# CITY & COUNTY OF SWANSEA

# LOCAL IMPACT REPORT

**Tidal Lagoon Swansea Bay Project**

PINS REFERENCE: EN010049
CCS REFERENCE: 2013/1017

Economic Regeneration & Planning
Civic Centre
Oystermouth Road
Swansea
SA1 3SN

**City & County of Swansea**

**Local Impact Report**

**Proposed Swansea Bay Tidal Lagoon**

## 1. Terms of Reference

*Introduction*

1.1. This report comprises the Local Impact Report (LIR) of the City & County of Swansea and has been prepared in accordance with s60(3) of the Planning Act 2008 (as amended) and the Planning Inspectorate's Advice Note One, Local Impact Reports(April 2012).

## 2.0 Purpose and Structure of the LIR

2.1 The purpose of the LIR is to provide details of the likely impact of the proposed development on the administrative area of the City & County of Swansea (CCS) and Swansea Bay.

2.2 The LIR in the first instance considers the principle of the development before working through the topic issues identified in the Environmental Statement and an additional topic area relating to residential amenity by:

1. Identifying relevant development plan policy and supplementary guidance;
2. Identifying relevant local issues where appropriate;
3. Providing a commentary on the adequacy of the application.

2.3 The LIR also includes commentary on the adequacy of the draft Development Consent Order (DCO), including the draft Heads of Terms for a Section 106 Obligation and the requirements/conditions. Where it has been logical to do so, these comments have been made under the relevant topic area. In other cases it has been specifically addressed under the DCO section of the report.

2.4 The LIR addresses some of the Examining Authority's (ExA's) first written questions, but where it does so that is made clear in the local authorities' separate response to those questions.

## 3.0 The Site and its Surroundings

3.1 The red line boundary of the project, encompassing all the elements proposed and the maximum extent of land over which powers are sought, is shown below.


3.2 The main focus of the application site essentially comprises the southern edge of Swansea Docks and formerly associated industrial land from the eastern side of the River Tawe to the eastern edge of the new Swansea University Bay Campus and the foreshore and seabed of part of Swansea Bay between the dredged channels of the Rivers Tawe and Neath.

3.3 The site is primarily focused within the administrative area of the City & County of Swansea and Welsh Territorial Waters other than the eastern landfall of the lagoon and grid connections, which fall within Neath Port Talbot County Borough Council (NPT).

3.4 The applicant does not currently own any part of the application site, but is negotiating for its acquisition and is also applying for powers of compulsory acquisition.

## 4.0 Description of Development

4.1 A summary of the description of development is included within the covering Committee Report for this LIR, along with an appended detailed description. The descriptions are based entirely on the information provide within Chapter 4 of Volume 6.2 of the Environmental Statement. The description contained within Chapter 4 is therefore accepted for this LIR and the SoCG, except where any additional commentary or promotional aspect is provided.

## 5.0 Relevant Planning History

5.1 Outline planning permission was granted to the former Welsh Development Agency (now Welsh Government) on the 19th August 2003 for a mixed use development of SA1 Swansea Waterfront (SA1) comprising employment (Use Class B1, B2) residential (C3), retail (A1), commercial leisure (D2), food and drink (A3), hotel (C1), and educational (D1/C3) uses, car parking, associated infrastructure (including new highway access and pedestrian overbridge), hard and soft landscaping. (Planning application 2002/1000 refers). The site area extends to just over 40 hectares of land surrounding 10 hectares of water body (the Prince of Wales Dock) along with significant frontage to the basin and tidal area of the River Tawe, located to the north and west of the application site.

5.2 A variation of conditions relating to this permission was approved on the 11th October 2010 to allow a review of the phasing, masterplan, land use allocation and development capacities. (Planning permission 2008/0996 refers.) A copy of the current approved Masterplan is provided as **Appendix A.**

5.3 In pursuance to the mixed use outline planning permission, a number of detailed planning permissions have been granted for significant infrastructure development in and around SA1. Those planning permissions implemented include:

- The provision of two pedestrian/cycle bridges comprising the iconic Swansea Sail Bridge and the Lock Bridge (now known as Trafalgar Bridge), linking SA1 to the City Centre;
- A riverside walkway/cycleway linking to the aforementioned bridges and the walkway/cycle path along the northern part of the site (Fabian Way). The site therefore links the City Centre and Waterfront and the communities to the north via National Cycle Network Route 43. National Cycle Network Route 4 runs through SA1 from the east to the City Centre.
- A continuous dockside walkway/cycleway;
- Areas of public open space;
- Roads and footways;

5.4 Planning permission has also been granted for:

- The construction of channel and channel feature with holding basin and sea lock linking the Prince of Wales Dock and the River Tawe/Swansea Bay. The design incorporates a significant amount of public access and footpaths to create a critical mass of activity in this area. This planning permission has technically been implemented.

- The change of use of water area of Prince of Wales Dock from operational dock to commercial marina (550 berths), craft based water sports, floating commercial outlets (food and drink and retail), boat hire and repair.

5.5 Subsequent to the outline planning permission for SA1, a number of full and reserved matters applications have been approved and implemented. It is evident now that SA1 represents a successful and sustainable waterfront renewal development where people want to live, work and visit. To date, SA1 has achieved planning permission for in excess of 1,000 dwellings and significant commercial development including, circa 30,000 square metres of business floorspace occupied, Class A3 food and drink units and two operational hotels.

5.6 SA1 has a hugely beneficial impact on the eastern gateway to the City Centre, endorsing the City's credentials as a Waterfront City. It is equally visually beneficial when seen in its context from the west, as it completes the waterfront aspirations of the Maritime Quarter and the Tawe Basin. What sets SA1 apart from many other waterfront renewal projects, which are peripherally located, is that SA1 is centrally located and forms part of the comprehensive waterfront/city centre regeneration initiative. Its integration with the City Centre and the Maritime Quarter has underpinned its success and vice versa.

5.7 The Maritime Quarter located to the north west of the lagoon, is an award winning waterfront regeneration development. Other than development at sites known as Meridian Quay and Swansea Point, the majority of the development here took place in during the 1980's and early 1990's and is focused around Swansea Marina located within the South Dock, which provides approximately 550 berths.. The Marina connects into the Tawe River Basin, which was created through the construction of the River Barrage in 1992. This provides an attractive waterfront environment in its own right and accommodates in excess of 200 berths as part of the Swansea Yacht Club. The Tawe River Basin also provides a strong waterfront link between the renewal areas of the Maritime Quarter and SA1 and a strong focus for the development of these areas. SA1 in particular enjoys approximately 800m river frontage at its western extent. The Maritime Quarter benefits from approximately 700m of river frontage.

5.8 The Meridian Quay development within the Maritime Quarter has recently been completed and includes a twenty nine storey tower with retail/leisure use at ground floor, restaurant and bars on the top two floors (Class A3) and 124 residential uses throughout the interim levels. Other smaller blocks within this mixed use development combined provides 291 residential units. Many of the apartments within the 29 storey tower, as well as the restaurants and bars on the top two floors enjoy uninterrupted views of Swansea and its waterfront, including the application site.

5.9 The former 'Spontex' site, now renamed 'Swansea Point', is a transition between the existing Maritime Quarter, Swansea Bay, the Tawe and SA1. Outline planning permission was granted in April 2004 for a mixed use development of this site for housing, employment, commercial (leisure, restaurant/public house, hotel) and maritime uses, public open spaces (including a park, play area and promenade) and car parking. (Planning application 2003/0808 refers). The residential element of this scheme is now complete with approximately 600 units, including a 14 storey residential block (known as Aurora) located in the south east corner of the site, at the junction of the Bay and River Tawe. This also has clear and elevated views of the Bay.

5.10 The Section 106 Obligation forming part of the outline planning permission for Swansea Point has delivered significant waterfront infrastructure to this area. It has completed the promenade along the Bay, which previously terminated at the end of the 1980's and 1990's Maritime Quarter development, adding approximately 500m to the 9.5km (approximate) promenade running from this area to Mumbles in the west along with a north – south riverside extension.

5.11 A Certificate of Lawfulness of Proposed Use or Development was granted at appeal on the 6th April 2010 for Class B2 Use (general industrial) purposes (to repair, recycle and break up marine units, including ships) within the dry docks and adjoining land, located immediately to the north of the application site, within the Kings Dock. (Application 2009/1684 refers.) A subsequent Certificate for the repair, recycling and breaking up of marine units, including ships (Class B2) was granted for Phoenix Wharf on the 14th December 2011 under reference 2011/0503. (Phoenix Wharf is located at the western extent of the Queens Dock.)

5.12 An appeal against the refusal of planning permission for the erection of a biomass fired combined heat and power plant with ancillary offices, workshops, heat rejection building, car parking, landscaping and infrastructure requirements was dismissed on the 6th April 2009. (Planning application 2007/2694 refers.) The application site comprised land between Kings Dock and Queens known as Graigola Wharf. This land is also included within the current application site.

5.13 The existing 43m high wind turbine at the western end of Queens Dock was granted planning permission on the 8th April 2004, whilst an application for a second 77m wind turbine approximately 300m to the east on the proposed access road of the lagoon is currently with the Local Planning Authority for consideration. (Applications 2002/1838 and 2014/0260 refer.)

5.14 The new Swansea Bay Campus at the eastern end of the proposed lagoon is described within NPT's LIR.

5.15 Planning permission for a 104m wind turbine on land at Welsh Water Treatment Works on Fabian Way was refused on the 20th July 2012 and a second application for a 79m wind turbine in the same location was refused on the 25th October 2013. (Planning applications 2011/1658 and 2013/1033 refer.) The second application is currently the subject of an appeal to Welsh Ministers.

## 6.0 Statutory Development Plan

6.1 The City and County of Swansea Local Development Plan (LDP) Preferred Strategy will be published in August 2014. A Pre-Deposit LDP will be published in late 2014 as an additional stage to the LDP process. It is anticipated that the Deposit Plan will be published in mid 2015 and the LDP will replace the Unitary Development Plan in late 2016.

6.2 The current adopted development plan for the City & County of Swansea is the therefore its Unitary Development Plan (UDP), which was adopted in November 2009.

## ASSESSMENT OF IMPACTS AND ADEQUACY OF RESPONSE

### 7.0 Principle of Development

7.1 The Plan's Spatial Strategy, set out in Part 1 of the Plan, is firmly based on sustainable planning principles. Its primary focus is the reinvigoration of the City Centre and waterfront.

7.2 The core element of the Spatial Strategy is therefore to develop a modern, attractive and vibrant waterfront area integrated with a revitalised City Centre.

7.3 The spatial strategy is summarised in the Spatial Strategy Map provided and amplified with site specific detail in the Proposals Map. It effectively determines the sustainable settlement strategy for the UDP, which includes capitalising on the redevelopment opportunities afforded by brownfield land and the Waterfront area. The application falls within the area identified as "Urban Waterfront", of existing and new housing development, Employment Centre, Sport/Leisure and Regeneration initiatives.

7.4 The spatial strategy reflects the WAG's vision for the regeneration of Swansea Waterfront, which emanates from the Wales Spatial Plan. It is stated that the extensive area of brownfield land on the eastern approach to the city, south of Fabian Way and east of SA1, offers considerable regeneration opportunities. It is recognised that SA1 lies adjacent to the commercial docks, which make an important contribution to the economic infrastructure of the County. It is recognised that land within, and adjacent to, the existing Queens Dock may become surplus to operational requirements during the lifetime of the Plan. Redevelopment of these areas has the potential to create a major mixed use destination, in order to:

- Enhance linkages between a number of sites and locations along the Fabian Way corridor,
- Build upon the success of SA1 Swansea Waterfront,
- Provide opportunities for potential new tourism, leisure, and commercial developments in a range of settings, and
- Contribute to the creation of a strong sustainable transport corridor.

7.5 In line with the recommendations of the WSP, any future proposals for the redevelopment of such a significant brownfield waterfront and coastal area will be considered with the benefit of the waterfront regeneration masterplan for the wider Swansea Bay area. This will be prepared on a joint basis between adjoining Authorities and relevant partners to provide an overarching development framework for the area.

7.6 The overall vision for the Council's UDP is to adopt a sustainable approach to the development of a prosperous region focused on a cosmopolitan and multi-cultural City and County, which capitalises on its waterfront location. The strategy is based on the conservation of the best the County has, whilst making effective provision for the promotion of employment, good housing, shopping, leisure, tourism, community and education facilities in a safe, accessible, innovatively designed, healthy, ecologically rich and visually attractive environment.

7.7 This vision is seen to demonstrate the Council's commitment to the promotion of sustainable development which is to be pursued through goals based on sustainable principles of environmental protection, economic growth, social progress, safeguarding of resources and improved accessibility, each of which forms the basis for the topic policies in the second part of the Plan.

7.8 Within this context, Goal 1 seeks to sustain a healthy, visually attractive, ecologically and historically rich environment. Objectives of Goal 1 include:

- To upgrade the visual environment and image of the area;
- To promote locally distinct, innovative design, sensitive to the location and setting;
- To avoid significant adverse environmental impacts from new development;
- To promote resource efficient buildings and layouts in all new development.

7.9 Goal 2 is to help promote the sustainable growth of the local and regional economy. The objectives of Goal 2 include:

- To develop Swansea as a major Waterfront City capitalising on the opportunities provided by SA1;
- To improve and revitalise existing industrial and commercial areas;
- To reinforce and improve the City Centre as a vibrant regional focus for business and administration, shopping, culture and leisure;
- To improve, expand and diversify tourism infrastructure.

7.10 Goal 4 is to make more efficient and sustainable use of the area's resources. The objectives for Goal 4 include the support of renewable energy projects which would make a positive contribution.

7.11 Arising from the Vision and Goals, the UDP sets out 15 Strategic Policies. The following Strategic Policies are relevant to this application:

7.12 Policy SP1 and SP3 are concerned with creating a quality environment with Policy SP1 stating that sustainable development will be pursued as an integral principle of the planning and development process and that development proposals designed to a high quality and standard, which enhance townscape, landscape, sense of place, and strengthen Swansea's Waterfront identity, will be favoured. Policy SP3 states that the natural, built and cultural heritage of the County will be protected and enhanced to protect from materially harmful development.

7.13 Policy SP4 provides support for proposals to develop or improve the variety and quality of tourism facilities where they contribute to the growth of the local economy, and where they do not have a significant impact on natural heritage and the historic environment or the amenity of local communities.

7.14 Policy SP8 seeks to improve the range of sports and leisure facilities and the tourism portfolio by establishing a network of urban destinations, enhancing sustainable countryside recreation opportunities and further developing a hierarchy of sports facilities.

7.15 Policy SP11 relates to the efficient use of resources and that the upgrading of infrastructure provision and the generation of energy from renewable resources to meet the needs of existing and new development will be favoured, provided the environmental impact is kept to a minimum.

7.16 Policy SP12 states that development that makes efficient use of resources and energy will be encouraged.

7.17 It is the Strategic Policies which provide the link to the topic specific policies contained within the second part of the UDP.

7.18 Part 2 UDP Policy R11 relates to renewable energy and is a key policy for CCS for an application of this nature. The preamble to this policy sets out the Council's support for Welsh Government's (WG) policy for strengthening renewable energy production, and recognises the long-term benefits to be derived from the development of renewable energy sources. It is recognised that renewable energy technologies can have a positive impact on local communities and the local economy in terms of monetary savings and in generating and underpinning economic development within the County. There are however concerns about the impacts that some renewable energy technologies can have on the landscape, local communities, natural heritage and historic environment, nearby land uses and activities. The Council therefore seeks to achieve a balance between supporting renewable energy proposals whilst avoiding significant damage to the environment and its key assets. Favourable consideration will be given to developments that produce or use renewable energy where such proposals conform with UDP policies and are in scale and character with their surroundings.

7.19 The policy itself therefore states that proposals for the provision of renewable energy resources, including ancillary infrastructure and buildings, will be permitted provided:

i. The social, economic or environmental benefits of the scheme in meeting local, and national energy targets outweigh any adverse impacts,
ii. The scale, form, design, appearance and cumulative impacts of proposals can be satisfactorily incorporated into the landscape, seascape or built environment and would not significantly adversely affect the visual amenity, local environment or recreational/tourist use of these areas,

iii. There would be no significant adverse effect on local amenity, highways, aircraft operations or telecommunications,
iv. There would be no significant adverse effect on natural heritage and the historic environment,
v. The development would preserve or enhance any conservation areas and not adversely affect listed buildings or their settings,
vi. The development is accompanied by adequate information to indicate the extent of possible environmental effects and how they can be satisfactorily contained and/or mitigated,
vii. The development includes measures to secure the satisfactory removal of structures/related infrastructure and an acceptable after use which brings about a net gain where practically feasible for biodiversity following cessation of operation of the installation.

7.20 Policy EC1(5) allocates land to meet the growth needs of the local economy and the proposed Landward Ecological Park adjoins this designation. The amplification to the policy recognises that the docks make an important contribution to the industrial infrastructure of the City. It is stated that the remaining operational docks and general industrial side of the port provides opportunities, primarily around the Kings Dock and Queens Dock, for B1, B2 and B8 uses. The amplification to the policy advises that development that would compromise the potential redevelopment of adjoining areas will not be supported.

7.21 Development within the area is technically constrained by a notified hazard safeguarding zone around the BP sphere. This installation is in the process of being removed and the Council is negotiating with BP to rescind the hazardous substance licence, until which time the zone must remain on the Proposals Map. In the meantime, UDP Policy EV41 is relevant and states that development of land in the vicinity of existing hazardous installations will not be permitted if there would be significant risk to life or health.

7.22 It also recognises that there is potential for further releases of land within the Queens Dock for development other than port related activities and that the Wales Spatial Plan emphasises that the revitalisation of significant brownfield sites in this coastal location should be delivered with the benefit of a waterfront regeneration masterplan for the wider Swansea Bay area.

7.23 Policy EC1(2) also allocates land at SA1 as a prestigious mixed use development, which includes elements of housing, commercial, cultural and high grade employment in Use Classes B1 and B2. (Policy EC2 is referenced within the Policy amplification). In this respect, Policy EC2 allocates a major redevelopment area at SA1 Swansea Waterfront for mixed employment and residential development together with supporting leisure, tourism, community uses and ancillary services.

7.24 The amplification to this policy states that a robust and comprehensive policy context for considering proposals within SA1 is set out in the Port Tawe and Swansea Docks Supplementary Planning Guidance and that this guidance has been augmented by an outline planning consent for the site and a Design and Development Framework prepared by the former Welsh Development Agency (now Welsh Government). Together these make clear the broad characteristics and objectives that development within the site must adhere to, emphasising the importance of high quality design and principles of sustainable development.

7.25 The amplification to the policy highlights the importance of the redevelopment of SA1 being suitably integrated with adjoining areas, particularly the existing Maritime Quarter and retained commercial docks. Development within these areas must be compatible with existing land uses and not inhibit redevelopment proposals and strategies.

7.26 It is explained that a programme of infrastructure work is planned with a view to bringing the dock into use as a major marina facility. The SPG and Development Framework provide detail on the use of water areas within the Prince of Wales Dock basin, including the type of uses and activities that are envisaged.

7.27 Policy EC15 seeks to consolidate the urban tourism resource in locations including the, Maritime Quarter, Tawe Riverside Basin, and Mumbles and specific destinations around Swansea Bay. The amplification to the policy explains that the City Centre is intended to be a major attraction for visitors and business tourism. It is envisaged that this attraction will be strengthened when the planned integration with the foreshore to create a “Waterfront City” is more fully realised. The City Centre shopping, leisure, food and drink, and cultural facilities combined with SA1, the Maritime Quarter, the new National Waterfront Museum and the Tawe Basin near to the barrage are intended to create a mixed use destination area with a very strong character.

7.28 Policy EC16 states that new or improved recreational and tourism facilities at specific destinations around Swansea Bay are proposed which capitalise on the seafront aspect and contribute towards the regeneration of the Bay. Between these areas of appropriate development, the emphasis is on safeguarding and enhancing the environment of the Bay and other waterfront areas.

7.29 The entire interface of the Queens Dock to the proposed lagoon falls under the Policy AS12, which relates to the port and docks and states that development proposals that enhance the viability of the port, extend the use of the ferry terminal facilities and increase employment and business opportunities will be permitted provided that such proposals are compatible with adjacent development areas, communities, environmental enhancement schemes, and safeguard the potential canal route corridor.

7.30 The policy amplification recognises that the operational port and docks is an important commercial asset, providing jobs and business opportunities that contribute towards economic regeneration. Proposals for enhancing facilities and operations at the Ferryport and increasing commercial docks activity will be supported where development has suitable regard to issues of amenity, land use compatibility and environmental impact.

7.31 It is stated that the future development of the port and docks will be an important consideration in the proposed waterfront regeneration masterplan for the wider Swansea Bay region. The Council will contribute to the formation of this plan on a joint basis with other relevant authorities and partner organisations, in line with the recommendations of the Wales Spatial Plan.

7.32 Policy HC31 of the UDP supports opportunities for the development of water based recreation facilities and provides protection for the proposed link from the Tennant Canal to Swansea and for the linkage of the Swansea Canal with the navigable section of the River Tawe. Development that would prejudice the restoration of the canals or damage their fabric or infrastructure will not be permitted. The amplification to the policy states that the potential of the local canal system to provide an important tourist and recreation facility has been highlighted by a recent Feasibility Study which investigated the restoration and reopening of the Neath, Tennant and Swansea Canals to create a 32 mile integrated waterway system centred on Swansea Docks, which could serve a national tourism market. The preferred route of this network is safeguarded on the UDP Proposals Map and runs through land to the north of Kings Dock, which is proposed as part of the lagoon access arrangements.

7.33 As referred to above and in the amplification to Policy EC2, a comprehensive policy context for considering proposals within the area is set out in the Port Tawe and Swansea Docks Supplementary Planning Guidance (SPG). The SPG relates also to all of the area between the River Tawe and the eastern boundary of Swansea, south of Fabian Way. A copy of the SPG is provided as **Appendix B.**

7.34 The SPG derives from the premise that Port Tawe (now re-branded as SA1 Swansea Waterfront) is a key element in the next era of the City's development and to the establishment of Swansea's identity as a major "Waterfront City". Part of the purpose of the SPG is to:

- Define the concept of Port Tawe;
- Relate it to the wider docks area and the City Centre/Maritime Quarter;
- Provide an overall strategic framework to assist more detailed master planning;
- Promote sustainable development of the area for the economic, social and environmental benefit of Swansea.

7.35 Swansea City Centre Strategic Framework was adopted as Council Policy in January 2007 and endorsed as SPG to the adopted UDP in January 2009.

7.36 The Study Area was defined to encompass all of the main retail and commercial areas of the City Centre. The City Centre includes the "Maritime Quarter" extending down to the seafront, developed around the old South Dock. Whilst the Civic Centre and SA1 Swansea Waterfront are located outside but adjacent to the Study Area, the Strategic Framework clearly acknowledges their importance, and the need to improve connections between them and the City Centre.

7.37 The Framework is being implemented jointly by the Council and Welsh Assembly Government.

7.38 The Vision for the City Centre is of Swansea City Centre as:

"A vibrant, exciting, attractive, sustainable, cultured European Waterfront City Centre, attracting businesses and visitors, driving the economy and enhancing the quality of life of residents of Swansea and South West Wales."

7.39 A number of Strategic Objectives are set out if Swansea City Centre is to achieve its vision. On such objective is to make a Waterfront City. To do this Swansea needs to:

- Provide good access throughout attractive waterfront areas;
- Developing mixed-uses on the waterfront (including supporting water-related leisure activities);
- Create much better links from the waterfront to the rest of the City.

7.40 In defining the Vision for the City Centre, four priority themes have been identified, including connecting the City to the Waterfront.

7.41 It is envisaged that connecting the City to the Waterfront will ensure that the river and the seafront play a far more active part in the life of the City Centre truly establishing Swansea as a distinctive Waterfront City. Its potential will be realised by fully utilising waterfront locations, so as to create new destinations and attractions which allow people to enjoy both City Centre and waterfront activities. Proximity within walking distance, vibrant spaces, high quality buildings and public realm will contribute to the success of this aspiration.

*Commentary*

7.42 In principle UDP Policy is supportive of proposals for the provision of renewable energy resources, including ancillary infrastructure and buildings, subject to compliance with the criteria of Policy R11, which are considered below under the relevant topic headings, and other relevant UDP Policy.

7.43 It is however evident from the above synopsis of relevant development plan policy and adopted SPG, the focus for CCS is to make Swansea a vibrant, exciting, attractive, sustainable, cultured Waterfront City and proposals which would compromise these objectives will not be supported. In this respect, the proposal will provide significant new waterfront facilities and attractions but these have to weighed against the significant adverse impacts on the City's existing tourist and recreational assets within the bay.

7.44 Within this context, the positive, negative and neutral impacts of the proposal are considered below.

## 8.0 Seascape, Landscape and Visual Impact Assessment

*City & County of Swansea Unitary Development Plan*

8.1 Policy EV1 sets out the Council's commitment to achieving high standards of design and layout in all new developments. To achieve this, the policy requires proposals to meet a number of criteria, which include:

- Being appropriate to its local context in terms of scale, height, massing, elevational treatment, materials and detailing, layout, form, mix and density;
- Not resulting in a significant detrimental impact on local amenity in terms of visual impact, loss of light or privacy, disturbance and traffic movements.
- Sensitively relate to existing development patterns
- Promote resource efficient and adaptable buildings and layouts using sustainable design and construction techniques, including the re-use and recycling of construction and demolition waste on site, and energy and water efficiency measures.

8.2 Policy EV2 deals with siting and location of new development and gives preference to the use of previously developed land over greenfield sites, having regard to the physical character and topography of the site and its surroundings by meeting criteria, which include the following:

- Avoiding locations that would have a significant adverse impact on prominent buildings, landscapes, open spaces and the general locality, including loss of visual amenity;
- Effectively integrating with the landscape, seascape or coastline by utilising topography to integrate into the contours of the site and avoiding conspicuous locations on *prominent skylines* and ridges;
- Retaining important views into and out of the site;
- Having due regard to the implications of the development for infrastructure and services;
- Integrating with existing community facilities;
- Utilising landscape and topography to maximise energy efficiency;
- Having full regard to existing adjacent developments and the possible impact of environmental pollution from those developments, as well as the creation of any environmental pollution to the detriment of neighbouring occupiers (including light, air and noise).

8.3 Criteria (ii) of Policy R11 requires the scale, form, design, appearance and cumulative impacts of proposals to be satisfactorily incorporated into the landscape, seascape or built environment and not significantly adversely affect visual amenity, the local environment or recreational/tourist use of these areas.

*Background*

8.4 White Consultants have been commissioned by CCS to review the seascape and landscape visual impact assessment (SLVIA).

8.5 Whilst part of the site is located within NPT, the analysis of potential impacts set out below are confined to those on CCS.

8.6 For the purposes of this LIR and the Council's Written Representations, the advice provided by White Consultant's represents the formal position of CCS.

8.7 A copy of the final report from White Consultants is provided as **Appendix C**.

8.8 The LIR and White Consultant's report makes reference to Regional and Local Seascape Units, Landscape Character Areas and to Viewpoint Locations; for reference, these are provided as **Appendix D**.

*Adequacy of the application*

8.9 The structure of the section covers policy context, assessment method, baseline conditions including the assessment of the value of seascape and landscape character areas, and potential individual and cumulative impacts of the project during construction and operation. This is logical and clear. The text is generally well written and considered comprehensively with a few omissions or inconsistencies which are mentioned below.

8.10 The study area of 15km radius is reasonable.

*Method and guidance used*

8.11 The SLVIA sets out an assessment method which is generally understandable. Guidance references are noted and are generally helpful. Following comments on the PEIR, the guidance cited by the SLVIA has been updated. However, this excludes the approach taken for seascape assessment at a district scale which has been piloted in Pembrokeshire by White Consultants for the National Park and NRW. This includes a method for taking on board NECR105 as well as CCW guidance and is the most up to date method and relevant to the scale of this project  Instead a more limited approach has been taken, based primarily on coastal and Admiralty chart information.

8.12 In terms of the use of LANDMAP, the assessment takes the approach of using the five LANDMAP aspects to inform the derivation of landscape character areas. This is permitted as an option in Guidance Note 3 and appears to be a sensible approach in this case.

8.13 The main effect of this proposal is on the seascape rather than landscape and following PEIR comments the development is assessed in terms of effects on established regional seascape and derived local seascape units which is welcomed. The extent of the local seascape units (LSUs) appear justifiable.

8.14 The overall emphasis of the descriptions is centred primarily on the coastal character, probably due to the limited information collected for the marine element (Admiralty chart). Whilst the descriptions are long and thoughtful, there is limited depth in the marine element of the area including seabed, degree of exposure/wave climate and the patterns of use of the water in various cases. The views across to England also appear to be underplayed.

8.15 The effects of coastal processes are now addressed in respect of the effect of the potentially changed balance and proportions of sand, mud and gravel in Swansea Bay. This is predicated on the conclusions of Chapter 6 of the Environmental Statement (Coastal Process).

8.16 In respect of the calibration of effects, Table 13.10 (Magnitude of visual effects) indicates that medium impact is defined as the development being visually prominent. This seems to be a low calibration. It would have been expected that term 'prominent' would have been more associated with a high/medium impact.

8.17 The SLVIA separates out the significance of change from the nature of that change ie whether it is beneficial, neutral or adverse. This is in line with good practice guidance. Only adverse significant changes are important in the decision-making process.

8.18 In terms of the significance of visual effects, the calibration of these are defined in both the SLVIA Table 13.11 but also in overarching terms, in the Environmental Statement section 2.5.4.4. - The difference between the definitions of level of impact between major and moderate in the SLVIA is large and justifies an intermediate category. This is dealt with to an extent by stating that some effects are major/moderate or moderate/low but there is no definition of these terms either in the SLVIA or the ES in general. This is an omission as many of the assessed effects in the SLVIA are major/moderate. The ES makes it clear that major and moderate effects are significant so it is assumed that major/moderate effects are also significant. Section 2.5.4.4 states that moderate significance of impacts are defined as:

*'Where these changes are adverse they may require mitigation'.*

8.19 Major significance of impacts are defined as:

*'Effects are highest in magnitude and reflect the high vulnerability and importance of receptor (e.g. to nature conservation, noise). Where these changes are adverse they will require mitigation.'*

8.20 Neither the SLVIA or ES fully explain what the levels of significance mean in terms of decision making. Suggested definitions are located in this report in Appendix C. This issue is addressed in the discussion at the end of this section considering the SLVIA as a whole.

8.21 A number of other recent and proposed developments are included for consideration in conjunction with the proposal as requested by various consultees [Table 13.12]. The concern of the consultees appears to be the potential combined cumulative effect of the proposal with these other developments- possibly resulting in an over intensification of use of the area. This appears to be reflected in both Tables 13.13 and 13.14 considering the magnitude and significance of combined cumulative effects respectively which is helpful. However, the method appears to only consider the additional rather than the combined change caused by the proposed development over and above the cumulative baseline [13.3.7.7]. It is assumed that this is just carried over from a previous draft but introduces a small degree of uncertainty/inconsistency as to what is considered.

8.22 The viewpoints have been agreed and the photomontages are generally of good quality. The 450mm viewing distance visualisations are particularly helpful.

8.23 The photos were taken on a day with a slight haze so that distant objects are either in distinct or not visible. For instance, from viewpoints 4, 9 and 11 the coastline of England and the landform of Exmoor is not fully apparent although on clear days this is the case and enhances the views. On the other hand, in the visualisation for viewpoint 8 the built form at Port Talbot is not apparent. Whilst it is not expected that new photos will be taken, the assessment should take views of more distant objects into consideration, and not rely on the visualisations to provide this information.

8.24 The Offshore Building is shown as a rectangular block with straight sides in the photomontages. This is assumed to be the maximum visual 'envelope' of the building with the detailed /final design of the building to be resolved. However, this is problematic as the 'envelope' appears as a detractive new focal feature in a very sensitive location. In other words, the visualisations do not do the likely final design justice but the assessment has to be carried out on what is shown rather than indicative designs. The final design of the building must be excellent to achieve a positive landmark which enhances/ complements the horizontal emphasis of the seawall and turbine structure and does not detract from Mumbles as the main focus of Swansea Bay. It should achieve this in nearby views but also more importantly in distant views which is how most people will view it, most of the time. It is possible that the indicative design shown in Figure 4.25 may be appropriate but the evidence is not presented to demonstrate this in the photomontages.

8.25 Some visualisations show the Project at low water and high water. This is helpful. They show the water level inside and outside the Lagoon at the same level. From the reading of the description of the development it is clear, however, that the water level will be different on the inside and outside of the Lagoon for a period of time every six hours to form a head of water so the turbines can optimise their power output. This may be perceptible when viewed from elevated viewpoints.

It would have been helpful if a couple of viewpoint visualisations illustrated the maximum difference likely to occur to understand the degree that this might affect the perception of the development e.g. from Mumbles Hill Nature Reserve and Kilvey Hill.

8.26 The columns supporting the floating boom demarcating and protecting the exclusion zone around the turbines outside the Lagoon are shown as black columns and are indistinct in some visualisations such from Viewpoint 5. It is likely that they will be yellow to a certain height as per Trinity House rules so they would be more noticeable than indicated.

*Coastal processes issues*

8.27 Chapter 6 coastal processes explores the potential effects on coastal processes, sediment transport and contamination. Of most interest to the seascape and visual effects assessment are the effects on sedimentation pattern to the west of the Lagoon.

8.28 As discussed below, Kenneth Pye Associates Ltd (KPAL) has been engaged to review the coastal processes chapter for NRW and subsequently asked to comment on specific issues for CCS including sediment transport and the potential effects on Swansea Bay beach. KPAL found that the level of the assessment by ABPMer was limited with few detailed studies or sampling. Whilst this was appropriate for a regional scale study the data did not provide full confidence for assessing the likelihood of local impacts. KPAL has recommended that further baseline studies are carried out and monitoring is carried out during construction and operation with trigger points for action/remedial works as necessary.

8.29 The KPAL report for CCS arrives at the following conclusions:

- There has been no specific modelling of littoral sediment transport in the ES or construction of a sediment budget for the north western part of the bay.
- There is little evidence to support the ES's statement that sand transported east from Crymlyn Burrows to the north west of Swansea Bay is significant.
- The main source of sand is provided by sources external to the Bay including south westerly waves and storm tides transporting sand from south of Mumbles Head to the northern and eastern parts of the Bay. The dominant (net) direction of littoral sand transport in the Bay is eastwards.
- The beach varies dependent on wind and wave conditions as illustrated by the period 2000 to 2014.
- Overall, on the basis of evidence, it appears unlikely that the supply of sand to the recreational beaches would be significantly reduced. The net effect is more likely to increase the retention of sand and reduce the severity of upper beach erosion during storms.
- The above could increase wind blown sand on the promenade but this not a seascape issue.

- Increased intertidal mud deposition in sub-tidal areas adjacent to Blackpill SSSI and the mid foreshore seaward of beaches between St Helen's and West Pier could lead to the development of saltmarsh [5.0]. This would change the visual appearance of the shore and would need increased management to prevent Spartina marsh establishing.
- It is assumed that the sandy beaches would be unaffected by the marsh but this needs clarification.

8.30 For the purposes of this topic area, the above conclusions are taken to mean that the predominantly sandy beaches from the Tawe to the Mumbles will remain as an important visual component of the sweep of Swansea Bay, with their essential character unchanged. Therefore, the findings of the ES and KPAL reports combined appear sufficient to arrive at conclusions on this issue in this review.

*Review of seascape, landscape and visual impact assessment*

*Baseline: Local seascape units (LSUs)*

8.31 The seascape units descriptions focus on the coastal character with limited comment in some cases of the intertidal characteristics eg sediment movement and marine characteristics eg wave and tidal patterns, use of the water, exposure, openness. It is difficult to fully appreciate the text without the Admiralty chart as a figure in the SLVIA. The distinctive long distance views to Exmoor and the English coast are not mentioned eg in LSU4. It is appreciated that these are most apparent on clear days and in certain lights and may not have been so evident on the assessment site visit days.

*Effects on seascape and landscape character- Key Local Issues*

8.32 The comments on the individual effects of the Project on the key seascape and landscape character areas are set out in Appendix A of White Consultant's Report.

8.33 In terms of the impacts on seascape and landscape character, the levels of significance are agreed. It is not agreed that the effects are generally either beneficial or neutral.

*Significant effects*

8.34 In terms of the regional seascape unit of Swansea Bay as a whole [RSU1], it is agreed that the significance of impact is major and significant. It is considered that the development would be adverse to the overall character and sweep of the bay and its mainly sandy foreshore. This sweep would be disrupted by the length and height of the breakwater bund, ancillary structures and, potentially, the difference in levels of the water between the Lagoon and the sea at several times of day. The effects extend beyond the immediate environs of the lagoon. The beneficial effect is in the likely improvement to the coastal edge within the Lagoon and the activity within the Lagoon which is likely to add interest.

8.35 In terms of local seascape unit (LSU) 4, Swansea Port and Crymlyn Burrows, a major significance of effect is agreed but it is considered that the effects are a mixture of adverse, neutral and beneficial.

8.36 It is considered that the development would be adverse to the open sweeping character of the sea/marine element of the seascape character area with a large breakwater bund and ancillary structures projecting into this part of the bay and, potentially, the difference in levels of the water between the Lagoon and the sea at several times of day. The effects would be adverse on the area exterior to the lagoon with the walls and turbine structure dominating the seascape character. However, within the Lagoon the adverse effects would be mitigated to an extent by sporting activity on the water which would give vitality and interest to the seascape, and by some designed elements on the breakwater bund. The effects on this marine element would, on balance be neutral. The effects on the coastal element of the seascape unit would be beneficial where it abuts the interior of the Lagoon. The effects would be adverse on the Crymlyn Burrows to the east as stated in SLVIA.

8.37 For LSU 5, Swansea Bay, a major/moderate significance is agreed but it is considered the development would be adverse to the character and sweep of the bay and its mainly sandy foreshore as views of the continuation of the sandy strand to the east are disrupted and screened by the breakwater bunds at sea/beach level. The turbine structure would stand out from the breakwater bunds as a lighter rectangular object, breaking up the horizontal emphasis of the structure. The offshore building would be a new focus for the bay competing with Mumbles to an extent. The effects extend beyond the immediate environs of the Lagoon.

8.38 For LCA G1 Swansea, a major/moderate significance is agreed but the beneficial/neutral effect is not agreed. The Swansea Bay frontage of the area enjoys unimpeded views out across the bay towards the Bristol Channel and Exmoor. This open unimpeded scenic view is a contrast to the built form of the city. The proposed breakwater bund and ancillary structures would disrupt this view as a feature in the middle ground with no benefits of increased water use etc apparent from the outside of the structure. The effect would therefore be adverse. A neutral effect on much of the built form area character back from the coastal strip is agreed.

*Not significant effects*

8.39 For LCA G6 Mumbles, a moderate level of significance is agreed but the predicted neutral effect is not agreed. The development is considered to be adverse as the area focuses and relies on the wild open character of the marine element of the bay as a foil for its own complex topography, vegetation and built form character. The Lagoon structures extend far out into the bay, disrupting this simple setting.

8.40 For LSU 6, Gower Coast, a minor significance is agreed but it is considered that the development is adverse for the reasons set out for LSU5.

8.41 For LCA D1 Clyne Valley Country Park, a moderate/minor significance is agreed but it is considered that the development is adverse as the Lagoon structures extend far out into the bay, disrupting the parks focussed views and simple setting.

8.42 For LCA E1 Gower farmlands, a negligible significance of effects is agreed.

8.43 It is broadly agreed with the assessment of neutral or beneficial effects to landscape character areas G9 SA1, H1 Swansea Port and H2 Swansea Gate Business Park.

*Visual effects*

8.44 The comments on the individual effects of the Project on the representative viewpoints are set out in Appendix B of White Consultant's Report.

8.45 Generally, the significance of effect set out in the SLVIA viewpoint assessment is agreed, with one minor exception.

8.46 The nature of the effect is not agreed in views from outside the Lagoon. The effects are considered to be adverse, or at best, neutral in some cases, such as Meridian Tower, whereas, the SLVIA indicates that effects are generally either neutral or beneficial (with the exception of Viewpoints 5 and 17 discussed below).

*Significant effects*

8.47 The SLVIA states that there is one major adverse ie significant effect from Crymlyn Burrows [Viewpoint 17]. This is agreed. It states that there is one major neutral i.e. significant effect from Swansea Bay promenade near the Lido at low water [Viewpoint 7] and near the Civic centre [Viewpoint 11]. In the view of CCS the effect is adverse in both cases. The SLVIA states there is one major beneficial and significant effect from Meridian Tower [Viewpoint 10] but in CCS's view, this is neutral.

8.48 The SLVIA states there is a major/moderate adverse i.e. significant effect- from The Knab [Viewpoint 5]. This is agreed.

8.49 The SLVIA identifies five viewpoints undergoing major/moderate significant but neutral effects. These are at Headland Road, St Thomas [4], Mumbles Hill Nature Reserve [6], Kilvey Hill [13], Swansea Bay [19] and Pant y Celyn Road, Townhill [21]. In the view of White Consultant's the effects are adverse.

8.50 There is one viewpoint undergoing major/moderate significant but neutral/beneficial effects - the new Swansea University campus abutting the interior of the Lagoon [16]. This is agreed.

*Not significant effects*

8.51 The SLVIA states that there are moderate neutral effects from Clyne golf course [8], Nicander Parade, Townhill, [9] and Clyne Gardens [22]. The significance is agreed but the effects are considered adverse.

8.52 The effect on the views from the bridge in SA1 and Pant Street, St Thomas are of minor significance.

8.53 The above findings mean that those most adversely affected are users of the Swansea Bay promenade and beaches, visitors to Mumbles Head and environs and leisure users of Swansea Bay itself. Those most benefiting are new users of the Lagoon as a leisure or sporting experience, and users of the new Swansea University campus.

8.54 Lighting is mentioned in the SLVIA in respect of uplighting of the Onshore and Offshore Buildings, sculptures and on the inside of the Lagoon wall at a low level. It is noted that public access is not allowed after dark so it is assumed that lighting will be limited. Without specific night time views, and an explicit lighting Project it is difficult to verify the findings on night time effects. The 3D model can only be regarded as indicative and appears to be more of a promotional and public consultation tool rather than an assessment tool.

8.55 It is accepted that there is lighting along existing roads and within the built form along the coastline, some of it intense and industrial in nature. However, the existing, flat reflective water surface of the bay itself acts as a positive foil and setting to this, and the Lagoon seawall will interrupt views of this from the promenade and beach level viewpoints.

8.56 There is therefore a balance to be achieved. If it is assumed that the lighting is imaginatively but sensitively designed, particularly taking into account minimising the effects or enhancing the views, especially from the west of the development, then the level of effects are likely to be no more than for daytime views. Lighting is clearly an opportunity to transform and enhance the development and should be utilised in close liaison with CCS and NPT.

*Cumulative Effects*

8.57 The level of the SLVIA's cumulative significance of effects for viewpoints are the same as for the effects of the development on its own with one exception (see below). This is an indication that the Project is the largest contributor to effects. The largest combined effect is likely to be with the University Campus which affects the Crymlyn Burrows adversely outside Swansea [Viewpoint 17] but is neutral/beneficial within the Lagoon along the coast [Viewpoint 16]. Overall, Swansea Bay will become more defined by development than at present.

8.58 The one exception in the consistency of the assessment appears to be from Swansea Promenade near the Civic Centre [Viewpoint 11] where the effects are stated as less. Here the cumulative magnitude of effects are stated as moderate, compared to high, with major/moderate significance compared to major. This is not logical as it is stated that the view will become more defined by development [13.8.4.170].

*Effects on receptors*

8.59 The SLVIA states that views from the Gower AONB will be restricted to the north eastern fringe and that the Project will not erode the character of the AONB or contradict management plan policies [13.8.5.2]. It is not considered that there will be significant adverse effects on the qualities or purposes of the designation. This is agreed.

8.60 The SLVIA states that no Registered Parks and Gardens of special historic interest will be significantly adversely affected, including Victoria Park, Clyne Gardens and Cwmdonkin Park. This is agreed.

8.61 The Wales Coast Path will be significantly adversely affected along its route along the Swansea promenade from the Mumbles expressed as a series of virtually uninterrupted views between Viewpoints 5, 7 and 11. The SLVIA predicts the effects on the high sensitivity users are moderate and the significance of effects major/moderate. This is considered fair overall although the effects closer to the Project are likely to be higher. The cumulative effects are stated as high/moderate and the significance of effects major/moderate. This is agreed.

8.62 The effects on the Gower Way are stated as not significant which is agreed.

8.63 The effects on the National Cycle Route (NCN) 4 is stated as similar to the Wales Coast Path which is agreed.

8.64 Users of the A4067 parallel to the Swansea promenade from Oystermouth Castle to Swansea are stated as having intermittently screened views apart from 750m relatively unobstructed views from Victoria Gardens through to the Civic Centre. The users are stated as moderate/low sensitivity with moderate/low magnitude of effect with moderate/minor significance ie not significant and neutral. Whilst the level of effects are probably correct, the effects are likely to be adverse, but they are agreed as not being significant.

8.65 The effects on the visual amenity of the settlement of Swansea is stated as represented by a series of viewpoints (already discussed above and in Appendix B) and are stated as significant but neutral. The effects on the Mumbles are stated as limited by the tight urban grain. In line with the comments on the viewpoints it is considered that the effect is adverse on the settlements for the reasons previously stated.

8.66 The decommissioning process is stated as only including removal of turbines and sluice gates with all other elements remaining. It is also stated that ongoing maintenance is necessary during operation to maintain the integrity of the walls and other features, as well as dredging. White Consultant's has therefore highlighted that this Council will need to take into account responsibilities for maintenance, the future intended use and associated costs in perpetuity and it is strongly advised that this is fully resolved before approval is given to the project.

*Discussion*

8.67 The key issues are similar to those stated in the PEIR and draft SLVIA reviews although some issues appear now to have been resolved.

8.68 Swansea relies on the character of the bay, in particular west of the Tawe, as a major asset essential to its positive image and quality of life. In this respect, it is helpful that the character of the sandy beaches of north western part of the Bay will be retained.

8.69 The development itself is very large scale protruding 3.5km into Swansea Bay and effectively dividing it into two. The water level regime and character of the water inside the Lagoon will be different inside to outside the Lagoon. The effects are minimised where the water level is high both inside and outside Lagoon.

8.70 The proposed Lagoon seawall forms a strong dark horizontal line extending a long distance into the bay, closing down its apparent width and restricting views. The offshore building is highly noticeable and forms a built focus in the middle of the bay which, with the sea wall, competes with the Mumbles as a visual focus.

8.71 The seawall structure, as one might expect, appears to be dictated almost entirely by engineering and cost considerations, with design finesse and intervention primarily having effect at a very local level along the inside edge of the structure, in associated buildings and on the coastal edge of the Lagoon. These elements are generally positive based on the indicative designs but have limited mitigating effects on the overall character of the structure when viewed from outside the Lagoon. The design of the offshore building, however, is very important. Whilst the line of the seawall is simple and the development generally uncluttered, the overall effect is somewhat utilitarian.

8.72 The rock armour seawall is higher than the existing promenade and will be of dark colour forming a strong line in the Bay. The concrete turbine structure will contrast with the dark rock breaking up its horizontal line in views around Mumbles.

8.73 The overall sweep of the Bay will be disrupted with views of the almost continuous strong sandy strip around the bay being hidden by the seawall from the beach. However, the photomontages appear to indicate that the upper parts of the Aberavon beach would be visible above the seawall from some viewpoints on the promenade as well as from higher viewpoints which is helpful.

8.74 It is crucial to resolve outstanding design elements, in particular the Seaward building but also the gantry cranes, as these will help define the quality of the project in many sensitive views.

8.75 The long term future of the structure post-operation needs to be resolved.

8.76 Overall, it is considered that the effects on seascape and visual receptors are generally adverse outside the Lagoon rather than neutral stated in the SLVIA. This is important to the consideration of the project as neutral effects, even if involving significant change, are not important considerations in the decision-making process compared to adverse effects.

8.77 The ES and SLVIA do not give definitions as to how the various levels of significance of effect should be weighed in the decision-making process. Appendix C of the White Consultants' report sets out a representative calibration used in similar assessments. In order to inform this report definitions are stated after a summary of each significant set of effects set out below.

*Major adverse significant effects are expected on:*

- Regional Seascape Unit1: Mumbles Head (Swansea Bay) to Sker Point-
- The Crymlyn Burrows part of Local Seascape Unit LSU4: Swansea Port and Crymlyn Burrows.

- Representative viewpoints at Swansea Bay promenade near the Lido at low water [Viewpoint 7], near the Civic Centre [Viewpoint 11] and at Crymlyn Burrows [Viewpoint 17].

8.78 Major adverse significant effects are taken to represent key factors in the decision making process or at least important considerations. At the higher end of the scale these effects are (although not exclusively) associated with sites or features of national importance and resources or features that are unique and which, if lost, cannot be replaced or relocated. This also relates to landscapes/seascapes where the effect of development would overwhelm and/or substantially change their character or where mitigation will not remove the effects on a receptor.

*Major/moderate adverse significant effects are expected on:*

- Local Seascape Unit 5: Swansea Bay
- Landscape character area G1: Swansea
- Representative viewpoints at Headland Road, St Thomas [Viewpoint 4], The Knab [Viewpoint 5], Mumbles Hill Nature Reserve [6], Kilvey Hill [13], Swansea Bay [19] and Pant y Celyn Road, Townhill [21]
- Wales Coast Path
- National Cycle Route (NCN) 4

8.79 Major/moderate adverse significant effects are taken to represent important considerations at a regional or district scale and, if adverse, are potential concerns to the project depending upon the relative importance attached to the issue during the decision making process. Mitigation measures and detailed design work are unlikely to remove all the effects upon the surrounding landscape/seascape or receptors.

- *A major neutral significant effect is expected on:*Meridian Tower [Viewpoint 10]

*A major/moderate neutral or beneficial significant effect is expected on:*

- Swansea University Science and Innovation Campus [Viewpoint 16]

8.80 There are no significant effects expected on Gower AONB or on Historic Parks and Gardens.

8.81 There are a number of moderate adverse effects which are taken to represent effects which, while important at a local scale if adverse, may not be key decision making issues. Whilst sometimes a particular combination of such effects may increase in the overall effects on a particular area or set of receptors and therefore may be significant, this is not considered to be the case in relation to this project.

8.82 Having regard to the foregoing, taken in isolation, the proposal would conflict with UDP Policies EV1, EV2 and R11(ii). However, the adverse impacts identified need to be considered in the planning balance with the positive benefits of the development.

## 9.0 Design and Public Realm

*City & County of Swansea Unitary Development Plan*

9.1 Design and siting and location Policies EV1 and EV2 are set out above.

9.2 Policies EV4 and EV5 are also relevant to this topic area.

9.3 UDP Policy EV4 states that where development and ancillary features impact on the public realm designs should ensure that schemes integrate with areas to produce spaces and sequences that result in quality townscape and building frontages that actively engage with the public, are of human scale and provide effective surveillance resulting in spaces that are “people friendly” in terms of perceived and actual safety levels, and provide attractive detail through the use of high-quality, durable materials.

9.4 Policy EV5 states that the provision of public works of art, craft or decorative features to enhance the identity and interest of major new developments or refurbishment schemes will be supported.

*Adequacy of the Application/DCO*

9.5 In addition to energy generation, the stated benefits of the tidal lagoon include an accessible 'world class' public realm, leisure and recreation water sports, visitor and education attractions and mariculture.

9.6 As stated in the supporting information, the lagoon wall would be approximately 4m above the average high tide and up to 12.5m above the average low tide. The structure will be visible as a distinct horizontal band extending out into Swansea Bay and the wider visual impacts of the lagoon structure (especially at low tide) are considered above.

9.7 The proposed lagoon structure has two basic forms; between the western landfall and the off shore building it has a split level arrangement with a service road along the crest and a shared pedestrian/ cycle route alongside. This is supplemented by a pedestrian path at the lower level on the lagoon side. This arrangement is welcomed to encourage the multi functional use of the area including the proposed shuttle bus to the offshore building,

9.8 To the east of the offshore building looping back to the eastern landfall, the lagoon has a more basic structure with a single shared path that is 5m wide. This is because there is no shuttle bus proposed and the main users would be occasional operation vehicles and pedestrians/ cyclists. This arrangement is supported as it reflects the lower levels of use that are expected in this area.

9.9 In both types of lagoon structure it should be noted that there are no extensive areas of hand rails or barriers and this is welcomed to minimise visual clutter and to avoid an overly functional appearance. Furthermore, various low structures are proposed as informal sitting/ resting points. The slopes of the lagoon structure would be protected by rock armour and the size of the boulders would depend on the exposure and wave actions. The lagoon walls would have a hard and functional character which is supplemented by focal buildings and areas of public realm.

9.10 The supporting information indicates that the public realm is conceived as a number of connecting areas:

- Landward Urban Park
- Broad Seaward Park
- Narrow Seaward Park
- Landward Ecological park

9.11 The supporting information proposes to create a 'world class public realm'. However as discussed in detail below there are considered to be fundamental concerns about the pedestrian/ cycle access and wider connectivity, especially to the west with the failure to improve strategic linkages between the City Centre and the new Swansea Bay Campus of Swansea University.

9.12 The proposed inshore facilities would lie to the south and west of the existing wind turbine that is to be retained. This area would be the heart of the 'Landward Urban Park' and would include a multi functional public realm, landscape areas, car park, boat park, play area, wheeled sports park (skate park), inshore building/ facilities as well as access to the lagoon waters. This area has potential to become a significant city park in a maritime location, but the long and convoluted access may deter many users from Swansea. The main focal area around the inshore building would be supplemented by focal points alongside the access road at the retained WWII pill boxes where localised stepped access to the beach would be provided.

9.13 At the eastern landfall along the frontage of the Swansea University Bay Campus that is currently under construction a 'salt marsh' environment is proposed as the 'landward Ecological Park'. As well as creating a new habitat this would also create a softer and more attractive interface between the university/ coastal public realm and the lagoon waters. Within the salt marsh environment a timber boardwalk with bridges over water areas is proposed to provide public access to this new area.

9.14 The 'Broad Seaward Park and Narrow Seaward Park are both exposed areas projecting out into Swansea Bay. These 'parks' are effectively the functional lagoon structures and the main focal point would be around the offshore building and turbine area. This focal area would comprise a tidal sculpture within the lagoon, a rocky and rugged character, plus functional elements such as shuttle bus turning circle (21m) and operational car parking.

9.15 Overall the public proposals are welcomed and supported, but the detail including any public art features would need to be agreed by condition.

9.16 The concept for focal points around the lagoon is based on what is described as a 'string of pearls'. This is a number of distinct points as follows:

- Western landfall building (see below)
- Off shore building (see below)
- Spectator area overlooking the water activity part of the lagoon on the western part of the lagoon wall. This is proposed as a spherical structure (reference to a pearl) to provide shelter with terraced steps as informal seating.
- On the eastern part of the lagoon wall, the 'long walk' to the eastern landfall is split by a 'half way' focal point in the form of another spherical structure that is cantilevered over the lagoon.
- An exhibition centre is proposed at the eastern landfall to address the Burrows SSSI. This is a simple and small land based elevated viewing platform of corten steel which is considered appropriate to this location.

9.17 The proposed western landfall building to the south of the existing wind turbine would be on new made up ground, but it would be perceived as part of the docks. It is a simple linear form with a pitched roof. The stated dimensions are 19m wide 6m to eaves and 13.5m to ridge. It is actually four separate buildings which are 14.5m, 86m, 14.5m and 24m long respectively that share a common form and materials such as engineered timber cladding. The close spacing means that they will be generally read as a single form which is some 153m long overall. Whilst the applicant makes reference to oyster sheds, it is considered that the simple linear form with pitched roof and scale of the building is reflective of the various dock buildings including the listed J Shed and the warehouse that now forms part of the National Waterfront Museum. Furthermore the siting and orientation of the building integrates with the wider character of the docks. Externally boat hoists are proposed which is in keeping with the functional character of the docks. It would be visible from the city across the River Tawe as part of the docks and is considered appropriate to the dock location and the function as a focal public building.

9.18 The offshore building would be some 3km from the current sea wall within the open expanse of Swansea Bay. The building is proposed to be 21.5m tall above the proposed barrage surface level which approximately 4m above the average high tide and up to 12.5m above the average low tide. The proposed footprint is 35m by 47m and the walls flare outwards. The volume is proposed to accommodate 3 levels with café, viewing areas and flexible exhibition. Given the exposed location a texture concrete finish is proposed along with areas of glazing.

9.19 Whilst this offshore building would be highly visible around Swansea Bay, unfortunately the visual testing has included a 'grey box' that reflects the stated parameters from Part 1 of the DCO Schedule – Part 2: Building Heights in place of the proposed architectural design, plus it does not show the adjacent 8m high lifting structure necessary to maintain the barrage and generating machinery. This makes it difficult to comment on the appropriateness of this significant building which would be located in a prominent and unique location. Therefore it is suggested that further visualisations be prepared to show the architectural proposals from the agreed view points.

9.20 As described above, this issue has also been highlighted as part of White Consultants review of the SLIVA on behalf of CCS who has advised that it is possible that the indicative design may be appropriate but the evidence is not presented to demonstrate this in the photomontages.

9.21 Whilst therefore the public realm proposals are supported as are the majority of the buildings/ structures including the main Western Landfall building. The main concerns for CCS focus on:

- The lack of a pedestrian/cycle access westwards to Swansea City Centre;
- The conflict of the proposed access road with the wider regeneration of the western part of the docks as well as the protected route of the canal; and

- Detailed aspects of the public realm design such as the retention of the WWII pill boxes.

9.22 It is also suggested that a full representation of the offshore building is needed to assess the visual appropriateness of this large structure some 3 km out into Swansea Bay.

9.23 As evidenced above, in overall terms the visual impact of the, lagoon and associated structures, will be considerable. As such there would be conflict with UDP Policies EV1, EV2 and R11(ii) but in many respects this is considered inevitable with a development of this nature. There are significant positive aspects to the newly created public realm which would accord with Policy EV4 but the omission of a western link to SA1 and the city centre is significant and would be in conflict with the provisions of this policy. Policy EV5 is supportive of the public art elements of the proposal.

9.24 Additional requirements are considered necessary in respect of:

- Further discussions and/ or future provision for the western end to city pedestrian and cycle connection;
- Realignment of the vehicular access to avoid the protected canal route and provision of servicing of development plots; and
- The design of buildings and public realm within the agreed parameters.
- Delivery of a landmark off shore building as envisaged. It is crucial to resolve outstanding design elements, in particular the Seaward building but also the gantry cranes, as these will help define the quality of the project in many sensitive views.
- The existing navigation structure at the end of the eastern short pier at the mouth of the River Tawe being retained and relocated as a public realm feature.

## 10.0 Cultural Heritage and Terrestrial and Marine Archaeology

*City and County of Swansea Adopted Unitary Development Plan*

10.1 UDP Policy EV1(xi) requires new development to have regard to the desirability of preserving the setting of any listed building.

10.2 UDP Policy EV6 seeks to protect, preserve and enhance Scheduled Ancient Monuments and their settings, and also unscheduled archaeological sites and monuments. Where proposals affect sites and areas of archaeological potential, applicants will be required to provide the following information with planning applications:

- An assessment or evaluation of the archaeological or historic importance of the site or structure,
- The likely impact of development on the archaeological site, and
- The measures proposed to preserve, enhance and record features of archaeological interest.

10.3 Policy EV9 states that development within or adjacent to a conservation area will only be permitted if it would preserve or enhance the character or appearance of the conservation area or its setting.

10.4 Policy R11 support for renewable energy schemes is subject to meeting specified criteria including criteria (iv) and (v) which state that the scheme should not have a significant adverse effect on the historic environment and should preserve or enhance any conservation areas and not adversely affect listed buildings or their settings.

*Impacts and Adequacy of Application/DCO*

10.5 Glamorgan Gwent Archaeological Trust, in its role as the professionally retained archaeological advisors to CCS has confirmed that information on the marine and terrestrial historic and archaeological resource in the development area contained within the Environmental Statement has been prepared to the Standards and Guidance of the Institute for Archaeologists Standard for Historic Environment Desk-based Assessment (2012) as agreed at the scoping stage for the work.

10.6 The work has looked at all of the relevant existing information on the historic and archaeological resource in the development area and included analysis of information provided by marine geophysical data and walkover surveys. The results of this work have shown that Swansea Bay (including the proposed development area) was subject to periodic marine inundations during the prehistoric period, but there is a possibility that occupation and activity sites of most prehistoric periods could be located in the area although Late Upper Palaeolithic, Mesolithic, Neolithic, Late Bronze Age and Iron Age are the most likely. The current maritime location makes it likely that if such sites are found they will be well preserved and be associated with important palaeo-environmental information. Unfortunately the nature of the marine deposits in Swansea Bay mean that archaeological sites are normally covered by sediment and may only be exposed, if at all, in rare short periods. Consequently the short period of investigation allowed for the preparation of the environmental statement, especially for walk over surveys, means that the presence of potentially vary important prehistoric archaeological sites in the development area cannot be discounted and the construction of the proposed lagoon could reveal and destroy these sites.

10.7 The model for sea-level change in Swansea Bay given in Appendix 20.2 confirms with current predictions. It appears that by the Roman period the Bay had been flooded to its current shores, it is therefore unlikely that any Roman and later settlement sites will be found in the area. However, the Bay was heavily used for fishing, not only by boat but particularly using traps and nets with associated features. The walkover survey did find evidence for fish traps in the intertidal part of the development area, but given the variable nature of the sediment cover, the presence of further sites inside the development area cannot be discounted. The discovery of fishing sites could provide considerable information on the development of this important aspect of the historic economy of the Bay.

10.8 The maritime nature of the Bay in historic periods removes the possibility of settlement sites being found but makes it likely that evidence of shipping could be located in the development area. The historic record identify a number of vessels that are known to have been wrecked in, or close to the development area; however, it is often difficult to precisely identify the location of even well documented wrecks, and in many cases there are no documentary references to wrecks. The use of geophysics has been able of identify a number of potential sites inside the development area but analysis of the data suggest that they are unlikely to be wrecks and therefore have been discounted. However, given that the majority of historic boats and ships were constructed in wood with, in some case, no metalwork it is unlikely that geophysical survey at the resolution used for most of the existing surveys would have located them. As such there must remain a possibility that the wrecks of historic vessels could be located in the development area and be revealed by the proposed development.

10.9 As noted above, the marine sediments of Swansea Bay and the nature of the site, part intertidal and partly sea, restricts archaeological investigation of the development area prior to construction commencing. The assessments so far have been carried out to the appropriate levels but cannot discount that important archaeological sites, both terrestrial and marine, may be located in the development area. However, so far, apart from the presence of some features associated with fishing no archaeological sites have been located in the development area. Section 20.9.1.12 provides suggested mitigation of the marine sites, including the continuing analysis by archaeologists of new information produced to assist in the construction process and the need for a watching brief to be maintained during the dredging operations. The Trust suggest that there is also a need for the identified fish traps to be fully investigated and recorded and that contingency arrangements are in place, including the provision of appropriate time and finance, to ensure that that any archaeological features that are revealed during the construction programme are fully investigated and recorded. The developer will also need to ensure that any significant archaeological artefacts that are recovered are appropriately recorded and conserved.

10.10 Chapter 21 of the environmental statement provides little information on appropriate mitigation measures to protect the terrestrial archaeological resource. It is noted that it is proposed to ensure the preservation of at least one of the pillboxes that constitute part of the WWII defences of Swansea and to ensure that any other associated features are fully recorded. Whilst the authors of the assessment suggest that there are only a few possible areas where archaeological sites may be encountered during the construction of the connection to the National Grid there remains a possibility that evidence for human activity could be found. Therefore the Trust would expect an appropriate watching brief to be maintained during these construction works and that contingency arrangements are in place, including the provision of appropriate time and finance, to ensure that that any archaeological features that are revealed during the construction programme are fully investigated and recorded.

10.11 In order to ensure that the measures outlined above are implemented the Trust recommend that appropriate conditions are attached to any DCO granted for this development. The Trust suggest a condition could be worded in accordance with the model given in section 54 of Circular 11/95:-

*"No development shall take place until the applicant, or their agents or successors in title, has secured the implementation of a programme of archaeological work in accordance with a written scheme of investigation which has been submitted by the applicant and approved in writing by the local planning authority."*

*Reason: To identify and record any features of archaeological interest discovered during the works, in order to mitigate the impact of the works on the archaeological resource.*

10.12 However, given the complexity of the proposed scheme, the Trust note that preference may be given to the condition set out below, which would provide the developer with a clearer route for meeting their responsibilities.

*A) No development shall take place/commence until a programme of archaeological work including a Written Scheme of Investigation has been submitted to and approved by the local planning authority in writing. The scheme shall include an assessment of significance and research questions; and:*

1. *The programme and methodology of site investigation and recording*
2. *The programme for post investigation assessment*
3. *Provision to be made for analysis of the site investigation and recording*
4. *Provision to be made for publication and dissemination of the analysis and records of the site investigation*
5. *Provision to be made for archive deposition of the analysis and records of the site investigation*
6. *Nomination of a competent person or persons/organisation to undertake the works set out within the Written Scheme of Investigation.*

*B) No development shall take place other than in accordance with the Written Scheme of Investigation approved under condition (A).*

C) The development shall not be operational until the site investigation and post investigation assessment has been completed in accordance with the programme set out in the Written Scheme of Investigation approved under condition (A) and the provision made for analysis, publication and dissemination of results and archive deposition has been secured.

10.13 As is the case with NPT, CCS would not object to an alternative time restriction to section C of the above condition, so that energy generation is not unnecessarily delayed, on the proviso that post investigation works are effectively secured.

10.14 There are no listed buildings or conservation areas directly impacted by the tidal lagoon proposals and any indirect impacts are not considered to be significant. However there are a number of heritage features of local interest as outlined below:

10.15 The proposed retention of the WWII pill boxes is welcomed as is the use of these as focal points in the proposed public realm where stepped access to the water/ sand is proposed. Furthermore the proposed removal of the 2m high concrete sea wall is supported in terms of public realm to open up views. However it should be noted that these WWII defence features are integral to the concrete sea wall which is proposed to be removed. Therefore the 3m sections either side of the pill boxes as indicated should be secured.

10.16 The supporting information indicates that these pill boxes have been discussed with Cadw and that they are considering listing them as features of national importance. No formal correspondence has however been received from Cadw on this matter. This matter should be resolved prior to any work affecting them.

10.17 The supporting information also indicates that the existing navigation structure at the end of the eastern short pier at the mouth of the River Tawe could be retained and relocated as a public realm feature. This is supported and is requested as a condition.

## 11.0 Coastal Processes, Sediment Transport and Contamination

*City and County of Swansea Unitary Development Plan*

11.1 Policy EV25 states that development, alone or in combination with other plans or projects, which is likely to adversely affect the integrity of a European protected site (SAC, Marine SAC, SPA and Ramsar Sites) and is not directly connected with or necessary to the management of the site, will not be permitted unless:

I. There are imperative reasons of over-riding public interest, including those of a social or economic nature, which are sufficient to override the reasons for designation, and
II. There is no alternative solution.

11.2 Where such development is permitted, planning conditions and/or obligations will be used to secure all compensatory measures necessary to ensure that the overall coherence of the European Site is protected.

11.3 Policy EV27 states that development that significantly adversely affects the special interests of sites designated as SSSIs and NNRs will not be permitted unless the need for the development is of such significance that it outweighs the national importance of the designation. Where development is permitted, planning conditions and/or obligations will be used to protect and enhance those interests and where necessary provide effective mitigation and compensatory measures.

11.4 Policy EV28 states that within locally designated areas the natural heritage will be preserved and enhanced wherever possible. Development that would significantly adversely affect the special interest of Local Nature Reserves will not be permitted unless the need for the development is of such significance that it outweighs the importance of the designation. Development that would significantly adversely affect SINCs or RIGs, or which would not provide for appropriate compensatory or mitigation measures will not be permitted, unless it can be demonstrated to meet appropriate social or economic needs where the benefits in such terms would outweigh the harm to the feature concerned. Where development is permitted which would damage the nature conservation value of the site, such damage will be kept to a minimum, and appropriate mitigation or compensatory measures sought.

*Local Issues*

11.5 The ecologically important habitats at Blackpill SSSI, Crymlyn Burrows SSSI, and the Section 42 habitats and species (Natural Environment and Rural Communities Act 2006) e.g. sand dunes and *Sabellaria* reefs) within the bay are all dependent on the movement and deposition of sediment. Relatively small changes in the flow of currents, wave structure and sediment deposition can lead to large changes in the quality and distribution of these habitats. Changes in sediment deposition also have potential to significantly alter the visual, recreational, and amenity value of the bay as well as its role in providing sea defences. These changes could result in additional management requirements and costs.

*Adequacy of the Application/DCO*

11.6 Kenneth Pye Associates Ltd has been instructed by CCS to provide comments relating to the potential impacts of the proposed tidal lagoon development in northern Swansea Bay. Particular attention is given to the potential impacts of the Lagoon on coastal processes, sediment transport and rates of sediment accretion and erosion along the CCS frontage. A copy of the report is provided as **Appendix E** (Comments and Advice relating to the proposed Swansea Bay Tidal Lagoon, with particular reference to changes in coastal processes and potential impacts June 2014) (KPAL Report No: 160995).

11.7 The comments and advice are based on an appraisal of chapters contained within the Environmental Statement, information contained in a number of supplementary reports which have been made publically available by the applicant during the consultation process, and a review of previous scientific investigations, publications and environmental monitoring data relating to Swansea Bay.

11.8 Issues relating to coastal processes which have been identified as being of concern to CCS include:

- The potential of the tidal Lagoon to interrupt the supply of sediment to the sandy beaches to the west of the River Tawe; the compositional condition and visual appearance of these beaches are of vital recreational and amenity importance to the local population and contribute significantly to the overall attractiveness of Swansea as a destination for leisure and business visitors, longer stay tourists and University students. Many of the objectives and actions identified within the Swansea Bay Strategy (CCS, 2008) and the Environment Management Plan Pre-consultation draft document depend on maintenance of the quality of the existing beach features and overall seascape (Commons Vision 2012; Trawscoed Ltd & Commons Vision, 2012).

- The effect of a possible reduction in sand supply on long-term beach levels and the ability of the sand dune systems in northwest Swansea Bay to recover following storm events; this could have implications for coastal flood risk as well as net loss of sand dune habitat and recreational beach area.

- The likely effect of the Lagoon development on the wind-blown sand problem which currently affects the promenade and coastal road between the Civic Centre and Bryn Mill Lane. This is likely to become worse which could potentially lead to increased maintenance costs.

- The potential impact of the Lagoon to cause greater mud deposition / accumulation in the shallow sub-tidal and intertidal areas, possibly leading to more extensive salt-marsh development in the medium term, which would have potentially negative implications for the existing habitats and biota, visual landscape and recreational use of the area.

- The possibility that construction of the Lagoon will lead to increased sediment dredging requirements upstream of the Tawe barrage, as well downstream in the main Tawe navigation channel. (CCS has a Parliamentary obligation to dredge the impoundment).

- The magnitude of changes in flood risk arising from greater wave heights around parts of the Bay (the Environmental Statement suggests increases in wave heights, notably in the Mumbles – Oystermouth area, mainly from wave reflection off the Lagoon structure).

- The effect of possible changes in wave height / energy on recreational navigation in the approach to Swansea Marina, and on the potential for local sediment erosion adjacent to the western wall of the lagoon.

- The potential risk of remobilization of contaminated sediments during, and following, lagoon construction, and possible implications for sediment and water quality on the recreational beaches.

- The adequacy of the Coastal Processes Baseline Assessment undertaken for the Environmental Impact Assessment.

- The adequacy of the modelling undertaken as part of the EIA relevant to the above questions.

- Requirements for monitoring and mitigation measures which might be paid for by the Developer if the development is consented, including requirements for the specification of change thresholds for action.

*Sediment Supply to Recreational Beaches*

11.9 As stated in the Coastal Processes chapter (Chapter 6) of the ES, construction of the lagoon would effectively divide northern Swansea Bay into two separate hydrodynamic and sediment transport cells, one to the east and one to the west of the lagoon structure. This is anticipated by ABPmer to have two main effects: (1) it would interfere with the anticlockwise residual current in northwest Swansea Bay which is capable of transporting suspended mud, and (2) it would prevent episodic storm-generated littoral transport of sand from north-eastern Swansea Bay towards the west, potentially cutting off the supply of sand to the recreationally important beaches between West Pier and Singleton Park.

11.10 No results of sand transport modelling are presented in the Environmental Statement to support this conclusion. Figure 6.15 of the Environmental Statement shows postulated sand transport pathways in Swansea Bay based largely on previous work summarised in Collins *et al*. (1979). It shows (probably episodic) tidal current transport from the nearshore area off Crymlyn Burrows, across the proposed Lagoon footprint area, towards the anticlockwise tidal eddy in northwest Swansea Bay. However, there is very little empirical evidence to suggest that this pathway is significant for the transport of sand; as reported by Collins *et al*. (1979) and Collins & Banner (1980), tidal current velocities in northern Swansea Bay are too low to entrain sediment from the bed and can only transport fine grained sediment (mud and very fine sand) in suspension. Waves and wave-induced currents are more important for the entrainment and transport of sand across the Bay. The main source of sand is provided by sources external to the Bay, and south-westerly storm waves, combined with the flood tide, play an important role in transporting sand south of Mumbles Head towards the northern and eastern parts of the Bay. The geomorphological evidence from shoreline features demonstrates that the dominant (net) direction of littoral sand transport along the entire shore of northern Swansea Bay, from Oystermouth to the Neath estuary, is easterly. No specific modelling of littoral sediment transport has been undertaken in the Environmental Statement.

11.11 There is no reason to expect that the construction of the Lagoon will change the rate of sand supply from the southwest into Swansea Bay, although this has not been demonstrated in the Environmental Statement by modelling using the Mike 21 Sand Transport module. However, retention (accumulation) of sand in north-western Swansea Bay may be made more likely due to a predicted reduction in both significant wave height (and hence wave energy) (Figures 6.45, 6.46, 6.47, 6.48, 6.49) and tidal current speeds (e.g. Figure 6.34).

11.12 Sediment transport in the shallow sub-tidal and intertidal areas of northwest Swansea Bay is complex. Aerial photographs taken since 1945 show a complex pattern of sand-waves which experiences significant change on annual to decadal timescales (Figure 1 of KPAL Report No: 160995). No analysis of the importance of these features in onshore - offshore alongshore sand transport has been undertaken as part of the Environmental Statement. No attempt has been made to construct a sediment budget for northwestern Swansea Bay, or to document net gains or losses of sediment using historical beach profile data or aerial photogrammetry. However, it is clear from a qualitative comparison of the aerial photographs and beach survey data that there have been periods when there has been a more or less continuous cover of mainly sandy sediment across the north-western part of the Bay, and others when the sand has been concentrated into discrete sand wave features separated by exposures of early to mid Holocene-age muds and peat. The width and elevation of the upper sandy beach between Black Pill and the Civic Centre has also varied in response to variations in wind and wave conditions. The period between 2000 and 2013 was one of relatively few storms and during this period there was a net movement of sand from the shallow sub-tidal areas and mid intertidal zone towards the higher intertidal zone. By 2005 / 6 a very large quantity of sand had accumulated on the upper beaches, giving rise to significant problems of windblown sand incursion onto the promenade and Oystermouth Road (see below). The problem has continued until the winter of 2013/ 14, when a series of severe storms caused significant upper beach and frontal dune erosion and transfer of sand back to the mid / lower intertidal zone (Pye & Blott, 2012, 2014a,b). However, since the 1970s there has been significant net accretion of littoral sand in northwest Swansea Bay between the south side of Black Pill and West Pier (with the exception of the Civic Centre frontage which lies seaward of the general shoreline alignment).

11.13 On the basis of the available evidence, the KPAL Report No: 160995 concludes that it appears unlikely that the supply of sand to the recreational beaches between the west pier and Blackpill lido would be significantly reduced as a result of construction of the Lagoon. The net effect is more likely to increase the retention of sand brought into this part of the Bay (mainly by wave processes) and to reduce the severity of upper beach erosion during storms between St. Helen's and West Pier due to the shelter provided by the Lagoon (especially from southeasterly waves). However the western part of the bay from Blackpill lido to Mumbles is unlikely to see any increase in sand deposition.

*Resilience of Sand Dunes and Implications for Coast Protection and Flood Risk Management*

11.14 Events during the stormy winter of 2013-14 demonstrated the importance of dunes as a reservoir of sand which is available to release sand to the beaches during storms, and in preventing direct wave attack on the sea wall behind (Pye & Blott, 2014b). Any increase in the frequency / magnitude of dune erosion would potentially diminish this role and increase the risk of storm damage to the sea wall and infrastructure behind. However, as noted above, a consideration of the evidence suggests that the effect of Lagoon construction would be to reduce wave heights, encourage sandy sediment retention on the beach, and reduce the risk of serious dune erosion between St Helen's and West Pier. The 'protective' effect of the Lagoon would decrease westward, especially for south easterly waves, with probably no net change in the vicinity of Black Pill.

*Wind-Blown Sand Hazard*

11.15 If, as anticipated, there is a medium to longer term increase in total sand volume in the intertidal and supra-tidal areas between St Helen's and the Civic Centre, the existing problem of wind-blown sand incursion onto the promenade, Oystermouth Road and into the Civic Centre west car park is likely to become worse (Pye & Blott, 2012, 2014a,b). This would potentially result in increased maintenance costs associated with removal and disposal of sand from the promenade, road and car park, and increase the safety risk to pedestrians, cyclists and motorists.

11.16 Near Swansea Point, adjacent to the West Pier, the existence of a fairly wide belt of sand dunes should prevent any additional sand blowing on to the promenade and into properties, provided that the recent improvements to sand fencing and visitor management are maintained (Phillips, 2014).

*Intertidal Mud-Deposition and Possible Saltmarsh Development*

11.17 The coastal processes modelling with the lagoon in place has suggested increased mud deposition in parts of northwestern Swansea Bay, predominantly within shallow sub-tidal area adjacent to Blackpill SSSI, and to a lesser extent across the adjoining intertidal zone including the mid foreshore seaward of the recreational beaches between St. Helen's and West Pier (ES Figure 6.50 , 6.52). The predicted reductions in high tide levels (e.g. ES Figure 6.42), current speeds (e.g. 6.34) and wave heights (e.g. Figure 6.45) suggest that there is a significant risk of increased mud deposition and accumulation across a much wider area, especially within the sheltered areas leeward of the higher intertidal sand bars.

11.18 The effect of increased mud deposition would be to restrict the mobility of the sand bars if mud drapes are formed on the bars and/ or the movement of sand across the surfaces between the bars is reduced as exposures of 'hard' peat and consolidated mid Holocene muds become progressively buried by new mud deposits. Such changes could have implications for the in-fauna and birds as well as affecting the exchange of sand between the upper beach and the lower sub-tidal areas.

11.19 The increased deposition of both sand and mud, together with slight reduction in high tidal levels, indicated by the Environmental Statement modelling, implies a progressive reduction in average water depths and reduction in wave and current energy which will increase sediment accretion by positive feedback. If upper foreshore levels rise sufficiently and wave action is reduced, saltmarsh vegetation will become established, leading to a further acceleration in mud accretion rates. This would change the visual appearance of the shore and potential affect recreational usage. The extent of the existing saltmarsh elevation 'window' is shown in Figure 2 of KPAL Report No: 160995. This could increase significantly in the medium term following Lagoon construction.

11.20 Considerable time and effort has been spent in the past to prevent the development of *Spartina* marsh in the western part of the Bay, involving spraying, pulling and bull-dozing of pioneer vegetation, and such measures could be required again in the future. These historical problems have not been considered in the Coastal Processes Baseline Assessment and the possibility that similar action in the future may be required following construction of the lagoon have not been recognized.

*Dredging Requirement in the River Tawe Impoundment*

11.21 The ES modelling with the Lagoon in place has indicated higher rates of mud deposition within the approach channel to Swansea Docks during 1 in 10 year and 1 in 20 year storm events, and it is estimated that there will be a mean increase in dredging requirement of 52 x $10^3$ $m^3$, or 27%, annually). Mud accretion along parts of the eastern wall of the Lagoon where tidal energy would be reduced is also indicated by the modelling.

11.22 Figures 6.50 – 6.52 of the Environmental Statement show no increase in mud deposition in the innermost part of the Tawe channel immediately downstream of the Tawe Barrage. However, the Environmental Statement model domain does not extend upstream to include the areas on both sides of the barrage, and contains no specific assessment of potential changes in sedimentation within the impoundment.

11.23 The barrage structure, completed in 1992, includes a boat lock, spillway, fish pass and generator turbine and is designed to allow overflow at the approximate level of mean high water in Swansea Bay (c. 3.4 m OD). Tidal overtopping of the barrage therefore occurs on spring tides, allowing ingress of marine sediment carried in suspension. The majority of sediment transported into the impoundment is likely to settle out and require periodic removal by dredging. The magnitude of the sediment carried into the impoundment, and of any likely change in dredging requirement following lagoon construction, has not be quantified in the Environmental Statement coastal process modelling. However, there is a significant possibility that some of the fine sand and mud released into the water column during the construction phase could be transported over the Tawe barrage on spring tides and become trapped within the impoundment. Longer-term increases in sediment accumulation are also possible and should be monitored.

*Adequacy of the Baseline Assessment*

11.24 The report presented by Kenneth Pye Associates Ltd highlights that the Coastal Processes, Sediment Transport and Contamination Baseline Assessment displays the following limitations:

- Limited scope of literature review – no detailed consideration given to outputs of previous research projects such as those carried out by the Institute of Oceanographic Sciences (e.g. Heathershaw *et al*., 1980) and Swansea University (e.g. Collins, *et al*., 1979, 1980; Collins & Banner 1980; and more recently by SEACAMS).

- No detailed quantitative analysis undertaken of historical maps, charts or aerial photographs; no attempt made to quantify historical sediment volume or sea bed level changes in different parts of the Bay.

- Very limited analysis and use made of existing environmental monitoring data – e.g:

  - Tide gauge data for Mumbles held by NTSLF and PSMSL
  - Wind data for Mumbles available from Met Office
  - LiDAR data available from EA Geomatics
  - Recent dredging data relating to Ports of Swansea, Port Talbot and Neath
  - Swansea Bay and Carmarthen Bay Coastal Engineering Groups intertidal profile monitoring data 1998-2013

- No detailed field studies have been undertaken from a geomorphological or sedimentological perspective.

- No intertidal sediment samples have been collected or analysed for particle size or levels of contaminants.

- No measurements made of sediment thickness / lithostratigraphy (e.g. from shallow geophysics or boreholes).

- Only a limited number of sub-tidal sediment samples has been collected and analysed; the number and spatial distribution are inadequate to allow sediment trend analysis (STA) or detailed mapping of sedimentary facies.

- Metocean data (water levels, currents, limited suspended sediment concentrations) were collected by Titan Environmental Surveys (2012a) from only two locations (both within the approximate lagoon footprint) and for a short time period (3 months between 16 February and 16 May, 2012). While the data are adequate for model calibration and validation purposes (as reported by ABPMer 2013a), they do not give a full picture of the range of conditions experienced in Swansea Bay. The measurement period included a significant period of time when conditions were dominated by high pressure and northeasterly winds. No long-term wave buoy deployment was used to provide data about wave conditions within the northern part of the Bay.

*Adequacy of the Coastal Processes Modelling*

11.25 Kenneth Pye Associates Ltd also highlight that the coastal processes, sediment transport and contamination modelling also has a number of limitations:

- Modelling has been restricted to use of a single suite of 2D modelling tools, mainly DHI Mike 21 -FM -HD (flexible mesh hydrodynamic model) and Mike 21 FM-SW (flexible mesh spectral wind-wave model; these are widely used and highly respected models but are applicable only to modelling of change over relatively short time periods. They do not include process – sediment transport - bedform feedbacks and the FM-HD model provides only depth-averaged current velocities and suspended sediment concentrations

- The discussions of the hydrodynamic and wave models provided in Appendix 6.1 of the ES are brief and lack detail. Some further information relating to the hydrodynamic and wave modelling is provided in a report by ABPmer (2013a), but there is no discussion of the DHI Mike 21 mud transport module, sand transport module or particle tracking module in any of the presented documents.

- No validation of the mud transport, sand transport or particle tracking modules has been undertaken using observational data.

- No results for sand transport modelling are presented in the ES, even though much of Swansea Bay is sand-dominated.

- The modelling has considered changes mainly at a regional scale; the models do not capture the details of processes, sediment transport and morphological changes in shallow sub-tidal and intertidal areas.

- Although the short-term hydrodynamic, wave and sediment modelling, undertaken is adequate for the assessment of regional scale changes in water levels, depth-averaged currents and broad scale patterns of likely sediment erosion and accretion, it cannot resolve the detailed patterns of wave - current interaction and sediment movement in the intertidal and shallow sub-tidal areas which are critical for the understanding of likely impacts on the morphology and sedimentary character of receptors.

- The Environmental Statement contains no specific consideration of surface zone processes and littoral sediment transport.

- Appendix 6.4 provides a convenient summary, in tabular form, of all the model runs undertaken as part of the Coastal Processes assessment. Nine model runs were performed using the Mike 21 FM-HD (hydrodynamic) model (including three sensitivity test runs using modified intertidal bathymetry), six runs using the Mike 21 SW (Spectral Wave) model, three using the Mike 21 PT (Particle Tracking) module, two using the Mike 21 MT (Mud Transport) module, and two using the Mike 21 ST (Sand Transport) Module).

- The data used to construct the bathymetric grid used in the short-term modelling originate from several different sources and are of varying age and resolution (this is described in Appendix 6.2 of the ES (Model Bathymetry Review) and in reports by ABPmer 2013b,c). It would have led to increased confidence in the results if the baseline assessment for the project had included collection a comprehensive new bathymetric data set using specially commissioned, synoptic, multi-beam swath bathymetry and airborne LIDAR surveys.

- Most of the hydrodynamic and particle tracking model runs undertaken relate to the construction phase of the proposed development, specifically in relation to the effect of dredging of sediment within the lagoon area and the filling of Geotubes to construct the framework of the lagoon, and to a lesser extent the disposal of surplus dredged material at the Swansea Outer Grounds licensed disposal site. By their very nature, the modelling tools are unsuited to assessment of medium to long term (> 30 days) effects on sediment erosion and deposition patterns / rates during the lagoon operation and decommissioning phases.

- It is evident from Environmental Statement Chapters 1 and 4 that considerable uncertainty remains regarding the methods which might actually be used to construct the Lagoon. It is presently unclear whether Geotubes or more conventional construction methods using imported rock / concrete / fill will be used for parts or all of the construction. No modelling of possible alternatives to Geotubes has been undertaken in Environmental Statement Chapter 6.

- It is also mentioned in Environmental Statement Chapter 4 that the western training wall of the River Neath may be re-built; this has not been included in the modelling. The possible requirement to extend the existing treated sewage / storm-water discharge outfall beyond the limits of the Lagoon walls also has not been modelled.

- The wave modelling undertaken using Mike 21 FM-SW considered two wave approach directions, the prevailing southwesterly approach direction, and a southeasterly direction. The analysis focused mainly on changes in average wave height around the Bay. Patterns of wave refraction with changing pre- and post-construction bathymetries have not specifically been considered even though this aspect is likely to be important for nearshore and intertidal sediment transport.

- Waves from a south-south-west to southerly approach direction have not been considered although these could be important in terms of wave penetration into the mouth of the River Tawe (with implications for small craft navigation), wave interaction along the western walls of the proposed lagoon and the West Pier, and the transfer of sediment over the Tawe barrier.

- Longer-term changes have been considered only using expert geomorphological assessment (EGA) based on the outputs of the short-term numerical modelling and the baseline understanding; no quantitative numerical modelling has been undertaken for alternative future scenarios, using modified bathymetries. The fact that only a limited number of scenarios have been assessed by the short-term modelling, and the baseline assessment is of limited scope, restricts confidence in the EGA.

- No detailed modelling of the Decommissioning phase has been undertaken and only a very brief qualitative assessment based on EGA provided. The option of total removal of the lagoon structure on decommissioning has not been considered. The consequences of allowing the Lagoon structure to degrade through lack of maintenance in the long term also have not been considered.

*Requirements for Monitoring, Mitigation and Possible Remediation*

11.26 Two potential methods of monitoring are identified in the Environmental Statement as potential contributors to an Operational Environmental Management Plan (OEMP):

- Beach profile monitoring to the west of the lagoon extending into the Blackpill SSSI and to the east in front of Crymlyn Burrows.

- Monitoring of sedimentation within the navigation channel to Swansea Docks.

11.27 In view of potential concerns about the potential impacts of the development on the beaches, intertidal flats and adjacent sub-tidal areas of northwestern Swansea Bay, including possible impacts on windblown sand hazard, mud accretion / saltmarsh development and dredging requirements in the Tawe barrage impoundment, it is suggested by Kenneth Pye Associates that a more extensive programme of pre-construction baseline data acquisition and subsequent monitoring should be agreed with the applicant, and other bodies including Natural Resources Wales, if a DCO is granted. Specific thresholds of change should be agreed which trigger further action in terms of mitigation / compensation / remediation.

11.28 From the viewpoint of physical processes and sediments, the following should be undertaken:

- A baseline LiDAR and comprehensive swath bathymetric survey of the whole of Swansea Bay before any construction activities commence.
- Repeat LiDAR / swath bathymetry surveys at 5 yearly intervals to allow quantitative assessment of changes in beach sediment volume.
- RTK GPS surveys of additional beach profiles to be established between the existing Swansea Bay and Carmarthen Bay profiles line shown in Figures 2 to 5.
- Bathymetric surveys to monitor sediment accumulation in the impoundment above the Tawe barrage
- Aerial photography surveys at 5 yearly intervals to monitor changes in morphological features and vegetation extent (e.g. saltmarsh).

- A comprehensive sediment characterization study of Swansea Bay, involving a minimum of 200 sampling points across the whole of the sub-tidal and intertidal area; samples should be taken from the surface and from specified depth intervals below the sea bed.
- Repeat sediment sampling at 5 yearly intervals in a reduced number of targeted locations.
- Continuous water level, wave and tidal current monitoring in at least two locations within northern Swansea Bay (e.g. using smart buoys).
- Installation of a weather station (including anemometer) at the control centre on the lagoon wall.

11.29 Kenneth Pye Associates Ltd advise that agreement should be reached regarding responsibility for any actions which may be required to tackle potentially adverse impacts such as increased windblown sand hazard, increased dredging requirement, improved coast protection / flood defence, and control of invasive saltmarsh vegetation. Additional agreements should be made in relation to habitat and species monitoring / mitigation.

11.30 With regards to the formal amendments to the application, as submitted by DLA Piper on 3rd June 2014, the following advice has been provided by Ken Pye Associates on behalf of CCS:

11.31 Annexe 9 – Submission re: UV water treatment facility, for option reduction - the decision to abandon the option of the UV water treatment plant and to go for the option of extending the storm water / treated effluent outfall beyond the Lagoon footprint.

"This in itself constitutes a potentially significant engineering scheme which has not been subject to any kind of assessment in terms of its impact on coastal processes, sediments and potential contamination. The potential impacts are likely to depend on the design and method of construction – e.g. whether by open cut trenching followed by burial of the pipe, or construction of an exposed pipe on piers across the sea bed. More details should be required from the Developer and a full coastal processes / ecology / navigation risk assessment undertaken. An extended, exposed outfall could potentially have major effects on hydrodynamics and sediment transport during both construction and operation."

11.32 Annexe 10 – Submission re: temporary cofferdam, for option reduction.

11.33 Location 'A' has now been identified as the preferred location for the sluices and turbine housings. The implications of building a temporary sediment berm / Geotube cofferdam at this location need detailed consideration. The potential impacts during the construction and removal phases have not been modelled or been subject to any other kind of physical processes / sediment assessment. It is advised that this would appear to be a substantial task which would take some time to complete; the effects of sediment dredging, filling of Geotubes and rock emplacement, followed by at least partial removal, need to be fully assessed by further modelling and possibly by geotechnical investigation and sediment testing.

## 12.0 Intertidal and Subtidal Benthic Ecology

*City and County of Swansea Unitary Development Plan*

12.1 Policies EV25 (sites of international importance), EV27 (SSSI's and National Nature Reserves) and EV28 (sites of local importance) are set out above.

*Adequacy of Application/DCO*

12.2 The bay contains a number of intertidal and subtidal habitats including *Sabellaria* reefs and peat and mud exposures which are sensitive to changes in sediment movement. Relatively small changes in the flow of currents, wave structure and sediment deposition can lead to large changes in the quality and distribution of these habitats.

12.3 The current modelling of the coastal processes is not detailed enough to come to a precise conclusion as to the possible effects of the construction of the lagoon on the intertidal and subtidal habitats. and species.

12.4 The KPA:L 2014 report states that "The predicted reductions in high tide levels (e.g. ES Figure 6.42), current speeds (e.g. 6.34) and wave heights (e.g. Figure 6.45) suggest that there is a significant risk of increased mud deposition and accumulation across a much wider area, especially within the sheltered areas leeward of the higher intertidal sand bars. This needs to be discussed and possible effect indicated in detail.

12.5 Kenneth Associates Ltd has also stated that "The effect of increased mud deposition would be to restrict the mobility of the sand bars if mud drapes are formed on the bars and/ or the movement of sand across the surfaces between the bars is reduced as exposures of 'hard' peat and consolidated mid Holocene muds become progressively buried by new mud deposits. Such changes could have implications for the in-fauna and birds as well as affecting the exchange of sand between the upper beach and the lower sub-tidal areas" and that "If upper foreshore levels rise sufficiently and wave action is reduced, saltmarsh vegetation will become established, leading to a further acceleration in mud accretion rates." (Section 5, KPAL Report No: 160995).

12.6 Peat and clay exposures with piddocks are a UK Biodiversity Action Plan priority habitat and a Section 42 Habitat. This biotope is considered to be scarce in the UK. There are sections of this habitat across Swansea Bay, for example, just to the south of the end of Mumbles Pier where clay with piddocks occurs just below spring low tides. This important habitat which is vulnerable to changes in sediment distribution is not mentioned.

12.7 The data on the distribution and species of plankton and macro algae is largely based on desk top studies some of which are now several years old. If these habitats and species are to be protected it is considered essential that an accurate base line is established against which to measure any change.

12.8 The existing data needs to be checked in order to allow an up-to-date base line to be established. There is no reference to the Mumbles Pier Lifeboat Station Subtidal Survey report (Moore, J.J. (2003) Mumbles Lifeboat station Subtidal Survey, May 2003). A report to Posford Haskoning Ltd from Coastal Assessment, Liaison and Monitoring. Cosheston, Pembs.

12.9 There is no description or listing of the Section 42 intertidal and marine habitats and species (Natural Environment and Rural Communities Act 2006) (other than *Sabellaria alveolata* and *Ostrea edulis*). The only distribution maps are of Biotopes but these do not describe Section 42 habitats and species. It is the view of CCS that this needs to be addressed to allow a full assessment of potential effects of the proposed development.

12.10 The information contained in paragraph 8.5.6.5 of the Environmental Statement is not up to date as there are a number of marine non native species in Wales. There is no mention of the Pacific oyster *Crassostrea gigas*, which is present in Swansea Bay whilst paragraph 8.5.6.15 of the Environmental Statement states that it is not recorded.

12.11 The Environmental Statement implies that the probability of the introduction and spread of non-native species from the Lagoon development is considered to be low. It is questioned on what evidence this is based, as there is the potential, without strict bio-security measures in place, for construction materials and vessels to act as vectors of transfer of invasive marine non native species within the lagoon footprint and outside of it.

12.12 Kenneth Pye Associates has pointed out that “Considerable time and effort has been spent in the past to prevent the development of *Spartina* marsh in the western part of the Bay, involving spraying, pulling and bull-dozing of pioneer vegetation, and such measures could be required again in the future. These historical problems have not been considered in the Coastal Processes Baseline Assessment and the possibility that similar action in the future may be required following construction of the Lagoon have not been recognized.” (Section 5, KPAL Report No: 160995.)

12.13 ‘A comprehensive baseline survey of sedimentary facies and contaminant levels in the surface and sub-surface sediments across northern Swansea Bay has not been undertaken, and uncertainty therefore remains regarding the potential for release and redistribution of contaminants outside the sampled areas.’ (KPAL Report No: 160995.) CCS identifies that this could have a negative impact on marine life.

*Carmarthen Bay and Estuaries European Marine Site (Burry Inlet SPA and Ramsar site; Carmarthen Bay and Estuaries SAC)*

12.14 There are risks of far-field effects which require particular attention. The eastern boundary of CBEEMS is only approximately 11 nautical miles from the proposed Tidal Lagoon site and yet has been overlooked, other than for bird species within the SPA. Each of the features of the EMS must be looked at systematically and considered

in terms of potential damaging effects during construction and operation particularly, in the context of sediment transport and the SAC Sandbanks feature.

## 13.0 Fish Including Recreational and Commercial Fisheries

*Adequacy of Application/DCO*

13.1 Some of the fish species e.g. herring are sensitive to increased sediment loads and noise both of which will increase during construction and may increase in the running phase of the lagoon. Disturbed sediments have the potential for smothering feeding and nursery areas for important species of fish. Again uncertainty in the sediment transport modelling makes it difficult to predict effects on sensitive species. herring spawn in Swansea Bay primarily within the bounds of the lagoon footprint and once built they will be excluded from this preferred area. There is no information that can with any certainty explain what will happen to spawning Herring in the Bay. No evidence has been provided to show that any alternative sites will be suitable. With uncertainty as to the levels of sediment movement particularly over time it is not possible to understand potential impacts on the other fish and shell fish species present in the Bay

13.2 It is stated in paragraph 11.6.1.1 of the Environmental Statement that herring spawning media on the outer Lagoon wall will safeguard fish stocks. CCS questions what evidence there is for this as none has been outlined?

13.3 Herring are an important food source for harbour porpoise (e.g. Santos2003, Bjorge et al 2008this was confirmed for the Swansea area during a 2.5 year research project at UWTSD Swansea Metropolitan( Oakley pers comm). Stomach content analysis of locally stranded harbour porpoise provided evidence of the importance of particular fish species. These included whiting, poor cod, herring and smelt. If herring are excluded from the Bay during piling, then the consequential effect on harbour porpoise and sea birds must be fully considered.

13.4 ‘A comprehensive baseline survey of sedimentary facies and contaminant levels in the surface and sub-surface sediments across northern Swansea Bay has not been undertaken, and uncertainty therefore remains regarding the potential for release and redistribution of contaminants outside the sampled areas.’ This could have a negative impact on marine life.

13.5 The Council is also aware that fishing interests on the River Tawe have expressed concern about the possible effects of the development on salmon and sea trout (sewin) fisheries.

13.6 As juveniles going to sea and as adults returning to spawn in the river of their birth, salmon and sea trout have to migrate through Swansea Bay, past the lagoon and its turbine array. Fishing interests and Natural Resources Wales have indicated in their representations to the ExA that in their opinion the applicant’s Environmental Statement is flawed and inadequate.

13.7 Salmon and sea trout fishing rights on the River Tawe, including those owned by the Council itself, are mainly managed by not-for profit clubs which make the fishing readily available at modest cost to the local community and the general public. In some areas the clubs have purchased the fishing rights, whilst in others they pay landowners (including the Council) for the rights. For example, Pontardawe and Swansea Angling Society manages the fishing on about 8 miles of the lower River Tawe (some owned, some leased) and has 300 members of all ages. Younger members pay £5 or £10 a year, disabled and senior members pay £20 a year and other adults pay £60 a year for the right to fish the club's waters. Other clubs have similar arrangements.

13.8 Fishing interests state that over the 10 years 2003-2012 the Tawe was ranked 7th in Wales for salmon catches and 18th in Wales for sea trout catches.

13.9 Salmon and sea trout are important species and the Council recognises the value of these fisheries, not just to their owners but to the community in general (as described, for example, in "Fishing For Answers – The Final Report of the Social and Community Benefits of Angling Project, 2012"[1]).

13.10 The Council requests the Examining Authority to:

- Attach importance to the representations of River Tawe fishing interests and Natural Resources Wales;
- Ensure that the applicant's environmental statement as to fisheries is examined critically;

- Ensure that robust mitigation and monitoring arrangements are put in place, so that harm can be minimised but detected if it occurs; and

- Ensure that adequate mitigation arrangements for fishing interests are secured in the DCO in case the fisheries are harmed.

## 14.0 Marine Mammals and Turtles

*Local Issues and Adequacy of Application/DCO*

*Grey Seals*

14.1 Grey seals (Chapter 10 paragraph 10.4.7) travel large distances and are present on the Gower and Swansea coasts. They are features of the Pembrokeshire Marine SAC, the Cardigan Bay SAC and the Pen Llyn a'r Sarnau SAC. No reference has been made to Carmarthen Bay and Estuaries European Marine Site (Carmarthen Bay and Estuaries SAC). Although grey seals are not listed as a feature of the site, they are present and there may be possible links to grey seal populations on the Pembrokeshire islands or North Devon and Cornwall coasts. The possible effects of the construction of the lagoon on these should be considered in the HRA. There is no evidence in reports to show that there will be no significant effect.

14.2 CCS remains concerned that this document reflects a lack of consideration about:

- Seals in this area possibly being part of a genetically distinct sub population of grey seals and so requiring regional rather than national or international risk assessment.
- The fact that there are a relatively small number of seals in the Swansea Bay area, which increases the significance of potentially negative impacts upon them. Even if a small number of seals are affected relative to the world population, the regional effects will be proportionally huge.
- That monitoring (of live and dead animals) which need to be extremely spatially and temporally comprehensive and very frequent to ensure that it will be statistically robust, with enough power to detect effects in the light of apparently small numbers of seals over apparently temporary time scales.
- The model of ADDs to be used.

*Harbour Porpoises*

14.3 It is known from scientific research (eg. Jenkins & Oakley, 2013) that harbour porpoise use Swansea Bay on a regular basis, and that calves have been observed on a seasonal basis. Harbour porpoise are a European Protected Species and are listed in Section 2 of the Conservation of Habitats and Species Regulations (2010) and are afforded legal protection, under section 41 of the regulations. Because of the lack of specific land-based surveys in the central part of the bay or dedicated vessel transects within the bay as a whole, the data presented does not explain porpoise habitat use or the location of critical habitats within the Bay.

14.4 The data also does not explain what likely impact the destruction of the herring spawning ground might have, herring being an important prey item for porpoises. The Environmental Statement fails to indicate that the lagoon construction will not be detrimental to the maintenance of porpoises in favourable conservation status (section 9b CHSR 2010).

14.5 With reference to paragraph 10.4.2.10 of the Environmental Statement and the reference to the Jenkins and Oakley (2013) report, raw data was analysed and a summary report provided specifically for the Swansea Bay area (a wider study area was investigated from Port Talbot Docks to Carmarthen Bay/North Gower). The raw data are not included but neither is it for most other reports, none of which have needed to be validated. It is confusing as to what exactly the statement ‘the supporting data would need to be reviewed’ means. The study has been reviewed and analysed by professional Researchers at the University of Wales Trinity St. David.

14.6 With reference to paragraph 10.7.0.4 of the Environmental Statement, the C-POD surveys began in 2014, as a long-term acoustic monitoring programme but it is not stated how long this will continue. This will only provide presence/absence data and not any behavioural data. Acoustic monitoring should accompany dedicated long-term land-based and vessel surveys (specifically within coastal Swansea Bay

rather than offshore where some data is available). It is stated that the results of acoustic monitoring will inform the subsequent monitoring strategies. This data cannot be included after the EIA/ES have been written and submitted. CCS would suggest that these surveys should have already been undertaken and form part of Chapter 10. Also, if, as stated, monitoring is to continue during construction and operation – it is unclear how this could be assured for 120 years.

14.7 With reference to paragraph 10.7.0.6 of the Environmental Statement, an appropriate package of adaptive mitigation and monitoring to reduce collision impacts will be developed as outlined in Chapter 23. This 'package' should be outlined and included in full as part of Chapter 10 of the Environmental Statement.

14.8 The proposal for acoustic deterrent is not outlined in sufficient detail for either fish or marine mammals. It is important that marine mammals do not become habituated to these deterrents. Other than acoustic monitoring, there is no mention of any visual surveys from land or vessels to monitor habitat usage and critical areas.

14.9 No provision is made for recording and monitoring any collision events .There is no strategy included to describe measures to be taken to deal with carcasses nor are there any details of what measures can be put in place to prevent collisions or near misses from happening again.

14.10 For the capture and release of trapped marine mammals, only seal pups are mentioned. There are no procedures identified for harbour porpoise entrapments? As described in Table 10.12 of the Environmental Statement, there is low confidence in collision risk with turbines and noise disturbance during the construction phase therefore the full mitigation measures must be described.

14.11 Strandings data does not appear to have been considered. Evidence for this is available from Marine Environmental Monitoring/CSIP.

14.12 With reference to section 8.2.1.2 of the Environmental statement, surveys undertaken by Researchers at UWTSD Swansea from 2010-2013 indicate that the location with the highest level of harbour porpoise calf sightings was Port Talbot harbour with 22% of all sightings (Oakley & Jenkins, 2014 in press). In view of this and the conclusions from Jenkins and Oakley (2013) report regarding the importance of inshore habitat for porpoise off Tutt Head, Mumbles and Port Talbot docks, it is not clear why only Mumbles in the west is a designated control site for C-POD deployment monitoring and there is no C-POD across the east of the Bay near Port Talbot to monitor this important habitat.

14.13 In the view of CCS, due consideration must be given to timings of construction, particularly in terms of piling and underwater noise pollution, based on seasonal distribution of particularly harbour porpoise mothers and calves. Oakley and Jenkins (2014, in press) note that 38% of all calves sighted across the study area of Port Talbot Docks to Burry Holms, Gower were during the April to September calving period. Other research using TPODS/CPODS has indicated high levels of night-time presence of harbour porpoise. Therefore, if

night-time piling operations are undertaken, monitoring for marine mammals must be considered together with mitigation measures.

14.14 There have been a number of potential impacts on cetaceans from wind wave and tidal developments (Dolman and Simmonds 2010) (Ensuring adequate consideration of cetaceans in Scotland's ambitious marine renewable energy plans Report SC/64/E3. WDCS, Chippenham, Wiltshire). These include increased noise, physical interactions, habitat changes, increased contamination and effects on prey. These authors have suggested that in order to assess impact, plan mitigation and protect the affected species, the following advice should be followed:

- Two years' data collection must be considered as a minimum baseline requirement. This data must help the implementation of the plans through an adaptive management process. It is essential that thorough impact monitoring that is appropriate and adequate for harbour porpoise, grey seal and other marine mammal species found in the area is carried out. Little attention has been paid to understanding potential impacts. Before any development site is determined and construction commences, it is very important to fill data gaps with information from detailed local baseline studies, particularly how cetaceans are distributed and how they utilise their habitats within Swansea Bay.
- To identify whether or not changes in abundance or distribution are the result of adverse impacts from development, data is required that allows for identification of such trends. Considerations should include direct effects on cetaceans as well as indirect effects on prey species.
- A strategic approach to understanding and filling the data gaps of marine species is required. Development of broader monitoring programmes then the development site itself will help to ensure cumulative and in-combination impacts are accounted for and monitored.
- Mitigation alone cannot be guaranteed to overcome biodiversity issues, especially where those mitigation measures are not tested and so may not be effective.
- European Protected Species licenses for any pile-driving or other licensable activities should not be provided until all disturbance requirements resulting from the EU Habitats Directive have been adequately satisfied.
- Acoustic Deterrent Devices (ADDs) introduce additional noise pollution to important cetacean habitats. The use of ADDs to minimise injury from pile driving has yet to be tested so remains unproven as a mitigation measure. ADDs should therefore not be widely advocated.
- The zone of behavioural disturbance may extend considerably beyond 20km for harbour porpoise (Tougaard et al, 2009). As a result, monitoring of behavioural impacts should be conducted to adequate distances.
- Little information exists about how marine mammals will interact with new structures being placed in the water column. With monitoring, particularly if strandings occur as a result, other significant impacts may still come to light.

14.15 It is the view of CCS that the results of monitoring and mitigation studies should be fed back into the decision making process to further develop mitigation and management decisions. CCS does not consider that the application fully addresses the above issues, in order to allow for considered judgement of the affect of the lagoon on cetaceans.

14.16 It is stated in paragraph 8.5.2.4 of the Environmental Statement that an appropriate reporting mechanism will be set up to report collision events and near misses. If this is to be included as monitoring then in the view of CCS the process must be developed prior to inclusion in this appendix and stated in full within this section.

## 15.0 Coastal Birds

*Local Issues and Adequacy of Application/DCO*

15.1 The Blackpill SSSI is designated for its nationally important overwintering wildfowl (particularly sanderling and ringed plover) and consists mainly of fine intertidal sediments. The uncertainty therefore in the coastal process analysis makes an assessment of possible effects difficult. Small changes in sediment movement particularly over a long time span could have a significant negative effect.

15.2 The effect of increased mud deposition would be to restrict the mobility of the sand bars if mud drapes are formed on the bars and/ or the movement of sand across the surfaces between the bars are reduced as exposures of 'hard' peat and consolidated mid Holocene muds become progressively buried by new mud deposits. Such changes could have implications for the in-fauna and birds as well as affecting the exchange of sand between the upper beach and the lower sub-tidal areas. ( KPAL Report No: 160995.)

15.3 There is no certainty that the pairs of lapwing and little ringed plover will simply relocate. They are a significant population in local terms and would suffer disturbance for the length of the construction phase. Suitable mitigation should therefore be provided.

15.4 The bay is also used by a nationally significant population of great crested grebe which could be adversely affected by a loss of feeding opportunities through destruction of herring spawning ground and through displacement. 'The predicted reductions in high tide levels (e.g. Environmental Statement Figure 6.42), current speeds (e.g. 6.34) and wave heights (e.g. Figure 6.45) suggest that there is a significant risk of increased mud deposition and accumulation across a much wider area, especially within the sheltered areas leeward of the higher intertidal sand bars.This could have significant impacts on coastal birds,their prey and the intertidal habitat these species depend on.

15.5 There may be a transfer of birds in particular oystercatcher, dunlin and curlew between Blackpill SSSI and the Burry Inlet SPA. These birds are features of the Burry Inlet SPA. If the Blackpill SSSI undergoes geomorphological changes due to the lagoon construction there may be a significant effect on the features of the SPA and this should be assessed.

## 16.0 Terrestrial Ecology

*Local Issues and Adequacy of Application/DCO*

16.1 There is no mention of the Swansea Bay Site of Importance for Nature Conservation (SINC) and no map of the SINC boundary included as a local designation. The map and citation is therefore provided here as **Appendix F.** SINC habitats and species are not mentioned.

16.2 The Swansea Bay SINC supports a number of section 42 (NERC Act 2006) habitats and species including seastock and small-flowered catchfly which is regarded as "vulnerable to extinction" in Wales. This is probably the last remaining population of small flowered catchfly in the Vice County of Glamorgan. listed as Endangered (IUCN, 2001) and Nationally Scarce.

16.3 There is no mention of invertebrate surveys, nor reference to the presence of Section 42 invertebrates including sand dart moth and robber-fly in the Black Pill SSSI and the SINC in Swansea Bay. It is considered that the Environmental Statement should include a discussion of the strandline habitat across Swansea beach within the chapter on terrestrial ecology (section 12.4.5.28). Only the strandline at Crymlyn Burrows SSSI has been outlined.

16.4 In order to assess the impact of the proposal terrestrial ecology, it would be useful to have a quantitative estimate of losses and gains of Section 42 habitats and species.

16.5 There is likely to be an increase in tidal flooding risk as a result of the Lagoon construction and even if relatively small, this could have a negative affect on section 42 habitats and species.

16.6 There is also considered to be a need for an Invasive non native species strategy referring to terrestrial species.

16.7 A reptile mitigation scheme needs to be agreed. There may be significant numbers of animals involved.

16.8 Whilst the Environmental Statement considers the effect on the westerly sand dunes and the sediment in the Black Pill SSSI to be minimal, there is however, still uncertainty attached to the sediment modelling and accordingly this conclusion may not be valid.

*Crymlyn Bog SAC*

16.9 Airborne pollution produced as a result of construction may reach Crymlyn Bog. The bog is very sensitive to changes in nutrient status brought about by fall out of airborne nitrogen compounds; an assessment of this should form part of the Habitats Regulations Assessment.

*Swansea Bay*

16.10 There is no mention of the draft Swansea Bay Environmental Management Plan (Commons Vision 2014) which is available from CCS. The predicted increase in visitor numbers is likely to put increased pressure on the fragile habitats within the bay, and will require additional management resources to prevent additional adverse environmental impacts.

**17.0 Mitigation and Monitoring in Respect of Coastal Processes, Sediment Transport and Contamination; Intertidal and Subtidal Benthic Ecology; Fish; Marine Mammals; Coastal Birds and Terrestrial Ecology**

17.1 With compensatory measures there are many gaps and uncertainties in the reporting. Further investigation and study is required which would possibly reduce the associated risk. Assessment of possible compensation measures depends on the accuracy and robustness of all the preceding assessment processes with the potential for uncertainties to become magnified. The findings should therefore be treated as indicative and would require further development in light of more detailed understanding.

17.2 Like for like compensation requires proportions of habitats to at least reflect the areas lost and to ensure the same degree of ecosystem structure, function and quality. Provision needs to be made for monitoring to ensure that it is achieved and if it is not, for further supplementary compensation measures to be adopted.

17.3 It is difficult to support claims of assessment of effects and provide adequate mitigation with the level of uncertainty in the coastal processes report. Therefore, it is the view of CCS that the precautionary principle should apply.

17.4 There is a significant risk from invasive non native marine and terrestrial species .There is a need for a full assessment of the risks involved and a strategy to deal with them.

17.5 'In view of potential concerns regarding the potential impacts of the development on the beaches, intertidal flats and adjacent sub-tidal areas of north western Swansea Bay, including possible impacts on windblown sand hazard, mud accretion / saltmarsh development and dredging requirements in the Tawe barrage impoundment, it is suggested that a more extensive programme of pre-construction baseline data acquisition and subsequent monitoring should be agreed with the applicant, and other bodies including Natural Resources Wales, if a DCO is granted. Specific thresholds of change should be agreed which trigger further action in terms of mitigation / compensation / remediation.

17.6 From the viewpoint of physical processes and sediments, the following should be undertaken:

- A baseline LiDAR and comprehensive swath bathymetric survey of the whole of Swansea Bay before any construction activities commence.

- Repeat LiDAR / swath bathymetry surveys at 5 yearly intervals to allow quantitative assessment of changes in beach sediment volume.
- RTK GPS surveys of additional beach profiles to be established between the existing Swansea Bay and Carmarthen Bay profiles line shown in Figures 2 to 5.
- Bathymetric surveys to monitor sediment accumulation in the impoundment above the Tawe barrage.
- Aerial photography surveys at 5 yearly intervals to monitor changes in morphological features and vegetation extent (e.g. saltmarsh).
- A comprehensive sediment characterization study of Swansea Bay, involving a minimum of 200 sampling points across the whole of the sub-tidal and intertidal area; samples should be taken from the surface and from specified depth intervals below the sea bed.
- Repeat sediment sampling at 5 yearly intervals in a reduced number of targeted locations.
- Continuous water level, wave and tidal current monitoring in at least two locations within northern Swansea Bay (e.g. using smart buoys).
- Installation of a weather station (including anemometer) at the control centre on the lagoon wall.

17.7 Agreement should also be reached regarding responsibility for any actions which may be required to tackle potentially adverse impacts such as increased windblown sand hazard, increased dredging requirement, improved coast protection / flood defence, and control of invasive saltmarsh vegetation (eg cord grass). Additional agreements should be made in relation to habitat and species monitoring / mitigation.'

17.8 A comprehensive baseline habitat and species survey should be undertaken prior to any work starting on site and a programme of ongoing monitoring agreed with CCS.

17.9 The possibility of translocating *Sabellaria* successfully is uncertain and there is no published literature on such an attempt. This needs more consideration, particularly because of the high proportion of this section 42 habitat that will be affected and because of its association with the herring spawning ground.

17.10 The selection of receptor sites within Swansea Bay has not been fully considered and there have been no actual trials undertaken on a local level. A full feasibility study and extensive research is therefore required. The statement therefore that "the potential for the successful rehabilitation of this reef habitat exists although approaches are experimental" – is not acceptable to CCS. With regards to Table 8.10 it is questioned how can the confidence level be 'High' when there have been no successful *Sabellaria alveolata* translocation projects in the UK? To be considered as a mitigation method the process should be known to be successful.

17.11 Public access to areas of mitigation e.g. salt marsh and new sand dunes will significantly reduce their ecological value. This issue needs to be addressed to ensure disturbance is minimised.

17.12 Some habitats are very difficult to mitigate or compensate for e.g. mud flats that are used by overwintering wildfowl. There have been historic losses of intertidal habitats in Swansea Bay and Cardiff bay, any further loss is unacceptable. It is the view of CCS that there needs to be a clear statement of how these losses can be compensated.

17.13 There is a need for a detailed long term monitoring particularly as there are uncertainties with the sediment transport modelling. There also needs to be an adequate plan to compensate for any adverse changes that are identified.

17.14 The assumptions within the report are wide-ranging and there is considered to be insufficient linkage between the findings for each section, for example fish with marine mammals

17.15 If, as anticipated, there is a medium to longer term increase in total sand volume in the intertidal and supra-tidal areas between St Helen's and the Civic Centre, the existing problem of wind-blown sand incursion onto the promenade, Oystermouth Road and into the Civic Centre west car park (Pye & Blott, 2012, 2014a,b) is likely to become worse. This would potentially result in increased maintenance costs associated with removal and disposal of sand from the promenade, road and car park, and increase the safety risk to pedestrians, cyclists and motorists. This should be addressed by way of financial contribution in the Section 106 Obligation.

17.16 The applicant's response to the ExA's Section 51 Advice outlines a number of potentially significant decisions with regard to the environmental impact assessment. However, as detailed submissions are not available at the time of writing this report, it is not possible to make a detailed assessment. The most significant points identified by Kenneth Pye Associates on behalf of CCS are:

I. Notwithstanding the comments below regarding water quality, the decision to abandon the option of the UV water treatment plant in favour of the option of extending the storm water / treated effluent outfall beyond the Lagoon footprint is in itself a potentially significant engineering scheme which has not been subject to any kind of assessment in terms of its impact on coastal processes, sediments and potential contamination. The potential impacts are likely to depend on the design and method of construction – e.g. whether by open cut trenching followed by burial of the pipe, or construction of an exposed pipe on piers across the sea bed. More details should be required from the applicant and a full coastal processes / ecology / navigation risk assessment undertaken. An extended, exposed outfall could potentially have major effects on hydrodynamics and sediment transport during both construction and operation.

II. The potential impacts during the construction and removal phases of the decision to build a cofferdam around the turbine housing construction area using 'sediment berm, Geotubes and rock armour' technology, rather than sheet piling option have not been modelled or subject to any other kind of physical processes / sediment assessment. This would appear to be a substantial task which would take some time to complete; the effects of sediment dredging, filling of Geotubes and rock emplacement, followed by at least partial removal, needs to be fully assessed by further modelling and possibly by geotechnical investigation and sediment testing.

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## 18.0 Marine Water Quality Assessment

*City & County of Swansea Unitary Development Plan*

18.1 Policy HC31 states that opportunities for the development of water based recreation facilities will be supported, subject to their compatibility with environment and nature conservation interests, water supply, commercial shipping and flood defence at locations including:

- Inland waterways – rivers, dock system and canals;
- Coast and estuary – including Swansea Bay, Oxwich, Port Eynon.

18.2 Policy EV34 states that development proposals that may impact upon the water environment will only be permitted where it can be demonstrated that they would not pose a significant risk to the quality and or quantity of controlled waters. Initiatives that lead to improvements in the quality of surface water will be approved subject to satisfactory ecological and visual safeguards.

*Key Issues*

18.3 N.B. These comments are made in respect of the amended application which removes the option of ultraviolet ("UV") disinfection of the storm water intermittently discharged through the existing long sea outfall in favour of extending the existing outfall from Welsh Water Treatement Works by 1.5km such that it is located, and therefore discharges, outside the perimeter of the lagoon. The concerns of the Council in respect of the UV treatment option within the lagoon do not therefore form part of this LIR.

18.4 The Council's Pollution Control & Public Health Division has identified the effect of the tidal lagoon on bathing water quality and in particular, the potential loss of the current prediction method, which is used to protect public health on an otherwise failing beach as the most important issue affecting the Division.

18.5 CCS regards the compliance of Swansea Bay as a very important issue. This is for economic regeneration reasons, for legal reasons, for socio-political reasons as well as the fundamental reason behind the revised bathing water Directive (2006/7/EC) – that is to protect public health. For a period of years the council was seeking help to fund the necessary fieldwork to create a successful predict and protect model which could be used in this context, in line with World Health Organization (WHO) Guidelines for Safe Recreational Waters 2003 (WHO Guidelines 2003) and to comply with the revised Directive. Eventually, through a Interreg ('Inter-regional') bid (the Ireland Wales Territorial Co-operation Programme 2007 – 2013), CCS was able to access over €4 million of public money to investigate this issue and successfully deliver a predict and protect model capable of coping with an extremely complex bay. This approach has been successfully used for Swansea Bay and is successfully using the 'discounting rules' in the Directive to change its current status from 'Poor' to 'Sufficient'. This is of major significance to the Council as it is promoted as the 'waterfront city' and much of the regeneration efforts over the last 20 years have been to refocus on the Bay and the Maritime quarter. Without this approach to the revised Directive, the Council would have to publicly sign Swansea Bay as a failing beach with very obvious swimming prohibition signs and similar information on the Internet by 2016. Apart from these important concerns, there would also be the potential for infraction proceedings for the continued failure of Swansea Bay as a designated bathing water under the Directive.

18.6 Critically, this approach is very much in line with the fundamental ideas behind the WHO Guidelines 2003, which led to the revision of the bathing water Directive. It was considered likely by WHO, in preparing the 2003 Guidelines, that in many bathing waters, there would be various sources of faecal indicator organisms (FIOs) and it would not always be possible to eliminate all sources of pollution, through remedial engineering of sewerage infrastructure alone, thus, to guarantee compliance at all times. For some years in Scotland, the Scottish Environment Protection Agency (SEPA) has used predictive models, based on local river flow and rainfall data, to predict when a nearby bathing beach may fail and sign it accordingly.

18.7 This type of 'black box' model approach has been promoted by the WHO and the EC principally in recognition of its potential to protect bathers from poor water quality during storm events. This is not a process based hydrodynamic model which can take many hours to days to complete a full complex simulation. The 'black box' approach examines statistical relationships between environmental predictor variables, based on real 'empirical' field data, allowing a sound prediction to be made quickly to give the public an informed choice of whether to swim at that time or not. There have been some attempts to produce statistical models based on weekly compliance data and predictors such as, rainfall, river flow, wind and tide etc. These models generally produced low predictive power and early trials in Swansea confirmed this. Hence, it was felt by CCS and its partners that this approach required a better scientific foundation provided by a high quality dataset of both the FIOs in the bathing water and the various natural predictors.

18.8 The Interreg funded 'Smart Coasts' project in Swansea Bay delivered exactly what had been hoped for. From 2010 until this year, CCS and its partners have managed to develop a model that accurately predicts the excess risk of gastrointestinal illness (GI) from bathing in Swansea Bay. This uses the well-established epidemiology that underpins the Directive and WHO Guidelines 2003 and uses as its threshold a 10% risk of GI, which is the same as the threshold for dropping into the Poor classification. This brings together the science behind the revised standards and the epidemiological research that underpins that work so that public health is protected and the regulator can apply the discounting rules to compliance samples taken at times when the beach is signed accordingly. CCS partners included Dŵr Cymru/Welsh Water, Natural Resources Wales, Aberystwyth University, University College Dublin and Cardiff University.

This project has been presented in detail to Welsh Government, Defra, Public Health Wales, Examining Authority, Scottish Environment Protection Agency (SEPA) and others and can be supported by fully documented reports (Statistical modelling of faecal indicator organisms at a marine bathing water site: results of an intensive study at Swansea Bay, UK – A report from the Interrag 4a Smart Coasts – Sustainable Communities Project August 2013) (Interrag Report). The selected model, which explained almost 80% of the variance in water quality, uses real-time environmental data, from meteorological and river gauging stations to drive the beach signage outcome. A copy of the Interrag Report is provided as **Appendix G.**

18.9 The black box model used in Swansea Bay since the start of the bathing season 2013 has performed successfully and is principally driven by ultraviolet (UV) solar radiation and tidal height. The other parameters necessary to run the model, currently using an Excel workbook, include flows in the Clyne River, extraterrestrial radiation, two other river flows into the bay and wind speed. This model predicts intestinal enterococci (IE), which was selected rather than *E. coli*, as IE allows prediction of a GI risk outcome. Some observers may be surprised that rainfall was not a strong predictor of water quality. However, the detailed IE data collected for the modeling exercise did exhibit a strong diurnal pattern throughout the bathing season, consistent with solar radiation input (and observations at other sites world-wide which have been so intensively sampled). This pattern was also present regardless of other conditions (e.g. rainfall), producing a considerable variation in water quality within each day. It was clear that for discounting to work in a Bay as complex as Swansea, a rapid application black box type approach was essential. It is the intention of CCS to move from running the model manually three times a day, to an automatic system operating an electronic sign on an hourly basis, which will have two standard messages - one for good water quality and one advising against bathing. CCS intends the system to operate from 09.00 to 20:00 BST in the same way as SEPA.

*Adequacy of Application/DCO*

18.10 It was always accepted by the Council that if the lagoon was consented there would be a period during construction when the black box model may become less accurate and would require re-calibration as soon as the lagoon construction was completed. Initially, the applicant indicated their willingness to fund that work, but, on the basis of an estimate of the fieldwork costs of circa £400k at 2017 prices for re-calibrating only the black box model was unacceptable.

18.11 The above referenced Interreg project reports suggest that the application cannot claim that it is simply a question of removing more sewer misconnections or carrying out more capital improvements and Swansea Bay will be compliant solely via the corresponding AMP programs as stated in paragraphs 7.4.2.6 and 7.4.2.18 of Chapter 7 of the Environmental Statement. Indeed, at a meeting of the project partners and the water company's consultants it was agreed that using the predict and protect model approach to discounting was essential to achieve Directive compliance. It must be borne in mind that the Revised Directive 'Sufficient' classification is temporary and using the 'Black Box' approach to 'discounting' will be even more important as achieving 'Good' status in Swansea Bay will be a huge challenge.

18.12 Chapter 7 of the Environmental Statement describes the black box model as a statistical correlation although it incorrectly states it is not a predictive model. It is specifically developed to provide real-time prediction of faecal indicator concentrations and thereby, the excess risk of GI. It clearly cannot define causality as it is a statistical model, however the predictors in the model do demonstrate plausibility (e.g. solar radiation variables are inversely related to IE concentration).

This does mean that it cannot attribute effects to sources (which it was not designed to do), but also that means that one should not assume that it will over predict after certain improvements or that it is more sensitive to these changes than to the construction of the lagoon (paragraph 7.4.2.24 of the Environmental Statement). It should also be noted that connectivity from riverine sources to the DSP suggested by the black-box prediction model has been confirmed by dedicated microbial tracer studies.

18.13 It is considered likely that a project as large as the tidal lagoon may change the offshore processes sufficiently to require a different set of predictors to run a black box model after construction. However, given the explanation of how it works, it is not considered sensible to try and second-guess how accurate it may be in the future after such a major change, or how many decades of natural change would require revalidation. What does seem probable is that it is not that sensitive to the infrastructure network improvements, given that the main predictors are fundamental natural processes affecting the survival of FIOs.

18.14 It is therefore the Council's position that unless there is a paradigm shift in the science around this subject, CCS would expect any consent for the tidal lagoon to require sufficient fieldwork (i.e. comparable to the presently available model calibration resource) to be undertaken at the applicant's expense so that a high quality predictive statistical model can be maintained with the same degree of explained variance as the current model.

18.15 With reference to the issue raised in the application on the future use of hydrodynamic models around the lagoon, given the variability of microbial concentrations on any given day in the bathing season and given the strong relationship with UV, it is respectfully considered as misleading to suggest, as the applicant does in Chapter 7 of the Environmental Statement, that somehow after construction some version of a storm impact model can be modified to continue this function. This model uses multiple runs of a hydrodynamic model to provide a library of scenarios which can be used to simulate a given future state of weather and tides quickly, thus to drive water quality prediction at a site. However, it should be appreciated that the hydrodynamic model predictions are only as good as the calibration and validation data on which they are based. In the case of Swansea Bay, the previous hydrodynamic models have been very significantly improved by access to the uniquely rich model calibration data afforded by the Smart Coast Interreg project which were shared with Dwr Cymru/Welsh Water and its modelling contractor at an early stage. The costs of this data acquisition exceeded £1.5m. However, even the best hydrodynamic models still have, as yet, not proven competent to simulate the diurnal variability in microbial concentrations observed at Swansea Bay's bathing water compliance site – although this is actively being investigated as part of the Interreg project.

18.16 It is considered likely and highly probable, that the proposed lagoon would significantly change the hydrodynamic behaviour of water flows within Swansea bay. This would compromise the utility of any hydrodynamic model calibration data collected to date.

Thus any future hydrodynamic model build needed to drive a Storm Impact modelling approach would need to replicate the extensive calibration data acquisition, paralleling the Smart Coast programme scope and costs to ensure that the hydrodynamic model produced was equivalent to the present models produced for Dwr Cymru/Welsh Water. If this was not done, and most importantly, appropriate funds not committed (i.e. it is likely that similar to the Smart Coasts £1.5m plus inflation would be needed), any hydrodynamic modelling used to underpin the storm impact approach would prove insufficiently precise in predicting faecal indicator organism concentrations at the Swansea Bay designated sampling point (DSP). Even then, there are significant difficulties in delivering any hydrodynamic model which could approach the 80% explained variance achieved by the existing black box model. However, CCS is open minded and happy to use the best predictive system, post construction, but would need the decision to be based on a 'back to back' trial with a fully transparent analysis of the comparative statistical power of any future approach, undertaken by an independent expert. It should also be noted that the current approach was publicly funded and is 'open – source' whereas the 'storm impact model' would be a commercial product and may not be freely available on a daily basis to the Council or Natural Resources Wales.

18.17 A further point raised by the Council's Pollution Control & Public Health Division is that the existing emergency short outfalls from Welsh Water's Sewage Treatment Works are not really taken into account. These would discharge into the lagoon directly, should there be a major problem. It is considered that this should be taken into account in a management plan for the lagoon users and will need Natural Resources Wales involvement to resolve at the same time as they deal with the existing old Queens Dock outfall, which discharges small amounts of untreated sewage into the lagoon area.

18.18 The final comment from the Council's Pollution Control and Public Health Division is in relation to the Water Framework Directive Assessment (Doc. 8.5). It is noted that the map used (section 3.2.0.4) to show the boundaries of the transitional water body for the Tawe Estuary does not appear to include the correct upper limit. The Tawe is tidally influenced as far upstream as Beaufort Weir at least. Also the impoundment itself is made up of 70% direct from Swansea Bay. Hence consequences of any dredging activity downstream could have implications within the impoundment and a significant distance up the Tawe.

## 19.0 Land Quality and Hydrogeology

*City & County of Swansea Unitary Development Plan*

19.1 Policy EV34 states that development proposals that may impact upon the water environment will only be permitted where it can be demonstrated that they would not pose a significant risk to the quality and or quantity of controlled waters. Initiatives that lead to improvements in the quality of surface water will be approved subject to satisfactory ecological and visual safeguards.

19.2 Policy EV38 states that development proposals on land where there is a risk from contamination or landfill gas will not be permitted unless it can be demonstrated to the satisfaction of the Council, that measures can be taken to satisfactorily overcome any danger to life, health, property, controlled waters, or the natural and historic environment.

*Local Issues*

19.3 Swansea Bay has operated as the main sink, for over 300 years, of very significant contamination by almost all the heavy metals. Swansea was the metallurgical world centre for the nonferrous metal smelting industries throughout the 17 and 1800s. A huge amount of contamination ended up in the River Tawe or the local canal systems. Much of this eventually ends up in Swansea Bay sediments.

*Adequacy of Application/DCO*

19.4 It is acknowledged as very difficult to come up with a sampling strategy that adequately describes the current situation at a reasonable cost. It is however a reasonable assumption that particularly during construction, it is possible that the production of shellfish for human consumption may need to be prohibited by the Food Standards Agency. It is accepted that this could be regarded as a temporary problem, which could be inevitable given the scale of construction, but CCS Pollution Control & Public Health Division has limited confidence in the approach that the various hotspots will be suitably diluted and will not accumulate in local filter feeders. In these circumstances it is considered reasonable to suggest a further risk assessment of the various pathways for the toxic or ecotoxic metals prior to agreeing a detailed dredging and construction plan. The application implies an iterative process but it needs to be clearer that the aim is not just 'geotechnical' but is also designed to avoid mobilizing metals where ever possible.

19.5 A similar lack of confidence exists around the discussion of contaminated land, particularly on land previously occupied by BP in and around the Queens Dock. A very limited remediation project is underway dealing with fairly serious and obvious contamination which has actually released free hydrocarbons into the intertidal zone. It is likely that there is much more widespread contamination around the Queens Dock area which would need to be properly assessed. This needs the usual type of conditions, agreed by ourselves and NRW, which can be properly enforced (not as outlined in the schedule of draft conditions).

*Remobilization of Contaminates Sediments*

19.6 On this subject area, the KPAL Report No: 160995 refers to the Environmental Statement, which concludes that there will be no significant risk of contaminant remobilization associated with dredging of sediment for construction of the Lagoon since none of the samples analyzed exceeds Cefas action level 2 for any specific contaminant (paragraph 6.4.4.5 of Chapter 6).

However, this conclusion is based on the collection and analysis of a very limited number of sediment samples, most from the surface or shallow depth and largely excluding the intertidal areas of the Bay (see Figure 6.16 of the Coastal Processes Chapter, Figure 4.7b of the Marine Ecology chapter and the summary Figure 6 in this report). As noted in paragraph 6.4.4.1 of the Environmental Statement Chapter 6, "Across the wider Swansea Bay region, and specifically within the footprint of the proposed Lagoon, there is a general paucity of historic sediment quality data".

19.7 Environmental Statement Appendix 6.3 provides a summary of the particle size analysis and contaminant analysis performed on sediment samples collected during the sub-tidal benthic survey and the geotechnical investigation (Atkins, 2013; Titan 2012b, 2013a,b; EGS, 2013). The total number of samples analysed for particle size and composition is very small for a project of this scale and does not give a comprehensive picture of the surface or sub-surface sediment character in the northern part of Swansea Bay. No sampling or analysis has been undertaken in the intertidal and supratidal beach areas of northwest Swansea Bay. No investigation has been carried out of the thickness of superficial sediment in these areas, or the sedimentary characteristics and chemical composition of older sediments which underlie them. A comprehensive baseline survey of sedimentary facies and contaminant levels in the surface and sub-surface sediments across northern Swansea Bay has not been undertaken, and uncertainty therefore remains regarding the potential for release and redistribution of contaminants outside the sampled areas.

## 20.0 Onshore Transport Assessment/ Highways, traffic, car parking, access and pedestrian movements

*City and County of Swansea Adopted Unitary Development Plan*

20.1 UDP Policy AS1 requires new development associated with housing, employment, shopping, leisure and service provision to be located in areas that are currently highly accessible by a range of transport modes, in particular, public transport, walking or cycling, on in areas where a good level of such provision can realistically be achieved.

20.2 Policy AS2 states that new developments should be designed to:

I. Promote the use of public transport and facilitate sustainable travel choices,
II. Provide suitable facilities and an attractive environment for pedestrians, cyclists and other non-motorised modes of transport,
III. Allow for the safe, efficient and non intrusive movement of vehicles, and
IV. Comply with the principles of accessibility for all.

20.3 The means of access to new developments should be designed to ensure that vehicle speeds are minimised, extraneous traffic is not attracted and impacts on the natural, historic and built environment and local communities are minimised.

20.4 Policy AS4 seeks to encourage the creation or improvement of public access routes whilst Policy AS5 states that development proposals will be required to consider the access requirements for pedestrians and cyclists and, where necessary, provide appropriate facilities and/or infrastructure to encourage their use.

20.5 Policy AS6 states that parking provision to serve development will be assessed against adopted maximum parking standards to ensure that proposed schemes provide appropriate levels of parking, including motorcycles and cycles.

20.6 Policy AS10 states that new developments will be required to incorporate appropriate traffic management measures to mitigate against significant adverse impacts that would otherwise be caused by traffic movements.

20.7 Policy EV3 of the UDP requires new development proposals to provide access and facilities for all; provide satisfactory parking in accordance with Council adopted design standards; contribute to a high quality public realm by improving pedestrian linkages with adjoining spaces and attractions and be accessible to pedestrians, cyclists and users of public transport.

20.8 Policy HC31 supports the development of water based recreation facilities subject to their compatibility with environment and nature conservation interests, water supply, commercial shipping and flood defence. The policy also sets out a line to be protected for the proposed link from the Tennant Canal to Swansea and for the linkage of the Swansea Canal with the navigable section of the River Tawe. It is stated that development that would prejudice the restoration of the canals or damage their fabric or infrastructure will not be permitted.

*Local Issues*

20.9 Highway Network: Fabian Way is an arterial road which forms part of the A483, connecting Swansea city centre with the M4 motorway at Junction 42. It is the main route into Swansea from the surrounding area and for traffic from further afield, and forms the principal object of study within the study area.

20.10 Fabian Way is a dual carriageway for its whole length in the study area. The speed limit is 30 mph between Swansea city centre and the junction with Port Tennant/SA1 Swansea Waterfront, after which the speed limit rises to 50 mph until the junction with Ffordd Amazon (Jersey Marine roundabout). The road is a standard, national speed limit, dual carriageway between Jersey Marine and the junction with the M4.

20.11 An extensive study has been undertaken on Fabian Way in order to prepare it for future traffic flows. A scheme has been prepared with a budget estimate of £25 million and all developments both in CCS and NPT that generate any traffic directly to Fabian Way are expected to contribute towards this sum of money on a pro-rata basis.

20.12 Bus services operate regularly in the vicinity of the site, with 11 services operating along Fabian Way, Elba Crescent or Baldwin's Crescent. All of these services start from Swansea Bus Station and travel between Swansea and various towns and villages to the east. Service 7 runs between Swansea Bus Station and Swansea Marina. The site can be accessed from bus stops at two locations. The first is on Fabian Way near the junction with Wern Terrace. These stops are approximately 3.7km from the western landfall, via Bevans Row and the new Lagoon access road. There is a pedestrian overbridge crossing Fabian Way providing access to the eastbound stop. The second location is near the Bay Campus, and is approximately 950m from the perimeter cycle and footpath that will run around the Project, approximately 3.3km from the western landfall, and is presently accessed from Fabian Way via Baldwin's Bridge.

20.13 There is a cycle path running along the southern side of Fabian Way between Kings Road and the junction with Port Tennant Road, which forms a section of both National Cycle Network route 4 (NCN 4) and the Swansea to Glyncorrwg Loop. NCN 4 provides links between Swansea, Neath, Briton Ferry, Port Talbot and several local villages. To the east of the Port Tennant junction the cycle path continues running adjacent to the southern side of Fabian Way and then crosses to the north via the pedestrian/cycle and bus bridge linking to the Park and Ride facility. The cycle path runs to the north of the Park & Ride site to Wern Terrace. It is then signed along a short section on Wern Terrace to the north side of Fabian Way, where is continues east to Baldwin's Crescent. NCN 4 is signed along Baldwin's Crescent and Elba Crescent until re-joining the north side of Fabian Way. It continues east to the Jersey Marine roundabout where it turns north to join Ffordd Amazon.

20.14 The existing rail sidings to the north of Fabian Way are still in use. Where the rail passes underneath Fabian Way it changes possession from Network Rail to ABP. The railway through the docks has not been in use for approximately eight years and would require refurbishment to be in a serviceable state. The railway lines within the docks also have some tight corners which may need upgrading to be usable by more modern rolling stock. The feasibility of using the rail sidings for import of construction materials has been considered and upgrade works would be required.

*Adequacy of the Application/DCO*

20.15 The Project is expected to employ approximately 72 staff during its operational phase, comprising 21 O&M staff and 51 staff at the Visitor Centre. Key O&M staff will work a rota ensuring coverage at all times to support the operation and security of the project. Visitor and staff car and cycle parking is included within the project area.

20.16 The project also makes provision for a shuttle bus service from the Park & Ride facility on Fabian Way, subject to investigation of its viability. No details have been provided as to the mechanism of how this may work, nor whether there is capacity in the existing Park and Ride to supplement parking for the Tidal Lagoon.

20.17 The application also refers to the provision of a water shuttle service between the western bank of the River Tawe and the lagoon but no further details have been included. (Please refer to the comments included within the Navigation and Marine Transport Assessment section of this report below.)

20.18 In terms of visitor numbers, it is anticipated that the project will attract some 70,000- 100,000 visitors a year, with national triathlon, swimming, sailing or running events occurring once or twice a year. These would be likely to attract between 2,000 and 8,000 visitors each. In preliminary discussions that have been held much larger visitor numbers were discussed and these relatively conservative figures would have a bearing on the level of the project contribution to the Fabian Way Corridor works that are proposed as joint venture between CCS and NPT and not considered to be sufficiently robust to give an idea on the level of traffic generated nor impact on the affected junctions.

20.19 In order to construct and operate the project, different types of access will be needed at different times, namely:

- Construction phase - for staff, HGV deliveries and abnormal loads (if required); and
- Operational phase - access at all times for O&M staff and emergency vehicles; local pedestrian, cycle and vehicular visitor access; visitor access from the wider area; and visitor access for major sporting events.

*Access impacts during the construction phase*

20.20 Much of the construction phase transport movement will be marine-based, including delivery of rock and the construction of the Geotubes®, which will use locally derived sediment from the seabed or a combination of dredge gravels and imported quarry run. This will limit construction phase impacts on the local road network.

20.21 However, some raw materials for concrete production, steel reinforcement, turbine components and other elements of the project will have to be imported by road. It has been assumed that sand required for concrete production will be obtained via Swansea Port, and that concrete will be produced at an on-site batching plant, which means that these activities will not generate any HGV movements on the external road network.

20.22 Based on these assumptions the maximum number of HGV deliveries using the local road network is expected to be 1,975/month. Based on a five and a half day working week, or 24 days in each month, this equates to an average of 82 deliveries per day. Assuming that deliveries are made between 08:00-18:00 this gives an average of 8 deliveries per hour, or 16 two-way trips. Even if the deliveries are restricted to outside of the peak hours (to minimise congestion on Fabian Way) of 08.00 to 09.00 and 17.00 to 18.00 then the resulting movements per hour would increase by 2 to 10 per hour, or by 4 to 20 two way flows.

20.23 Overall Construction phase traffic will result in an increase of 2.6% on Fabian way east and 0.7% west. In terms of HGV's there will be an increase of 12% on Fabian Way. Whilst there is anticipated to be minimal impact during the traditional peak hours there will be increase both before the morning peak and after the evening peak. The overall impact is said to be a short term minor adverse impact on the local highway network and CCS concurs with this statement.

20.24 Working hours during the construction phase have not yet been finalised. However, it is likely that there will be continuous working during some phases of construction. In terms of impact on the local highway network, the key busiest periods are the AM and PM commuter peaks, typically 08:00-09:00 and 17:00-18:00. When work is carried out in shifts, the start and finish times generally do not coincide with the regular commuter peaks. To ensure that the assessment of the impact of construction traffic is conservative it has been assumed that construction staff will operate typical daytime hours. Working hours for construction projects are typically 08:00-18:00 on weekdays and 08:00-13:00 on Saturdays. However, for safety reasons, it is expected that staff will not be permitted to drive their own vehicles close to the Lagoon seawall. Instead, transport will be provided between the site compound and the work area. Therefore, it is expected that construction staff will be required to arrive at the site compound by 07:30 in the morning, which will allow 30 minutes for transport within the site.

20.25 The implementation of the Construction Phase Travel Plan will include an access strategy for the project which will help minimize the impact of construction on all modes of transport. HGV movements will be timed to avoid peak hours and CCS request that a suitably worded condition to this effect should form part of any DCO granted. Furthermore, all HGVs will be required to travel to and from the site via the M4 and Fabian Way to avoid routing such traffic through Swansea city centre.

*Impacts during operational phase.*

20.26 A total of 21 staff will be associated with the operation and maintenance side (working 24 hours over shifts) whereas a total of 52 staff are to be employed to service the visitor and recreational facilities.

20.27 The project will form a new focal point as a tourist attraction within the bay and therefore an assessment of the impact on leisure related traffic has been made. In this respect, the Environmental Statement states that 'the normal weekday operation of the project will not have an unacceptable impact on local transport network. Leisure use at the site will be a greatest at weekends and therefore does not coincide with the weekday peak flows experienced on the highway network. Impact at weekends and in holiday periods is not expected to be significant.'

20.28 This statement is disputed and is of concern to CCS's Telematics Team as traffic flows in the summer holidays at weekends and lunchtimes can be in excess of the a.m. and p.m. peaks of a normal working week and hence severe congestion may arise. As some of the junctions are approaching capacity already this could result in unacceptable congestion and delays being experienced.

20.29 A suggested solution could be to install an Automatic Traffic Counter (ATC) at a location to be agreed which would provide daily vehicular movements to the site. A cycle ATC could also be included for completeness and in order to measure cycle daily flows adjacent to the vehicular access.

20.30 If the car flows measured are in excess of those expected than a financial penalty could be imposed, firstly to resolve any arising issues with the signals/junctions to improve flows and secondly to increase the contribution made towards the Fabian Way Corridor Study proposed series of works, over and above those already identified as being required due to the expected traffic flows predicted. In this respect, NPT has arrived at a sum of £535,000 as a financial contribution required for the Fabian Way Corridor Study works based on visitor numbers to Pembrey Country Park. This figure is agreed by CCS and will be used jointly between the two Authorities to fund the more pressing elements of the proposed upgrade.

20.31 The precise penalty levels should be identified and form part of the Section 106 Obligation.

20.32 Similarly patronage on the bus network will also occur when the background levels are not at their highest so impact on public transport is expected to be acceptable.

20.33 The lagoon will be capable of holding major sailing events and these may attract up to 8000 spectators per day. They would be one off events occurring several times per year.

20.34 Special measures would be put in place to manage vehicle and spectator movements. It is stated that there will be no spectator parking at site and that all visitors will park off site and be bussed in. A framework major events travel plan will be supplied prior to any event taking place in joint consultation with CCS and NPT. The major Events Travel Plan will attempt to minimise impact on all modes of transport and should be planned in advance with both local Authorities. Through the suggested measures it is hoped that impacts on the local highway network can be minimised.

20.35 No highway objections are therefore raised to the proposal subject to additional requirements in respect of:

1. No deliveries to be received on site (via on shore methods) between 0800 and 0900, and 1700 and 1800 in the interests of the free-flow of traffic along Fabian way.
2. The installation of an ATC (Automatic Traffic counter) at a site, the exact location to be agreed with the LPA in order to monitor ongoing traffic flows within the site.
3. The development of a financial penalty scale dependent on the levels of vehicular traffic over and above that predicted. The monies to be used to fund traffic signals alterations (if required), and to contribute and appropriate sum to the Fabian Way Corridor Study scheme already identified. Details to be agreed at a later date.

4. The nomination of a Travel Plan Co-ordinator within three months of the date of this consent.
5. The Construction Phase Travel Plan/Operational Travel Plan/Major Event Travel Plan to be developed in conjunction with the relevant affected bodies.
6. The payment of a sum to be agreed towards the Fabian Way Corridor study works, as per NPTBC committee report circa £535,000 towards improvement works on Fabian Way.
7. All the infrastructure works, vehicular access, shared use pedestrian/cycle path will need to be undertaken to Local Authority Standards and Specification.
8. Any off site car parks/park and rides will be the subject of separate planning applications.
9. Adequate cycle parking to be provided in accordance with details to be submitted for approval.
10. Adequate car parking layout to be laid out in accordance with details to be submitted for approval.

20.36 The lack of a pedestrian and cycle linkage to the west to connect to the city centre via the SA1 regeneration area is a significant issue. It is noted that this option was discussed at length with ABP but has been discounted for security reasons due to the route having to cross the lock to Kings Dock which is the sole sea access to the operating docks. Whilst an accessible ferry shuttle has been proposed to access Tidal Lagoon from the west bank (city side) of the River Tawe, this is only a minor compensation for the lack of a permanent physical path connection towards the city centre.

20.37 Whilst the reasons for this omission are understood, this is considered to be a fundamental missed opportunity to provide a direct and car free link from the City Centre and SA1, along the dock edge to the emerging Swansea University Bay Campus and onward links to the Wales Coastal Path and Sustrans cycle routes, in accordance with the Council's wider ongoing waterfront regeneration objectives.

20.38 In doing so, it is a missed opportunity to improve strategic linkages and to retrofit the Bay Campus within NPT in a sustainable manner to Swansea City Centre. This amounts to an integral component to delivering 'world class' public realm. Its forced omission from the scheme has severe implications in terms of sustainable connectivity, resulting in the essentially becoming a destination rather than part of the City.

20.39 Given the level of concern on this matter, it is respectfully requested that further investigation should take place as part of the formal examination to explore other options to secure a pedestrian and cycle connection westwards to Swansea City Centre, perhaps as part of a walkway integrated into the Kings Dock locks. If this is not successful, it is further requested that provision should be made for any DCO that is granted, to allow this option to be revisited at some point in the future.

20.40 Whilst a ferry shuttle may be novel, it will not accommodate high levels of visitors. There are also significant operational concerns, as set out in the Navigation and Marine Transport section of this report.

20.41 The proposed vehicular access road, with pedestrian and cyclist provision, leaves Fabian Way at what is referred to as 'McDonalds Junction' then passes eastward through vacant industrial sites to run alongside the existing port road as a separate carriageway. The proposed public road would be separated from the port road with a security fence. This parallel arrangement would run east to the existing port security point and then would turn westwards to run alongside the existing sea wall to the proposed inshore facilities. This route measures 3km from the existing eastern end of Langdon Road to the proposed western landfall building and would pass through what is currently a range of vacant sites with no activity or natural policing. Therefore given the significant distance; the convoluted route; the vacant sites and the perceived safety issues it is considered that this will discourage pedestrians and cyclists and it is likely that the Tidal Lagoon would primarily be access by car users and this may limit the potential number of users.

20.42 To make sense of the significant distance involved with regard to walking and cycling, the proposed access route along Langdon Road and then westwards into the docks measures 4.9km from Ice House Square to the proposed western landfall, whereas the direct route to the south from the same start and end points over the lock to the docks measures 1.35km.

20.43 There is also a fundamental conflict with the alignment of the proposed tidal lagoon access road and the protected route for the Tennant Canal as protected by UDP Policy HC31. Whilst the application references this policy it does not address the protected canal route. Therefore CCS requests mechanisms be put in place to allow a different road alignment that avoids the protected canal route to be agreed between Langdon Road and the existing port road (in the vicinity of the Welsh Water site).

20.44 Given also that the proposed vehicular access to the Tidal Lagoon passes through vacant sites that are no longer required for the operation of the docks, it is considered that the access road should facilitate/make provision for access to the potential development sites in this area in order to stimulate wider regeneration of the area. The Council is currently exploring this strategic issue with the relevant landowners as part of the Local Development Plan process via a concept master planning exercise.

**21.0 Navigation and Marine Transport Assessment**

*City & County of Swansea Unitary Development Plan*

21.1 Policy HC31 states that opportunities for the development of water based recreation facilities will be supported, subject to their compatibility with environment and nature conservation interests, water supply, commercial shipping and flood defence at locations including:

- Inland waterways – rivers, dock system and canals;
- Coast and estuary – including Swansea Bay, Oxwich, Port Eynon.

*Local Issues and Adequacy of the Application/DCO*

21.2 Much of the attention in the Navigational Risk chapters of the Environmental Statement appears to be on larger vessels. This is important, as CCS would not wish to see any increased risk of oil spills etc. However the Council must also be concerned about the risk to smaller craft, including sailing vessels, using the Council Marina or the local sailing clubs. This is particularly significant for Swansea as it is seen as a safe haven during storms. There are very few safe entrances under all conditions in the Bristol Channel and certainly no safe alternatives close to Swansea.

21.3 The lagoon wall will be a rocky lee shore for any small vessel approaching the Marina. This is particularly difficult for sailing vessels that also have to take account of some of the potential jet currents around the turbine area. Some of the figures for tidal flows, particularly in the area that vessels would need to pass through to enter the river, are concerning to CCS and in this respect the Marina Manager has commented that the proposed 50m exclusion zone around the turbine outfalls seems very small given the volume of water that would be passing through them. Due to flow rates it is a concern that smaller craft may struggle to negotiate the waters adjacent to the exclusion zone during operation.

21.4 Sailing vessels will not be able to deviate inshore to avoid this as they will run the risk of going aground at certain times. Given the variety of wind directions, the position of Mumbles Head, the shallow inner bay areas and the physical restrictions around the lagoon, this could make Swansea a far less attractive destination for Marina clients on the perception that it is a difficult place to enter or exit. This in turn may have knock on effects for local marine businesses.

21.5 This Environmental Statement comments on problems with increased wave heights particularly due to reflections from the lagoon wall, but considers them an insignificant risk. Also chapter 6 comments that vessels will be unaffected when manoeuvring in the channels (6.5.2.42). However chapter 6 claims that wave heights could increase by approximately 30 cm in exactly the area that small vessels will need to pass through to reach Swansea. In addition it should be noted, that small vessels will particularly struggle where the prevailing wind is against the strong jet currents ebbing from the turbine area. This will cause an additional wave height and can lead to a very unpleasant chop that smaller vessels can find difficult given the proximity to Mumbles Head and shallow waters.

21.6 Furthermore, vessels entering or exiting Swansea will be faced with a dredged approach channel, shared with commercial shipping, bordered on one side by the rocks of the lagoon and the shallows of Swansea Bay on the other during certain tidal conditions. It seems that the development will cause an increased risk to all users of the approach channel, as a potential escape route will be taken away by the scheme. These risks range from little or no time to react in the event of a vessel breakdown to avoid collision with the rocks of the lagoon, to an increased likelihood of collision between pleasure and commercial traffic.

21.7 The presence of a safety boat during the construction phase is welcomed, but given the rocky nature of the lagoon structure and the flows from the turbines, it may be wise to retain a safety boat post-construction in order to deal with events such as vessel breakdowns on a rapid response basis.

21.8 Increased siltation in the impounded waters, the estuary channel and Swansea Bay in general is of concern to CCS. In this respect, the Environmental Statement states a likelihood of increased dredging being required around the Tawe dredged channel. In paragraph number 14.6.2.31 and also in 6.5.2.74, table 6.18 as well as chapter 4, an increase of between 20 to 34% is suggested.

21.9 Any significant changes in siltation as a result of the scheme, particularly with the impounded waters or the estuary channel leading to the Barrage, could lead to a general perception that Swansea is a difficult place to get in to and out of. (Some visitors already claim that the River Tawe lock entrance is a little difficult as it is not dredged regularly or marked between the river entrance and the River Tawe barrage lock.) If this perception were to occur, it could result in a loss of Marina custom and could affect the viability of Swansea Marina, Swansea Yacht and Sub Aqua Club and the proposed SA1 Swansea Waterfront Marina development. In turn it could also affect the viability of local marine businesses whose trade relies on boat owners keeping the boats in Swansea. This is not just an issue that would affect local boat owners, as approximately 40% of the Swansea Marina customer base come from outside of the Swansea area and this percentage does not include the circa 500 visiting vessels received per annum.

21.10 Furthermore, given that the Council already struggles to fund its dredging liability in relation to the Barrage and most of the material dredged has entered from the bay, the lines of responsibility for monitoring and dredging post construction should be agreed. The existing limited dredging already costs £100k per annum and it is considered reasonable therefore that any additional dredging requirements arising from the development should be addressed by way of financial payment through an appropriate planning agreement.

21.11 The loading / unloading pontoon immediately below the Tawe Barrage was fully grant funded with the intention of it being used for local water sport activities, including loading / unloading for charter vessels and sea schools, and general use by marina users. Acquisition of this piece of infrastructure by the scheme could lead to CCS being required to repay the grant that funded it.

21.12 The water space and land immediately below the Tawe Barrage provide the only entry / exit point to Swansea Marina and the Marina Manager has advised that acquisition for the proposed scheme or losing control of this area could mean enforced closures of the Marina, leading to possible breach of contract with Marina customers, who would not be able to enter or leave the impounded waters.

21.13 Even if the pontoon is not acquired, there is a strong likelihood that barrage lock operations would be impeded by a shuttle ferry, particularly during certain tidal conditions.

21.14 During peak times, in excess of 50 pleasure and commercial craft may be waiting below the Tawe Barrage to lock in. The navigable channel leading up to the Tawe Lock is narrow and negotiating the waiting craft could be problematic in both directions for the proposed shuttle ferry service, particularly during certain tidal conditions. This would almost certainly lead to delays for Swansea Marina customers who are paying to berth their boat in Swansea and use the Tawe Lock.

21.15 Furthermore, there are sometimes significant flows from the lock and penstock systems during certain tidal conditions, which could lead to Swansea Marina being asked to suspend operations during times when the shuttle ferry is manoeuvring. If this were to happen, it would impact negatively on customer waiting times.

21.16 KPAL Report No: 160995 has advised that Environmental Statement Tables 6.15 and 6.16 summarise the changes in significant wave height and wave period for 10 in 1 year, 1 in 1 year, 1 in 10 year and 1 in 20 year waves approaching from the southwest at ten locations in Swansea Bay. Point location 2 relates to the seaward end of the Tawe navigation channel close to the southwestern corner of the lagoon (position shown on Environmental Statement Figure 6.44). These Tables show an increase in significant wave height at Point 2 of between 8 and 12 cm. The predicted increases in wave period range from 0.11 to 0.15 seconds.

21.17 Environmental Statement Table 6.17 presents values for changes in significant wave height and period at the same locations for 10 in 1 year and 1 in 10 year waves approaching from the southeast. A reduction in significant wave height of between 3 and 7 cm, and an associated increase in wave period of 0.07 to 0.16 seconds, is predicted at Point 2 due to the sheltering effect of the Lagoon.

21.18 No modelling results are presented for locations further up the navigation channel, and no modelling of waves approaching from a south-southwesterly direction, parallel to the axis of the navigation channel, has been undertaken. The possibility of complex wave interaction, arising from reflection, deflection and refraction of waves off the western wall of the Lagoon and/or the West Pier, has not been considered. However, from the results presented it is likely that small recreational vessels will encounter larger head-waves when navigating the Tawe entrance channel towards the open sea.

## 22.0 Air Quality

*City & County of Swansea Unitary Development Plan*

22.1 Policy EV40 states that development proposals will not be permitted that would cause or result in significant harm to health, local amenity, natural heritage, the historic environment or landscape character because of significant levels of air, noise or light pollution.

*Local Issues*

22.2 The main pollutant of concern for CCS is nitrogen dioxide ($NO_2$). There are two standards/objectives set within the Air Quality (Amendment) (Wales) Regulations 2002 (the EU Limit Values mirror these standards):

- The hourly $NO_2$ concentration shall not exceed 200$ug/m^3$ on more than 18 occasions in any one calendar year;
- The $NO_2$ annual mean shall not exceed 40$ug/m^{3.}$

22.3 CCS is monitoring for NO2 along Fabian Way to make an assessment against the annual mean objective. Results for the last two years indicate a failure to meet this objective along Vale of Neath / Wern Terrace (outbound towards M4). An Air Quality Management Area has not yet been declared whilst results are being verified and properly understood.

22.4 Monitoring on the inbound section of Fabian Way at Bevans Row indicate compliance. Current thinking is that the new docks entrance signal controlled junction has an influence on concentrations along the Vale of Neath/Wern Terrace. Despite traffic being free flowing at this location it is likely that the acceleration past these properties is resulting in the concentrations being recorded as well as exhaust plumes from any queuing traffic on the inbound lanes drifting over to the facades on prevailing winds.

22.5 CCS is unable to assess compliance with the 1-hour objective due to funding issues procuring real-time equipment. However, research published into the relationship of the 1-hour objective with the annual mean concentrations indicate that as the annual mean at this location does not exceed 60ug/m3 then no exceedences of the 1-hour objective are likely to have occurred.

22.6 Defra and Welsh Government have this week further amended the Local Air Quality Management Technical Guidance (LAQM.TG(09) to reflect the projections of future roadside NO2 concentrations into future years. This guidance builds on work to understand vehicle emissions given the probability that newer EURO class diesel vehicles emit direct from the exhaust system primary NO2. The guidance indicates cases where all future projections require an assessment of the HDV content of the flow. Where the HDV content is less than 10% one set of adjustment factors are to be used. Where the HDV content is greater than 10% a different set of factors apply to the future year projections.

22.7 CCS's traffic counter along Fabian Way shows the HDV content for 2013 is 5.3%. However, the ATC is along Fabian Way by Sebastopol Street and does not reflect the HGV flows into/out of the docks entrance which is suspected would increase the overall HDV component of the flow. Funding issues again presently prevent resolving this issue by replacing/upgrading an old manual traffic counting site outside Four Counties Office Furniture buildings in Crymlyn Burrows. (Manual in the fact that it has to be dialled up (by Highways staff) to collect data whereas the traffic counters operated as part of the air quality network are automatic in that they send the data to CCS servers every 5 minutes.

Also, these counters have been configured to produce a vehicle by vehicle EUR6 classification scheme whereas Highways counters are configured in general for volumetric counts and not always classified.)

22.8 The current issue regarding EU infraction proceedings against CCS are complicated but it remains a possibility that fines may cascade down to the local level.

*Adequacy of Application/DCO*

22.9 The application does not recognise the fact that some dwellings around Fabian Way are currently failing air quality objectives already. It is hoped that some adjustments to local traffic management systems may improve this situation. However it should be recognised that the Swansea University Bay Campus and this application both put extra pressure on this part of the road network. Clearly the Council has a statutory obligation to ensure that residents are not overexposed to air pollutants specified in the relevant Directives and Regulations.

22.10 Should the scheme be able to fund a real-time chemiluminescent analyser along Vale of Neath/Wern Terrace, this would address air quality issues/concerns as real-time measurements would be possible.

22.11 Furthermore, as noted above, an additional requirement has been requested to provide an ATC to monitor on site vehicle movements; if funding can be justifiably be sought to "upgrade" the 4 Counties site to an automatic, classified counter, this would provide valuable data to Highways and the Council's Pollution Control & Public Health Division, as ve*hicle access for both the construction and operational phases will be via the Fabian Way/Langdon Road/Park & Ride junction*.

22.12 Statutory background for LAQM is as follows:

- Part IV of the Environment Act 1995 – required production of a National Air Quality Strategy (NAQS)
- Environment Act 1995 places duty on local authorities to carry out periodic reviews (LAQM cycle of reporting)
- NAQS first published in 1997 with the Air Quality Regulations 1997 which set the legal footing for the objectives set out in NAQS
- NAQS uses health based standards to control seven designated pollutants
- NAQS has evolved over time with the latest revision - the Air Quality Strategy 2007 being published in July 2007
- The air quality objectives now applicable to LAQM in Wales are set out in the Air Quality (Wales) Regulations 2000, No. 1940 (Wales 138), Air Quality (Amendment) (Wales) Regulations 2002, No 3182 (Wales 298),

22.13 Statutory background for EU (and therefore WG) Limit Values are:

- The EU Ambient Air Quality Directive (2008/50/EC) and the 4th Air Quality Daughter Directive (2004/107/EC) set the air quality standards against which national and local ambient air quality policies are formulated.

- The directives set limit values and target values for various pollutants in ambient air including nitrogen dioxide (NO2) and require EU member states to assess and report compliance and take action to rectify any exceedences of those values
- The 2008 directive consolidated the requirements of the Air Quality Framework Directive (1996/62/EC) and its daughter directives (1999/30/EC, 2000/69/EC, 2002/3/EC) which are now largely repealed. The 2008 directive was transposed into national legislation in Wales by the June 2010 deadline.
- The Air Quality Standards (Wales) Regulations 2010 incorporate the CAFÉ Directive and the Fourth Daughter Directive into Welsh law, and replace the Air Quality Standards (Wales) Regulations 2007. The Regulations come into force on 11 June 2010 and require that Welsh Ministers divide Wales into two air quality zones: North Wales and South Wales

## 23.0 Hydrology and Flood Risk

*City and County of Swansea Adopted Unitary Development Plan*

23.1 Policy EV2 states that new development must have regard to the physical character and topography of the site and its surroundings by meeting a range of criteria including, determining whether the proposal would be at risk from flooding, increase flood risk off-site, or create additional water run-off, development for infrastructure and services. (Criteria (ix).)

23.2 Policy EV36 states that new development, where considered appropriate within flood risk areas, will only be permitted where developers can demonstrate to the satisfaction of the Council that its location is justified and the consequences associated with flooding are acceptable.

23.3 Policy EV37 states that the integrity and continuity of tidal and river defences will be maintained and improved where necessary. Access to existing and future tidal and river defences for maintenance and emergency purposes will be protected and where appropriate, improved subject to satisfactory ecological and visual safeguards. Where development relating to tidal and river defences is permitted the stability and continuity of the defences must be maintained.

*Key Local Issues*

23.4 The low lying areas of Swansea Bay are at tidal flood risk as identified by the Technical Advice Note 15 (Development and Flood Risk) Development Advice Maps; there are areas around the bay where flooding issues are more high profile than others and which require careful consideration and assessment to avoid increasing flood risk to surrounding third parties, infrastructure and the public as a result of the development.

23.5 Swansea Bay is fronted by a promenade and sea wall that is made up of a variety of structures ranging from concrete revetments to old stone walls to soft ground which offer the low lying areas of the city protection from coastal flooding events.

23.6 The application has indicated that water levels and wave heights to the west of the lagoon will increase, this may have the effect of eroding the standard of the current defences that protect the public. There are also areas where flooding occurs more regularly due to the interactions between fluvial and coastal processes, the submitted reports have identified that Blackpill and Mumbles could be particularly affected by any changes in the coastal regime. In Blackpill there are two watercourses (R. Clyne & Cwm Stream) both of which are tidally influenced and have caused flooding to the public, businesses and infrastructure.

23.7 There are a number of locations where there are openings in the sea walls from the Civic Centre to Mumbles where the City and County of Swansea install stop logs to prevent flooding, the changes in coastal regime as a result of the tidal lagoon may mean that the Authority's current operational regime in relation to the stop logs may need to become more active and greater in extent due to increased flood risk.

*Adequacy of the application*

23.8 CCS consider that the flood risk aspects of the application have not been adequately considered in Swansea Bay in general or for the various locations identified as suffering detriment as a direct consequence of the proposals and therefore the application does not meet the requirements of TAN15: Development and Flood Risk and UDP Policies EV2(ix) and EV36.

23.9 Paragraph 6.5.2.27 of the Environmental Statement states that increases in wave height are shown to occur across the intertidal area within the western region of the bay between Mumbles Head and West Cross, where the reflected waves are refracted across the shallow foreshore. For a 1 in 20 year wave event, the model predicts that wave heights will generally be increased within this area by 0.1 to 0.2m, with a peak increase at the shoreline fronting Oystermouth. There does not appear to be any assessment included regarding whether this increase will overtop the sea wall or the defences that have be installed prior to high tide/storm events. This has the potential to be detrimental to flood risk management assets and third parties and must be investigated further and if necessary mitigation measures must be proposed and incorporated as part of the development.

23.10 Section 17.5.2.3 states that in order to open up the views to the lagoon the majority of the existing 2m port sea wall will be removed and that the presence of the lagoon seawall will provide coastal protection, however there does not appear to be any studies included on the standard of protection the existing sea wall provides and whether the new lagoon wall will provide comparable protection. Furthermore when the lagoon is decommissioned it is questioned who will become responsible for the upkeep of the remaining lagoon walls, details of this must be submitted and how the walls will be maintained in perpetuity.

23.11 Section 17.5.3.4 part iii states that extreme wave heights for location 8 (Mumbles/West Cross Area) is predicated to increase by up to 0.23m or 230mm with the lagoon in place. However, again no assessment has been made with respect to the possible impacts regarding the onset of any possible flooding. CCS would expect the FCA to have looked at the standard of protection of the sea wall/defences as the point of comparison with the new wave heights as this may affect the onset of flooding i.e. defences may be overtopped sooner than at present or they may need to be deployed sooner as a direct result of the lagoon thus in certain circumstances increasing the risk/potential for coastal flooding to third parties.

23.12 Whilst the application has identified that the Oystermouth/Mumbles promenade is affected by the changes in coastal regime, there is no comparison with the existing situation. As such, it is not possible to assess the full impact of the proposals apart from indications that the promenade may suffer greater flooding on a far more frequent basis.

23.13 Section 17.5.3.5 identifies that the operation of the project will cause some marginal changes to water levels within Swansea Bay and that these 'minor' effects on peak tidal water levels will not increase flood risk from tidal sources. It is questioned how has this statement has been substantiated as no assessment against the existing situation has been provided. Furthermore there does not seem to have been any deeper investigation on increased wave heights and levels on the watercourses that discharge directly to the bay. These watercourses are tidally influenced and controlled and do cause localised flood risk to adjacent property. CCS would therefore expect this issue to be assessed as part of the FCA as the most sensitive watercourses affected by these issues are around West Cross/Blackpill where the application has identified higher water levels and wave heights.

23.14 West Cross may also suffer greater effects of erosion and flood risk due to the deeper water and high waves, again the effects are not fully known as a like for like comparison has not been undertaken.

23.15 The effects of climate change over the lifetime of the development have not been incorporated. The operational lifetime of the project is anticipated to be 120 years but only 75 years is considered as part of this application. This should be considered as part of the assessment.

23.16 Accordingly it is considered that the application has not adequately considered the effects of the development on flood risk within the bay in accordance with the requirements of TAN15 and UDP Policies EV2 and EV36. Any revised assessment must therefore consider these issues including but not limited to the following on a like for like basis for the pre and post development situations:

- Effect of increased wave height and number on Swansea Bay flood risk management features including outfalls, contributing watercourses and tidal inundation routes.
- Effect of increased flood risk on third parties and critical infrastructure.

- Effect of reflected waves in general on the bay and including the areas identified as being put at greater risk over the lifetime of the development including climate change on a like for like basis.
- Effect of deeper water and larger waves on erosion/deposition in relation to flood risk management infrastructure as well other interest features already looked at.

23.17 On the issue of wave heights, tide – river flow interaction and flood risk, the KPAL Report No: 160995 commissioned on behalf of CCS also highlights that the analysis of the potential impact of the lagoon on wave heights undertaken by ABPMer indicates a potential increase in water levels with the Lagoon present of 0.1 to 0.23 m on the western side of Swansea Bay, with the largest increases between Mumbles and Oystermouth (Hydrology and Flood Risk, Chapter 17, p36 of the ES; also ABPmer, 2013d). This will lead to an increased risk of overtopping and flooding in this area, which is backed by areas of low-lying land (Figures 3 & 4 of KPAL Report No: 160995).

23.18 It was concluded from the analysis that, since the biggest waves on the Swansea Bay waterfront originate from a southeasterly direction, construction of the Lagoon will provide a measure of shelter and lead to no increased flood risk along this frontage. However, Figure 17.7 of the Environmental Statement shows that the Lagoon structure only provides shelter from waves from an easterly direction; there is effectively unbroken fetch from southeasterly to south-southwesterly directions. No modelling of waves from the SSW to SSE has been undertaken.

23.19 Paragraph 6.5.2.32 reports that consideration has been given to extreme waves under conditions of a 1.5 m surge on top of a MHWS tide. It is reported that for Point 8 on the Mumbles frontage there is an increase in significant wave height of 0.19 m compared with an increase of 0.17 m for the without-surge case. A consideration of the effects of sea level rise based on the UKCP09 medium emissions scenario 95$^{th}$ % model output value indicated an increase of 0.18 m compared with 0.17 m for the without sea-level rise case. The additional water depth associated with surges and sea level rise is therefore predicted by the modelling to have a relatively minor effect.

23.20 The overall conclusion to be drawn from this assessment is that there is likely to be an increase in tidal flooding risk as a result of the Lagoon construction, albeit relatively small.

23.21 Any increase in wave heights along parts of the shore of western Swansea Bay where there is no high tide beach or dunes is also likely to increase the risk of wave reflection from the sea defences and to create increased risk of beach lowering by toe scour.

23.22 No specific assessment is provided in the Environmental Statement of potential interactions between high tides, surges, waves and high flows from the River Tawe. The Tawe barrage is overtopped by tides which reach above mean high water level (c. 3.4 m OD).

Potential increases in the still water levels or wave heights in the Tawe Channel, adjacent to the western arm of the lagoon, could potentially increase the frequency and/ or duration of overtopping of the barrage, or could impede the discharge of Tawe floodwater to the sea. Potential implications for the Lower Swansea Valley Flood Risk Management Scheme have not been explored by the Environmental Statement hydrodynamic and wave modelling.

23.23 The Environmental Statement Baseline Assessment contains no detailed analysis of severe historical floods of the Tawe, or modelling of the likely behaviour of water levels arising from interaction of tides, waves and river floods of magnitudes similar to those in 1929 and 1979 (e.g. Walsh, 1982).

## 24.0 Residential Amenity

*City and County of Swansea Unitary Development Plan*

24.1 As stated above, Policy EV1 of the UDP requires new development to accord with 11 specified objectives of good design. Criteria (iii) is that the development should not result in a significant detrimental impact on local amenity in terms of visual impact, loss of light or privacy, disturbance and traffic movements. Furthermore, UDP Policy EV40 states that development proposals will not be permitted that would cause or result in significant harm to health, local amenity, natural heritage, the historic environment or landscape character because of significant levels of air, noise or light pollution.

24.2 The support for renewable projects in Policy R11 is subject to criteria including criteria (iii) which states that there should be no significant impact on local amenity.

*Adequacy of the Application*

24.3 Issues relating to impacts relating to visual amenity and air quality have been addressed above.

24.4 A residual area of concern for CCS is that the proposed access arrangements to the proposed lagoon will significantly result in traffic movements and general disturbance in close proximity to the rear of these residential properties. This would run contrary to UDP Policy EV1(iii) and Policy R11(iii).

## 25.0 Economy, Tourism and Recreation

*City and County of Swansea Adopted Unitary Development Plan*

25.1 Policy EC1 allocates land to meet the growth needs of the local economy.

25.2 Policy EC2 allocates a major redevelopment area at SA1 Swansea Waterfront for mixed employment and residential development together with supporting leisure, tourism, community uses and ancillary services.

25.3 Policy EC3 seeks to encourage the improvement and enhancement of the established industrial and commercial areas, through building enhancement, environmental improvement, infrastructure works, development opportunities and targeted business support. Development at established industrial and commercial areas for non-business uses will not be permitted where proposals unacceptably limit the range and quality of sites available for employment development.

25.4 Policy EC15 supports proposals that consolidate the urban tourism resource, by improving the quality and range of attractions, destinations, accommodation and services, at locations including the City Centre, Maritime Quarter, Tawe Riverside Basin, and Mumbles and specific destinations around Swansea Bay.

25.5 Policy EC16 states that new or improved recreational and tourism facilities at specific destinations around Swansea Bay are proposed which capitalise on the seafront aspect and contribute towards the regeneration of the Bay. Between these areas of appropriate development, the emphasis is on safeguarding and enhancing the environment of the Bay and other waterfront areas.

25.6 Policy HC31 states that opportunities for the development of water based recreation facilities will be supported, subject to their compatibility with environment and nature conservation interests, water supply, commercial shipping and flood defence at the following locations:

1. Lakes and reservoirs,
2. Inland waterways – rivers, dock system and canals,
3. Coast and estuary – including Swansea Bay.

25.7 As set out above, the support of Policy R11 for renewable energy schemes is subject to satisfying a number of criteria. Criteria (i) is that the social and economic benefits of the scheme in meeting local, and national energy targets outweigh any adverse impacts.

*Adequacy of the Application/DCO*

25.8 The Cardiff Business School assessment (Appendix 22.1 of the Environmental Statement) estimates the value of the three year construction phase from 2015 to Wales at: -

- £454 million of additional output;
- £173 million Gross Value Added (GVA); and
- 5,540 person years of employment (or 1,847 full time equivalent jobs per annum).

25.9 The value of the operational phase per annum is estimated to be: -

- £5.2 million of additional output;
- £2.2 million GVA; and
- 60 full time equivalent jobs.

25.10 The equivalent estimates for Swansea Bay (the geographical assessment area) are not provided.

25.11 During the construction phase, the following employment profile across Wales is envisaged: -

| **Sector** | **Average Annual Employment (person years)** |
|---|---|
| Manufacturing and Production | 387 |
| Construction | 1,150 |
| Distribution, Retail and Hospitality | 97 |
| Transport and Communications | 33 |
| Financial and Professional Services | 157 |
| Other | 23 |
| **Total** | **1,847** |

25.12 Construction phase occupational/professional profiles are not specified so it is not possible to assess the value profile of these jobs.

25.13 Together with leakage, displacement, multiplier effects and deadweight, the total net employment from the operation phase is estimated to 57 jobs, which corresponds to the overview of operational employment proposed by the Welsh Economy Research Unit of 60 full-time equivalent jobs referred to above.

25.14 A procurement strategy is under development with a commitment to focus on maximising local procurement in partnership with Welsh Government, CCS, NPT and others, encompassing employment, supply and manufacture, training and up-skilling the workforce and creating opportunities for the long-term unemployed.

25.15 Environmental Statement Appendix 22.1 Economic Significance study states that "Historically renewables projects in Wales (at commercial scale, particularly on shore and off shore wind) have fairly limited local economic effects during development because the highest value components, and elements of specialist professional services tend to be sourced outside of the UK…

25.16 (However)…In this respect Tidal Lagoon Swansea Bay could offer the opportunity for a more sustained economic impact with the innovative project placed in a more industrial part of Wales and with a supply side background in metal goods and structures, and construction engineering which could feed into the project…"

25.17 An art & science study project is ongoing in collaboration with Swansea University, University of Wales Trinity St David (specifically Swansea Metropolitan University) and The Low Carbon Research Institute to consider the potential impacts the proposed tidal lagoon development will have on the local community and beyond. In addition, the project would support the development and production of high quality public art projects and the applicant has established three programmes to progress the public art research and development phase in respect of the project.

25.18 The applicant has created an education programme 'TLSB Education Programme and Resource' to help young people develop their skills, knowledge and understanding of global climate change and renewable energy.

25.19 As part of the development of the Project, links with the local educational community will be developed to progress plans for how the Project can best benefit Swansea Bay and the surrounding areas. The key themes the applicant is working on are: -

- Science, Engineering, Energy and Enterprise;
- Arts, Culture and Heritage; and
- Skills, Training and Employability.

25.20 Links are also being established with organisations/initiatives: Regional Learning Partnership; NSA Afan Community Regeneration; Jobs Growth Wales Internships; undergraduate/Post Graduate research; EU Leonardo or Erasmus placements, alongside year-in-industry placements; and future opportunities with Beyond Bricks and Mortar, Workways and the Sector Skills Councils

25.21 Environmental Statement Appendix 22.1 states that "The project also offers an element of community ownership through a share offer which will seek to give preference to those living in the immediate vicinity of the project", although this is not detailed in Chapter 22.

25.22 A variety of opportunities are described in the Statement to enhance recreation and tourism (such as the visitor centre, fishing, walking, cycling and watersports). Initial estimates suggest that between approximately 70,000 to 100,000 people could visit the lagoon each year, generating visitor spend to support between 65 and 90 full time equivalent jobs per annum.

25.23 The Environmental Statement assesses the project will be beneficial to employment (construction "major, short term"; operation "minor, long-term), mariculture ("moderate, long term"), tourism ("minor long term"), recreation ("moderate, long term") and education/arts ("minor, long term").

25.24 The Environmental Statement's analysis of the Policy Context and its methodology for assessing impacts are relevant and appropriate. It identifies the key socio-economic impacts and its evaluation is reasonable, although some of the estimated economic impacts are for Wales and not specifically Swansea Bay. It is evident that the project will have a significant socio-economic impact during the construction phase with wider, more modest impacts secured for the long term.

25.25 Further information would however be welcomed in respect of:

- The estimated employment impact in Swansea Bay (the geographical assessment area), and what the occupational/ professional employment profile is likely to be; and

- The share offer and any other economic (e.g. a Community Fund, cheaper electricity tariffs) and community benefits TLSB plc and its on-going art and science study are examining.

25.26 From a tourism perspective, it is important that the project links to 'Destination Swansea Bay 2013-2016', the official Destination Management Plan for Swansea Bay (DMP). This strategic document, provided here as **Appendix H**, and states clear development and marketing priorities for the next three years. Planned projects are done so in the knowledge that they link to the overall development of the destination to help achieve its aspirations to be a world class visitor destination by 2020.

25.27 Projects, like the Tidal lagoon, not identified in the plan but which come forward during its implementation, are done so on the basis that they have the potential to make significant contributions to the stated aims. In particular the Tidal Lagoon appears to be able to;

- Provide Swansea Bay and Wales with a unique 'maritime-themed' visitor attraction – this might help provide Swansea with a real sense of distinctiveness over other coastal locations. In effect, this project could attract a new type of visitor, a major stated aim of the DMP.

- Contribute towards a more visually appealing gateway to the city from the sea and the highway.

- Provide a visitor centre in a seascape setting which can be enjoyed in all weather conditions.

- Create a new 'Unique Selling Point' to include in destination marketing activity for the area.

- Meet the needs of our current visitor demographic – mainly interested in scenery/landscape, walking and watersports.

- Complement the existing Swansea Bay watersports projects including the 'Watersports Centre of Excellence' capital projects achieved in the Marina, St Helen's and at Knab Rock and build on this even further with more actual reasons to visit.

- Provide the infrastructure to potentially stage major events in the area at international and national levels regardless of any tidal restrictions that currently exist due to the difference between very high and low water levels.

- Have the potential to act as a catalyst to either encourage further tourism investment – e.g. accommodation, additional attractions, etc. or fill some of the spare capacity of bedspaces during shoulder season.
- Generate employment opportunities both at construction stage and post completion (linking with Beyond Bricks and Mortar scheme).

- Combat seasonality challenges by relieving pressure from Gower in busy summer period for water based recreational activities.

- Improve the offer within the destination for water sports related training and recreational activities (sailing, rowing etc.)

- Encourage sustainability by rejuvenating bio-diversity / marine eco-systems, therefore promoting local produce (oysters, lobsters, samphire) and Welsh heritage. This in turn could help support the increased demand for and expectation of locally sourced seafood products as part of the important food product for visitors.

25.28 However, the proposals raise a number of significant concerns in relation to:

- Water quality - Poor water quality within the Bay and/or the lagoon would build a negative reputation as a major tourist attraction and fail to attract watersports events – as well as being detrimental to the marine eco-systems.

- The size of the Lagoon and the fact that it is taking up such a large portion of Swansea Bay – the bay may lose its appeal for activities such as sailing and windsurfing as an area of 'calm' bay water would be greatly reduced.

- The adverse seascape, landscape and visual impact to existing recreational/tourism resource and receptors, such as the seafront promenade, Mumbles, Maritime Quarter and the Bay itself.

- Impact on the make up and appearance of Swansea Bay beach.

- There is the potential for displacement of business from other Watersports facilities recently in receipt of public funding.

- Adverse impacts on the operation of Swansea Marina as set out in the Navigation and Marine Transport section of this report.

- The 'bottleneck effect' at entrance of Port/Marina – access would be limited during construction and may lead to drop in Marina occupancy level. Access to port would also be affected during construction and may have an effect on potential cruise ship visits. Once complete the Lagoon would represent an attraction but could also be seen as making access to port and Marina more difficult and more risky.

- Access to Lagoon – no direct link with City and SA1 other than via a proposed water ferry service. Visitors would have to drive through port to access Lagoon and this is considered to be a missed opportunity to link the Lagoon to Swansea as a 'Waterfront City'.

25.29 Some aspects where further information / clarification would be helpful:

- Impact on any other tourism sectors e.g. cruise market and port access and what impact this might have on the potential of Swansea to encourage cruise ships.
- Business plan measures of success, including marketing strategy and targets for visitor numbers and expenditure.
- The role and management of the visitor centre - experience from other alternative energy projects which have included visitor centres as community gain haven't been sustainable.
- Parking provision at peak times and during major events.
- Pricing structure and policy.

## 26. Sustainability

*City and County of Swansea Adopted Unitary Development Plan*

26.1 The Plan's Spatial Strategy of the UDP, contained in Part 1 of the Plan, is firmly based on sustainable planning principles. The overall vision for the UDP is to adopt a sustainable approach to the development of a prosperous region focused on a cosmopolitan and multi-cultural City and County, which capitalises on its waterfront location.

26.2 This vision is seen to demonstrate the Council's commitment to the promotion of sustainable development which is to be pursued through goals based on sustainable principles of environmental protection, economic growth, social progress, safeguarding of resources and improved accessibility, each of which forms the basis for the topic policies in the second part of the Plan.

26.3 UDP Policy R11 states that proposals for the provision of renewable energy resources, including ancillary infrastructure and buildings, will be permitted provided:

i. The social, economic or environmental benefits of the scheme in meeting local, and national energy targets outweigh any adverse impacts,
ii. The scale, form, design, appearance and cumulative impacts of proposals can be satisfactorily incorporated into the landscape, seascape or built environment and would not significantly adversely affect the visual amenity, local environment or recreational/tourist use of these areas,
iii. There would be no significant adverse effect on local amenity, highways, aircraft operations or telecommunications,
iv. There would be no significant adverse effect on natural heritage and the historic environment,
v. The development would preserve or enhance any conservation areas and not adversely affect listed buildings or their settings,
vi. The development is accompanied by adequate information to indicate the extent of possible environmental effects and how they can be satisfactorily contained and/or mitigated,

*Local Issues*

26.4 The City and County of Swansea defines sustainable development as:

26.5 "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" and has an adopted Sustainable Development Policy (Sustainable Development Policy - City and County of Swansea).

26.6 The Policy contains a Vision for a sustainable Swansea that is "inclusive and safe and provides an excellent start to life. A county that supports a prosperous and resilient economy, recognises and benefits fully from its exceptional environment and promotes good health" and identifies seven priority areas:

I. Sustainable use of natural resources
II. Climate change/decarbonisation
III. Economic resilience
IV. Procurement
V. Social inclusion
VI. Natural Environment
VII. Governance

*Adequacy of the Application/DCO*

26.7 The following comments are based upon the impact the proposal on the aims and priority areas within the above policy, other than for issues relating to natural environment, which have been considered above.

*Sustainable Use of Natural Resources*

26.8 If built as per the project description, the proposal will make a significant contribution to renewable electricity generation, using a natural resource in a sustainable way.

26.9 Renewable energy installations, by their nature, are likely to have a lower installed capacity as compared to large scale power generation stations using thermal energy from fossil or nuclear fuels to produce electricity. Whilst it is unlikely that this scheme in itself will result in a reduction in electrical output from fossil fuelled power stations, it will help the UK build resilience into its aging energy infrastructure, which is facing a significant reduction in the number of operating fossil fuel and nuclear power stations in the foreseeable future. The scheme will also have the potential to help the UK to reduce its reliance on imported energy which currently stands at 43%[2] and is on an upward trend.

26.10 The development of power generation infrastructure locally that is able to supply intergenerational production of electricity has the potential to provide long term energy resilience into the region.

*Climate change/decarbonisation*

26.11 At this present time, the proposal will make some but limited impact in terms of climate change mitigation at a local level as the electricity will be distributed via the National Grid for distribution.

Whilst there will be no direct local benefit there will be indirect benefits to the de-carbonising the supply of electricity and supporting the UK and Welsh Governments meet their renewable energy targets.

26.12 At a national level the impact on climate change mitigation is less significant as compared to other renewable energy technologies at this time, for example solar photovoltaic. However if this scheme proves the concept, then the Tidal Lagoon Swansea Bay could be the gateway to larger tidal lagoon projects which would have a much greater national impact.

26.13 The Environmental Statement however is still unclear about what contribution the development of a tidal lagoon in Swansea Bay will have in building or undermining resilience to climate change in the future. The Environmental Statement considers a UKCP09 medium emissions scenario when looking at the impact of climate change on coastal processes. The Council's report on the changes to coastal process suggests that the changes will increase the risk of tidal flooding, albeit small, under these conditions. However evidence from the IPCC and other sources suggests that a high emissions scenario is also a likely outcome at this point in time, due to the uncertainty about the path of global economic development and the global response to climate change mitigation. When considering the worse case scenario CCS would have expected the Environmental Statement to look at the impact of a high emissions scenario (SRES A1FI) as well and the cumulative impact on wave height and other coastal processes.

26.14 The lack of a direct access for pedestrians and bicycles over the river from Swansea City Centre is disappointing and reduces the options for visitors to lagoon to use sustainable forms of transport.

*Economic Resilience & Procurement*

26.15 As is the nature of large scale energy projects, the financial value of the project comes from the selling and export of energy to National Grid. It is usual that the income generated from the energy sales will primarily go to pay off loans to investors and dividends to the shareholders. The applicant ran a local share offer and subsequent share offers will help build local ownership, but the impact of this is going to be limited and only to those who can afford to buy shares. It should also be noted that such investment comes with significant risk and the long term benefits of such investments may not be realised.

26.16 The Department for Energy and Climate Change (DECC) recognises the value of owning or co-owning renewable energy developments, that communities can have a real stake in, and share in the profits of the energy generation in their local area. This encourages joint venture/partnership working between developers and communities.

26.17 There are other models of community ownership schemes, where the developer provides a shareholding in the renewable enterprise as a community benefit, which can be supplemented by local communities investing further as a community energy enterprise.

If the level of confidence in the scheme is such that it will successful, then this approach could offer a more reliable and sustainable form of income to support economic development in the area.

26.18 Since however it is unlikely that there will be significant local ownership, to build resilience locally, the short term economic value to the Swansea Bay Region will be in the supply chain for the development of the lagoon. In the long term it will be in the potential to supply goods and services for future lagoons, as the direct employment by the lagoon for operation and maintenance is limited. The commitment to a local employment scheme in the draft DCO and a strategy to support local procurement of goods and services is welcome as this helps local businesses and people take advantage of the opportunity presented by the development, especially if these strategies include training and business development support in the pipeline stages to address the issue of paucity of supply identified in Appendix 22.1.

26.19 In addition to direct economic benefits through employment and supply, the applicant has outlined potential indirect benefits for the tourism and recreation sector, through the creation of new infrastructure and a destination. This has focused on the construction of new public realm, water shuttle jetty, on shore and off shore visitor facilities that may include a hatchery, laboratory facilities and a sailing/boating centre. Appendix 22.1 also identifies the potential to attract additional visitors to eight national sporting events a year, although the Environmental Statement does not provide evidence about how this figure was determined.

26.20 Furthermore, the application does not provide information about how these facilities will be managed and run once they have been constructed and there is no evidence provided regarding the viability of such facilities and business opportunities. Appendix 22.1 identifies a list of visitor attractions to demonstrate the potential for increased visitor numbers. However all these examples require significant public sector subsidy, without which they are financially unsustainable. Without this supporting evidence, that there is a sustainable business case for the new facilities, there is a risk that this infrastructure will be redundant, or need substantial public monies to remain viable.

*Social Inclusion*

26.21 "Social Inclusion" is a broad term describing the kind of "wealth" which comes from being able to play a full and active part in society – such as having access to good work, training or educational opportunities, as well as other factors such as sound health, a secure home and finances, and having a fulfilling social life. Poverty and poor health, symptoms of social exclusion, are significant sustainability issues for Swansea. There is a strong correlation between the two, so developments that are able to maximise access to opportunities that improve health and well-being to those who face disadvantage will have a positive impact on social inclusion.

26.22 In this respect, the lack of access via a bridge from the west side of the river Tawe is a significant barrier to those who do not have access to a car. There is no guarantee at this stage that either the water taxi across the river or the shuttle bus will be viable, and any charge will be an additional barrier to those with low incomes. In addition, those wanting to visit the lagoon using public transport are currently not able to catch a bus directly to the park and ride from the City Centre due to the way the park and ride buses are currently operated.

26.23 The concept of community benefits stems from the renewable wind power industry, focusing on how communities can have more of a say over, and receive greater economic and wider social benefits from on-shore wind power. The UK Government[3] is proposing to introduce legislation making it compulsory for developers to consult local communities before submitting planning applications for more significant onshore wind applications in England with expectations of the wind power industry to enhance community benefits, improve local economic impacts and increase community ownership. Similar actions are proposed for nuclear power and gas-fracking industries. No such guidance currently exists for tidal range power due to the immaturity of the industry in the UK and the lack of any comparator developments.

26.24 Contained within the Preliminary Environmental Information Report (PEIR) were proposals for a local energy tariff, a community fund and a local share offer. These have been removed from the Environmental Statement. The applicant's document titled 'Notes on the rationale for draft s106' clarifies the applicant's position on these two proposals. In this respect, Tidal Lagoon Swansea Bay Ltd are still committed to a local energy tariff but have limited this to 20,000 households in the Swansea and Neath Port Talbot area. There is currently no detail on how the tariff will be allocated to households. Targeting household that are fuel poor or households that are most disadvantaged would support the Council's objectives to address poverty. However the document suggests that the fund will be limited to a specific period of time that is relatively short in comparison to the time that the development will be operational. If this is the case then the benefit from this offer will be limited. There are no comparisons to how similar savings might be achieved in other more sustainable ways that have a longer term benefit, such as investment in energy efficiency initiatives or through collective purchasing of energy - where householders procure energy through bulk purchase, gaining savings through economies of scale.

26.25 Tidal Lagoon Swansea Bay Ltd are no longer proposing to provide a community fund arguing that the proposed on-site facilities (public realm, on-shore visitors facilities, hatchery etc) along with a range of 'off-site' benefits accords with the consultees' ambitions for the project. However it is not clear from the evidence presented in Volume 5 of the Environmental Statement why some benefits are deemed to outweigh the benefits of a community fund. No direct question has been asked of the local community about a community fund, only about the value to them of "Benefits to the community (e.g. grants to community projects)".

26.26 In the applicant's analysis of this element of the consultation responses, it is stated that in "simple terms, this indicates that all of the potential benefits of the proposed lagoon were regarded as important by all respondents, with little to choose between them" (Pages 1-16 Chapter 9, Volume 5 of the Environmental Statement).

26.27 Much of the detail of the project was not available at that time and there have been some significant changes to the project such the inability to secure a pedestrian and cycle link to the western sea wall to allow greater access to the project. There was no detail at the time of consultation regarding the scale of the community fund and what it could be used for. In comparison, the on-shore wind power industry is now proposing community funds based on a figure of £5,000 per MW per annum. The UK Government is consulting on a fund of £1,000 per MW per annum for new nuclear, where the energy outputs are that much greater.

26.28 The applicant also states that another reason why a community benefit fund was discounted was due to budgetary constraints, a fund could only be considered after approximately 30 years. This position is different from other energy developments where it is expected that community funds are payable for the operational lifetime of the development. It is also anticipated that after the operational lifetime of such energy developments the infrastructure is then removed. This is not the case with the tidal lagoon proposal where local people will be impacted by the project in perpetuity.

26.29 It is the view of CCS that a Community Benefits Fund, running the lifetime of the project, has the potential to support social inclusion initiatives, support the development of social enterprises through seed funding and provide an element of local control on how that benefit is allocated to meet local needs. Of all the community benefits proposed it is the one with least risk associated for local communities and it is the view of CCS that the applicant has not provided enough evidence to show why it has been discounted and why other benefits are seen to have greater value for local people.

26.30 The provision of a local employment scheme has the potential to support social inclusion. This will be limited to the availability of appropriate skills and expertise. Appendix 22.1 suggests that there is paucity in the locality. It would be beneficial therefore if there was a pro-active training strategy for local people in advance of the build to maximise this benefit, especially if this targets those people facing the most disadvantage. This impact is limited by the construction timescale of the lagoon but will help local people develop skills that could be used elsewhere in the construction industry or in the building of future lagoons.

*Governance*

26.31 The scheme will have little impact on governance in the region.

*Additional comments*

26.32 The applicant suggests that the development will provide benefit through the creation of freely accessible public realm. The benefit to local people will be limited due to the inaccessibility of the project from the western landfall of the sea wall and controls put in regarding the sea wall and the compounded water. These limitations will be exacerbated in the winter months due to the short day length.

26.33 Whilst the provision of walking and cycling provision along the sea wall is positive, it must be considered in conjunction with the visual impact on the promenade and the cycle route, which is considered by the Council to be adverse, and the potential for increase of blown sand on the promenade creating difficulties of access to cyclists and pedestrians.

26.34 Elements of the project do support the long term resilience for Swansea, however there are aspects of the project that do not fully mitigate some of the adverse impacts. The high uncertainty of the long term impacts on coastal processes and the wider potential social, economic and environmental negative impacts is still cause for concern.

## 27.0 Development Consent Order, Obligations and Requirements

27.1 The comments below refer to the Draft Development Consent Order (DCO) February 2014 (Document Reference: 3.1). The comments are made in the order in which the DCO is set out and do not repeat those comments given above where the adequacy of the DCO is considered under the relevant topic heading.

27.2 Article 4 applies section 96A of the Town and Country Planning Act 1990, which applies only in England at present, to the development. The section allows a Local Planning Authority to make changes to planning permissions in its area subject to the terms of the section. Nothing is said in this clause about section 96A(5), which states that the form and manner of an application under section 96A must be as prescribed in a development order. The development order which is relevant is the Town and Country Planning (Development Management) England Order 2010 which does not apply in Wales.

27.3 The council does not believe Article 4 of the DCO is appropriate in view of the procedure provided for Changes to and Revocation of Orders under the Planning Act 2008 Section 153 and Schedule 6.

27.4 In principle however, mechanisms to agree changes to the scheme, which do not extend beyond the parameters tested within the Environmental Statement, is considered reasonable and justified for a scheme of this scale and complexity.

27.5 Article 5 of the DCO allows a large amount of what would normally constitute development to be carried out without planning control once the Order has been made. The heading of the Article is “Maintenance of the authorised development”, but the matters set out under sub paragraph (2) –which states the power is to “carry out” as well as to maintain - is much wider than a power to maintain that which is allowed. The Clause goes well beyond the model clause, which only consists of sub paragraph 5(1) of the Order. This is of significant concern to CCS given the sensitivity of the location and the potential adverse impacts arising to the City’s main asset.

27.6 Similarly, given the nature and location of the development and significant issues arising from decommissioning and demolition works, such issues should not, in the view of CCS be contained within this Article. Furthermore, Article 3 (2) of the DCO already gives a meaning to the authorised development which allows alteration, removal, clearance, refurbishment, reconstruction, decommissioning and demolition of any building or other structure within the Order limits to the extent that they relate to or are required by or incidental to the carrying out of the authorised development. Therefore Article 5 (2) as drafted is not required as it duplicates the Article 3 rights.

27.7 For these reasons CCS objects to Article 5 as drafted and would wish this clause to be revised to restrict its provisions to maintenance and small scale ancillary works only.

27.8 CCS would also wish to Article 7 amended to ensure it its notified of any change in development and operator, given the responsibilities of the Authority under Article 48.

27.9 With regards to Article 8 (defence to proceedings in respect of statutory nuisance), the Council’s Pollution Control & Public Health Division is of the view that whilst a CEMP can be advantageous for some construction or engineering works, CCS has a statutory duty to ensure that it takes an enforceable position on the control of this type of noise. It cannot be backed up by statutory nuisance powers, as there is considerable doubt over whether temporary works can be a legal nuisance. This is why the parallel powers were introduced in the 1974 Act. On some major schemes contractors will still weigh up the penalties they may pay for contract delays against the potential penalties of a Section 60 notice. This matter has been tested in the courts and has been successfully dealt with using Section 60 alongside CCS’s power to seek an injunction with unlimited fines.

27.8 It is always hoped however, that draconian actions are not necessary, but CCS has a duty to protect residents from this type of noise and to follow the extensive guidance specifically on this subject in BS 5228. The system is designed (and reinforced by recent case law) to specifically tailor controls to the scheme on its merits. The City and County of Swansea automatically serves Section 60 notices on any development sites where construction is starting unless it is involving certain statutory undertakers who require their contractor to use a section 61 agreement with this authority. Anything less than that leaves the authority vulnerable to ombudsman complaints.

Whilst alternatives may sound attractive they have no statutory backing and are not clearly enforceable on a timescale required by the nature of this business.

27.9 Article 9 (street works) should include a requirement to reinstate/make good any work undertaken.

27.10 Article 10 (temporary stopping up of streets) is considered reasonable but the requirement for adequate diversions to be advertised and implemented for both pedestrians and vehicles.

27.11 Article 11 (access to the works) should include reinstatement in accordance with details to be agreed with the relevant Local Planning Authority following the cessation of the use.

27.12 CCS would again request that Article 12 (agreements with street authority) that the reinstatement of any works should be carried out within a specified timescale to be agreed.

27.13 The applicant will need to be registered on the NSG website as a stand alone utility and will require a DTI licence and subsequently a unique organisation reference number to send notices via EToN (Electronic Noticing System).

27.14 The applicant can been granted Code Powers which would entitle them to place apparatus in public and private land.

27.15 Code Powers allow the applicant to benefit from certain exemptions under Town and Country Planning legislation and also entitles them to carry out street works under the New Roads and Streetworks Act 1991 (NRSWA) without the need to apply for a licence to do so.

27.16 Code Powers enables an organisation to plan effective delivery of large infrastructure builds with an emphasis on close liaison with the Local Authority Roads departments. The legislation has an inspection regime that is monitored locally, regionally and nationally to ensure that all operators work to certain standards. In broad terms, this applies to the opening and closing of streetworks notices, the placement of apparatus in roads and footways including final re-instatement which needs to be guaranteed ensuring quality is maintained throughout the build.

27.17 Article 13(1), which relates to the discharge of water, is of significant concern to CCS as there may be watercourses in the area that it would not wish any further water to be connected to due to flood risk issues. It is requested that the wording is changed to more accurately reflect flood risk. There is also no statement regarding when the relevant drainage body will be consulted about any physical alterations and how this will be recorded and agreed i.e. in the case of ordinary watercourses the normal route is via the Land Drainage Act. CCS suggests re-drafting as follows:

13(1) Prior to utilising any watercourse or public sewer or drain for the drainage of water in connection with the carrying out, operation or maintenance of the authorised development the undertaker shall obtain the written agreement of the relevant drainage authority and for that purpose may not lay down, take up and alter pipes and may, on any land within the Order limits, make openings into, and connections with, the watercourse, public sewer or drain without the express consent of the relevant drainage body, which shall not be unreasonable withheld.

27.18 Article 13(2) makes no reference to any disputes regarding connections to watercourses be it a culvert or open watercourse. Allowance should be made for procedures regarding this to avoid any possible issues arising in the future.

27.19 For Article 13(3), CCS would question whether private people's riparian rights and responsibilities been considered here? Under common law a riparian owner would be within their rights to refuse a connection for no reason. It is also questioned what process will be followed with respect to agreeing discharge rates? CCS would expect any discharge to an ordinary watercourse to be based on the appropriate greenfield rate. If to a culvert the rate will need to be agreed based possible capacity which may not reflect greenfield rates.

27.20 Article 13(5) does not include ordinary watercourse and it is suggested therefore that the clause be amended as set out below to take account of all eventualities.

27.21 13(5) The undertaker shall not, in carrying out or maintaining works pursuant to this article, damage or interfere with the bed or banks of any watercourse forming part of a main river or ordinary watercourse in such a way as to affect the flow or flood risk management.

27.22 It is the view of CCS that the definition of an ordinary watercourse should be added for clarity as Article 13(8)(c) as follows:

(c) The term ordinary watercourse, as defined in the Land Drainage Act 1991 is a watercourse that does not form part of a statutory main river, and includes all rivers, streams and all ditches, drains, cuts, culverts, sluices, sewers (other than public sewers within the meaning of the Water Industry Act 1991) and passages through which water flows.

27.23 CCS is supportive of the provisions of Articles 17(3)(b), 18 and 19 which:

- If it appears to the Welsh Government urgently necessary to do so, the Welsh Government may remove the tidal work, or part of it, and restore the site to its former condition; and
- Provides for the relevant enforcing authority to require the undertaker to repair or restore at its own expense any tidal works abandoned or suffered to fall into decay.

27.24 Article 42 allows a Section 106 Obligation to be entered into even though the applicant may have no land interest at the time of the Obligation. This will be significant for the Section 106 provisions.

27.25 CCS is agreeable to Article 48(1) which provides that for the period beginning with the date when the Order comes into effect and ending on the accretion date, the area east of the administrative boundary of the County within the Order limits that falls within NPT and seaward of mean high water springs shall, for the purposes of the Control of Pollution Act 1974 and the 1990 Act be annexed to and incorporated with CCS. This agreement is subject to satisfactory resolution of the resources issue considered below under Schedule 6 and a fair and reasonable procedure for the discharge of requirements.

27.26 CCS however, agrees with the position of NPT that the annexation of Article 48(2) should not be a permanent change in jurisdiction for the purpose of this development, once completed.

27.27 A major part of the Draft DCO is concerned with compulsory acquisition of rights and land by the applicant. So long as CCS are assured that all compensation payable under these provisions is not to paid by CCS but is payable by TLSB, then no further concerns are raised here.

*Schedule 1 Part 2 - Buildings Heights*

27.28 Schedule 1 Part 2 details building heights and upward deviations that would be permitted; CCS raises no issue with this if the upward deviation is included within the parameters tested as part of the SLIVA.

*Schedule 1 Part 3 - Requirements*

27.29 Additional developer requirements are set out throughout this report under the relevant topic headings.

*Schedule 6 – Procedure for Discharge of Requirements*

27.30 The requirements essentially placed on CCS by the draft procedures for the discharge of requirements set out in Schedule 6 are considered to be unreasonable, unrealistic and onerous.

27.31 CCS will make every effort to deal with each submission as promptly as possible, however, given the size, nature, complexity, significant uncertainties and sensitivity of the location, as well as the requirement to involve other relevant parties, including statutory consultees, it will not be possible to deal with each requirement within 5 weeks. Many aspects of the scheme will also require significant pre-submission discussion with CCS prior to submission. The Statutory time period for the determination of condition applications is 8 weeks.

27.32 For the same reasons, the requirement to request additional information within 7 working days is unreasonable and onerous and also relies on responses to the submissions being made to the relevant case officer which will be outside of his or her control.

27.33 The requirement to send out all consultations in regards to requirements and to forward all response within 1 working day is again considered unreasonable and onerous and does not reflect the multiple responsibilities that local Authority officers have. Nor does it allow for instances of annual leave or sickness.

27.34 Given the budgetary constraints faced by local authorities and the issue of ongoing associated resource issues, to meet reasonable expectations, it will be necessary for the applicant to enter into a Planning Performance Agreement with CCS that funds one full time senior planning officer and one full time technical support officer.

27.35 Furthermore, the suggested fee for discharging requirements is disproportionally small and would not cover the costs for dealing with such matters.

27.36 Finally, the provision that if the application is rejected or not determined within the specified time period that the fee should be returned is unacceptable. This implies payment for approvals only rather than the process of consideration.

*Section 106 Draft Heads of Terms*

27.37 In the "Note on rationale for draft S106" the Applicant describes the document entitled "Heads of Terms" as a draft section 106. This is not the case as the draft document is in fact a document, which seeks only to list the obligations which the Applicant will covenant to provide. It could be a cause of confusion if the Heads of Terms (HOT) document continues to be referred to as a draft section 106.

27.38 Paragraph 5 of the HOT refers to the obligations to be given by the Applicant to cover Traffic and Transport. The obligations should include:

(a) The payment of a sum towards the Fabian Way Corridor Study Works in the sum of circa £535,000.
(b) The installation of an Automatic Traffic Counter at the site in a location to be agreed at the Applicant's expense in order to monitor ongoing traffic flows within the site.
(c) A mechanism requiring the Developer to make payments to the Council if the monitoring referred to in (b) above shows traffic flows over and above that predicted for the development. The payments to be used to fund traffic signal alterations, any other traffic orders as required by the flows of traffic and additional Fabian Way Corridor Study Works.
(d) The appointment of a Travel Plan Coordinator within 3 months of the date of the Consent Order, at the expense of the Applicant. This post to be maintained throughout the life of the project.
(e) That the three Plans referred to in Paragraph 5.4 are to be developed in conjunction with the Councils.

27.39 In addition to the extra obligations referred to above the applicant will have to provide the traffic and transport obligations to the standards and requirements of the Council. The caveat "subject to investigation of its viability" should be removed from Paragraph 5.2.2.

27.40 Paragraph 6 of the HOT refers to obligations to be given by the Applicant to cover Environmental matters. Paragraph 6.4.2.2 refers to a "financial or in kind contribution". The manner of the contribution must be at the discretion of the Council. The HOT should also cover the monitoring and mitigation issues raised above under the sections of this report relating to coastal processes, sediment transport and contamination; intertidal and subtidal benthic ecology; fish; marine mammals; coastal birds and terrestrial ecology.

27.41 The provision or upgrading of any necessary air quality equipment should form part of the Section 106 Obligation.

27.42 Further obligations in respect of the following environmental issues are also considered necessary and relevant:

a) The applicant to fund the re-calibration/validation of a water quality model capable of continuing to provide the level of prediction and discounting necessary for the designated sampling point in Swansea Bay. This should include funding the appointment of an independent expert, agreed by CCS and NRW, to assess the available approaches that could be trialled as soon as the construction of the lagoon is completed and the sluices are operational. This will include the existing statistical approach and any other suitable technique, including the use of hydrodynamic models.

b) Funding the collection of the necessary environmental data, including local met data, hydrodynamic data, detailed faecal indicator data, with the assistance of CCS and NRW. This must include certainty that any microbial data is of sufficient standard to satisfy the relevant European Directives.

c) Funding the independent expert to analyse and interpret these data, in such a way that a back-to-back trial can take place between the existing approach being used by CCS and other partners, and any other selected technique. The independent expert will report publicly on the findings of any such trial so that CCS and NRW can select the best performing system for prediction, protection, public information and discounting for Directive purposes.

d) Funding of detailed riverbed and River channel surveys by a reputable Marine surveyor. This will need to take place from the Sail Bridge to at least the middle fairway buoys. It should commence as early as possible, so that any change in sediment deposits in the navigable channels can be detected throughout the construction phase and beyond, probably for a period of five years from operational completion. It may be that ABP will need to be party to this agreement as they currently accept responsibility for dredging the shipping channel and the Council have responsibility for dredging upstream of the Kings Dock lock entrance. CCS currently undertakes a survey of its area of responsibility on an annual basis with Longden and Browning, but clearly this could be negotiable if the three parties could agree on one surveyor undertaking this project.

In terms of dredging liability, should the survey identify a significant additional burden to certain parts of the navigable channel, the applicant should be accepting that part of the dredging cost. These can be considerable, particularly for the outer channel currently dredged by ABP.

27.43 As detailed above, given the rocky nature of the lagoon structure and the flows from the turbines, consideration should be given to retain a safety boat post construction in order to deal with events such as vessel breakdowns on a rapid response basis.

27.44 The obligation should also set out matters for a suitably detailed decommissioning strategy and appropriate funding arrangements along with a clear position of responsibility for maintenance or any future intended use and associated costs for the same.

27.45 Paragraph 7 of the HOT refers to the Applicant's obligations to provide Community Provisions. Paragraph 7 is vague and would not commit the applicant to the provision of benefits of the scheme which are significant to the planning 'balance' of acceptability for the proposal as a whole.

27.46 In Paragraph 7.4 the requirement to fund the University Post does not have a date and this should be specified.

27.47 Paragraph 8 of the HOT refers to the Applicant's obligations to provide Public Art. The obligation as stated in the HOT refers only to the Applicant funding three competitions. The obligation should also be to pay for the items of public art which emerge from the competitions and to maintain those items once they are constructed.

27.48 Generally, all the obligations must be to provide the matters described to the Council's specifications and to meet all relevant standards. Trigger dates for all the obligations must be identified and the Applicant's commitment in terms of maintenance must be specified.

*Other matters*

27.49 CCS shares the concerns highlighted by NPT in its LIR regarding the "potential risks associated with the failure of the project to complete construction and the unpredicted impacts that partial completion could have upon biodiversity, coastal processes, navigable waters, tourism and commercial economies, and the visual amenity of the wider area. As the project will be one of the first of its type, together with the dynamic and complexity of the environment in which it is to be located, and in combination with the potential interrelationship between many of the potential impacts identified above, the financial failure of the project is possibly greater than that which would be associated with other large scale infrastructure projects of this type." CCS also agrees with the suggested response of NPT and invite the Examining Authority to "fully consider the relevant merits of the provision of a suitably constructed bond or insurance to ensure the possibility of appropriate measures being available to deal with any resultant impacts or where necessary to provide suitable mitigation measures should the project, or a significant contractor, or funding source fail." (Paragraph 10.1.1 of NPT LIR).

27.50 It is the view of CCS that further investigation should take place as part of the formal examination to explore other options to secure a pedestrian and cycle connection westwards to Swansea City Centre, perhaps as part of a walkway integrated into the Kings Dock locks. If this is not successful, it is further requested that provision should be made for in any DCO that is granted, to allow this option to be revisited at some point in the future.

## Appendices

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| Appendix A | SA1 Swansea Waterfront Masterplan |
| Appendix B | Port Tawe and Swansea Docks adopted Supplementary Planning Guidance |
| Appendix C | White Consultants Report – Swansea Bay Tidal Lagoon Review of Environmental Statement: Seascape, Landscape and Visual, Final Report for the City & County of Swansea June 2014**.** |
| Appendix D | Seascape Landscape and Visual Impact Assessment Regional and Local Seascape Units, Landscape Character Areas and to Viewpoint Locations. |
| Appendix E | Kenneth Pye Associates Ltd Report - Comments and Advice relating to the proposed Swansea Bay Tidal Lagoon, with particular reference to changes in coastal processes and potential impacts (April 2014) (KPAL Report No: 160995). |
| Appendix F | Swansea Bay Sinc Map |
| Appendix G | Statistical modelling of faecal indicator organisms at a marine bathing water site: results of an intensive study at Swansea Bay, UK – A report from the Interrag 4a Smart Coasts – Sustainable Communities Project August 2013 |
| Appendix H | Destination Swansea Bay 2013-2016', the official Destination Management Plan |