of projects that will be considered include those that are artist-led, those that are community driven, and those that bring art and the creative process into the designs of the Lagoon. There are a number of opportunities for aesthetic interventions that could enhance the visitor experience throughout their time at the Lagoon.

The arts strategy will be delivered through three programmes: the Community Workshop Programme; the Public Realm Programme; and the Major Piece Programme.
SUSTAINABILITY

The sustainability of the Project is underpinned by its contribution to the development of low carbon technology under the binding agreements of the Kyoto Protocol reflected in the Renewable Energy Directive. In addition, the Project will bring benefits to the local economy, environment and community.

National Planning Statement EN-1 requires applicants to take into account the effects of climate change when developing infrastructure. The Project takes these issues into account. EN-3 requires that applicants set out how a proposal will be resilient to the effects of higher temperatures, increased flood risk and increased drought for example.

Some of the key attributes of the Project that address climate change and wider sustainability matters include:

- **Flood risk and sea level change** - The design engineering for the Project makes allowances for climate change in relation to sea level rise and the proposed seawall will form a new flood defence structure that will defend the coastline from flooding and wave attack.

- **Land and water quality** - The Project re-uses brownfield and former industrial land to provide a new public realm and onshore landing for the energy generating station, and provides recreation resources and economic activity on land that presently provides no public access or benefit. Careful site planning has sought to avoid developing land with anticipated high ground pollution levels.

The presence of the Lagoon itself will result in a slight improvement in water quality at the designated bathing beach in the Bay. Proposed mitigation measures associated with improving water quality within the Lagoon for water contact sports will also provide an additional benefit to the wider Bay area.

- **Building design** - The designs of both the Offshore Building and Western Landfall Building have considered sustainable design principles from the outset and incorporate the following passive design features/design considerations:
  - Orientation
  - Natural light
  - Stack effect
  - Insulation
  - Sealed building
  - Thermal mass
  - Displacement ventilation and natural ventilation
  - Heat recovery system
  - Rainwater harvesting
  - Photo voltaics
  - Composting toilets and water-less urinals
  - Material selection, in some cases using prefabrication

- **Public realm design** - The public realm design is founded on the concept of providing an attractive recreational environment that responds to context, seeks to minimise impacts on habitats, uses locally-derived plant material, promotes education and learning, interaction with sport plus health and well-being.

- **Transport** - Opportunities for promoting sustainable forms of transport have been considered and include the exploration of viable public transport connection between the city’s park and ride facility on Fabian Way and the western landfall of the Lagoon, and the provision of improved cycle connections.

- **Habitats** - The integration of Project into its natural environment has been an important consideration in the design process. This has been particularly important for ecology with Crymlyn Burrows SSSI located immediately adjacent to the eastern landfall, and is reflected in the establishment of new areas of habitat including rock pools, saltmarsh, coastal grassland and sand dunes and management of the operational design to retain intertidal areas. In addition, the oyster hatchery designed in conjunction with SEACAMS, is proposed to support the re-introduction of the native oyster into the Bay.

- **Approach to materials selection – public realm and engineering** - Material will be resourced in a responsible manner. In relation to the seawall, material sourced beyond the site will arrive by sea where possible, and will include rock from a quarry purchased and to be managed by TLSB to ensure it is sourced responsibly and efficiently. The construction of the seawall will use locally-derived sediment for the formation of the Geotube® structures.

- **Construction and Operational Environmental Management Plans** - Plans have been drafted which outline commitments to key construction and operational activity that will secure sustainable practices and commitments to the maintenance of mitigation measures and management of habitats.
Mae'r Datganiad Dylunio a Mynediad (y Datganiad) hwn yn ategu cais Tidal Lagoon (Swansea Bay) plc am Orchymyn Caniatâd Datblygu ar gyfer morlyn amrediad llanw a seilwaith ategol, tir i'r cyhoedd, cyfleusterau adeiledig a chysylltiad llwybr cebl, ym Mae Abertawe, De Cymru.

Mae'r Datganiad yn cofnodi ac yn dangos yr egwyddorion dylunio, y rhesymeg, y broses ddylunio amladroddol a dyluniad terfynol y Prosiect. Mae'r broses ddylunio amladroddol wedi ystyried adborth ymgynghori gan ymgynghoreion statudol ac anstatudol, perchenogion tir, rhanddeiliaid a’r cyhoedd, a gofnodir yn Adroddiad yr Ymgynghoriad. Bu’r broses ddylunio hefyd yn destun trefniodu ar gyfer datblygu gofynion gweithredol, dadansodd hŷfywedd, mireinio perianeg dechnegol y dyluniad, mireinio dyheadau’r cleient ac esblygur’r ffodd o feddwi, ac ystyriwyd materion amgylcheddol drwy broses yr Asesiad o’r Efalieth Amgylcheddol (AEA).

Mae'r Datganiad yn disgrifio sut mae dyluniad y Prosiect yn ymateb i'r cyd-destun ffisegol, polisi a chymdeithasol mewn perthnas â'r canlynol:

▪ Defnydd
▪ Graddau
▪ Cynllun
▪ Ymddangosiad

Mae'r crynodeb hwn yn darparu trosolwg cryno o'r Datganiad sydd wedi'i strywthuro o dan y penawdau canlynol:

▪ Adran 1 – Cyflwyniad
▪ Adran 2 – Arfarniad o'r safle a'r cyd-destun
▪ Adran 3 - Amcanion ac egwyddorion dylunio
▪ Adran 4 – Y Prosiect
▪ Adran 5 – Datblygur’r dyluniad
▪ Adran 6 – Cynaliadwyedd
ARFARNIAD O’R SAFLE A’R CYD-DESTUN

Mae’r Datganiad yn dangos sut mae’r Prosiect wedi ymateb i’w gyd-destun a sut y mae’r cyd-destun hwnnw wedi dylanwadu arno.

Mae’r Prosiect yn ardal Bae Abertawe sydd wedi'i amgylchynu ar ei ochr arfordirol gan dir uchel yn cynnwys Pen y Mwmbwls i'r gorllewin ac Pen Gyffin i'r dwyrain. Mae canol dinas Abertawe i'r gorllewin ac Pen y Mwmbwls i'r de orlrelin, a Phort Talbot i'r dwyrain. Weddwrdir y Bae gan draethau tywodlyd i'r gorllewin a Thwyni Crymlin (twyni tywod a morfa hela ‘r dyddi’u dynodi fel Safle o Ddiddordeb Gwyddonol Arbennig, SoDDGA), i'r dwyrain.

Mae sianelau mordwyo wedi'u carthu Afon Tawe i'r gorllewin ac Afon Nedd i'r dwyrain o'r Prosiect. Mae amrediad llanw’r Bae (sef y gwahaniaeth rhwng perllanaw a thrai) ymhllith yr uchaf yn y byd, gyda chyfrifoldeb o 8.5m ac uchafbywynt o 10.5m.

Mae Ffordd Fabian (A483) sy’n ffordd ddeuol i'r gorllewin o'r Prosiect ac ymestyn i'r dwyrain o ganol dinas Abertawe i'r M4, Mae cyfreulfa ‘parcio a theithio’ Ffordd Fabian i'r gogledd o Afond Fabian, gyferbyn â mynedfa arall o prosiect i gerbydau.

Mae sianel Morlyn i'r de o Borthladd Abertawe a Doc y Frenhines ac Champw y Bae Prifysgol Abertawe, sy'n cael ei adeiladu ar hyn o bryd. Cynhaliwyd yr astudiaethau lianell syflan fel rhan o'r AEA er mwyn deall y materion sensitiv a amgylcheddol allwedol sydd wedi dylanwadu ar y broses o ddylunio’r Morlyn:

- Topograffi, bathymetri a’r defnydd o dir
- Nodweddion y tirlun a’r morlun
- Hydroleg a’r perygl o lifogydd
- Answdd dwr
- Prosesa arfordirol, trosglwydd gwaddod a halogi
- Bioamrywiaeth
  - Ecoleg fôr-waelodol rynglanwol ac islanwol
  - Pysgod, gan gynnwys pysgodfeydd hamdden a masnachol
  - Mamaliaid morol
  - Adar arfordirol
  - Ecoleg ddaearol
- Trafndiaeth, mynediad a mordwyaeth
- Answdd tir
- Trefndaeth ddigwyliannol ac archeoleg
  - Archheoleg forol
  - Archheoleg ddaearol
- Cyd-destun gweledol
  - Elfennau economiaidd-gymdeithasol, hamdden a thwristaeth

Nodir y cyd-destun cynllunio ac yni ar gyfer y Prosiect yn y Datganiad Cynllunio sy’n agetru’r Cais.

EGWYDDORION AC AMCANION DYLUNIO

Nodwyd amcanion gweithredol ar gyfer y Prosiect. Dylai’r Morlyn fod y:

- ddas at y diben
- Amgylcheddol gadarn
- Efleithlon
- Diogel
- Dibynadwy
- Cymdeithasol gyfrifol
- Cydymffurfio â gofynion rheoliadol

Bydd y Prosiect yn destun Cynllun Rheoli Amgylcheddol ar gyfer adeiladu (CEMP) a Chynllun Rheoli Amgylcheddol Gweithredol (OEMP) er mwyn sicrhau'r perfformiad gorau, rheoli risgiau ac effeithiau, rheoli cynefnedd a darparu tir diogel a deniadol i'r cyhoedd.

Y weledigaeth ar gyfer y Prosiect, yn seiliedig ar amcanion a’r egwyddorion dylanwol, yw sefydlu arfordi’n llawenydd i Abertawe rhwng traeth canol y ddinas i’r gorllewin a SoDDGA Twyni Crymlin i’r dwyrain, gan ddarparu cyrchfan o lefel leol hyd at lefel genedlaethol ac hyd yn oed rhyngwladol.
Pennwyd amcanion dylunio o gychwyn y Prosiect gan lywio egwyddorion dylunio dilynol. Mae’r amcanion dylunio sy’n rhan o’r Prosiect yn cynnwys y canlynol:

▪ Creu etifeddiaeth werthfawr i Abertawe a’i thrigolion
▪ Cynhyrchu ynni cynaliadwy gan ddefnyddio prosesau naturiol
▪ Adfywio chwaraeon, twristiaeth a hamdden yn ardal y Bae
▪ Darparu amgylchedd addysgol deinamig
▪ Gweithredu fel catalydd ar gyfer datblygiad economaidd parhaus
▪ Darparu cynf-logoedd newydd a sefydlu tirlun arfordirol
▪ Datblygu’r cynnig gan ystyried ei gynefinoedd naturiol a’r amgylchedd.

Amlinellir yr egwyddorion dylunio isod a dyma’r mesurau a ddefnyddir i fodloni’r amcanion dylunio. Bydd y Morlyn yn:

▪ Adeiladu ar dreftadaeth ddiwylliannol gyfoethog Abertawe
▪ Ymateb i le a chreu amgylcheddau newydd
▪ Meithrin cysylltiadau cryf
▪ Cysylltiadau llwybr ar gyfer digwyddiadau rhyngwladol
▪ Ysgraff ar ochr allanol y morglawdd gorllewinol (yn cydffinio â’r lanfa orllewinol) i hwyluso cynigion yn y dyfodol i gysylltu â ‘gwennol dŵr’ rhwng y Prosiect a glan orllewinol afon Tawe a thu hwnt (yn amodol ar hyfrydodd).

▪ Mae morglawd y Morlyn yn cynnwys wal wedi’i hadeiladu gan ddefnyddio tiwbiau geodestil wedi’u llenwi â gwaddol a gwaddol a’r rhwng y waddod, wedi’i chysylltu â’r tir ar lanfeydd sy’n dyfaino â Phorthladd Abertawe a Champws y Bae.
▪ Tyrbinau a llifddorau sy’n cynnwys rhwng 13 ac 16 o dyrbinau deugyfeiriad 7m mewn diametr, a rhwng 6 a 10 o lifddorau o fewn strwythur 410m o hyd a 67.5m o led wedi’i adeiladu ar wey’r mór.

▪ Cysylltiadau llwybr cerflunyddol sy’n cynnwys cerflunydd ar gyfer y morglawd gorllewinol, ac’r dwyrain a dywch o hyd ochr ddeheuol y Bae ar yr ychydig un o hyd ar y morglawd gorllewinol i gyflymu o hyd i mewn i’r tir ar gyfer digwyddiadau rhyngwladol.

▪ Ysgraff ar ochr allanol y morglawdd gorllewinol (yn cydffinio â’r lanfa orllewinol) i hwyluso cynigion yn y dyfodol i gysylltu â ‘gwennol dŵr’ rhwng y Prosiect a glan orllewinol afon Tawe a thu hwnt (yn amodol ar hyfrydodd).

▪ Mae morglawd y Morlyn yn cynnwys wal wedi’i hadeiladu gan ddefnyddio tiwbiau geodestil wedi’u llenwi â gwaddol a gwaddol a’r rhwng y waddod, wedi’i chysylltu â’r tir ar lanfeydd sy’n dyfaino â Phorthladd Abertawe a Champws y Bae.

▪ Mae morglawd y Morlyn yn cynnwys wal wedi’i hadeiladu gan ddefnyddio tiwbiau geodestil wedi’u llenwi â gwaddol a gwaddol a’r rhwng y waddod, wedi’i chysylltu â’r tir ar lanfeydd sy’n dyfaino â Phorthladd Abertawe a Champws y Bae.

▪ Mae morglawd y Morlyn yn cynnwys wal wedi’i hadeiladu gan ddefnyddio tiwbiau geodestil wedi’u llenwi â gwaddol a gwaddol a’r rhwng y waddod, wedi’i chysylltu â’r tir ar lanfeydd sy’n dyfaino â Phorthladd Abertawe a Champws y Bae.

▪ Mae morglawd y Morlyn yn cynnwys wal wedi’i hadeiladu gan ddefnyddio tiwbiau geodestil wedi’u llenwi â gwaddol a gwaddol a’r rhwng y waddod, wedi’i chysylltu â’r tir ar lanfeydd sy’n dyfaino â Phorthladd Abertawe a Champws y Bae.
DATBLYGU’R DYLUNIAD

Datblygu y prif gynllun ar gyfer y Prosiect fel ffframwaith hyblyg a allai ymateb i waith dadansoddi amgylcheddol, gwaith ymyngynhori, gwaith negodi tir a threfniadau dylunio ailadroddol parhaus. Nadwyd yr agweddu canlynol ar y ffframwaith:

- Cysylltiad
- Mynediad
- Hamdden
- Chwaraeon
- Defnyddiau cyfagos
- Nodwed
- Amgylchedd

Mae’r broses ailadroddol wedi effeithio ar y broses o ddatblygu’r dyluniad ar gyfer yr ailadroddol sy’n rhan o’r Prosiect:

SIÂP Y MORLYN

Mae siâp y Morlyn wedi esblygu wrth i’r dealltwriaeth o’r gwaith modelu ynni, dylunio tyrbinau, y model cost ac ystyriaethau amgylcheddol ddatblygu. Nadwyd yr opsiwn a ddewiswyd o blith tua 15 o ddatblygion, ac mae’n cydhwysog i’r defnyddio amgylcheddol a mordwyl â gofynion technegol tra’n ymateb i’r broses ymyngynhori. Mae’r dyluniad yn seiliedig ar yr egwyddorion canlynol:

- Allbwn ynni – wedi’i lywio’n bennaf gan gyfaint y dŵr a ddelir.
- Hyfywed – wedi’i lywio’n bennaf gan gymhareb hyd y morglawdd i arwynebedd gwely’r môr ac felly gyfaint y dŵr amgaeedig.
- Bathymetri – mae angen morglawdd uchwch ar ddiwr dwfn ac felly mae’n costio mwy.
- Dull adeiladu – Technoleg Geotube® oedd y dewis ddull ar gyfer y morglawdd o’r cychwyn ystyriwyd sawl opsiwn ar gyfer adeilad y tyrbinau. Cynigir dull adeiladu in situ.
- Alinio a lleoli’r tyrbinau – ystyriwyd yr opsiynau alinio yng ngoleuni ansawdd dŵr ac effeithiannau eraill ar Draeth Aberfan o Afon Nedd.
- Sianelau wedi’u carthu – roedd yr angen i gymhali sut mae sianelau mordwyo Afon Tawe ac Afon Nedd yn hanfodol.
- Twyni Crymlin a phhoresau arfordirol – nododd gwaith modelu arfordirol y dylai’r Morlyn gael ei leoli y tu allan i’r SoDdGA gan leihau’r effeithiannau posibl ar brosesau arfordirol.

MYNEDIAD A SYMUDIAD

Ystyriwyd nifer o opsiynau posibl ar gyfer mynediad i geir a bysiau/coetsys, yn ogystal â thraffig adeiladu, drwy Ffordd Fforbl disfa anfodion y mor yn y Prosiect:

- Capaciti’r gyfylliad bresennol
- Ardaloedd o dir i’w croesi
- Priodolrwydd ar gyfer gofynion adeiladu a gofynion gweithredol
- Y llwybyr i’r Prosiect (ac yn enwedig y lanfa orllewinol) a’r angen i sicrhau cyn hael ei phosibl ar weithrediau’r Porthladd
- Budiannau ychwanegol posibl yn deillo o hynny

Mae’r mynediad arfaethedig terfynol i’r de o gymryd y prif gylch cysyltiadol presennol Ffordd Fabian ar gyfer goleuadau trwy eisoes a ddefnyddio y fforddol ym morda fi’i ymporthiwyd ac uchel o gasglu i hael ei phosibl ar weithredu’r Prosiect. Mae’n bosibl y caiff ei defnyddio ar gyfer agwedd a warchodd ar gyfer rhan o’r Prosiect.

Ystyriwyd y llwybyr i gerddwyr a beicwyr ar yr un pryd. Mae’r prif gysylltiadau yn sicrhau cyseiw llwybyr i’r ymylwaith a Heol Langdon (sy’n ymestyn drwy ardal addfynnu SA1), ac i’r dwyrain i lwybr beiciau Ffordd Fabian (drwy’r mynediad presennol i’r Porthladd i ffinio â llawer o’r Bae).
Mae'r cysyniad o Barc Morol yn sefydlu prif gynllun hyblyg sy'n rhoi hunaniaeth i'r Morlyn yn seiliedig ar ardaloedd nodwedd diffiniedig. Mae'r ardaloedd nodwedd hyn yn ymateb i gyd-destun presennol a datblygol y safle, ac i'r cyfleoedd sy'n deillio o lan fawr o ardal y Morlyn. I'r dwyrain, mae'r prif gynllun yn ymateb i leoliad tawel, naturiol SoDdGA Twyni Crymlin, Campws y Baesau a dyfroedd yr ardal glan wyn, o gyd i adar. I'r gorllewin, mae'r prif gynllun yn ymateb i leoliad tawel, naturiol SoDdGA Twyni Crymlin, Campws y Baesau a dyfroedd yr ardal glan wyn, o gyd i adar.

Mae'r prif gynllun yn darparu canolfan newydd i ymwelwyr ar gyfer gorsaf ynni llanw gyntaf y byd, tir newydd i'r cyhoedd, ac i'r adar ar gyfer hwylio a mynediad i chwaraeon dŵr wedi'i lleoli'n ddelfrydol fel cyrchfan ar gyfer hamdden, a mynediad i chwaraeon dŵr wedi'i lleoli'n ddelfrydol fel cyrchfan ar gyfer hamdden, a mynediad i chwaraeon dŵr, a gyw y Morlyn. Mae'r prif gynllun yn ymateb i leoliad tawel, naturiol SoDdGA Twyni Crymlin, Campws y Baesau a dyfroedd yr ardal glan wyn, o gyd i adar.

Mae'r prif gynllun yn darparu canolfan newydd i ymwelwyr ar gyfer gorsaf ynni llanw gyntaf y byd, tir newydd i'r cyhoedd, ac i'r adar ar gyfer hwylio a mynediad i chwaraeon dŵr, a gyw y Morlyn. Mae'r prif gynllun yn ymateb i leoliad tawel, naturiol SoDdGA Twyni Crymlin, Campws y Baesau a dyfroedd yr ardal glan wyn, o gyd i adar.

Mae'r prif gynllun yn darparu canolfan newydd i ymwelwyr ar gyfer gorsaf ynni llanw gyntaf y byd, tir newydd i'r cyhoedd, ac i'r adar ar gyfer hwylio a mynediad i chwaraeon dŵr, a gyw y Morlyn. Mae'r prif gynllun yn ymateb i leoliad tawel, naturiol SoDdGA Twyni Crymlin, Campws y Baesau a dyfroedd yr ardal glan wyn, o gyd i adar.

Mae'r prif gynllun yn darparu canolfan newydd i ymwelwyr ar gyfer gorsaf ynni llanw gyntaf y byd, tir newydd i'r cyhoedd, ac i'r adar ar gyfer hwylio a mynediad i chwaraeon dŵr, a gyw y Morlyn. Mae'r prif gynllun yn ymateb i leoliad tawel, naturiol SoDdGA Twyni Crymlin, Campws y Baesau a dyfroedd yr ardal glan wyn, o gyd i adar.

Mae'r prif gynllun yn darparu canolfan newydd i ymwelwyr ar gyfer gorsaf ynni llanw gyntaf y byd, tir newydd i'r cyhoedd, ac i'r adar ar gyfer hwylio a mynediad i chwaraeon dŵr, a gyw y Morlyn. Mae'r prif gynllun yn ymateb i leoliad tawel, naturiol SoDdGA Twyni Crymlin, Campws y Baesau a dyfroedd yr ardal glan wyn, o gyd i adar.

Mae'r prif gynllun yn darparu canolfan newydd i ymwelwyr ar gyfer gorsaf ynni llanw gyntaf y byd, tir newydd i'r cyhoedd, ac i'r adar ar gyfer hwylio a mynediad i chwaraeon dŵr, a gyw y Morlyn. Mae'r prif gynllun yn ymateb i leoliad tawel, naturiol SoDdGA Twyni Crymlin, Campws y Baesau a dyfroedd yr ardal glan wyn, o gyd i adar.

Mae'r prif gynllun yn darparu canolfan newydd i ymwelwyr ar gyfer gorsaf ynni llanw gyntaf y byd, tir newydd i'r cyhoedd, ac i'r adar ar gyfer hwylio a mynediad i chwaraeon dŵr, a gyw y Morlyn. Mae'r prif gynllun yn ymateb i leoliad tawel, naturiol SoDdGA Twyni Crymlin, Campws y Baesau a dyfroedd yr ardal glan wyn, o gyd i adar.
Bu ystyriaethau ecolegol yn rhan hollbwysig o'r gwaith o ddylunio amgylchedd y Morlyn ar y tir ac ar y môr. Mae'r strategaeth ecoleg yn cynnwys y mesurau canlynol:

- Creu cynefinnoedd Glaswelltir arfordirol er mwyn lliniaru unrhyw laswelltir sy’n bodoli eisoes a gaiff ei goilli o ganlyniad i’r Prosiect;
- Cynefinnoedd twyni tywod newydd er mwyn integreiddio glanfa ddwyreiniol y Morlyn â Thwyni Crymlin, gyda gorchudd o greigiau ar oleddf isel i annog creigbyllau i ddatblygu adeg llarw isel;
- Creu morfa heili fel cynefin ychwanegol gyda llywybr cerdded i ddyfoedd y Bae;
- Darparu ardaloedd o ddŵr/llôn newydd i ddefnyddio glanfa dŵr y Morlyn ymìgyrchrwydd gan y creiglychdd y ddwfn yr ymddiriedigaeth y prosiect i’r dŵr hwn a hynny a glân gan gyfryngau ecolegol.

STRATEGAECH CHWARAEON, HAMDDEN A MYNEDIAD I’R DŴR

Darparwyd ar gyfer nifer o weithgareddauchwaraeon ym y Morlyn. Ymhlith y rhain mae:

- Chwaraeon dŵr/hwylio
- Triathlon
- Rheged/berarded/seiclo

Wrth ddadbadu’r prif gwreiddiol o ymeiriad agosrwydd y Prosiect i’r dŵr, gan ei defnyddio fel adnodd. Mae mynediad i’r dŵr yn cynnwys mynediad i’r dŵr/tywod rhinglanaw o’r twyni tywod ac ardal yr traeth, mynediad llwybrau ym mbr dros yr ardal morfa heili arfaethedig a mynediad llithirfrordd meddwl yn ardal y Lanfa Orllewinol.

STRATEGAECH GOLEUADAU

Mae’r strategaeth golecuดาu yn sicrhau amgylchedd cydyllyn wedi’r oleuo ar draws y Morlyn cyfan ar ôl iddi dywyllu, gan ychwanegu cymeriaid, ei gwneud yn haws i bobl dddod o hyd i’w ffordd, gwella diogelwch, lleihau’r defnydd o ynni a chefnogi cynefinnoedd ac econoleg yr ardal. Datblygwyd y strategaeth yn benodol i sicrhau bod golecuดาu artiffisiaid yn cael cyn lleied o effaith â phosibl ar yr amgylchedd.

Caiff golecu�다u pensaerniolo a thirlun eu cyfuno à golecu�다u arwynder er mwyn creu’r effaith gyfrifol o ran golecu�다u ar gyfer y Morlyn a phob un o’r Parciau.

STRATEGAECH CYFLEUSTODAU

Bydd y cyfleustodau ar gyfer y Morlyn yn cynnwys mewnforio trydan, dŵr yfed, draenio dŵr budr a thelegyfathrebu yn rheideg o fewn coridorau gwasanaethau cyfyn. Caiff yr holl geblau, dwythellau a phibellau mewnforio newydd a fydd y cefnogwr y Morlyn ac mae TLSB yn gweithio gyda Cape Farewell fel eu partner diwylliannol i roî ymgyrchau o’r strategaeth ar waith, gan ymdrin â photensial y Morlyn i newid bywydau cymunedau lleol, gydag amrywaeth helaeth o fuddiantau economaidd a chymunedol hirdymor.

Mae’r amrywaeth o’r brosiect eu gaiff ei hystyried yn cynnwys y rheini o dan arweiniad artistiaid, y rheini a gaiff eu llywio gan y gymuned, a’r rheini a fydd yn sicrhau bod cefn a’r broses greadigol yn rhan o’r gwaith o ddylunio’r Morlyn. Mae nifer o gyleoedd ar gyfer ymhydrau aesthetig a allai wella profiad ymylwr yr ystod eu cyfnod yn ardal yr Morlyn.

Caiff strategaeth y cefnoguدافع ei rhoi ar waith drwy dair rheglan: y Rheglan Gweithdaid Cymunedol; Rheglan Tir y Cyhoedd; a’r Rheglan Darnau Mawr.
CYNALIADWYEDD

Ategir cynaliadwyedd y Prosiect gan ei gyfraniad at y broses o ddabyrinthu technolog carbon isel o dan gynteddeb cyffrynom Protocol Kyoto a adlewyrchir ym y Gyrforwydded Ynni Adnewyddadwy. Yn ogystal, bydd y Prosiect o fudd i’r economi, yr amgylchedd a’r gymeriad leol.

Mae Datganiad Cynllunio Cenedlaethol EN-1 yn ei gwneud yn ofynnol i ymgeiswyr nodi sut y bydd ddatblygu seilwaith. Mae'r Prosiect yn ystyried y materion hyn.

Mae’r Prosiect yn ailddefnyddio tir llwyd a darparu gwell cysylltiadau i feiciau. Theithio'r ddinas ar Ffordd Fabian a glanfa orllewinol y Morlyn, trafnidiaeth gyhoedd hyfryd rhwng cyfleuster parcio a cynaliadwy o drafnidiaeth, gan gynnwys ystyriwyd cyfleoedd ar gyfer hyrwyddo mathau oedd rhagweithio â chwaraeon yn ogystal ag iechyd a lles.

Yn ogystal, bydd y Prosiect o ddefnyddio dulliau rhag-gynhyrchu dull o deunyddiau - tir i'r cyhoedd a pheirianneg - Bydd presenoldeb y Morlyn ei hun yn amddiffyn rhag llifogydd a fydd yn amddiffyn y morlin rhag bydden ar ír morglawdd arfaethedig yn ffurfio strwythur newydd hinsawdd mewn perthynas â chynefinoedd, yn defnyddio deunyddiau deniadol sy’n ymateb i gyd-destun, yn ceisio lleihau'r seiliedig ar y cysyniad o ddarparu amgylchedd hamdden ac adeilad wedi'i selio.

Dylanwad yr Adnewyddadwy - Mewn perthynas â'r morglawdd, bydd deunydd a ddaw o'r tu ddeorfa wystrys a ddyluniwyd ar y cyd â SEACAMS, er mwyn sicrhau yr ândododd a ddeorfa wystrys amgylchedd a dyma'r prydau sydd â chwaraewr a chanweddiadau.

Dylanwad yr Adnewyddadwy - Mewn perthynas â'r morglawdd, bydd deunydd a ddaw o'r tu ddeorfa wystrys a ddyluniwyd ar y cyd â SEACAMS, er mwyn sicrhau yr ândododd a ddeorfa wystrys amgylchedd a dyma'r prydau sydd â chwaraewr a chanweddiadau.

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Dylanwad yr Adnewyddadwy - Mewn perthynas â'r morglawdd, bydd deunydd a ddaw o'r tu ddeorfa wystrys a ddyluniwyd ar y cyd â SEACAMS, er mwyn sicrhau yr ândododd a ddeorfa wystrys amgylchedd a dyma'r prydau sydd â chwaraewr a chanweddiadau.

Dylanwad yr Adnewyddadwy - Mewn perthynas â'r morglawdd, bydd deunydd a ddaw o'r tu ddeorfa wystrys a ddyluniwyd ar y cyd â SEACAMS, er mwyn sicrhau yr ândododd a ddeorfa wystrys amgylchedd a dyma'r prydau sydd â chwaraewr a chanweddiadau.

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Dylanwad yr Adnewyddadwy - Mewn perthynas â'r morglawdd, bydd deunydd a ddaw o'r tu ddeorfa wystrys a ddyluniwyd ar y cyd â SEACAMS, er mwyn sicrhau yr ândododd a ddeorfa wystrys amgylchedd a dyma'r prydau sydd â chwaraewr a chanweddiadau.
1.0 INTRODUCTION

1.1. BACKGROUND

Tidal Lagoon Power Ltd (TLP) was established in 2012 and comprises a team with extensive experience in the delivery of renewable energy projects in the UK. Tidal Lagoon Power has assembled a consortium of leading design, construction and delivery partners to develop the world’s first, purpose-built, tidal energy lagoon, under the special purpose company Tidal Lagoon (Swansea Bay) plc (TLSB).

TLSB has developed a way to generate cost effective, predictable and fully renewable power from the tidal range in Swansea Bay, enhancing energy security for Wales (and the UK) allowing important carbon reductions. The Lagoon would harness the 8.5m tidal range of Swansea Bay (average Spring tides) to generate renewable electricity for 14 hours per day, for 120 years, with a net annual output of 400GWh. The works to secure this renewable energy source comprise a nationally significant infrastructure project, which together are referred to as the ‘Project’ in this Design and Access Statement.

1.2. WHAT IS THE TIDAL LAGOON?

The Lagoon is formed by a man-made seawall 9.5km long impounding an 11.5km² area of water. The total height of the seawall is between 5 and 20m above the seabed, depending on the seabed level itself, with a height above mean High Water of 3.5m. The level of the seawall is approximately 7.3m AOD which is similar to the existing eastern breakwater of Swansea Port.

Power will be generated by creating a ‘head’ of water – a difference in water level between the inside and outside the Lagoon – and channelling the resulting flow through low-head hydro turbines, like a hydro-electric power station. Although the Lagoon is the first of its riverine kind, all component parts of the Project have been proven elsewhere in the world, keeping technology risk low. The Project includes:

- A UK-standard seawall
- A Concrete turbine housing similar to those found in many maritime structures
- Hydro turbines whose reliability has been established for 50 years.

TLSB proposes that the Lagoon seawall will be publicly accessible and will accommodate visitor centre facilities (which will be free to access), and which they hope will become a key education amenity and tourist attraction. In addition, sailing facilities are proposed alongside necessary operation and maintenance (O&M) facilities, providing a venue for local fitness and national, regional and local sporting events.
1.3. PLANNING CONTEXT

In order to obtain development consent to construct and operate the Lagoon, TLSB is submitting an application for a development consent order (DCO) pursuant to the Planning Act 2008 (PA 2008), to the Secretary of State for Energy and Climate Change.

The DCO process allows a number of separate consent procedures to be considered in a single decision and facilitates delivery of what can be complex projects in a coordinated manner. There are two main statutory applications required to deliver all parts of the proposal:

1) Development consent order

The DCO application will be submitted to the Secretary of State for Energy and Climate Change. The DCO application will seek approval (including compulsory purchase of land) for the construction and operation of:
- The Lagoon seawall structure, including the turbines and sluice gates
- The necessary grid connection, extending (underground) from the turbines on the seawall to Baglan Bay substation
- Other elements of the Project including:
  - Offshore Building, including visitor space, near the turbines on the seawall
  - Western Landfall Building and public realm area, including boating facilities, Operation and Maintenance, pontoons, mooring, emergency facilities and a slipway
  - Eastern landfall and public realm works
- Access facilities for the Project including highway improvement works
- New, publicly accessible areas and water front areas
- Other operation, maintenance and mitigation facilities.

2) Marine Licence

- A Marine Licence is required for construction of works and dredging in Welsh waters under the Marine and Coastal Access Act 2009. The Project will therefore require a licence application which will be processed in parallel with the DCO. The licence is issued by the Welsh Government.

It should be noted that Section 33 of the Planning Act 2008 dispenses with the need for separate planning permission or deemed planning permission under the Town and Country Planning Act 1990 (TCPA 1990) and consents under Section 36 of the Electricity Act 1989. Nevertheless, should any other permissions be required under the TCPA 1990, they will be sought after the grant of the DCO. Any elements subject to such processes will not be integral to the construction or operation of the Project as authorised by the DCO.

1.4. STATUS AND PURPOSE OF THE DESIGN AND ACCESS STATEMENT

This Design and Access Statement (DAS) accompanies TLSB’s application for a DCO, as outlined above. There is no legal requirement for a DAS to accompany an application for a DCO. However, Regulation 5(2)(q) of the Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 requires that the application must be accompanied by the submission of ‘any other documents necessary to support the application’. This DAS is such a document.

The purpose of this DAS is to explain the design principles and design rationale for the Project. This DAS demonstrates how the Project has responded to, and how it has been influenced by its context. It explains the approaches taken in relation to access and how relevant planning policy has been taken into account, and how the outcome of consultation has informed the design process. It explains the principles and concepts that have been applied or influenced the form and appearance of the Project and communicates how the requirements for good design and access provision have been considered.

Specifically, the DAS illustrates how the Project design responds to the physical, policy and social context in relation to the following:

- Use: the function of the Lagoon as a source of clean renewable energy, a vital contribution to the public realm of Swansea Bay and the waterfront, and generator of employment opportunities.
- Extent: the tidal range and energy generation capacity required to meet economically viable operational requirements, and the wider development aspirations including onshore regeneration, landscape and ecological enhancement, enhanced flood defences, rights of way and connections to the city centre and Swansea University Bay Campus (SUBC), transport access and incoming and outgoing power.
- Layout: the layout of the Project including the configuration of the Lagoon seawall, positioning of visitor, O&M and sporting facilities, access routes and the relationship between these elements and the surrounding land.
- Appearance: how the design of the buildings and public realm spaces define the visual character and qualities of the Lagoon and wider setting.
The structure of this DAS is outlined below.

1.5. REPORT STRUCTURE

This DAS provides an overview of the site of the Project and its context and outlines the Design Objectives adopted for the Project. It explains the iterative design process undertaken from the inception of the Project and the key stages of design development. It goes on to provide a Project definition which describes the physical form of the Project and a non-technical summary of how the Lagoon will operate. The DAS then proceeds to describe each aspect of design development under a number of identified topics. The main Sections of the DAS are:

- Section 1: Introduction
- Section 2: Site and context appraisal
- Section 3: Design objectives and principals
- Section 4: The Project
- Section 5: Design development
- Section 6: Sustainability

The DAS is supported by and interrelates with the following documents that accompany the Application for a DCO:

- Environmental Statement
- Planning Statement
- Consultation Report

1.6. DESIGN TEAM

The design team for the Lagoon includes:

<table>
<thead>
<tr>
<th>Design Team</th>
<th>Responsibilities</th>
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<tbody>
<tr>
<td>Tidal Lagoon Power Ltd</td>
<td>Design and operational engineers</td>
</tr>
<tr>
<td>LDA Design</td>
<td>Masterplanning Architects</td>
</tr>
<tr>
<td>Atkins</td>
<td>Design engineer</td>
</tr>
<tr>
<td>URS</td>
<td>Onshore transport</td>
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<tr>
<td></td>
<td>Hydrology flooding</td>
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<td>Socio economic</td>
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<td>Air quality</td>
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<td>Land quality</td>
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<td></td>
<td>Terrestrial archaeology</td>
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<td>ABPmer</td>
<td>Coastal processes</td>
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<td></td>
<td>Benthic ecology</td>
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<td></td>
<td>Marine mammals</td>
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<tr>
<td>MP Ecology</td>
<td>Terrestrial ecology</td>
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<tr>
<td>Intertek</td>
<td>Water quality</td>
</tr>
<tr>
<td>Turnpenny Horsfield</td>
<td>Fish</td>
</tr>
<tr>
<td>Associates</td>
<td></td>
</tr>
<tr>
<td>Soltys Brewster</td>
<td>Fish</td>
</tr>
<tr>
<td></td>
<td>Birds</td>
</tr>
<tr>
<td></td>
<td>Seascapes, landscape and visual, and advise in relation to lighting impacts</td>
</tr>
<tr>
<td>Cotswold Archaeology</td>
<td>Marine archaeology</td>
</tr>
<tr>
<td>Anatec</td>
<td>Navigation</td>
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</tbody>
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