

INTERNAL CONSULTATION RESPONSES

**Ecological Comments on the Proposed Swansea Bay Tidal Lagoon
(Generating Station) Development Consent Order
City and County of Swansea****Volume 5 Reports**5.4 Natural Features Report

It is difficult to support claims of assessment of effect in table 2.3 and in section 2.9.0.3 considering the uncertainty with sediment modelling.

5.5 Habitats Regulations Assessment

Grey Seals

Grey seals 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. The possible effects of the construction of the lagoon on these must be considered in the HRA. There is no evidence in reports to show that there will be no significant effect.

Crymlyn Bog SAC

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

Carmarthen Bay and Estuaries European Marine Site (Carmarthen Bay and Estuaries Special Area of Conservation (SAC), Carmarthen Bay Special Protection Area (SPA), Burry inlet SPA. and Ramsar site)

Carmarthen Bay and Estuaries European Marine Site (EMS) is part of a European-wide network of areas – the *Natura 2000* series – designated under the European Union's Habitats and Birds Directives to safeguard habitats and species that are important and threatened on a European scale.

There is no mention of Carmarthen Bay and Estuaries European Marine Site (CBEEMS). There are risks of far-field effects which require particular analysis. 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 two SPAs. Each of the features of the EMS must be looked at systematically and considered in terms of potential damaging effects during construction and operation.

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

Volume 6 Environmental Statement

Chapter 6 Coastal Processes, Sediment Transport and Contamination

The ecologically important habitats at Black Pill SSSI, and Crymlyn Burrows SSSI, and the Section 42 of the Natural Environment and Rural Communities Act 2006 habitats (sand dunes and *Sabellaria* reefs) within the bay are all dependant on the movement and deposition of sediment. Relatively small changes in the flow of currents and wave structure can lead to large changes in the quality and distribution of these habitats. The current modelling of the coastal processes is not detailed enough detail to give enough confidence to any prediction particularly as time passes. The bay will effectively be cut in two which may affect the . periodic east west movements of sand and the long term effect on the sediments present in the western section of the bay are uncertain.

'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; could have implications for coastal flood risk as well as net loss of sand dune habitat and recreational beach area.' KPAL report No 160995

There may be possible effects on Helwick Bank from sediment transport changes this needs to be addressed.

The report notes that "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. The recent report by Ken Pye Associates (KPAL Report No 160995 April 14) discusses issues with the coastal processes these comments are summarised as follows. No specific modelling of littoral sediment transport has been undertaken in the ES." Aerial photographs taken since 1945 show a complex pattern of sand-waves which change significantly on annual and decadal timescales. No analysis of the importance of these features in onshore - offshore alongshore sand transport has been undertaken as part of the ES. No attempt has been made to construct a sediment budget for north-eastern Swansea Bay, or to document net gains or losses of sediment using historical beach profile data or aerial photogrammetry" and it was noted that "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". These areas need to be covered. The report also 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.

With reference to Section 6.4.4 Contamination of sediment and Section 6.4.3 Sediment Regime of the Lagoon report Ken Pye states that with reference to contamination that “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” and that 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.

In Section 6.7 Mitigation and Monitoring Ken Pye 14 has suggested and we agree that “a more extensive programme of pre-construction baseline data acquisition and subsequent monitoring should be agreed with the Developer, 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.” and that “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”

Chapter 8 Intertidal and Subtidal Benthic Ecology

Because of the uncertain conclusions of the assessment of coastal processes it is difficult to come to a precise conclusion as to the possible effects of the construction of the lagoon on the intertidal and subtidal habitats. The bay contains a number of intertidal and subtidal habitats including *Sabellaria* reefs and peat and mud exposures, these are sensitive to changes in sediment movement. The data on the distribution and species of plankton and macro algae is largely based on desk top studies some of these are now several years old. If these habitats and species are to be protected it is essential that an accurate base line is established against which to measure any change. 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. Cosheton, Pembs. 11pp.

There is no description ,or listing of Section 42 intertidal and marine habitats and species (other than *Sabellaria alveolata* and *Ostrea edulis*). The only distribution maps are of Biotopes but these do not describe Section 42 habitats and species. This needs to be addressed to allow a full assessment of potential effect of the proposed development.

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 e.g. just south of the end of Mumbles Pier where Clay with piddocks occurs just below spring low tides it is vulnerable to changes in sediment distribution. This important habitat is not mentioned

In section 8.5.6.5 the information is not up to date 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 (section 8.5.6.15 states it is not recorded).

The probability of the introduction and spread of non-native species from the Lagoon development is considered to be low, what evidence is this based on? There is the potential, without strict biosecurity measures in place for construction materials and vessels to act as vectors of transfer of marine non native species within the lagoon footprint and outside of it.

It is stated in section 8.5.2.4 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 the process must be developed prior to inclusion in this appendix and stated in full within this section.

Ken Pye has 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 a 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.”

Ken Pye 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-doing 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. “

Chapter 9 Fish Including Recreational and Commercial Fisheries

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, 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 using the Bay

It is stated in section 11.6.1.1 that Herring spawning media on the outer Lagoon wall will safeguard fish stocks. What is the evidence for this?

Herring are an important food source for harbour porpoise (Oakley pers comm.) this was confirmed during a 2.5 year research project at UWTSW Swansea Metropolitan. 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 knock-on effect on harbour porpoise must be fully considered.

Chapter 10 Marine Mammals and Turtles

Harbour porpoises use Swansea Bay and seasonally bring their calves with them. Harbour porpoises are listed in section 2 of the Conservation of Habitats and Species Regulations 2010 (CHSR 2010) and are afforded the legal protection under section 41 of the regulations. The data does not explain what harbour porpoises are doing in the Bay in particular what they are doing with their calves. 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 report fails to indicate that the lagoon construction will not be detrimental to the maintenance of porpoises at a favourable conservation status (section 9b CHSR 2010).

There is no data presented that would allow an assessment of the effect of the development on Atlantic grey seals, a feature of the Pembrokeshire Marine SAC, Cardigan Bay SAC and PenLlyn a'r Sarnau SAC

With reference to section 10.4.2.10 (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 is 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.

With reference to section 10.7.0.4, the C-POD surveys began in 2014, as a long-term acoustic monitoring programme, when do they continue until? 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. How can this data be included after the EIA/ES have been written and submitted? 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 – how will this be undertaken for 120 years?

With reference to section 10.7.0.6, 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 here, as part of Chapter 10 and not in some future document.

The proposal for acoustic deterrent is not outlined in 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.

Who will record the collision events reporting these 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.

Capture and release of trapped marine mammals (only seal pups are mentioned). What about procedures for harbour porpoise entrapments?

As described in Table 10.12 there is low confidence in collision risk with turbines and noise disturbance the full mitigation measures must be described.

Strandings data does not seem to have been considered. Evidence is available from Marine Environmental Monitoring.

With reference to section 8.2.1.2, surveys undertaken by Researchers at UWTSD Swansea Metropolitan 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 is a designated control site for C-POD monitoring and there is no C-POD across the Bay near Port Talbot to monitor this important habitat.

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.

There have been a number of potential impacts on cetaceans from wind wave a tidal developments proposed by Dolman and Simmonds 2010 (Dolman & Simmonds, 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. They 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 are needed that allow 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 than 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.
- The results of monitoring and mitigation studies be fed back into the decision making process to further develop mitigation and management decisions?

The report does not fully address the issues above, in order to make a considered judgement of the affect of the lagoon on cetaceans the points above need to be covered.

Chapter 11 Coastal Birds

The Blackpill SSSI is designated for its nationally important overwintering wildfowl (particularly sanderling and ringed plover); the SSSI consists mainly of fine intertidal sediments, the uncertainty in the coastal process analysis makes a an assessment of possible effects difficult .A small changes in sediment movement particularly over a long time span could have a significant negative effect. The bay is also used by a nationally significant population of great crested grebes 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. 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.

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 a 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.'

Chapter 12 Terrestrial Ecology

There is no mention of then Swansea Bay SINC and no map of SINC boundary and habitats/species included as a local designations.(See attached map and citation?) The SINC supports a number of section 42 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 There is no mention of invertebrate surveys (e.g. section 42 invertebrates including sand dart moth, robber-fly and the strandline beetle) in the Black Pill SSSI and the SINC in Swansea Bay. This chapter should include a discussion of the strandline which is missing from the chapter on terrestrial ecology (section 12.4.5.28). Only Crymlyn Burrows SSSI has been outlined.

It would be useful to have a quantitative estimate of losses and gains of section 42 habitats and species to be able to help assess the impact of the proposal on the terrestrial ecology

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

There is no mention of the Swansea Bay Management Plan

There is a need for an Invasive non native species strategy.

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

Within the document the effect on the westerly sand dunes and the sediment in the Black Pill SSSI are considered to be minimal however there is still uncertainty attached to the sediment modelling and this conclusion may not be valid.

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 needs to be provided.

Chapter 23 Mitigation and Monitoring

There is a need for an Invasive non native species strategy to cover both marine and terrestrial species

The possibility of translocating *Sabellaria* successfully is uncertain 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. 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 required. The statement “Therefore the potential for the successful rehabilitation of this reef habitat exists although approaches are experimental” - is unacceptable In Table 8.10 – how can the confidence level possibly 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, otherwise it cannot be mitigation.

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.

With compensatory measures there are many gaps and uncertainties in the reporting. Further investigation and study 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.

Like for like compensation requires proportions of habitats to reflect the areas lost.

‘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 that a more extensive programme of pre-construction baseline data acquisition and subsequent monitoring should be agreed with the Developer, 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.

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

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.'

Other Issues

There is a need for a detailed long term monitoring particularly as the outcomes due to 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.

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.

Some habitats are very difficult to mitigate or compensate for e.g. mud flats that are use by overwintering wildfowl there have been historic losses of intertidal habitats in Swansea bay any further loss is unacceptable, how these may be compensated for.

It is difficult to support claims of assessment of effects and provide adequate mitigation with the level of uncertainty in the coastal processes report. The precautionary principal should apply

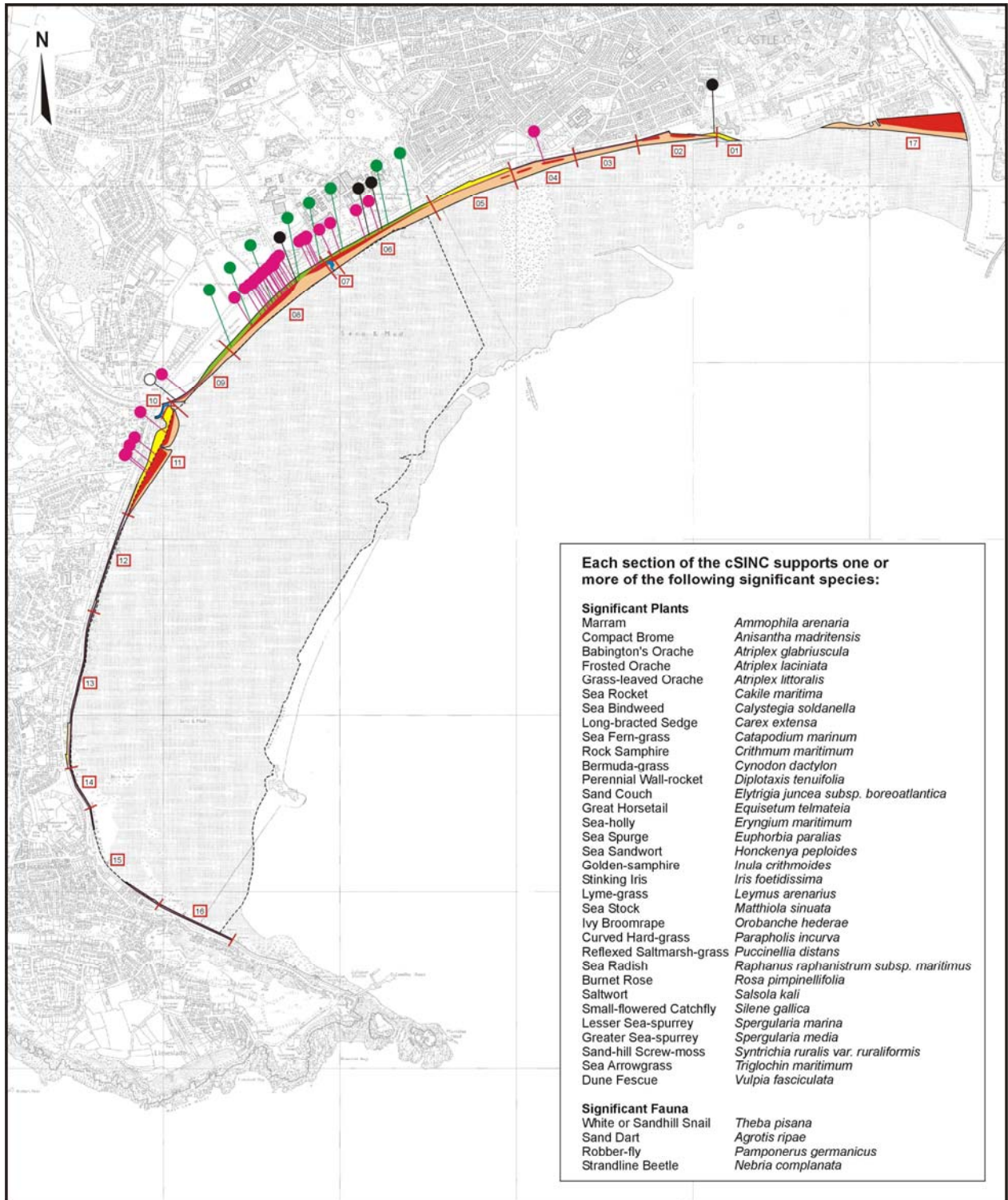
The assumptions within the report are wide-ranging with no real effort to link sections such as fish with marine mammals

‘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 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.’

‘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.’ Who will cover the additional costs for this work ?

‘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.

2nd June 2014



Legend

- Seawall with significant species (non-intervention)
- Marginal vegetation (non-intervention, though Japanese Knotweed present by University stream outlet)
- Lawns with significant species (best maintain as lawns - Bermuda-grass abundant where soils sandy)
- Dune with trees and scrub (mostly degraded dune that would benefit from management)
- Open dune vegetation (most important habitat in SINC supporting several key species)
- Open beach above MHWM (supports key strandline species)
- Blackpill SSSI
- Proposed Swansea Bay SINC boundary
- Sea Stock (Population of National significance)
- Sea-buckthorn (Invasive alien that degrades dunes - clearance work required)
- Poplar hybrid (Invasive alien that has degraded the dunes - some clearance work would be beneficial)
- Small-flowered Catchfly (Last remaining site in Glamorgan - population highly vulnerable)

City and County of Swansea

**SWANSEA BAY cSINC
Terrestrial Qualifying Features**

0 SCALE 10m

DRAFT

Based upon the Ordnance Survey 1:10,000 scale map with the permission of The Controller of Her Majesty's Stationary Office. © Crown copyright. November 2009

Huw Morgan
Pollution Control & Public Health Division
Residual issues for our submission to Inspector
(in addition to water quality evidence)

A remaining minor point of detail would be that the existing emergency short outfalls from the Swansea sewage treatment works are not really taken into account. These would discharge into the lagoon directly should there be a major problem. Clearly this needs to be taken into account in the management plan for the lagoon users. This will need NRW 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.

Much of the attention in the Navigational Risk chapters seems to be on larger vessels. This is important, as we 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. 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, seem quite concerning (fig 4.13). 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. This chapter 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 maneuvering 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.

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. The lagoon application also mentions the likelihood of increased dredging being required around the Tawe dredged channel. In 14.6.2.31 also in 6.5.2.74 – table 6.18 as well as

chapter 4, an increase of between 20 to 34% is suggested. Given that the Council already struggles to fund its dredging liability in relation to the Barrage and most of the material we dredge has entered from the bay, we should agree the lines of responsibility for monitoring and dredging post construction. Given the possible costs (our limited dredging already costs £100k pa) is this another area for legal agreements through the obligation?

I understand that the Royal Yachting Association has registered an interest and I would hope that they may identify specific risks with regard to the safety of water users within the lagoon. In case no one else raises this issue, I think I should mention some of the significant hazards which will be present some of the time in terms of the velocities of flow and the turbulence of flow patterns which are likely to occur during certain parts of the tidal cycle. Given some of the likely uses, Kayaking, paddle boarding, dinghy sailing, windsurfing and of course open water swimming, some of these risks could be highly significant and require careful attention.

Metal contamination of the sediments is referred to in the application. Whilst the data looks reasonable at first glance, it should be borne in mind that the 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. Huge amounts of contamination ended up in the River Tawe or the local canal systems. Much of this eventually ends up in Bay sediments. It is 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 FSA. I accept this could be regarded as a temporary problem, which could be inevitable given the scale of construction, but I have 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 seems 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.

A similar lack of confidence exists around the discussion of contaminated land, particularly on land previously occupied by BP. 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).

Air quality management is mentioned by the applicant, but it 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 second 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.

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Tidal Lagoon Application
Huw Morgan- Pollution Control & Public Health Division.

The most important issue for my section is 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.

1. The City and County of Swansea 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 (WHO, 2003) and to comply with the revised Directive. Eventually, through a Wales-Ireland programme Interreg bid, we were 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.
2. Critically, this approach is very much in line with the fundamental ideas behind the World Health Organization recreational waters guidelines (WHO, 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. 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 the Council and our 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.

3. The Interreg funded 'Smart coast' project in Swansea Bay delivered exactly what we had hoped for. From 2010 until this year, we 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 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. Our 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, EA, SEPA and others and can be supported by fully documented reports (ref¹). 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.

4. 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 flow 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 our intention 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. We intend the system to operate from

09.00 to 20:00 BST in the same way as SEPA.

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 our estimate of the fieldwork costs for re-calibrating only the black box model (probably £400k at 2017 prices) was unacceptable.

5. The 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 (7.4.2.6) and Swansea Bay will be compliant solely via the corresponding AMP programs (7.4.2.18). 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. Chapter 7 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 (7.4.2.24). It is also worth noting that connectivity from riverine sources to the DSP suggested by the black-box prediction model has been confirmed by dedicated microbial tracer studies.
6. It is 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 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.
7. **It is the Council's position that unless there is a paradigm shift in the science around this subject, we 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 so that a high quality predictive statistical model can be maintained with the same degree of explained variance as the current model.

8. For the sake of clarity, some further comments are needed on the issue raised in the application on the future use of hydrodynamic models around the lagoon. Clearly, given the variability of microbial concentrations on any given day in the bathing season and given the strong relationship with UV, it is 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 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.

9. It is likely and highly probable, that the proposed lagoon would significantly change the hydrodynamic behavior 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. 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 the Council are 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 NRW.

ref 1

**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 Interreg 4a Smart Coasts – Sustainable Communities Project

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August 2013

HM / SN 18.6.14

Head of Highways and Transportation

Tidal Lagoon, Swansea Bay, Swansea

Proposed application for development consent to construct a tidal lagoon for the purpose of generating renewable energy (consultation under Section 42 of the Planning Act 2008).

Onshore Transport Assessment

1. Introduction

The TA describes the assessment of the impact of the Project on the surrounding highway network, public transport, cycling and pedestrian amenities. It is based on an assessment of the interaction between future development-related movements and existing patterns of vehicular, pedestrian and cycle movements.

The outline construction programme (as discussed in more detail in other parts of the submitted document) anticipates construction starting in 2015 with the main construction phase lasting for about three years.

The first phase of the TA was the identification of sensitive receptors (i.e. locations that may be sensitive to changes in numbers of people or vehicle movements). The following sensitive receptors have been identified:

- i. pedestrian and cyclists on the roads and footways leading to the site;
- ii. motorised users on the local highway network;
- iii. public transport facilities around the site.

The Institute of Environmental Management and Assessment (IEMA) recommends a detailed assessment for highway links where:

- i. traffic flows will increase by more than 30% (or the number of heavy goods vehicles (HGVs) will increase by more than 30%); or
- ii. specific environmental problems may occur (sensitive areas affected by traffic increases of at least 10%, unless there are significant changes in the composition of traffic).

Based on these guidelines, the geographical extent of the assessment was initially identified as incorporating Fabian Way from the Tawe Bridges junction to the junction with Baldwin's Crescent. Subsequently both CCSC and NPTCBC requested that the assessment should be extended to include all junctions on Fabian Way east to the A48/A483 junction after reviewing the PEIR, and this has accordingly been incorporated into this assessment.

The significance criteria for assessing the traffic and transport effects of the Project have been assessed. These significance criteria have been based on the IEMA guidance and the Department for Transport document 'Guidance on Transport Assessment' (2007). However, for a number of effects there are no ready thresholds of significance. In these cases, the thresholds of significance have been assessed through interpretation and professional judgement,

based on knowledge of the Project and study area and/or quantitative data, where available.

Impacts are assessed before and after mitigation, and are identified as either: I. adverse - meaning that they produce disbenefits in terms of transportation and access; II. negligible - meaning that there is no measurable effect; or III. beneficial - meaning that they produce benefits in terms of transportation and access. Where adverse or beneficial impacts have been identified these have been assessed against the following scale: 1) minor - slight, very short or highly localised impact of no significant consequence; 2) moderate - limited impact (by extent, duration or magnitude) which may be considered significant; and 3) major - considerable impact (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.

2. Baseline conditions and study area

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. The section of Fabian Way under consideration is approximately 7.6 km long and extends through the centre of Crymlyn Burrows and bridges the two unitary authorities of CCSC and NPTCBC. 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, 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.

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 NPTBC that generate any traffic directly to Fabian Way are expected to contribute towards this sum of money on a pro-rata basis. NPTBC have undertaken calculations based on visitor numbers to Pembrey country park and arrived at a contribution of approximately £535,000. I have no reason to dispute this figure which will be used jointly between CCS and NPTBC to fund the more pressing elements of the proposed upgrade.

Public Transport: 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 SUBC, 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.

Pedestrians and cyclists: 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 Glyncothrog 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 it 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.

Rail: 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. For the purpose of the worst case assessment in this it has been assumed that those construction materials required which will not be transported by or sourced from the sea (e.g. sediment/gravel from seabed or rock armour and quarry run from Dean quarry) will reach the Project by road.

3. Baseline traffic flows

Information gathered during site visits has been used to establish baseline conditions in terms of the highway network, accessibility and public transport facilities. This data has been supplemented by information obtained from maps and documents published by various authorities, including NPTCBC and CCSC. 15.4.5.2 Baseline information on existing road traffic movements has been obtained from CCSC, and is based on turning count surveys and Automatic Traffic Counts (ATCs) undertaken in June 2010 and May 2012. Additional traffic counts were requested by CCSC and NPTCBC during a consultation meeting held on 9 October 2013. The purpose of the additional counts was to establish traffic flows at weekends, in order to assess the impact of traffic related to major sporting events that could be held at the Project. These additional counts were carried out in November 2013. In July 2013, ABP altered the location of their main port access from the Port Tennant Junction to the Baldwins Bridge Junction. The surveys undertaken in October 2013 represent conditions after the port access change. ATC (Automatic Traffic Counters) data was obtained from CCSC for a site located

on Fabian Way, close to the Baldwin's Bridge junction. Data for Monday to Friday is from a count undertaken in May 2012, and data for Saturday and Sunday is from a count undertaken in May 2013. Eastbound, westbound and two-way flow profiles were presented and can be summarised as follows:

Am peak (0800-900) Mon-Friday 1,477 (westbound) 791 (eastbound) total 2,268
Lunchtime peak (1100-1200) Saturday 1,207 (w/b) 991 (e/b) total 2,198
Lunchtime peak (1200-1300) Sunday 799 (w/b) 1,042 (e/b) total 1,841
Pm peak (1600-1700) Monday –Friday 1,105 (w/b) 1508 (e/b) total 2,612
Pm peak (1500-1600) Saturday 693 (w/b) 1,144 (e/b) total 1,837
Pm peak (1500-1600) Sunday 594 (w/b) 1,001 (e/b) total 1,595

In summary the peak weekday flow occurs between 16.00 and 17.00 and is 2,612 vehicles, on a Saturday between 11.00 and 12.00 and is 2,198 and finally on a Sunday between 12.00 and 13.00 which is 1,841 vehicles.

4. Assessment of impact.

The Project is intended to be of both functional and recreational benefit to the local and wider community and therefore public use of the Project. The principal purpose and function of the Project is as an electricity generating station. Two buildings are proposed which will be used by visitors: the Offshore Building which will comprise a visitor centre and O&M facilities and will be accessed along the western seawall; and the Western Landfall Building which will comprise a visitor orientation point, boating facilities, O&M facilities and a laboratory hatchery. In addition, extensive facilities for recreation are planned including a perimeter cycle and footpath around the Lagoon. 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.

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. 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 (upto 1 million). 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 NPTBC and also are not considered to be robust enough to give an idea on the level of traffic generated nor impact on the affected junctions.

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

- i. construction phase - for staff, HGV deliveries and abnormal loads (if required); and
- ii. 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. 1

Vehicle access for both the construction and operational phases will be via the Fabian Way/Langdon Road/Park & Ride junction. At the roundabout to the south of this junction, traffic will turn east along Langdon Road. From the eastern end of Langdon Road, a new road to link to the south side of the Port and Queens Dock will be provided, as well as a new coastal access road extending to the western landfall of the Lagoon. From Langdon Road, the route will turn south and then east, running parallel to and immediately north of the existing port access road, before running to the boundary of the existing waste water treatment works (WWTW). From here, the existing Port road will be moved south and the Lagoon access road will continue past the entrance to the WWTW. Approximately 50m east of the entrance to the WWTW, the Lagoon access road will turn south, cross the Port access road by a priority junction, and extend west along the south of Queen's Dock. A new port security entrance will be created, and the existing security gate house will be relocated to the west of the Lagoon access road. Access to the Port will continue to be from Baldwin's Bridge junction.

Once the Lagoon access road has crossed the Port road, there will be a drop off point and turning area. This will allow pedestrians and cyclists to join the footpath and cycleway to the eastern landfall. The Lagoon access road will extend along the south side of Queen's Dock and utilise the alignment of the existing Port road. A new road will be constructed immediately to the north of the Lagoon access road, which will be separated by a secure fence this should ensure that existing movement through the Port is not significantly affected by the Project. A shared use path (SUP) of 3m width is also included for shared cycle/ pedestrian access. At its southern end the SUP will link directly to the circular SUP which runs on top of the proposed lagoon wall. Lagoon Traffic will be prevented from direct access to Baldwins Bridge to join Fabian Way.

As was previously mentioned there is the possibility of running a shuttle bus from the Fabian Way Park and Ride but no details or agreements are included to that effect. A jetty will be provided on the western bank of the River Tawe on the lagoon wall to facilitate a water shuttle serving the Project from the west bank of the River Tawe and/or Mumbles. Again no further details have been included.

5. Car/cycle parking

Car parking provision at the western landfall building will be as follows:

- i. 304 spaces for visitors, including 33 disabled bays;
- ii. 28 spaces for staff, including 5 disabled bays

Since access to the Offshore Building incorporating the visitor centre will be on foot or by a shuttle bus provided by TLSB, car parking provision at the Offshore Building will be as follows:

- i. 27 spaces for staff, including 3 disabled bays.

Cycle parking for staff has been based on provision of one space per 10 employees, in line with CCSC parking standards.

There is expected to be a total of 73 staff (including Visitor Centre staff and O&M staff), and therefore 8 staff cycle parking spaces will be provided. For visitors, 100 cycle parking spaces will be provided. Cycle parking will be distributed across the site as follows:

- 1) Offshore building - 12 spaces;
- 2) Western arm - 30 spaces;
- 3) Western landfall - 56 spaces; and
- 4) Eastern landfall - 10 spaces.

6. Access impacts during the construction phase

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.

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. A suitably worded condition can be included to limit site deliveries to out of peak times.

Assumptions have been made regarding on site personnel during the construction phase after consultation with the Cardiff Business School. Annually, it is predicted that there will be 1,150 construction personnel. For the purpose of this assessment it is assumed that during the peak construction period the maximum number of employees on site is 600, comprising 200 contractor's staff and 400 sub-contractors. In order to

estimate the number of staff cars and vans travelling to site the following assumptions regarding vehicle occupancy have been made:

Contractor's staff 1 person/car = 200 vehicles

Sub-contractors 2 people/car = 200 vehicles

Total = 400 vehicles

Predictions have been made regarding the origin of these construction phase staff and the results are as follows:

Swansea 25%

M4 (east) 25%

M4 (west) 20%

A48 (to Neath/Port Talbot) 10%

B4290 / A465 (via M4 J43) 20%

TOTAL 100%

This seems a reasonable assumption to make and would mean that 75% of staff (equating to 300 vehicles) would originate from the east, and would therefore travel west along Fabian Way into Swansea in the morning. It has been assumed that one third of these (or 100 vehicles) would arrive between 06:30-07:00, and two thirds (or 200 vehicles) would arrive between 07:00-07:30. In the evening the 300 vehicles would travel in the opposite direction between 18:00-19:00. It is planned to have the staff arriving on site outside the traditional morning peak time of 0800 to 0900, and also leaving outside the traditional evening peak of 1700 to 1800. The 0700 to 0800 hour will increase by 19% to 1,255 but will remain below the current am peak of 1,477 vehicles/hour between 0800 to 0900. Similarly the 1800 to 1900 peak will increase by 28% to 1366 but will still remain below the current peak flow of 1508 between 1600 and 1700. The arrangement of moving the staff outside of the peak times will result in a minimal impact on the current traditional peak hour flows.

It is anticipated that the main bulk material for the construction of the Lagoon seawall will be imported by sea as far as possible. The use of a concrete batching plant within the Port has also been proposed. 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. 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.

As part of the requirements of the Construction Phase Traffic Management Plan which will be secured by Development Consent Obligation it is expected that all HGVs will be required to travel to and from the site via the M4 and Fabian Way. This is in order to avoid routing HGV traffic through Swansea city centre.

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 I concur with this statement.

In terms of the Fabian Way Corridor Study a financial contribution will be required from Tidal Lagoon, based upon average trips generated.

7. Assessment of impacts during operation.

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 employed to service the visitor and recreational facilities.

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. It is estimated that the project could attract 110 days of peak time (weekends march to October plus summer and Easter holidays) and 255 days of off peak times.

Using the figure of 100,000 visitors and assuming 50 visitors/day off peak then this equates to 12,750 visitors/year. This leaves a peak day averaging $(100,000 - 12,750)/110$ which equates to 793 visitors per day. Making the assumption that high season would attract upto 50% more visitors than an average peak day then this takes the figure upto 1,190 visitors per day.

Consulting the National TRICS Database for multi modal spilt it has been assumed that the following figures will apply (basing the figures on a leisure parks category):

- Car driver 40%
- Car passenger 40%
- Walk 10%
- Cycle 5%
- Public transport 5%

This works out at 476 car driver, 476 car passenger, 119 walk, 60 cycle and 60 by public transport.

Referencing the 'marinas' category of TRICS a distribution chart was produced which included for the arrivals and departures of staff plus visitors. An assumed distribution of operational traffic was also made which included:

33% coming from Swansea,
30% from m4 east,
17% from M4 west,
10% from NPTBC via the a48, and
10% Coming from junction 43 (A465).

In summary approximately 2/3 of the flows will be coming from the east, a total of 661 two way trips/ day.

Given that the peak events are likely to take place on the weekend then the combined flows still equate to less than the traditional weekday peak flows in both the morning and the evening. Major events are catered for separately, see point 8 below.

8. Major events

The lagoon will be capable of holding major sailing events and these may attract upto 8000 spectators per day. They would be one off events occurring several times per year and special measures would be put in place to manage vehicle and spectator movements. A framework major events travel plan will be supplied prior to any event taking place in joint consultation with NPTBC and CCS.

An additional traffic survey was undertaken on a Saturday in November 2013 (between 08.00 and 17.00) to determine traffic flows at 8 key junctions along Fabian Way.

The peak hour was subsequently identified as 12.00 to 13.00.

Major sporting events will require temporary measures to manage traffic movements including the provision of off-site parking and shuttle buses to the site. The location of the off-site parking has not been established as yet but assumptions have been made about distribution of the traffic. The modal split for traffic has been assumed along the same lines as that on an operational day but with a higher proportion of public transport and car sharing due to the fact that car parking will not be available at the site.

Assuming 8000 visitors for a major event this equates to
Car driver 2,400
Car passenger 3,600
Walk 400
Cycle 400
Public transport 1200.

A statement has been made that there will be no spectator parking at site and that all visitors will park off site and be bussed in. This will be covered by the Major Events Travel Plan. A number of options are being considered regarding shuttle bus locations but it is likely that 45% of visitor traffic will travel along Fabian Way. The peak hour for car trips is anticipated to be between 15.00 and 16.00 which provides 552 two way movements (based on

2400 cars (4800 two way flows) over the day). As a worst case scenario, and to provide a robust assessment this flow has been added to the current peak flow between 12.00 and 13.00. There will also be a demand from visitors needing transport to the project from Swansea city centre of from any temporary park and ride site. It is envisaged that 20 shuttle buses per hour will be required to cater for this need.

Construction works are expected to be completed by the beginning of 2019 and the traffic flows have been factored to take into account this time difference.

Junction assessment results were undertaken using Linsig and the traffic signal information was obtained from CCS. A total of eight junctions were tested and the majority were well within the theoretical capacity even up until 2018 with event traffic. Some of the junctions were in excess of 90% of the degree of saturation but still within capacity.

Summary of impacts during operational phase.

'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.'

Having consulted with CCS Telematics they are concerned regarding this statement and dispute this claim. 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. A solution could be to install an Automatic Traffic Counter 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. If the car flows measured are in excess of those expected than a financial penalty could be imposed, firstly to sort out any arising issues with the signals/junctions and secondly to increase the contribution made towards the Fabian Way Corridor Study.

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.

The project will include enhancements to the pedestrian and cycle ways in the port area and will provide new links along the waterfront. A shared use cycle/pedestrian route is proposed alongside the new vehicular access and this will link to the Swansea University Bay Campus.

Due regard has also been taken of all the relevant committed development in the area of CCS and NPTBC.

9. Mitigation measures.

- A detailed construction Management Plan will be prepared by the contractor and submitted to CCS and NPTBC for approval prior to any works commencing on site.
- All construction traffic will be closely controlled. Vehicles entering/leaving the site will travel via designated routes to be agreed with CCS and NPTBC.
- Deliveries will be phased on a 'just in time' basis to minimize travel and congestion. **I propose to also suggest limiting deliveries to outside the peak hours of 0800 to 0900 and 1700 to 1800 in the interest of the freeflow of traffic in the area.**
- A safe site access strategy will be agreed with the relevant bodies including the access and egress of construction traffic to minimize the impact on the highway.
- Construction staff will be encouraged to travel by sustainable means. Parking within the car park will be managed to prevent overspill parking on the surrounding side roads.
- Pedestrian access to the site will be segregated with clear signage to maintain the safety of the project and the general public.
- A detailed operational phase travel plan will be prepared and submitted to CCS and NPTBC for approval prior to any public visitors going to the site. The travel plan will include initiatives to encourage the use of sustainable modes of transport including the promotion of walking, cycling and public transport.
- A travel plan co-ordinator will be appointed, whose role will be set out in the travel plan.
- A separate major events travel plan will also be proposed and will be submitted to CCS and NPTBC. This will cover:
 - Definition of what constitutes a major event.
 - Expected numbers of competitors and spectators and mode of transport.
 - Management of vehicular and pedestrian access including off-site parking, park and ride, drop off and pick up arrangements.
 - Any temporary road closures or traffic management required.
 - Car and coach parking arrangements.
 - Details of any police liaison.
 - Access signage and advertising strategy.

10. Conclusions

An assessment of the potential impacts to onshore traffic and transport resulting from the project has been undertaken. The baseline environment was examined in relation to the surrounding highway network, public transport, cycling and pedestrian facilities. The assessment then considered the interaction between future development related movements and the baseline environment.

The site is accessible by a number of alternative options. There is no public access to the port of Swansea currently. Public transport runs along Fabian Way as does the National Cycle Network. There is a park and ride also located on Fabian Way but that only runs directly into Swansea City Centre. There is no feasible railway link at present to the site.

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 **but I consider that a condition is put in to this effect.** The impact on the local highway network is predicted to be of minor adverse impact (from the assessment) **however due to concerns regarding traffic in the summer holidays , possibly more in the operational phase but likely in the construction phase also (as mentioned above in point 8 above: Major events) we feel that the development has the potential to place increased demand on the affected junctions and roundabouts, and also on the flow on Fabian Way. Traffic in excess of that predicted will generate financial penalties which can be used to try to alter the traffic signals to improve flows, and also to put additional funds into 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. A way of monitoring this is to lay down at ATC at a location to be agreed which will pick up all flows. If the results show flows in excess of those predicted then there will be cost implications for the project. The level of costs can be agreed at a later date.**

Whilst the impacts on the local highway network are expected to be negligible during normal day to day use and also during weekends and holiday periods we do have concerns that the flows may be in excess of those previously referred to in general. The major Events Travel Plan will attempt to minimise impact on all modes of transport and will be planned well in advance. Through the suggested measures it is hoped that impacts on the local highway network can be minimised.

11. Recommendations

I recommend that no highway objections are raised to the proposal subject to:

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.

Tidal Lagoon Swansea Bay Environmental Statement

Economic Development Assessment

Content and Methodology

1. An Economic Development Assessment of Tidal Lagoon Swansea Bay's Preliminary Environmental Information Report in August 2013 concluded that: -
“...the Project is likely to have an overall positive impact on the study area economy, albeit a minor impact over the long term. Further assessment at the EIA stage is welcome, particularly if it reveals: -
 - The estimated economic impact/value of the Onshore and Offshore Project outputs;
 - Details of the occupational/ professional employment profile at the construction phase;
 - The procurement strategy and how opportunities for local procurement will be maximised;
 - How community benefits will be delivered (e.g. Community Fund, Share Offer, Cheaper Electricity and any other benefits);
 - The impact on tourism, recreational users, the Marinas, surfers and water quality, and details of any mitigation measures to minimise potential negative impacts.”
2. This second (updated) Economic Development Assessment focuses on TLSB's Environmental Statement and specifically on Chapter 22 Economy, Tourism and Recreation and Appendix 22.1 Turning Tide etc., which provides an assessment of the Tidal Lagoon Swansea Bay project conducted by Welsh Economy Research Unit at Cardiff Business School. The CBS assessment employs an established input output model for estimating the economic impact of the construction and operation of the Tidal Lagoon.

Impacts

3. Economic Impact/Value

The Cardiff Business School assessment (Appendix 22.1) 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).

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.

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

4. Employment

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

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

Additional information on operational employment is provided by the TLSB Project Team in Chapter 22 of the Statement. 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 in paragraph 3 above..

5. Procurement

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

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...

(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...”

6. Community benefits

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 will support the development and production of high quality public art projects and TLSB has established three programmes to progress the public art research and development phase in respect of the project.

TLSB 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.

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 TLSB is working on are: -

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

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

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.

7. Tourism and Recreation

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 TLSB estimates suggest that between approximately 70,000 to 100,000 people could visit the Project each year, generating visitor spend to support between 65 and 90 full time equivalent jobs per annum.

A small improvement in water quality is assessed, and wave conditions are not considered to affect surfing conditions. The project is also considered to have a beneficial effect on fish biodiversity, of benefit to recreational fishing.

Facilities to allow provision of a “water shuttle” are also proposed between the Project and the western bank of the Tawe.

8. Other benefits

A number of other projects are planned in the vicinity where there may be potential positive cumulative or in-combination socio-economic impacts, including: -

- Swansea University Science and Innovation Campus (in terms of education);
- Mumbles Pier etc. redevelopment (tourism);
- SA1 development (not specified);
- Port Talbot Harbour redevelopment (no information currently available);
- Porthcawl regeneration scheme (tourism);
- Mumbles Oyster project (employment diversification);
- Prenergy Biomass Power Station, Port Talbot - 350 MW wood chip fuelled thermal generating station;
- Abernedd Power Station (granted conditional approval by DECC on the 23 February 2011 for construction of a 870MW gas fired combined cycle gas turbine power plant.);
- The Swansea Bay (Thomas Shellfish Limited) Mussel Fishery Order.

Two options for decommissioning are outlined – continuous operation and removal of turbines and sluice gates: -

- Continuous operation would result in operational impacts being sustained;
- If the turbines and sluice gates are removed, options for maintaining the continued use of the lagoon for recreation would be considered, including creating an inter-tidal mudflat and saltmarsh area with potential ecological benefits.

Consideration

9. The 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”).

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.

Some further information on: -

- 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 would be welcome.

Comments on the Sustainability Impacts of the Proposed Swansea Bay Tidal Lagoon

The City and County of Swansea defines sustainable development as:

"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](#)).

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

These comments on the Planning Application and Environmental Statement for the Tidal Lagoon Swansea Bay (TLSB) proposal is based upon the impact the proposal will have on the aims and priority areas within this policy. Any comments made by us at this juncture are purely observational based on the information presented and may vary, should new / additional information be forthcoming at any stage in the future.

Sustainable Use of Natural Resources

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

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%¹ and is on an upward trend.

¹ DUKES 2013

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

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 but there will be indirect benefit to the de-carbonising the supply of electricity and supporting the UK and Welsh Governments meet their renewable energy targets.

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.

However the ES 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 ES considered 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 we would have expected the ES 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.

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

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 must be remembered that at this point such investment comes with significant risk and the long term benefits of such investments may not be realised.

DECC recognises the value of that owning or co-owning renewable energy developments, communities can have a real stake in, and share in the profits of, energy generation in their local area that encourages joint venture/partnership working between

developers and communities. 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 be successful, then this approach could offer a more reliable and sustainable form of income to support economic development in the area.

Since 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 short term. In the long term 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 Development Consent Order (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.

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 does not provide evidence about how this figure was determined.

However the applicant does not provide information about how these facilities will be managed and run once they have been constructed and there is no evidence provided by the applicant of 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

"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.

However 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.

Whilst not a planning obligation yet, 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 Government² 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 so it is our position that it is appropriate to use such guidance as a benchmark.

In the PEIR there were proposals for a local energy tariff, a community fund and a local share offer. References to both 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. TLSB are still committed to a local energy tariff but have limited this to 20,000 households in the Swansea, Neath Port Talbot area. There is currently no detail on how the tariff will be allocated to households. Targeting households 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.

TLSB 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 ES why some benefits are deemed to outweigh the benefits of a community fund. No direct question was 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)".

In their analysis of this element of the consultation responses, TLSB state

² "Onshore Wind Call For Evidence – Government Response" DECC June 2013

“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”³

Much of detail of 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 £1000 per MW per annum for new nuclear, where the energy outputs are that much greater.

The Applicant has 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.

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 provides 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 of my opinion 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.

The provision of a local employment scheme has the potential to support social inclusion in the year. 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 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.

Of the remaining community provisions, these would appear to benefit the developer as much as or even more so than the community and would have little impact on social inclusion in the area.

³ (p1-16 Chapter 9, Volume5 of the ES)

Natural Environment

The impact directly on the Natural Environment has been commented on by colleagues in other departments of the Council and NRW.

Governance

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

Additional comments

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. Whilst the restriction of access during periods extreme weather it would be useful to understand why access during hours of darkness has to be controlled. There are useful benefits, especially to anglers, for night-time access that cannot be realised under current proposals. Access to the sea wall along side the Tawe Barrage does not have similar constraints.

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.

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.

Tidal Lagoon Swansea Bay

Tourism comments – submitted 23.04.2014

From a tourism perspective, it is important that the TLSB project links to 'Destination Swansea Bay 2013-2016', the official Destination Management Plan for Swansea Bay. This strategic document 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.

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 USP (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 watersports 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.

However, we are aware that a number of real concerns have been raised in relation to:

- **Water quality in the Lagoon** if the discharge pipe cannot be moved / extended. Poor water quality would build a negative reputation of the Lagoon 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 area of ‘calm’ bay water would be greatly reduced. Potential displacement of business from other Watersports facilities recently in receipt of public funding.
- **‘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 cruiseship 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, particularly for large ships. Proposed water ferry service from Marina to Lagoon would increase ‘bottleneck’ effect in this busy area.
- **Access to Lagoon** – no direct link with City and SA1 other than proposed water ferry service. No bridge planned. Visitors would have to drive through port to access Lagoon. Missed opportunity to link the Lagoon to Swansea as a ‘Waterfront City’.

Some aspects which we felt needed further information / clarification related to;

- Level of noise affecting existing leisure and recreational businesses on SA1
- Impact of sand levels at other Swansea Bay beaches as a result of the development

- Impact on any other tourism sectors e.g. cruise market and port access and what impact this might have on our potential to encourage cruise ships .
- Business plan measures of success – clearly payback into the local grid system is one, but we would be keen to have more information about the 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 payback haven't been sustainable, although there are some good ones on the east coast of England
- Parking provision at peak times and during major events
- Pricing structure and policy

Jenkins, Hayley

From: Jones, Richard (Planning)
Sent: 26 June 2014 21:11
To: Jenkins, Hayley
Subject: FW: Lagoon Concerns - Swansdea Marina

From: Kern, Steve
Sent: 24 April 2014 11:58
To: Jones, Richard (Planning)
Cc: Morgan, Huw
Subject: Lagoon Concerns - Swansdea Marina

Marina Manager Comments

Acquisition of Water Space / Land Below Tawe Barrage, Including Loading / Unloading Pontoon

Current proposals suggest that water space and land immediately below the Tawe Barrage are to be acquired for the scheme. This is the only entry / exit point to Swansea Marina and losing control of this area could mean enforced closures of the Marina, leading to possible breach of contract with our customers.

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.

Shuttle Ferry Service

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, particularly during certain tidal conditions. This would almost certainly lead to delays for customers who are paying a not inconsiderable amount of money to berth their boat in Swansea and use the Tawe Lock.

There are sometimes significant flows from the lock and penstock systems during operation during certain tidal conditions, which could lead to us being asked to suspend operations during times when the Shuttle Ferry is manoeuvring. If this were to happen, it would negatively impact customer waiting times.

Siltation – Impounded Waters, River Tawe Estuary Channel and Swansea Bay

There are concerns that siltation may increase in the impounded waters, the estuary channel and Swansea Bay in general. 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 and out of. 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, the proposed SA1 Marina development and the 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 our customer base are

from outside of the Swansea area. This percentage does not include the some 500 visiting vessels we receive per annum.

A good example of siltation having a major impact on the viability of a Marina would be Burry Port. Since construction of the tidal gate, the pattern of the approach channel is constantly shifting and they are experiencing issues with significant siltation in their Marina basin. These factors have contributed to occupancy levels of less than 50%.

Navigational Hazards

The proposed 50m exclusion zone around the turbine outfalls seems very small when you consider the volume of water that will be passing through them. Concerns have been raised that smaller craft may struggle to negotiate the waters adjacent to the exclusion zone during operation due to flow rates.

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.

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.

Once again, if Swansea is perceived as being a difficult place to enter or exit, it is likely that custom will be affected, leading to knock on effects for all local marine businesses.

Jenkins, Hayley

From: Jones, Richard (Planning)
Sent: 26 June 2014 21:10
To: Jenkins, Hayley
Subject: FW: Tidal Lagoon Comments from Drainage and Coastal Management.

Expires: 14 July 2014 00:00

From: McAulay, Dan
Sent: 15 April 2014 11:49
To: Jones, Richard (Planning)
Cc: Sweeney, Mike; Anthony, Simon
Subject: Tidal Lagoon Comments from Drainage and Coastal Management.

We have reviewed the submitted information and would offer the following comments.

We 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 and National Planning Policy.

For example section 6.5.2.27 states that increases in wave height are shown to occur across the intertidal 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 been 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.

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 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.

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; we 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. our 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.

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. How has this statement 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, we would expect this issue to be assessed as part of the FCA as the most sensitive watercourses affected by this issues are around West Cross/Blackpill where the application has identified higher water levels and wave heights.


Furthermore the effects of climate change over the lifetime of the development have not been incorporated, we understand that there are two possible lifetimes for the development and that only 75 years is included as part of this application. However if the turbines are upgraded as envisaged in some aspects of the report the lifetime of the development will be extended this should be looked at as part of the assessment.

In summary we consider 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 any revised assessment must 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.

Regards,

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