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PONTARDAWE AND SWANSEA ANGLING SOCIETY LTD

WRITTEN REPRESENTATION

TIDAL LAGOON SWANSEA BAY'S COMMENTS

TLSB's Comment(s)

1 TLSB has no comment to make on Section 1 of the written representation.

2 *JUSTIFICATION FOR THE DEVELOPMENT*

2.1 *We don't accept that this development, which will have huge environmental impacts and only generate modest amounts of electricity, is justified within the terms of national energy policy.*

2.2 *Although described as a 240 MW project, actual production over time cannot achieve this because of utterly predictable tidal conditions. If annual production is 400 GWH, as claimed, that equates to 46 MW on average. That represents a capacity factor of under 20%, which doesn't compare well with, for example, onshore or offshore wind.*

2.3 *We aren't satisfied that the scheme meets the definition of a "nationally significant infrastructure project" for the purposes of the Planning Act 2008:*

2.3.1 *Section 15(3) says "A generating station is [...a nationally significant infrastructure project...] if— (a) it is an offshore generating station, and (b) its capacity is more than 100 megawatts."*

2.3.2 *"Capacity" is not defined in the Planning Act 2008 or other relevant legislation.*

2.3.3 *The Planning Inspectorate (PINS) has said that it believes that "'capacity", as used in the PA2008, probably ... means the rated maximum gross output, or 'nameplate capacity', of the station".*

2.3.4 *We believe that in the context of the contribution that a project can make to national renewable energy needs, a station's maximum achievable annual average production (46 MW in this case) is more relevant than the nominal capacity of the turbines.*

2.3.5 *PINS has also said "the Planning Inspectorate, on behalf of the Secretary of State, is only able to decide whether development consent is required for a project, under PA 2008 s.55, once an application has been formally submitted."*

We therefore ask the Examining Authority to make a ruling on this.

TLSB's Comment(s)

1. Please see TLSB's Written Representation, part 1.1. In England and Wales, an offshore generating station is considered to be a NSIP for the purposes of sections 14 and 15 of the PA 2008, if it is in waters adjacent to England and Wales and if its generating capacity is in excess of 100MW. For the purposes of an application for development consent, the Project is deemed to be an offshore generating station (i.e. in waters off Wales, in Swansea Bay) under section 15(3) PA 2008, rather than an onshore generating station. The Project will have 16

turbines with a nominal rated capacity (i.e. the nameplate capacity) of 20MW each, which amounts to a total installed capacity of 320MW (continuous) or 240MW based on four generating cycles each day. Consequently, as an offshore generating station, and with a generating capacity in excess of 100MW, the Project constitutes a nationally significant infrastructure project for the purposes of PA 2008.

2. Please also see TLSB's Response to Written Question 2.2. TLSB has developed a proprietary model for estimating the output of tidal lagoons, which is under constant refinement. At the time of submission of the Application, a conservative estimate of energy output was 400GWh, which has since been improved to a minimum of 500GWh. TLSB's model has been independently checked and validated by experts at the University of Liverpool and by consultants HR Wallingford. Furthermore, the three global turbine manufacturers who have tendered to supply turbines for the Project have each independently calculated the power output of their proposals, and confirmed that 500GWh is achievable. Further detail on the energy modelling is provided in TLSB's Response to Written Question 2.2.
3. The figure provided by PASAS, above, of 46MW "annual average production" is an assertion unsupported by calculations or evidence.

2.4 *The Overarching National Policy Statement for Energy (EN-1) says (our underlining):*

“3.1.1 *The UK needs all the types of energy infrastructure covered by this NPS in order to achieve energy security at the same time as dramatically reducing greenhouse gas emissions.*

3.1.2 *It is for industry to propose new energy infrastructure projects within the strategic framework set by Government. The Government does not consider it appropriate for planning policy to set targets for or limits on different technologies.*

3.1.3 *The IPC² should therefore assess all applications for development consent for the types of infrastructure covered by the energy NPSs on the basis that the Government has demonstrated that there is a need for those types of infrastructure and that the scale and urgency of that need is as described for each of them in this Part.*

3.1.4 *The IPC should give substantial weight to the contribution which projects would make towards satisfying this need when considering applications for development consent under the Planning Act 2008.*”

2.5 *The National Policy Statement for Renewable Energy Infrastructure (EN-3) states specifically that it doesn't cover tidal range schemes like this so there is no Government demonstrated / accepted need for this type of infrastructure.*

2.6 *We support the over-arching policy in EN-1 that “The IPC should give substantial weight to the contribution which projects would make towards satisfying this need when considering applications for development consent under the Planning Act 2008”.*

TLSB's Comment(s)

1. Please see the Planning Statement (doc ref 8.2), sections 1.2 and 6.3, and TLSB's Response to Written Question 1.4. NPS EN-1 sets out UK Government policy in Wales and England, in so far as meeting the urgent need (para 3.2.3) for energy infrastructure in the UK, in order to ensure the security of energy supplies (para 2.2.20). The policy states that the need for

nationally significant energy infrastructure projects is established in any case and that the need for renewable energy projects is urgent (para 3.4.3). Paragraph 3.3.10 of NPS EN-1 accepts that new renewable energy capacity may include generation from wave and tidal power. TLSB considers that the Project will significantly contribute to the established need for renewable energy generation (as set out in the TLSB comment, immediately above) both on its own and as the first in a potential network of tidal lagoons around the coast.

2. Furthermore, not only is there a need for energy infrastructure, NPS EN-1 states at paragraph 3.3.15

In order to secure energy supplies that enable us to meet our obligations [to decarbonise generation], there is an urgent need for new (and particularly low carbon) energy NSIPs to be brought forward as soon as possible, and certainly in the next 1 to 15 years, given the crucial role of electricity as the UK decarbonises its energy sector.

Since the Project is a low carbon generating station, it is squarely aligned with this policy.

3. Furthermore, the matter of the applicability of the NPS to the Project was discussed at the Issue Specific Hearing that took place on 31 July 2014, at which representatives of PASAS were present. The Examining Authority specifically requested submissions on the point as to whether the NPS (even if not directly applicable) were an important and relevant consideration in the determination of the application for development consent in respect of the Project. The point was not contested at the hearing, and as such, it may be concluded that even if the NPS are not directly applicable, the Project certainly benefits from the support of this important national policy.

3 OUR CONCERNS - SUMMARY

3.1 EFFECTS ON FISH AND OUR FISHERY.

3.1.1 *We are concerned that the proposed lagoon will harm salmon and sea trout, detrimentally affecting our fishery and its value. This is likely to arise as a result of:*

- *massive, unnatural flows in Swansea Bay interfering with normal migration routes and behaviour;*
- *fish (smolts, returning adults and kelts) being drawn into the turbines and killed;*
- *fish being drawn through the turbines into the impoundment and trapped;*
- *fish being driven away from the area by unfavourable conditions;*
- *other miscellaneous and unpredictable effects.*

3.1.2 *As some of the progeny of sea trout remain in the river as non-migratory brown trout, the scheme also has the potential to harm our wild brown trout fishery.*

3.1.3 *Because of these concerns we are opposed to the proposals and we ask the Examining Authority to recommend refusal of the application.*

TLSB's Comment(s)

1. Regarding salmon and sea trout fisheries: the listed impacts in bullet points 1-3 are part of the submitted model. These are addressed in TLSB's Response to Written Question 7.1. The overall predicted long-term impact on salmon and sea trout is expected to be of Low magnitude with a significance value of Minor, and a confidence of Probable. An independent peer review of this work commented: "I find the modelling outputs to be extremely high quality, built of robust and thoroughly explored rationales which provide a high level of confidence that these are good approximations of real life fish behaviours" (Appendix 7.1.6).
2. Regarding wild brown trout: the same models and arguments apply. Given that the overall predicted long-term impact on sea trout is expected to be of Low magnitude with a significance value of Minor, and a confidence of Probable, the impact on non-migratory wild brown trout remaining in the river will be similarly low.
3. The ES covers many 'miscellaneous' effects, but obviously not unpredictable ones. As it stands, the assertion above does not add anything, since its intention cannot be understood.

3.2 THE APPLICANT'S ENVIRONMENTAL IMPACT ASSESSMENT.

An independent expert fisheries analysis commissioned by us and others supports our view that the developer's environmental impact assessment is flawed and understates the likely harm to salmon and sea trout:

3.2.1 *their turbine encounter modelling uses incorrect assumptions for fish movements in Swansea Bay, over-optimistic assumptions for the proposed acoustic fish deterrent*

scheme and fails to allow for important factors such as river flows and migration delays caused by the nearby Tawe Barrage;

- 3.2.2 *their turbine mortality modelling uses incorrect fish sizes, fails to estimate population effects (lifetime egg deposition effects) and fails to allow for indirect mortality from post-passage predation, etc;*
- 3.2.3 *they fail to acknowledge the effect on fish from rivers further afield;*
- 3.2.4 *the assessment fails to set out a worst case for the effects on fish.*

TLSB's Comment(s)

- 1. TLSB addressed all points in the independent fisheries expert report (by APEM and known as the APEM Report) in Appendix 7.2.2 to TLSB's Response to Written Questions. In short:
 - 1.1 TLSB, and its expert technical fisheries consultants, THA are confident that the IBM fish behaviour model characterises the important aspects of salmon and trout behaviour that will determine their success in entering and leaving natal rivers with the Lagoon in place;
 - 1.2 Fish sizes used in the STRIKER turbine modelling were updated after NRW made Panteg trap data available and these were used in the final assessment and are reported in the ES in support of the application for a DCO;
 - 1.3 It is agreed the STRIKER model is inappropriate for assessing predation, as no formal predictions are possible. As such this was assessed by expert opinion as per the VER impact assessment tables (see appendix 7.7.1, TLSB's Response to Written Questions), meaning that there is no omission and hence no criticism that is appropriate in this respect ; and
 - 1.4 Rivers further afield than Swansea Bay were scoped out of the assessment due to very low probabilities of impact. However the effects on species associated SAC rivers were assessed as required under the Habitats Directive. As requested in the Rule 6 Letter an updated HRA was provided to the ExA on 9 July 2014.

3.3 *RE-SITING OF THE TURBINES.*

The application provides for the re-siting the turbine array, away from the location where the modelling has been carried out. This would invalidate the modelling and require re-assessment.

TLSB's Comment(s)

- 1. The option to micro-site the turbine housing at Location B is no longer being progressed, in line with materials submitted by TLSB to the ExA on 4 June 2014.
- 2. The submission made sets out how the assessments made were unaffected by the decision no longer to pursue this siting option.

3.4 *WATER FRAMEWORK DIRECTIVE (WFD).*

The WFD assessment is flawed in a number of ways and fails to take full account of the likely damaging effects on River Tawe waterbodies.

TLSB's Comment(s)

1. An updated WFD Assessment is submitted with these written representations.

4 CONSULTATION

- 4.1 *The applicant has implied (eg, in application document “5.1 A10.7 Inland fishing table.pdf”) that we have failed to engage in discussions about these concerns. At the Preliminary Meeting on 10 June 2014 they said that they had been seeking to meet us since October 2013. These claims are misleading.*
- 4.2 *Although the applicant has failed to consult us as “category 3 affected persons” (discussed in more detail later), we have made every effort to respond properly at each stage but the applicant has made this very difficult.*

TLSB's Comment(s)

1. TLSB has endeavoured to be accessible and transparent during formal and informal consultation exercises (see Statement of Community Consultation, Appendix 6.4). The table referred to and the accompanying Consultation Report (doc ref 5.1) have been provided in order to demonstrate the pre-application consultation conducted with inland fishing groups
2. As indicated by PASAS, consultation with fishing groups was undertaken (*inter alia*) under s47 of the PA 2008 for reasons set out in the Consultation Report (doc ref 5.1), chapter 10, section 10.6.
3. Regarding the statement made by TLSB at the Preliminary Meeting on 10 June 2014, it is accurate to record that TLSB has offered further meetings to PASAS and all fishing groups since the EIA Event on 17 October 2013, as shown in the emails appended to this document. PASAS has acknowledged such offers but did not accept them until 16 July 2014. PASAS has instead engaged with TLSB in writing. TLSB has not sought to make consultation difficult. TLSB regrets that no meetings took place for a long period. Despite the written materials supplied by PASAS, TLSB respectfully suggests that meetings offered in support of circulating documents would have provided earlier opportunities to resolve the misunderstandings described by PASAS in its Written Representation.
- 4.3 *PINS guidance (in Advice Note 16) is that “The overriding intention of the legislation is to ensure that detailed matters are consulted upon and solutions or mitigation negotiated with the local community, landowners, statutory consultees and local authorities before submission of the application for development consent.”*
- 4.4 *We and Fish Legal responded in detail to the Preliminary Environmental Information Report (PEIR) – our letters of 2 August 2013 (from ourselves, PASAS) and 5 August 2013 (from Fish Legal) are provided herewith. We received no response.*
- 4.5 *We made oral representations at a public presentation on 17 October 2013 and on 18 November received a draft copy of the Environmental Statement (ES) with a request to respond within a month.*
- 4.6 *Replies to our responses to the PEIR were eventually provided, at our request, on 20 November and 5 December 2013 with a grudging comment in email that the applicant’s “... responsibility is not so much to respond to [representations] individually, but rather to “have regard” to them”.*

TLSB's Comment(s)

1. TLSB is not obliged to respond to all consultees individually, but to ensure that detailed matters are consulted upon and to have regard to all representations received, which it has done at every stage as demonstrated in the Consultation Report (doc ref 5.1) - indeed, it continues to do so (see continued engagement with APEM submitted at appendix 7.2.2 of TLSB's response to Written Questions). The various consultation and submission documents circulated publicly respond to stakeholder representations (as set out in the Consultation Report): early non-statutory consultation informed the PEIR (chapters 2 to 5); statutory consultation on the PEIR informed the draft ES (chapters 2 and 6 to 10); and representations on the draft ES informed the submitted Application (chapter 11).
2. Where possible, TLSB has provided further documents outside the wider process in support of specific stakeholder concerns, including those referenced by PASAS above and below. TLSB has always provided at least the statutory minimum period of 28 days to respond to both statutory and non-statutory consultations.
- 4.7 *We came to the conclusion that we needed independent expert fisheries assistance, which Fish Legal commissioned from APEM Ltd (with funding provided by Fish Legal, the Angling Trust, ourselves, Tawe & Tributaries Angling Association and Afan Valley Angling Club).*
- 4.8 *Fish Legal provided an initial response to the draft ES on 17 December 2013 (copy provided herewith) and informed the applicant that we were obtaining independent advice to help us to respond further.*
- 4.9 *We received the APEM report on 10 February 2014 (copy provided herewith) but TLSB had by then submitted their DCO application (on 7 February).*
- 4.10 *On 3 March 2014 Fish Legal wrote to the Planning Inspectorate (and TLSB, enclosing the APEM report) arguing in detail that, in view of the lack of proper consultation, the application should not be "accepted". PINS nevertheless accepted the application for examination on 6 March.*

TLSB's Comment(s)

1. TLSB is not aware that PASAS, Fish Legal or APEM provided us with a date by which the APEM Report would be provided for consideration, and in any event complied with and exceeded the timescales provided for response by statute.
2. TLSB submitted the Application on 7 February 2014, in line with its development programme, having warned PASAS of this date by email on 3 February 2014 (see email of that date in Appendix 1 to this document). It received no response from PASAS to advise of a date for supply of the APEM report. TLSB advised PASAS that any remaining issues could be picked up in pre-examination and examination, as it has sought to do.
3. TLSB's consultation was robust irrespective of the timing of the APEM Report. TLSB has since sought to ensure the issues raised in the APEM Report have been addressed.
4. TLSB held a meeting with APEM on 2 May 2015 to discuss its report, and was confident that the Application submitted had addressed matters appropriately. TLSB further responded to PASAS on the APEM report issue-by-issue on 11 July 2014, in advance of a meeting on 16 July 2014 (and in Appendix 7.2.2 to TLSB's Response to Written Questions, submitted on 9 July 2014).

4.11 *On 4 April 2014 TLSB asked us to meet them to discuss (in confidence and without prejudice) a paper relating to their “efforts to maximise the benefits of the Swansea Bay Tidal Lagoon Project” or “other matters arising from the submitted application”. Such a meeting has now been arranged for 16 July 2014, subject to the production by TLSB of essential information (as to monitoring, mitigation, compensation, etc) which has been sorely lacking to date.*

4.12 *We’ve still received no response to the APEM report supplied to TLSB on 3 March 2014. When we pointed this out to TLSB at the Preliminary Meeting, in response to their implication that we we’d been dragging our feet, their immediate reaction was that they had addressed it in the ES as submitted with the application.*

That was incorrect, which they subsequently acknowledged in email, saying then that “The ES chapter which was issued in November 2013 (and on which APEM’s comments were based) was an early draft and had not been internally reviewed. As such many of the comments APEM picked up on the draft chapter were also picked up in our own parallel review and as such were addressed in the final ES where relevant.”

That’s also incorrect, as made clear in the Fish Legal letter of 3 March 2014.

TLSB have now agreed to respond to the APEM report before we meet on 16 July.

TLSB's Comment(s)

1. As noted above, TLSB provided an issue-by-issue response to the APEM report via its submissions to the ExA, and a "without prejudice" response to other questions provided by PASAS, on 11 July 2014 in advance of the meeting on 16 July 2014 (and in Appendix 7.2.2 to TLSB’s Response to Written Questions, submitted on 9 July 2014).

2. After the Preliminary Meeting, when challenged by PASAS on the timings of the APEM report and the DCO submission, TLSB staff said they believed the APEM report had been received pre-application but would need to check the dates and revert, which TLSB did, clarifying the matter promptly by email the following morning (as quoted). There was no intent to mislead and the matter was resolved at the earliest opportunity.

4.13 *Bizarrely, the consent application includes a proposal, not discussed with us, for our membership of a fisheries reference group to investigate the effects of the Tawe Barrage – presumably in connection with possible mitigation / offset measures.*

4.14 *We maintain, therefore, that:*

there has been a lack of proper consultation, as required by the legislation and PINS guidance

the application has been submitted prematurely

the applicant’s implication that we’ve been dragging our feet is disingenuous.

TLSB's Comment(s)

1. TLSB included PASAS and others, noting that they might not wish to be included in such a group and might forego this opportunity. As such, PASAS were identified in a group of potentially interested parties, but only “to the extent that they wish to be included” as possible

members of a “fisheries reference group”. This was as proposed in the draft Heads of Terms for a development consent obligation.

2. TLSB did not discuss this with PASAS in advance but included them as good practice (with appropriate caveats) due to the nature of PASAS’ interests and representations. PASAS is under no obligation to join such a group should it be progressed.
3. TLSB considers that consultation has been conducted appropriately; and that the Application submitted is robust and timely.

5 ENVIRONMENT STATEMENT - FLOWS, FISH MOVEMENTS, TURBINE ENCOUNTER, ETC

5.1 GENERAL

5.1.1 *Much of that which follows has already been set out in detail in correspondence, which we ask the Examining Authority to regard as part of this submission, particularly*

- *2 August 2013 (PASAS)*
- *5 August 2013 (FL)*
- *17 December 2013 (FL)*
- *3 March 2014 (FL)*

5.1.2 *Fish Legal will submit a written representation alongside this and their submission is likely to be more expert than ours. Ours is a layman's attempt to set out the issues as we see them.*

5.1.3 *Our experience (for example, with the Tawe Barrage, which we opposed in the 1980s and which was commissioned in the 1990s and has harmed our fishery ever since) is that the gut feeling (call it "expert opinion" if you like) of experienced anglers who understand fish, rivers, flows, tides and man's interference is that our predictions as to the likely consequences of major schemes are likely to be as sound as those of paid consultants, whose assurances and "expert opinion" need to be taken with very large doses of salt.*

Everything we predicted in the case of the Tawe Barrage has come to pass and the assurances we were given have proved worthless.

5.1.4 *We agree with ES Appendix 9.5 ("Accuracy And Limitations") where it refers to "a clear distinction between precision and accuracy" and "the potential false impression of accuracy due to precision".*

TLSB's Comment(s)

1. Computer modelling has, of course, advanced significantly since the 1980s in all areas of research and development, including fisheries. Indeed, one of the purposes for which advances in technology have been made is in order to reduce the likelihood of mis-match between predicted and experienced environmental effects.
2. Needless to say, Swansea Bay Tidal Lagoon is not a barrage.
3. For these reasons, while PASAS' input to the consultation and examination of the Application is very valuable, the Society's experience with the Tawe Barrage is not relevant to the Application in terms of a comparison with the modelling techniques previously available.

5.2 ABOUT THE FISH

5.2.1 *Salmon and sea trout (both adults returning to the Tawe and smolts and kelts leaving the river) have to navigate through Swansea Bay.*

5.2.2 *Table 9.12 shows migration and spawning periods for salmon and sea trout. We don't accept the accuracy of this table:*

- *fresh salmon enter the river as late as December or even January;*
- *spawning is unlikely to start as early as September for either salmon or sea trout;*
- *smolts probably leave the system most months of the year – certainly into June – and departure is also delayed by the Tawe Barrage.*

TLSB's Comment(s)

1. A revised table was sent to PASAS on (1 July 204). TLSB acknowledged that this was a generic UK description and that regional differences may occur but advised, based upon the views of its expert technical adviser, this would not affect impact assessments.

5.2.3 *We don't accept the statement in para 9.5.6.7. of ES Annex 9.1 that (our underlining) "Inter-annual variation in salmon and trout numbers according to rod catch data is evident, however broad scale estimates of fish numbers seem to indicate fairly stable populations. It should be noted that populations across the UK are in decline."*

TLSB's Comment(s)

1. The text within the ES "Inter-annual variation in salmon and trout numbers according to rod catch data is evident, however broad scale estimates of fish numbers seem to indicate fairly stable populations. It should be noted that populations across the UK are in decline, was from the Environment Agency, 2011a. CEFAS provided a response to the above in their response to the marine licence to state ".....It is incorrect to state that all salmon and sea trout populations across the UK are in decline, as some populations are recovering.."
2. As such, it is the view of THA that this statement, supported by data from regulators is an accurate representation of the current situation.

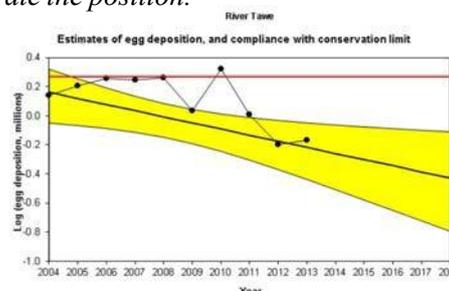
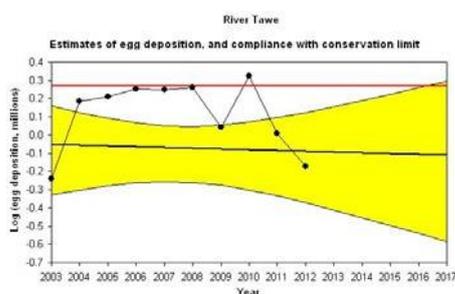
5.2.4 *Recent data released by NRW show that populations of salmon and sea trout in the Tawe (and other South Wales rivers) are declining.*

TLSB's Comment(s)

1. With respect to salmon and sea trout, rod catch numbers in Welsh rivers declined last year (as reported in Wales on-line: <http://www.walesonline.co.uk/news/wales-news/natural-resources-wales-urges-anglers-7280210>).
2. It is understood that PASAS does not consider that rod catch figures are a reliable indicator of stock variations owing to reduced angling effort in recent years, which they attribute to the

recent put-back policy making paying rod licences and fishing less attractive. This may have influenced the decline in catches rather than stock level per se.

5.2.5 *Tawe salmon are now classed by NRW as “at risk” and “at risk of failing in 2018”, requiring immediate measures to stop the killing of fish. The NRW graphs below, based on figures for 2012 and 2013, illustrate the position.*



TLSB's Comment(s)

1. See previous comment. It is assumed that the above figures are based on rod catch data and therefore there are uncertainties as to the accuracy. The derivation of egg deposition figures is described in the following Defra document: <http://www.cefas.defra.gov.uk/publications/salmon/salmonreport2012.pdf>. The salient description is as follows (p. 80, s.8.1):

“Annual compliance with the CL is estimated using egg deposition figures. These are derived from returning stock estimates, where such data are available, but for rivers without traps or counters, the usual procedure for estimating egg deposition involves derivation of run size from rod catch using estimates of exploitation (and an appropriate adjustment for under reporting). Currently, these procedures do not take into account annual changes in fishing effort”.

5.2.6 *Tawe sea trout are classed as “probably at risk”, down a category from 2012 when they were “probably not at risk”.*

TLSB's Comment(s)

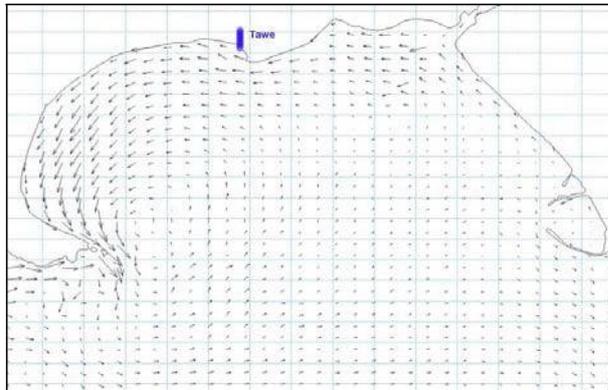
1. See response to previous two comments. If accurate, this may be a reflection of decline in fishing effort rather than necessarily a true reflection of stock.

5.2.7 *We are supplying herewith, as well as in response to Question 7.22 of the Examining Authority’s first round of questions:*

- *further information on methodology etc relating to the above assessments*
- *rod catch data for salmon and sea trout in all Welsh rivers from the 1970s to 2013, highlighting the rankings of the Tawe, Neath and Afan.*

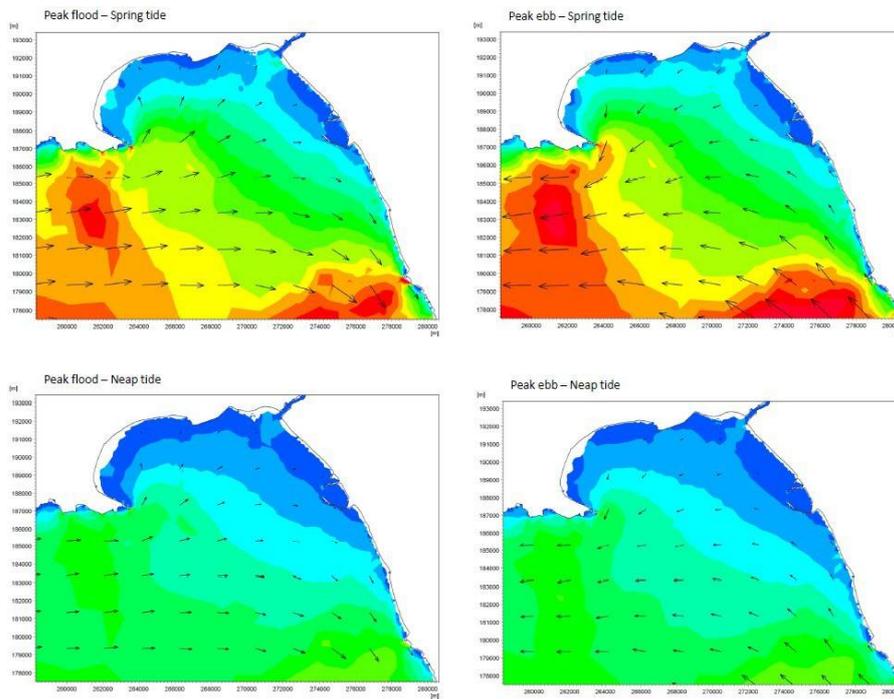
5.3 *FLAWS*

5.3.1 Baseline residual flows in Swansea Bay are illustrated in Figure 6.40 (location of Tawe added by us)



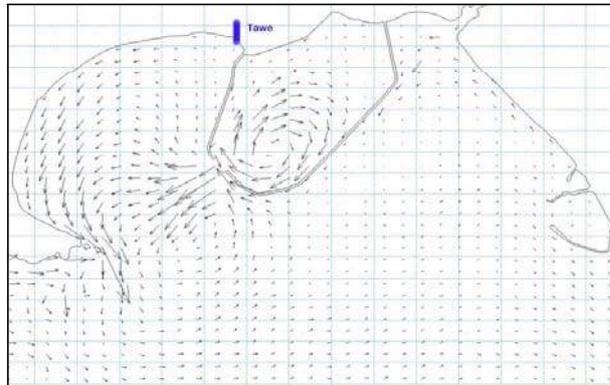
(included for illustration only - please refer to application document for more detail)

and peak flows are shown, for various tidal states, in Figure 6.4



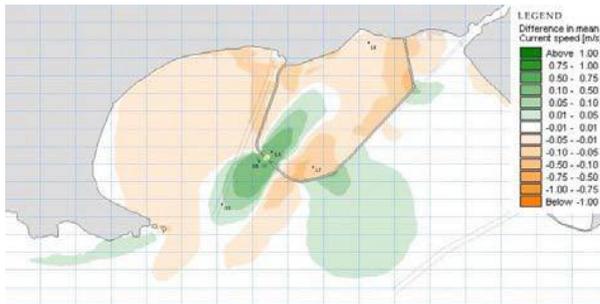
(included for illustration only - please refer to application document for more detail)

The effect of the lagoon on such flows, with the turbine array in its proposed location, is illustrated in Figure 6.41 (location of Tawe added by us)



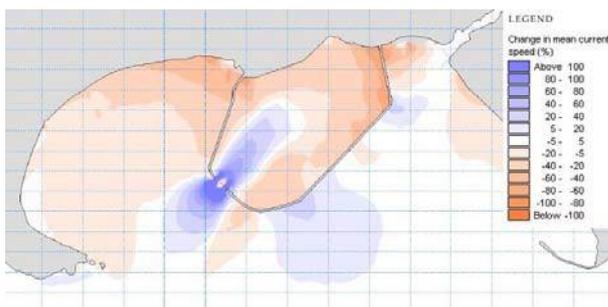
(included for illustration only - please refer to application document for more detail)

Differences in mean current speeds with the scheme in place are shown in Figure 6.33 (metres per second)



(included for illustration only - please refer to application document for more detail)

and Figure 6.34 (%)



(included for illustration only - please refer to application document for more detail)

It will be seen that fish navigating to and from the Tawe will be constrained to a narrower channel with much higher flows. Fish approaching from the east and fish holding in the bay are likely to come into close contact with the turbines.

TLSB's Comment(s)

1. The IBM model, which models fish behaviour within the hydrodynamic model, provides the only objective way of predicting how fish will react to the change in hydraulics, as any change in flows is accounted for in the modelling. No alternative modelling methodology is suggested.
2. It is correct to identify that Swansea Bay will be subject to change. However, the IBM demonstrates that effects will not be significant subject to suitable mitigation as described in the ES. It is not correct to extrapolate the statement that some very small numbers of fish will be entrained, and some of those will come into contact with turbines, to conclude that all fish will be so-affected.

5.3.2 *Maximum flows are not illustrated in the application documents in the same way as mean speeds are in Figures 6.33 and 6.34 but flows of up to 6,000 cubic metres per second (cumecs) are mentioned in the ES, para 9.5.3.5. These far exceed the flows which salmon and sea trout will encounter at any other time in their life.*

The biggest flow ever recorded in the River Tawe (a 1 in 200 year flood in December 1979, when much of the valley was inundated) was 400 cumecs. In normal years a big spate is about 200 cumecs.

TLSB's Comment(s)

1. The fish will routinely experience tidal flows of this magnitude circulating around the Bay, especially around Mumbles Head. In the models used here the fish do not react to flow, although that is a feature of these models.
2. During sensitivity testing the relative benefits of including this reaction to flows was evaluated. After analysis it was decided that the relative simplicity of the model would be the worst case assessment, since any reaction to currents high enough to be perceived as a risk would likely be evasive and it would therefore make the prediction of encounter less than the cases examined for the ES.

5.3.3 *Figures 6.38 and 6.39 show flow speeds*

- *at site O5 (close to the turbines) of 3 metres per second for short periods and of 1.5 metres per second for hours at a time*
- *at site O3 (an unknown distance from the turbines, as the drawing is not to scale, but apparently at least 1.4km) of 1 metre per second.*

TLSB's Comment(s)

1. It is estimated on spring flood generation velocities will reach 1.1 m/s at an upstream distance of around 30 m from the turbine inlets. The distance would be used to inform the range of effect an acoustic fish deterrent (AFD) would need to achieve for fish of smolt size (15 cm average assumed) or larger to escape. The table below also gives swimming speeds for bass and clupeid fish, e.g. herring and shad. See also response to following question.

Species	Temp C	L (cm)	MSS (m/s)
Clupeids	12	25	1.1
	18	25	1.4
Bass	12	25	1.1
	18	25	1.5
Salmonid*	12	15	1.1

5.3.4 *We understand that sustainable swimming speeds for adult salmon are about 1 metre per second. Sea trout swimming speeds are lower and those of smolts are obviously lower again (apparently about 0.5 metres per second sustained). Although they can swim faster in bursts, we understand that some sort of trigger which alarms them is required to generate such swimming and that merely encountering high flows will not do that.*

It will be seen that, even at considerable distances from the turbines, fish will encounter flows which draw them to the turbines or, at least, prevent them from making progress to the River Tawe. Such additional swimming effort at a critical time in their lives can compromise their ability to ascend the river, survive and spawn successfully.

TLSB's Comment(s)

1. For adult salmon, Beach (1984: Fisheries Research Report N0. 78, MAFF Lowestoft), shows a 0.7 m length salmon can sustain 6.5ms^{-1} for over 4 min at 15°C , during which it would travel 1.5 km. Sea trout swimming capacity will be similar size-for-size but will be lower for smaller individuals.
2. 0.5ms^{-1} is also too low a speed to be used for sustained swimming of smolts, although this value was used during sensitivity testing and the encounter probability was lower than the original default case. Environment Agency documentation (Screening for Intake and Outfalls: a best practice guide Science Report SC030231) shows the graph below: indicating average maximum sustainable swimming speed (MSSS) of $\sim 1.1\text{ms}^{-1}$ for a 15+ cm smolt. The test is for 200 minutes but it can hold this speed for even longer periods as this involves no anaerobic swimming.

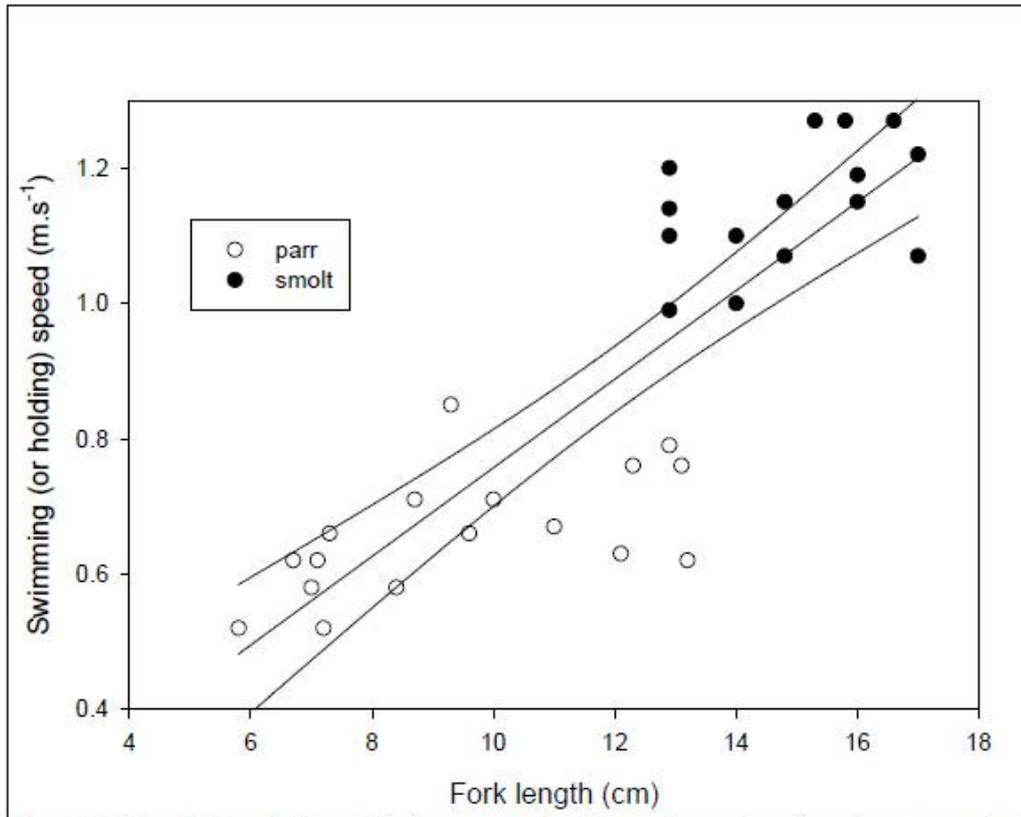


Figure 5.1 The relationship between fork length and swimming speed maintainable for at least 200 min for Atlantic salmon parr and smolts. Dotted lines are 95% confidence intervals (after Peake & McKinley, 1998).

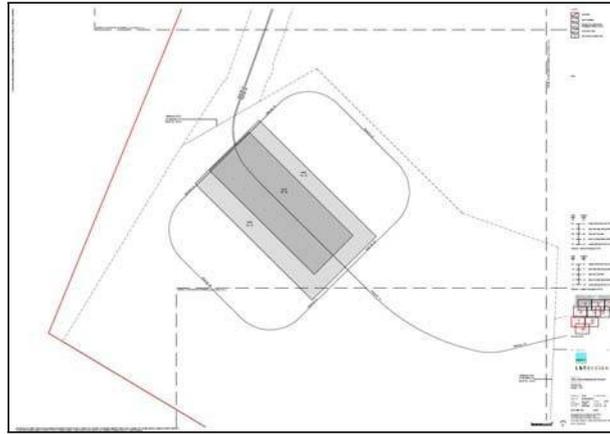
5.3.5 *The effects of these flows aren't covered properly in the ES. For example they aren't referred to per se in Table 9.11 "Potential impacts on fish and shellfish".*

TLSB's Comment(s)

1. The effects of flow on fish are integral in the IBM fish model. If a fish comes close to the turbines, the model assumes the **worst case**, i.e. that it will be drawn in, even though in reality it may have the capacity to avoid that occurrence. In practice, it likely that many fish would detect the turbulence caused by turbines and avoid it, hence the modelling results presented in the ES are worst case.

5.4 *TURBINE LOCATION*

The application proposes that re-siting of the turbine array be allowed within certain limits of deviation, as shown on page 7 of "2.2.2-2.2.10 Works Plan.pdf"



(included for illustration only - please refer to application document for more detail)

This would allow: (a) deviation of up to 150m to the west and rotation of up to 15degrees clockwise; or (b) deviation of up to 1,150m to the east and rotation of up to 45degrees anti-clockwise.

Either of these or any permutation in between would have a significant effect on the flows illustrated in Figure 6.41.

Figure 4.13 in “6.2.4 ES Project Description.pdf” shows two main alternative locations for the turbine array.

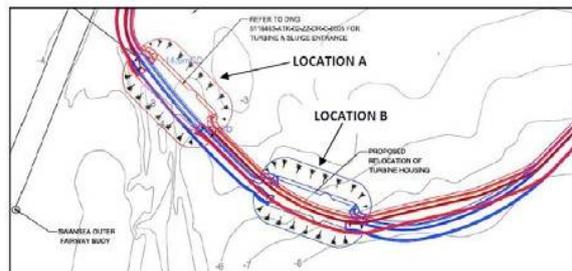


Figure 4.13 Two main alternative turbine and sluice gate housing locations

(included for illustration only - please refer to application document for more detail)

Additional document “Annexe 8 - Submission in respect of location of turbine and sluice gate housing structure.pdf”, published on the PINS website on 16 June 2014, indicates that “TLSB proposes not to pursue Option B further” and “TLSB proposes only to pursue Option A as part of the authorised development pursuant to the Application”.

The schedule of works and drawings in Part 3 of Schedule 1 to the draft DCO is inconsistent with the files submitted with the application so it’s unclear (to us) whether the proposal in the additional document is binding or whether re-siting of the turbines within the limits of deviation shown on “2.2.2-2.2.10 Works Plan.pdf” (say, to a location C) would still be allowable.

If re-siting were still allowed, we submit that it would invalidate many of the assumptions in the application.

TLSB's Comment(s)

1. As noted above, the option to micro-site the turbine housing at Location B is no longer being progressed, in line with materials submitted by TLSB to the ExA on 4 July 2014.
2. It is proposed to substitute drawings in order to remove this option from the application.

5.5 ENVIRONMENT STATEMENT

5.5.1 *The applicant's ES says (para 9.5.3.31) that "Fish behaviour in coastal waters is highly dependent on tidal water movements and on features such as water depth and habitat characteristics (...). ... Diadromous migratory species also use characteristics such as the earth's magnetic field (...), fluvial flow and associated salinity changes and olfactory cues to find their way into river systems. Features of the Project that may affect these behaviours include physical impedance by the seawalls, changes to hydraulic patterns, interactions with the turbine and sluices and temporary entrapment within the Lagoon. Changes in patterns of tidal movement can also be envisaged to have the potential to alter the course of olfactory trails, confusing fish attempting to find local rivers."*

We accept that, as far as it goes.

5.5.2 *Para 9.5.3.33 says (our underlining) "The model of virtual fish is based on a model of a drifting particle to which is added an individual swimming velocity at each time step in the model. Models of drifting particles are well advanced and standard methods were used (...). The difference between a randomly drifting particle and a virtual fish in the model is determined by establishing a number of rules of behaviour that are applied to the particles to simulate fish behaviour. The justification for doing so is well established (over more than 20 years) and the model developed for the Project adopted existing best practice (...). These rules can include positive or negative rheotaxis (reactions to water current direction); swimming performance; depth preferences (e.g. to ensure that fish in the surf-zone of a beach follow the tide down the beach); magnetic compass bearing; response to olfactory stimuli; salinity preference; tidal state, and any other factors that can be introduced and synchronised with the model time such as wind, rain, sunlight and so forth. However, the most effective IBM models focus on a small number of key variables that are important to a fish in the context in which the model is being applied. A small number of rules and variables allow the models to be calibrated effectively across their entire range of functionality. The aim of the calibration is to ensure that the models are plausible in so far as they are not falsified by any known information about the target species, and that they accurately represent the implications of expert opinion within known confidence limits. Calibration is most accurate where the target of the model is a definite activity, bounded in space or time, where there is reasonable confidence in the motivation of the fish and where there is often extensive information and expert knowledge."*

5.5.3 *Table 9.17 shows that the "particular rules applied to model" salmon and sea trout are "beach avoidance, minimum depth and olfactory trail".*

5.5.4 *Para 9.5.3.36 says that "Where there was no existing scientific evidence or expert opinion about a parameter (for instance exactly where fish are located in the Bristol Channel before they start their directed navigation to the river mouth), parameter values for the model were chosen from a uniform random distribution in the area most likely to be a source of impacted individuals."*

The illustrations of modelling for salmon and sea trout all show an assumed starting point outside Swansea Bay, to the south and west of Mumbles Head.

- 5.5.5 *Table 9.18 shows that the modelling of both salmon and sea trout, both juvenile and adult, is based on “trail follow”, whereas that of bass and sandeel, for example, is based on “area usage”.*
- 5.5.6 *Para 9.5.3.38 says that “at this proximity the model is completely defined by navigation along olfactory trails emanating from natal rivers”*
- 5.5.7 *Para 9.5.3.39 says “Salmon and sea trout smolts migrating from the rivers Tawe and Neath to sea were modelled leaving the rivers on an ebb tide, reflecting knowledge obtained from UK smolt tracking studies in the Tawe and other UK estuaries (Mee et al., 1996; Moore et al., 1998). Figure 9.16 shows an example of smolts emigrating from the R. Tawe.”*
- 5.5.8 *Para 9.5.3.117, about a Tawe Barrage study, refers to “delays experienced by the adult salmon, including: turbulent flows within the pass, poor fish pass design, time for physiological adjustments to freshwater, switch from passive to active migration.” (our underlining).*

5.6 ES APPENDIX 9.5 ("ACCURACY AND LIMITATIONS)

- 5.6.1 *Para 3.0.0.1 says "It must be appreciated that models of biology are inherently uncertain in comparison to models of physics and chemistry used for hydrodynamic models and water quality models respectively. ... Thus, expert opinion, is far more influential in assessment of the effects on animals and plants than is it on physical and chemical processes."*

TLSB's Comment(s)

1. The above abstractions are isolated quotations from the ES. It is not clear what point is being made. Further background to this type of modelling is to be found at appendix 2 to this document in:

Willis, J. (2012) Modelling swimming aquatic animals in hydrodynamic models. Ecological Modelling 222 3869-3887 doi:10.1016/j.ecolmodel.2011.10.004

- 5.6.2 *Para 3.0.0.11 says "There is a clear distinction between precision and accuracy for these models. ... The potential false impression of accuracy due to precision is the primary reason why the magnitude of impact statements based on broad classifications from 'likely to be negligible', through to, 'likely to be high impact' are a true reflection of the accuracy of the modelling combined with expert opinion."*

TLSB's Comment(s)

1. This means that the models cannot be used blindly, they have to be credible to experts. It is for this reason that an independent peer review was undertaken by Steve Colclough, formerly the Environment Agency's senior coastal fisheries and TrAC Waters WFD expert (provided as Appendix 7.1.6 to Examiners Questions).

5.6.3 *Para 3.0.0.14 says "The modelling is limited to the specific life stages outlined for each species. For the migrating species (salmon, trout, eel, lamprey, etc.) this is limited to the period of their lives when they either enter their natal or other river from the ocean, or when they leave the rivers and swim toward the open ocean. These models do not cover all or any other stages of their lives where they may conceivably use Swansea Bay, and do not cover any times when the fish are meandering around with no particular aim (if in fact they ever exhibit this behaviour in their lives). The models also do not incorporate any avoidance (or attraction) behaviour towards the turbines, sluices or lagoon wall structures."*

TLSB's Comment(s)

1. This limitation is duly and appropriately noted in Appendix 9.5 "Accuracy & Limitations", and in the updated version which was provided to the ExA as Appendix 7.6.1 of TLSB's Response to Written Questions submitted on 9 July 2014.

5.7 *INDEPENDENT EXPERT REVIEW*

5.7.1 *The APEM report commissioned by us (referred to above and provided with this representation) draws attention to many shortcomings in the applicant's ES. APEM only had access to the November 2013 draft ES but most of the points made in the report appear to us to apply equally to the final ES as submitted.*

5.7.2 *The applicants have not responded to the report but have told us that they will now do so – before we meet them in the near future to engage in the discussions which should have been held before the premature submission of the consent application.*

TLSB's Comment(s)

1. As noted above, TLSB has addressed all matters raised in the APEM Report.
2. TLSB met APEM on 2 May 2015 to discuss their report and was confident that the Application submitted had addressed matters appropriately. TLSB further responded to PASAS on the APEM report issue-by-issue on 11 July 2014, in advance of a meeting on 16 July 2014 (and in Appendix 7.2.2 to TLSB's Response to Written Questions, submitted on 9 July 2014).

5.8 *FALLACIES IN THE MODELLING*

5.8.1 *The adoption of a "small number of rules" is simplistic. Having started by saying that "Fish behaviour in coastal waters is highly dependent on tidal water movements" the applicants have gone on to produce a model which fails to take account of that and in which fish slavishly follow olfactory trails.*

TLSB's Comment(s)

1. This is incorrect. The tidal movements are intrinsic to the IBM model. This tidal effect can clearly be seen in the relevant video output files identified in Appendix 9.3 of the ES, "Fish turbine encounter modelling", which are available for download on the TLSB website.

2. The model fish do not slavishly follow the trails. The trails represent the assumption of general migrator direction based on the best scientific opinion. Therefore the assumed navigation trails can be seen to be followed very approximately (sometimes the average fish is drawn up to 5 km away from the trial by the tides) and this navigational uncertainty (sampled across a wide range of plausible values, and calibrated against the observed tracks actual tagged fish (see Appendix 9.4 of ES)) is part of the probabilistic design of the model.

5.8.2 *A paper recently published by the Crown Estate, "Hydrodynamic models to understand salmon migration in Scotland" (Guerin, A.J., Jackson, A.C., Bowyer, P.A. and Youngson, A.F. 2014), proposes, in the section dealing with "behaviours near the home river", that "adults follow (in reverse) a sequence of cues imprinted during their outward migration as smolts and that any odour memory forms only part of the sequential imprinting process" (our underlining).*

TLSB's Comment(s)

1. This is a selective quotation from the passage, which states:

"Subsequent field experimentation based on physical re-location of salmon of various sources and treatments has suggested a more complex, sequential imprinting model as originally proposed by Harden Jones (1968). This concept requires that adults follow (in reverse) a sequence of cues imprinted during their outward migration as smolts. Reared smolts raised in river water but liberated at sea, and which have not therefore undertaken the river and near-river migration, return as adults to the general vicinity of the rearing place but delay entering fresh water or fail to do so (Hansen et al. 1987; Jonsson et al. 1990; Hansen et al. 1993). This suggests that any odour memory forms only part of the sequential imprinting process. These studies have not identified the set of sequential cues nor their spatial extent along the migratory route. Presumably, candidate cues must be permanent biological, structural or environmental features of the river, or near-river, environment and they must be sampled by outgoing smolts and by returning adults. Both groups of fish must therefore use functionally coincident routes over the series of imprinted locations. Smolts go to sea in May, but adults return to Scottish rivers in every month of year so the presence of the cues must be independent of season. Imprinted geomagnetic information (Putman et al. 2013) may form part of the set of sequential cues. The set probably also includes the olfactory cues central to the home-stream odour hypothesis. If so, river plumes represent a variable but sometimes extensive connection between the river and coastal domains and may be a crucial determinant of behaviour in the final stage of the return migration."

2. Reading the section cited in full makes it clear that geomagnetic cues and odour trails (olfactory cues) are the only scientifically established mechanisms, while other features remain speculative.

5.8.3 *Fish looking to ascend rivers are attracted by fluvial flows, not just olfactory cues. The model apparently takes no account of varying flows from the River Tawe and has apparently been based on something like average flows in the River Tawe.*

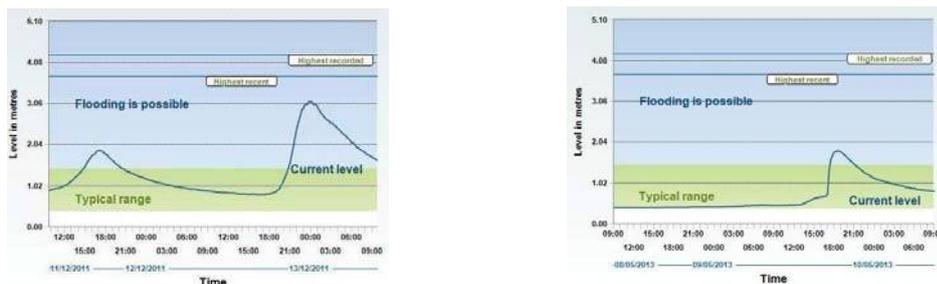
TLSB's Comment(s)

1. It is fully accepted that fluvial flows are extremely important for fish to make their entry into rivers (e.g. Environment Agency Science Report SC010016/SR). Higher fluvial flow will

however increase the olfactory trail strength and produce an even stronger signal guiding them towards the river.

2. The ebb generation flow speeds through turbines are predicted to be impossible for fish to ascend in any case. On the flood tide, the flows through the turbines will be inward, meaning that they will neither result in attractive flows nor attractive olfactory trails.

5.8.3.1 *The Tawe is a very flashy river, with summer flows down to 1 cumec or less and spates commonly reaching 200 cumecs. Average flow throughout the year is about 10 cumecs. Levels rise and fall very quickly as these charts of actual Tawe spates show:*



The first shows the river rising from about 10 cumecs to about 200 cumecs (2 metres rise) in about 3 hours. The second shows the river rising from about 2 cumecs to about 70 cumecs (1.5 metres rise) in about 1 hour.

TLSB's Comment(s)

1. See previous comment: spate flows will increase olfactory signal, but are not likely to result in additional risk to fish.

5.8.3.2 *These spates, which would normally be easily detectable by and attractive to salmon and sea trout, are likely to produce plumes out into Swansea Bay quite different from the olfactory trails illustrated in the models. Although not illustrated in the ES Chapter on Fish, the Water Quality Chapter confirms that during such spates the river plume will hug the lagoon wall rather than meander round the bay in an anti-clockwise direction.*

TLSB's Comment(s)

1. It is unclear to which Chapter 7 Marine Water Quality figure PASAS are referring. The figures shown in Chapter 7 are 'snapshots'; the video model representations shown on the TLSB website for adult salmon and sea trout trail-follow are entirely consistent with this, also hugging the lagoon wall. The predicted mortalities are computed on this basis.

5.8.3.3 *Such spates, which often last a very short time, would normally assume greater importance than remnants of olfactory trails in the west of the bay but are likely to be masked by the massive flows into and out of the lagoon.*

This is not allowed for in the model.

TLSB's Comment(s)

1. High flows from the Rivers Tawe, Neath and Afan were examined in the document 580R1001 Entrainment of olfactory trails (Appendix 7.6.2 to [TLSB's Response to Written Questions](#)).

Flows of Q10 exceedance were modelled in a high resolution model of the proposed lagoon, with a spatial resolution of a minimum of about 5 m, and including details such as the existing harbours walls. The impact on the pattern of implied trails was not significant and it was not evident that olfactory stimuli may be entrained into the lagoon and then subsequently ejected. The ejected water forms a plume of relatively low olfactory concentration for several kilometres in front of the turbines.

- 5.8.3.4 *Para 9.5.3.6 recognises that “The Project could marginally increase the energetic cost to migrating fish: first, due to them having to navigate around the structure; and secondly, by concentrating currents along its boundary. However, the IBM constructed as part of the Project (Appendix 9.3, Volume 3) indicates that total delay, at most, would be two tidal cycles, and thus the effective energetic cost would be minimal.” but it fails to acknowledge that such a delay could cause fish to miss completely the opportunity provided by a spate to ascend the river.*

TLSB's Comment(s)

1. The variations in delay are not statistically significant. The lagoon has the effect of slowing some of the strong tidal currents (in both directions) and so the variation in delay may be more without the lagoon. Model runs were undertaken to represent a worst case delay and it was found that most fish would not be delayed. Such an effect would be statistically minimal, therefore.

5.8.4 *The model apparently fails to allow for “positive or negative rheotaxis (reactions to water current direction)”, which is likely to be highly significant:*

- 5.8.4.1 *Without the lagoon fish are likely to follow tidal flows into the estuary (“passive migration” as mentioned in para 9.5.3.117) to investigate whether conditions are suitable for river entry. And they’re likely to drop back again in the same way if not “turned on” to “active migration” by attractive conditions.*

This is not allowed for in the model.

- 5.8.4.2 *Flows through the turbines (into the lagoon) on a flood tide could be mistaken by fish for flows into the estuary. Even if they try to avoid the turbines, flows are likely to be such that they can’t swim against them.*

- 5.8.4.3 *Flows through the turbines (across the bay) on an ebb tide are likely to mask river spates which could otherwise attract fish and facilitate river entry.*

TLSB's Comment(s)

1. The exclusion of positive or negative rheotaxis in relation to turbine passage means that no assumptions are made of fish actively avoiding entrainment, i.e. a worst case assessment.
2. Drop-back behaviour is only included in the model insofar as it is part of the calibrated navigational accuracy, and is not included in more detail as this is not the primary aim of the model
3. The IBM model indicates a very low likelihood of returning salmon and sea trout getting trapped in the draw zone of the turbines, which only extends out 20-30 m for fish of this swimming ability. Also, the evidence from other large seawater abstractions such as power

stations shows that the frequency of large salmon or sea trout accidentally enter seawater intakes is minimal.

4. Modelling of hydraulics with passive particles in Swansea Bay, indicative of the route of olfactory trails, indicates that plumes emanating from the Tawe and Neath remain distinct and are not broken up by the flow from the turbines.

5.8.5 *The model assumes that fish approach from a westerly direction and make directly for the Tawe, following olfactory trails to the west of the lagoon. Despite the comment in para 9.5.3.36 about "... no existing scientific evidence or expert opinion about a parameter (for instance exactly where fish are located in the Bristol Channel before they start their directed navigation to the river mouth)", it is known and has been pointed out to the applicant (with evidence) that fish are just as likely to approach from the east. See for example the section on "adult salmon model" on page 14 of the APEM report*

TLSB's Comment(s)

1. Eastern and western approaches were tested with the model and gave similar results.

5.8.6 *The model assumes that each fish, released at 60 second intervals, makes its own way at its own speed to the mouth of the river. But it's known that fish travel in groups so that, if one fish encounters the turbines, the others in its group are also likely to do so. Failure to recognise this is failure to allow for worst case.*

TLSB's Comment(s)

1. This is not the case. Each 'fish' in the model is a version of the same model with slightly different parameters drawn from the full range of potential parameters. When used with fish that form schools, it is standard practise that each model object represents the smallest school of fish (an atomic unit). However, some fish which apparently form schools are merely doing the same thing at the same time and the model shows the likelihood of this as increased density. Thus the overall probability of encounter remains unchanged.

5.8.7 *The model assumes that once a fish reaches the river mouth, it has achieved its objective and it's removed from the model. This is known to be wholly incorrect and has been pointed out to the applicants. It's quite normal for large numbers of fish entering a river mouth to drop back, hang around until conditions for river entry are more favourable, try again or even move to another river. The Tawe Barrage, which hinders entry into the Tawe, exaggerates this.*

TLSB's Comment(s)

1. This is not the case, the model fish continue to exist in the model and continue to react to the entrance of the river. They cannot pass the barrier, or the river mouth, and therefore exhibit 'land avoidance' behaviour. They drop back to an extent defined by their navigational and swim speed characteristics (which were calibrated from tags) and indefinitely try to enter the river. If they decide to leave then this is not directly the target of this model – but the model does suggest that smolt can leave with a small probability of impact, and thus it is likely to be a great deal less for adults.

2. With respect to standing off as a separate behaviour; there is no formal modelling procedure that can be used to estimate this, it is a purely random factor. However, on the basis of the modelling for smolt out migration, the expert view of THA's technical experts is that adults dropping back would experience the same conditions as out-migrating smolts but, having greater swimming capacity would be less at risk than smolts. Appendix 7.1.5, submitted with TLSB's Response to Written Questions, notes further smolt analysis, which shows the effect of better swimming performance in reducing predicted impact (a reduction of 80%).

5.8.8 *The statements in para 9.5.3.39 about smolts are wrong:*

5.8.8.1 *The Mee et al 1996 paper says nothing about smolts – it's about returning adults.*

5.8.8.2 *The Moore et al 1998 paper was about "The migratory behaviour of wild Atlantic salmon smolts in the River Test and Southampton Water, southern England" and it says "There was also a significant seaward migration of smolts during the latter part of the flood tide suggesting active directed swimming"*

5.8.8.3 *Moore et al also produced a 1996 paper "The movements of emigrating salmonid smolts in relation to the Tawe Barrage, Swansea" which said "The movement of salmonid smolts past the sonar buoys located immediately downstream of the barrage in the lower estuary was random with respect to the tidal cycle and occurred during both ebbing and flooding tides."*

Smolts leaving for sea on a flood tide will be exposed to the large flows into the turbines.

TLSB's Comment(s)

1. It is correct that Moore et al 1996 should have been cited.
2. Paragraph 9.5.3.39 reflects earlier runs of the IBM. Actual runs were as described in Appendix 9.3 of ES, s.5.2 & 5.4: This is based on uniform random distribution at various ranges (2-16 hours) each side of spring high tide.

5.8.9 *The model assumes that sea trout in Swansea Bay are in "trail follow" mode but sea trout inhabit coastal waters and, if there are good stocks of sandeel and other prey species in Swansea Bay, as indicated in Fish baseline Appendix 9.1, it has to be assumed that a proportion of the sea trout will be in "area usage" mode, greatly increasing the risk of turbine encounter.*

TLSB's Comment(s)

1. As stated in Appendix 9.5 of the ES, only the trail following mode is modelled and foraging sea trout are assessed according to expert opinion.

5.9 *MITIGATION PROPOSED*

5.9.1 *The only mitigation proposed to counter operational effects is the use of acoustic fish deterrent (AFD (devices)). No details are given.*

TLSB's Comment(s)

1. It is proposed that further details of the AFD will be developed taking into consideration of other factors, use of variable speed turbines, and the requirements for marine mammals. The

final system designed for the Lagoon will be discussed and agreed with the relevant planning authorities and NRW pursuant to the AEMP, an updated version of which is submitted with these written representations.

5.9.2 *Sections 14 and 41 of the Salmon & Freshwater Fisheries Act 1975 provide that:*

“in any case where— (a) by means of any conduit or artificial channel, water is diverted from waters frequented by salmon or migratory trout; and (b) any of the water so diverted is used for the purposes of [...] any mill [...]; “the responsible person” [...] [the occupier of the mill] [...] shall, unless an exemption from the obligation is granted by the appropriate agency, ensure (at his own cost) that there is placed and maintained at the entrance of, or within, the conduit or channel a screen which [...] prevents the descent of the salmon or migratory trout; and [...] Any exemption [...] may be granted subject to conditions.”

““mill” includes any erection for the purpose of developing water power”

““screen” means a grating or other device which, or any apparatus the operation of which, prevents [...] the passage of salmon or migratory trout”

TLSB's Comment(s)

1. The Project will not include screens on turbine or sluice entries, and such screens are not appropriate for a project of this nature since they would rapidly become blocked, thereby impeding flows and reducing power generation. Consequently, all environmental assessment has been carried out without the inclusion of such screens.
2. In light of this, and the submission made by PASAS, the draft DCO will be amended specifically exclude the application of s14 and 41 of the 1975 Act. This should not alter the considerations of the ExA and the Secretary of State since this alteration will not alter the assessments or other matters to be considered.

5.9.3 *It's understood that NRW, normally the “appropriate agency”, accept acoustic fish deterrent (AFD) devices as “screens” for the purposes of the SFF Act and they have detailed guidance on the subject “Science Report – Screening for intake and outfalls: a best practice guide”. Some extracts:*

“the effectiveness of the screening measures should reflect the level of risk to the fish stock or fish community and the importance attached to the stock, community or associated habitat”

“It is strongly recommended that the principles of risk analysis are applied to any intake screening proposal. However, the requirements of the relevant legislation must be taken fully into account.”

“a number of factors that may be used in a risk assessment [...]: the value of the fish stock in economic or conservation terms; the percentage of the fish stock that must pass the scheme; the percentage of those fish that pass successfully; the additional loss due to other schemes (i.e. cumulative impacts); the significance of given percentage levels of loss in economic and conservation terms.”

“The key elements of the Environment Agency’s s.14 policy are: 1. A standard risk assessment checklist procedure is used [...]; 2. Full recognition is given to the precautionary approach (“where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation”).

This is complementary to the approach adopted in the Habitats Regulations.”

“Projects within or connected with a designated SAC and therefore regulated under the Habitats Regulations demand more stringent risk assessment criteria. The critical test is whether the appropriate assessment can demonstrate no adverse effect on integrity of the European site. In this context, the BATNEEC criteria are replaced by BAT (Best Available Technology), without consideration to cost. The project may not proceed if adverse effect on site integrity cannot be avoided. The appropriate assessment therefore is the form of risk assessment procedure used in such cases.”

TLSB's Comment(s)

1. As per previous comment, SFFA 1975 s.14 will be specifically disapplied.
2. The assessment procedure used represents a risk analysis and in relation to entrainment risk is the percentage of those fish that are predicted to pass to the rivers successfully;
3. SAC rivers are assessed separately under with the HRA which has been provided with the DCO application and impact levels do not trigger mitigation.

5.9.4 *There’s no serious discussion in the ES of the effectiveness of such devices in circumstances such as these, merely some passing comments in para 9.5.6.14 et seq such as:*

“Results indicate that sounds with frequencies between 20 and 600 Hz can effectively repel fish from the intakes of power stations. Efficiency is species- specific, with hearing specialists, such as herring, being much more susceptible to AFDs than generalists such as goby. For salmonid fish (salmon and sea trout), deflection efficiencies of around 70% appear to be typical”

“An important factor to consider when planning the installation of AFDs are the velocities in proximity to the turbine intakes, and the range at which avoidance behaviour is expected. For maximum effectiveness the avoidance range should extend beyond the range at which current velocities exceed the swimming capacity of the target species. If velocities are above these, fish may become entrained regardless of the operation of AFDs. This is particularly important in a tidal context, where currents are naturally strong, and fish may not necessarily perceive an abstraction until they are very close to it.”

“Installation of AFD systems should be preceded by acoustic modelling of installation to ensure that the spread of noise is not excessive, which might interfere with the natural movements of fish or marine mammals”

This is wholly inadequate.

TLSB's Comment(s)

1. It is agreed that effective use of mitigation requires an adaptive approach to ensure effectiveness. Whilst AFDs have not been used in the specific context of tidal power, they have been used before in relation to the target species for the Project, and AFD have been applied in the marine environment - they are used at several UK coastal power stations for a similar range of fish types.
2. It will be necessary to seek that the effective range of deterrence extends to low velocity areas in front of turbines where fish have the chance to flee.

5.9.5 *The draft DCO says “No part of the authorised development shall commence until a written strategy for the mitigation of the impacts of the authorised development on fish [...] has been submitted to and approved in writing by NRW. [...] The fish mitigation strategy shall provide for [...] use of behavioural fish guidance systems to discourage movement of fish through the turbines.”*

This would place NRW under huge pressure. What would happen if they were not satisfied about the effectiveness of a proposed AFD system? What level of effectiveness should they require? This is a matter which should be resolved by the Examining Authority.

TLSB's Comment(s)

1. The effectiveness of the AFD system would be monitored through the AEMP (see updated version submitted 5 August 2014). The purpose of an AEMP is to allow mitigation to be adjusted as proved necessary via monitoring. Mitigation effectiveness should be such that impacts are reduced to below levels that would trigger the need for mitigation.

5.10 ES ASSESSMENTS AND CONCLUSIONS

5.10.1 METHODOLOGY

5.10.1.1 *The significance of an impact (Table 9.4) is based on the “value” of the receptor and the “magnitude” of the impact and can be: no impact, insignificant, minor to insignificant, minor, moderate to minor, moderate or major:*

Table 9.4 Significance of an impact resulting from the combination of receptor sensitivity/value and the magnitude of the effect upon it

Value/importance	Magnitude (Positive/Adverse)				
	Neutral	Negligible	Low	Medium	High
Very High/International	No impact	Minor to insignificant	Moderate to Minor	Major	Major
High/National	No impact	Insignificant	Minor	Moderate	Major
Medium/regional	No impact	Insignificant	Minor	Moderate	Moderate
Low/local	No impact	Insignificant	Insignificant	Minor	Minor

5.10.1.2 *The value of salmon and sea trout as fish is assessed (Table 9.2) as “National / High” and the value of the salmon and sea trout fishery is also assessed as “National / High”.*

5.10.1.3 *The magnitude of an impact (Tables 9.3 and 9.9) is based on the potential consequences for the receptor and can be:*

<i>Magnitude</i>	<i>Salmon and sea trout – fish</i>	<i>Salmon and sea trout – fisheries</i>
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<i>High</i>	<i>The impact would have a serious, non-reversible effect over the integrity of the VER. Activities predicted to occur and affect the VER continuously over the long term or during sensitive life stages.</i>	<i>Recreational fishing activity on ... adjacent watercourses will be severely affected by the project and/or associated construction activities. Permanent (> 3 years) interference ... will occur.</i>
<i>Medium</i>	<i>The integrity of the overall VER would not be affected but there may be some effect on the overall conservation objectives for that species within a given geographical area. There is the potential for activities to regularly</i>	<i>Recreational fishing activity on ... adjacent watercourses will be severely affected by the project and/or associated construction activities. Long-term (> 6 months to 3 years) interference ...</i>
	<i>disrupt the receptors, over the medium to short term and during sensitive life stages.</i>	<i>will occur.</i>
<i>Low</i>	<i>Species are subjected to a limited adverse effect. Disturbance to the population size is within parameters of natural variability. Activities are likely to be intermittent and irregular over the medium to short term.</i>	<i>Recreational fishing activity on ... adjacent watercourses will be severely affected by the project and/or associated construction activities. Permanent (> 1 to 6 months) interference ... will occur.</i>
<i>Negligible</i>	<i>A small observable effect is predicted. Disturbance is expected to fall within natural variability. Impacts are limited to the area in the immediate vicinity of the development.</i>	<i>Recreational fishing activity on ... adjacent watercourses will remain largely unaffected the Project and/or associated construction activity. Intermittent and temporary interference ... will occur.</i>

<i>Neutral</i>	<i>Although it is not always possible to state categorically that there will be no impact on a receptor the term 'neutral' will be used where the level of exposure is considered to be less than the tolerance of the receptor, therefore an impact is unlikely. Or there will be no impact at all on the species in question.</i>	<i>Although it is not always possible to state categorically that there will be no impact on a receptor the term neutral will be used where the level of exposure is considered to be analogous to natural variation.</i>
<i>Positive</i>	<i>The change is likely to prove beneficial to the VER.</i>	<i>The change is likely to prove positive to the status of the fishery.</i>

5.10.1.4 Para 9.3.4.7 says that “Confidence in the predictions of the assessment has been assigned according to a three point scale based on expert judgement:

- *High – the confidence in the prediction is very high and conclusions are primarily informed through data; some expert judgment has been used;*
- *Probable – the confidence in the prediction is likely and conclusions are based on a balance of data and expert judgement; and*
- *Uncertain – the outcome is unclear and conclusions are significantly based on expert judgement.”*

5.10.2 SALMON AND SEA TROUT RECREATIONAL FISHERIES

5.10.2.1 The potential impacts for River Tawe salmon and sea trout fisheries are shown (Table 9.47) as:

- *Reduction in salmon and sea trout returns.*
- *Reduction in revenue for fishing right owners, lease holders and angling clubs.*

5.10.2.2 As we have pointed out several times, we own salmon and sea trout fishing rights which have a capital value of many tens of thousands of pounds so another major potential (likely) impact is reduction in their value.

TLSB's Comment(s)

1. The assessment puts the level of impact as Low and the significance as Minor and therefore such a reduction in value is not expected.
2. To the extent that such an effect were to be suffered, which is not accepted by TLSB, owners of riparian interests would be able to seek compensation for the injurious affection of their

interests. As stated elsewhere, TLSB does not expect any damage to value, meaning that riparian owners would not be within the class of persons who could make and sustain such a claim.

3. Without prejudice to TLSB's primary position that such a diminution in value would not occur, there is an established mechanism for assessing such compensation.

5.10.2.3 As some of the progeny of sea trout remain in the river as non- migratory brown trout, the scheme also has the potential to harm our wild brown trout fishery. This is not mentioned anywhere in the ES.

TLSB's Comment(s)

1. Since this would be a sub-component of the S. trutta stock it would be expected that the impact would be no more than that already assessed for sea trout (see response to previous comments).

5.10.2.4 Para 9.7.4.18 says that “The impact of the operational phase on salmon and sea trout smolt and adult migration, including entrainment and injury in the turbines, has been assessed as being of Minor significance post mitigation. This is due to the low proportion of fish that are predicted to pass through the turbines, the relatively fish- friendly design (small number of blades, slow rotation rate and minimum gap runner) of the turbines and the proposed deployment of fish deterrent systems as a mitigation measure.”

Para 9.7.4.19 concludes that during the operational phase “the overall predicted long-term impact on the salmon and sea trout fishery is expected to be of Low magnitude with a significance value of Minor, and a confidence of Probable”.

We don't accept this.

TLSB's Comment(s)

1. TLSB notes that this is PASAS's position but stand by the assessment contained in the ES.

5.10.2.5 The definition of low magnitude in Table 9.7 is “Recreational fishing activity on ... adjacent watercourses will be severely affected by the project and/or associated construction activities. Permanent (> 1 to 6 months) interference ... will occur.”

This is not of “minor” significance.

TLSB's Comment(s)

1. As stated in ES para. 9.3.4.3 the Chartered Institute of Ecology and Environmental Management (IEEM, 2010) guidelines on impact assessment have been followed. Low magnitude implies the effect is local in the context of the overall distribution of the affected species.
2. Table 9.7 applies to commercial fisheries, whereas PASAS is dealing with recreational fisheries. It also deals with magnitude, rather than significance.

5.10.2.6 And operational effects will last longer than 3 years, so according to Table 9.9 magnitude should be “high”.

That produces a significance of “major”.

TLSB's Comment(s)

1. Table 9.9 deals with the magnitude of impacts on recreational fisheries. Duration of operational effects is not the sole criterion in the table. To qualify as a "high" magnitude effect, it would have to involve "sever effect" and "interference". Since fishing will still be possible, there is not "interference" in the sense intended by the table.
2. Based upon the assessment in the table, the impact is predicted to be "largely unaffected", and so a "negligible" effect is more likely to be experienced.

5.10.2.7 Turbine encounter is likely to be under-stated because of incorrect assumptions about fish movements, failure to apply an appropriate set of model rules, failure to take account of river flows and fish reactions to Tawe Barrage, etc.

In view of the current status of Tawe salmon, described above, we believe turbine encounters are likely to be of “high” magnitude.

This again produces a significance of “major”.

TLSB's Comment(s)

1. TLSB note that this is PASAS's position but stand by our assessment. However, it is unsupported by evidence of either the likelihood of entrainment or of the likelihood of contact with turbines.
- 5.10.2.8 Turbine encounter is just one of a number of potential impacts identified and assessed in tables 9.32 and 9.34 (15 for salmon, 17 for sea trout), with a range of magnitudes, significances and probabilities, some of which are challenged. It isn't clear how they've been distilled down to the overall conclusion in para 9.7.4.19.*

TLSB's Comment(s)

1. Rationale for VER assessment is better explained in Appendix 7.7.1 (VER note) to TLSB's Response to Written Questions (9 July 2014).
- 5.10.2.9 Para 3.0.0.1 (“Accuracy and Limitations”) says “It must be appreciated that models of biology are inherently uncertain in comparison to models of physics and chemistry used for hydrodynamic models and water quality models respectively. ... Thus, expert opinion, is far more influential in assessment of the effects on animals and plants than is it on physical and chemical processes.” Assessments incorporating a significant element of expert judgement, such as the turbine encounter assessment, cannot according to the principles set out above be given a confidence rating of “High”.*

TLSB's Comment(s)

1. The statement of confidence is based on the assumptions of the model as a scientific statement or prediction. If the model assumptions are well known (for instance salmon and trout are one of the most well studied animals in the world) then one can be relatively confident of the modelled result as it shows the implications of the assumptions. Nevertheless

the prediction is a scientific statement that can only be falsified (that is, it cannot be verified in all cases).

2. No information, from any source produced so far, has been provided that falsifies the prediction made by the model. As such, these are valid scientific statements and logical predictions. Confidence, or plausibility are subjective assessments which cannot falsify a scientific statement, and which are only relative to a certain context. The point made in this section of the document is that all statements of confidence about animals and plants, which are far more complex than physical processes, are uncertain and that the “terms” need to be viewed in that context. The models are repeatable and auditable.

5.10.3 SALMON AND SEA TROUT - FISH

5.10.3.1 Tables 9.32 and 9.34 contain a number of errors and inconsistencies, for example:

- *mitigation code F in Table 9.34 doesn't appear in Table 9.32*
- *impact of waterborne noise and vibration from turbines – Table different from 9.34*
- *significance of impact of waterborne noise and vibration from turbines goes from high to certain after mitigation when mitigation is n/a.*

TLSB's Comment(s)

1. The impact on Salmon are below the threshold that requires mitigation, hence it is not shown.
2. The second bullet point is not understood.
3. The assessment reported in relation to waterborne noise must be understood in full. The term “high” is the confidence in the assessment that there will be no significant effect and therefore the resultant confidence in the assessment is “certain”.

5.10.3.2 For the reasons set out above and below, we don't accept the conclusions relating to:

- *Turbine encounter. The mortality modelling counts only fish killed and fails to take account of lifetime egg deposition effects, ie the loss of killed fish from future breeding populations.*
- *Habitat fragmentation. Interference with normal migration through the masking of Tawe spates and delays due to entrapment in the lagoon is not fully recognised.*
- *Habitat modification. It's ridiculous to suggest a positive impact for sea trout through the provision of foraging habitat. Sea trout can already forage in Swansea Bay without the risk of turbine encounter.*
- *Increased predation. Adult sea trout (up to a couple of pounds or more) are just as vulnerable to predation by cormorants as smolts.*

TLSB's Comment(s)

1. TLSB's assessment is supported by independently audited expert evidence. The rationales are fully set out in the ES and key points are made below.
 2. Turbine encounter: The percentage effect on the breeding stock is predicted to be well below the 'noise' (i.e. natural year-to-year variation) in breeding stock abundance, which would make any population dynamics assessment meaningless. Current egg deposition estimates are based on rod-catch data, which PASA have advised are unreliable.
 3. Habitat fragmentation. The IBM model explicitly models the effect of the Tawe flow and potential entrainment of flow and movements of fish in and out of the lagoon. A high-flow case (see THA note No. 580N1002, video Scenario identifier TEM-A02e, TLSB Website) with Tawe, Neath & Afan flow at Q10 shows that actually lower impact is predicted at higher flows indicating that predictions used in the ES were conservative (worst-case).
 4. Habitat modification: The new seawall will create new habitat for a range of fish and crustacean species which will add to existing food resources for sea trout. Turbulence associated with the turbine jets and with the rock armour will also have a significant effect on productivity, as stated in the following ES paragraph; in this case, increased foraging would be by feeding on planktivorous fish such as sprat : Section 9.5.3.20 of ES: *Turbulence, especially that with high mixing efficiency caused by high energetic intensity and short length scales, is a critical factor for inducing a high abundance of plankton (Margalef, 1978). Thus, it is likely that planktivorous fish will be attracted to areas of predictable high turbulence caused by the new turbines in the same way they are presently attracted to turbulence in fast moving tidal currents around complex rocky coastlines (i.e. South of The Mumbles). Where foraging fish are attracted, so are their predators, including larger piscivorous fish. However, fish are attracted to these zones because they are able to access a richer zooplankton resource than they would otherwise be able to find locally, and thus this may lead to a positive feedback cycle and a more resilient and higher abundant population of resident foraging fish and their predators in Swansea Bay (Willis, 2013).*
 5. Increased predation: While cormorants taking larger fish is not unknown, it is unusual, as the following European Commission link indicates:
(<http://ec.europa.eu/environment/nature/cormorants/Cormorant-Fish-Fisheries.htm>):
"They (cormorants) consume a wide size-range of fish, from as little as 3 cm in length (which they very often swallow underwater) to as much as 50 cm (and longer for some Eels Anguilla anguilla). Though such big fish are relatively rare in their diet, cormorants eating big fish are highly conspicuous as they manipulate and try to swallow their prey on the water's surface. However, despite their ability to take fish of a wide range of sizes, small- to medium-sized fish (10-25 cm) typically predominate in cormorant diet".
- 5.10.3.3 *As some of the progeny of sea trout remain in the river as non- migratory brown trout, the scheme also has the potential to harm our wild brown trout fishery. This is not mentioned anywhere in the ES.*

TLSB's Comment(s)

1. Sea trout which remain in the river as non- migratory brown trout are mentioned 9.4.3.4 of the ES, which states "The River Tawe has the greatest numbers of salmon in the area, and numbers were steadily increasing from 1976 (Environment Agency, 2002b). The R. Neath has important salmon spawning grounds in its upper reaches, though most of the tributaries are used by non-migratory trout, as migration is obstructed by barriers. Salmon and sea trout also

spawn in the R. Afan, though similarly to the R. Neath, evidence indicates connectivity issues, primarily as a result of over-abstraction and barriers.”

5.10.4 OTHER SHORTCOMINGS IN THE ES

5.10.4.1 *There's no mention of the cumulative effects of building further tidal lagoons in the Bristol Channel, which is apparently the applicant's intention, according to press reports.*

TLSB's Comment(s)

1. Cumulative effects of further lagoons would be assessed in the applications for any further lagoons, should the Swansea Bay Tidal Lagoon be granted development consent. It is not possible to assess cumulative effects of further lagoons that have not yet been identified or designed.
2. This is the normal approach to EIA.

5.10.4.2 *The APEM report explains in section 3.1 that “Due to extensive movement of migratory salmonids along the South Wales coast there is potential for populations of more rivers to be impacted than currently included within the far-field zone.” Some of these will be fish from Special Areas of Conservation – eg, the Usk.*

TLSB's Comment(s)

1. The assessment of SAC associated species is addressed within the HRA which was provided with the original DCO application. An updated version of the HRA was provided to the ExA on 9 July 2014.
2. The updated HRA demonstrates that assessed impacts, including in combination effects with other projects, are acceptable in relation to fishery components (and other components) of designated sites.

6 WATER FRAMEWORK DIRECTIVE (WFD)

6.1 STAGE 1 - RELEVANT WATERBODIES

6.1.1 *In the WFD Assessment (application document “8.3 Water Framework directive.pdf”) paras 3.2.0.3 (coastal waterbodies), 3.2.0.4 (transitional waterbodies) and 3.2.0.5 (river waterbodies) identify the waterbodies likely to be affected by the scheme and therefore to be assessed.*

6.1.2 *Para 3.2.0.3 includes only two River Tawe waterbodies:*

- *GB110059032180 – River Tawe – confluence with Twrch to tidal limit. This is the main stem of the Tawe and its ecological status could be jeopardised by the effects of the scheme on fish described above.*
- *GB110059025690 – River Tawe – confluence with Nant Cwmgelli to tidal limit. We think this is a misdescription (by NRW) of an insignificant, largely culverted, stream entering the Tawe between the Tawe Barrage and Morrision. The waterbody is Nant Cwmgelli itself, not that part of the Tawe between the Tawe / Cwmgelli confluence and the tidal limit (wherever that might be).*

6.1.3 *Para 3.2.0.3 fails to include a number of others, linked to the proposed lagoon by migratory fish, and for which such fish are an essential element of their ecological classification, for example:*

6.1.3.1 *GB110059032200 – Lower Clydach – headwaters to confluence with Tawe. An impassable man-made barrier at the bottom of the Lower Clydach is currently being addressed to allow salmon and sea trout to re-populate approx 20km of this tributary, which could become a major spawning stream. The effects on fish, described above, could jeopardise this and the attempt to bring its WFD “fish” and ecological status up to good by 2015.*

6.1.3.2 *GB110059032190 – Upper Clydach – headwaters to confluence with Tawe.*

6.1.3.3 *GB110059032280 – Giedd – headwaters to confluence to Tawe etc*

6.1.4 *Para 3.2.0.4 fails to include the Tawe estuary between the Tawe Barrage and the highest point reached by tides at the Beaufort Weir in Morrision – about 3.5 miles of water with serious water quality issues caused by the Tawe Barrage.*

(Waterbody GB541005900900 described as Tawe Estuary doesn’t extend above the Tawe Barrage.)

Unfortunately NRW (or rather, Environment Agency Wales before them) have failed to give this a WFD waterbody identifier or to include it in any other waterbody. NRW have indicated that for the next WFD cycle (2016-2021) they propose to incorporate this stretch of water in existing waterbody GB110059032180 (Tawe –confluence with Twrch to tidal limit).

TLSB's Comment(s)

1. As noted above, an updated WFD is submitted with these written representations. The updated WFD includes the following rivers;

RIVER WATERBODIES	
RIVER NEATH	
GB110058032430	RIVER NEATH - CONFLUENCE WITH NEDD FECHAN AND MELLTE TO TIDAL LIMIT
GB71010012	NEATH AND TENNANT
GB110058026350	BAGLAN BROOK - HEADWATERS TO CONF WITH RIVER NEATH
GB110058026390	CLYDACH - HEADWATERS TO CONF WITH RIVER NEATH
GB110058026370	NANT CAE'R-BRYN - HEADWATERS TO CONF WITH NEATH
GB110058032430	NEATH - CONF WITH NEDD FECHAN AND MELLTE TO TL
GB110058032360	DULAIS - HEADWATERS TO CONFLUENCE WITH RIVER NEATH
GB110058032340	NEDD FECHAN - PYRDDIN CONF TO RIVER NEATH CONF
GB110058032330	MELLTE - CONF WITH SYCHRYD TO CONF WITH R. NEATH
GB110058032320	SYCHRYD - HEADWATERS TO CONFLUENCE WITH MELLTE
GB110058032350	MELLTE - CONF WITH HEPSTE TO CONFLUENCE TO SYCHRYD
GB110058032380	MELLTE - LLIA AND DRINGARTH CONF TO HEPSTE CONF
GB110058032410	LLIA - HEADWATERS TO CONFLUENCE WITH MELLTE
GB110058026380	NEATH-CLYDACH
GB110058032420	NEATH-MELLTE
GB110058032390	NEATH-MELLTE
RIVER AFAN	
GB110058026110	AFAN - CONFLUENCE WITH PELENNNA TO TIDAL LIMIT
GB110058026140	PELENNNA - HEADWATERS TO CONFLUENCE WITH AFAN
GB110058026130	AFAN - CONF WITH CORRWG TO CONFLUENCE WITH PELENNNA
GB110058026150	CORRWG - HEADWATERS TO CONFLUENCE WITH AFAN
GB110058026120	AFAN - HEADWATERS TO CONFLUENCE WITH CORRWG
GB110058026100	FFRWD WYLLT - HEADWATERS TO TIDAL LIMIT
AFON CYNFFIG	
GB110058026450	KENFIG - CONF WITH MARGAM MOORS TO TIDAL LIMIT
GB110058026180	MARGAM MOORS - HEADWATERS TO CONF WITH KENFIG
GB110058026160	KENFIG - NANT CWM PHILIP CONF TO MARGAM MOORS CONF
GB110058026190	NANT CWM PHILIP - HEADWATERS TO CONF WITH KENFIG
GB110058026170	KENFIG - HEADWATERS TO CONF WITH NANT CWM PHILIP
RIVER TAWE	
GB110059032180	RIVER TAWE - CONFLUENCE WITH TWRCH TO TIDAL LIMIT
GB110059025690	RIVER TAWE - CONFLUENCE WITH NANT CWMGELLI TO TIDAL LIMIT
GB110058026450	RIVER KENFIG - CONFLUENCE WITH MARGAM MOORS TO TIDAL LIMIT
GB110059025700	CRYMLYN BROOK - HEADWATER TO CONFLUENCE WITH TENNANT CANAL
GB110059025710	NANT Y FENDROD - HEADWATERS TO CONF WITH TAWE
GB110059032200	LOWER CLYDACH - HEADWATERS TO CONFLUENCE WITH TAWE
GB110059032190	UPPER CLYDACH - HEADWATERS TO CONFLUENCE WITH TAWE
GB110059032170	TAWE - CONF WITH GIEDD TO CONFLUENCE WITH TWRCH
GB110059032210	TWRCH - CONF WITH NANT GWYS TO CONF WITH TAWE
GB110059032260	LLYNFELL - HEADWATERS TO CONFLUENCE WITH TWRCH
GB110059032290	TWRCH - HEADWATERS TO CONFLUENCE WITH LLYNFELL
GB110059032220	TWRCH - CONF WITH LLYNFELL TO CONFLUENCE WITH GWYS
GB110059032270	GWYS - HEADWATERS TO CONFLUENCE WITH TWRCH
GB110059032280	GIEDD - HEADWATERS TO CONFLUENCE TO TAWE
GB110059032240	TAWE - CONF WITH NANT LLECH TO CONF WITH GIEDD
GB110059032250	NANT LLECH - HEADWATERS TO CONFLUENCE WITH TAWE
GB110059032300	TAWE-TWYNNI
CLYNE RIVER	
GB110059025620	CLYNE RIVER - HEADWATERS TO TIDAL LIMIT
GB110059025610	SOUTH GOWER STREAMS - BURRY PILL
PENNARD PILL	
GB110059025580	PENNARD PILL EAST - HEADWATERS TO TIDAL LIMIT
GB110059025520	PENNARD PILL - UN-NAMED CONF IN PARKMILL TO TL

STAGE 2 – BASELINE.

This is incomplete because of the omission of the waterbodies mentioned above.

TLSB's Comment(s)

1. As noted above, an updated WFD is submitted with these written representations. The table above demonstrates the extent to which fishery components of waterbodies are taken into consideration in relation to the WFD assessment carried out.
- 6.2 *STAGE 3 – RELATIONSHIP OF PROJECT COMPONENTS TO RELEVANT WATERBODIES:*
 - 6.2.1 *This assessment is incomplete because of the omission of the various waterbodies mentioned above.*
 - 6.2.2 *Table 3.3 – Turbines and sluice gates. Fails to acknowledge fish turbine encounters and associated mortality.*
 - 6.2.3 *Table 3.3 – Various construction components (cofferdam, seawalls, etc) which will cause suspension of sediments and contaminants, which will be swept into the estuary by incoming tides, fail to acknowledge the likely damaging effects on the stretch between the Barrage and Morriston.*
- 6.3 *STAGE 4 - PRELIMINARY ASSESSMENT:*
 - 6.3.1 *This assessment is incomplete because of the omission of the various waterbodies mentioned above.*
 - 6.3.2 *Table 3.5, GB110059032180 – River Tawe – confluence with Twrch to tidal limit:*
 - 6.3.2.1 *This fails to acknowledge the likely damaging effects on the stretch between the Barrage and Morriston of construction works and dredging, which will lead to the suspension of sediments and contaminants, which will be swept into the estuary by incoming tides. The Barrage is likely to prevent all these materials returning to the Bay on the ebb tide and they are likely to settle out in the Barrage impoundment. Water quality here is already poor because of stratification and sedimentation.*
 - 6.3.2.2 *It does acknowledge the likely effects on fish but not in way which is consistent with tables 9.32, 9.34 and 9.47 in the ES. The impacts discussed in more detail in the ES are likely to compromise the waterbody's good ecological status.*
 - 6.3.3 *Table 3.6, GB110059025690 – River Tawe – confluence with Nant Cwmgelli to tidal limit. No further comment.*
 - 6.3.4 *Table 3.9, GB541005900900 – Tawe Estuary. Fish are not a component of this waterbody's classification.*
- 6.4 *STAGE 5 - DETAILED ASSESSMENT*

- 6.4.1 *This assessment is incomplete because of the omission of the various waterbodies mentioned above.*
- 6.4.2 *Para 3.6.0.5 says “the pressures exerted from the Project on anadromous fish populations are by far outweighed by the natural dynamics (e.g. predation at sea) which influence stock recruitment. Additionally, risks posed from in-river sources, are likely to have a much greater impact than the Project itself.” We don’t think these are relevant considerations. Two wrongs don’t make a right. The development must not compromise achievement of WFD objectives.*
- 6.4.3 *We have argued above that the detrimental effects of the project have been understated and we submit that it would in fact compromise achievement of such objectives.*

TLSB's Comment(s)

- 1. As noted above, an updated WFD is submitted with these written representations. Please see updated document.
- 2. The WFD assessment includes the waterbodies that PASAS complains have been omitted and concludes that the effects of the Project are acceptable.
- 6.5 *WFD ARTICLES 4.7 AND 4.8:*
 - 6.5.1 *ARTICLE 4.7. The assessment makes no attempt to justify the damaging development on the grounds of overriding public interest etc.*
 - 6.5.2 *ARTICLE 4.8. This article appears to completely preclude any development which will permanently exclude or compromise the achievement of objectives in other waterbodies within the same River Basin District – eg, the River Tawe waterbodies mentioned above.*
- 6.6 *CONCLUSION. The WFD assessment is therefore defective and wholly inadequate. If the applicant seeks to correct these shortcomings with new information:*
 - 6.6.1 *it seems to us that Regulation 17 of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 would apply and that the examination should be suspended pending compliance with the requirements of the Regulation;*
 - 6.6.2 *we would want to make further representations in accordance with the Regulation.*

TLSB's Comment(s)

- 1. The updated WFD Assessment submitted with these comments on written representations addresses matters relating to both Articles 4.7 and 4.8.
- 2. The assessment has been undertaken in line with advice from NRW. These matters are discussed in TLSB’s comment on Section A1 of NRW’s Written Representation. The updated assessment concludes that the Project is compliant with the Directive.

7 OUR STATUS AND PROTECTION OF FISHERIES INTERESTS

7.1 OUR STATUS

7.1.1 *Damage to our property rights might entitle us to make a “relevant claim”. We are therefore “category 3 affected persons” for the purposes of the Planning Act 2008.*

TLSB's Comment(s)

1. Consideration of this matter is given in TLSB's Written Representation response to Principal Issues. Paragraphs 7.2.6 and 7.2.7 state that:

“the impact of the Project on fish travelling up the adjacent Rivers will be of such minor effect that it will not impact upon migratory species in terms of recreational fishing. The Project will not affect riparian interests on the Rivers. In spite of the lack of need to mitigate impacts, TLSB proposes to undertake to provide benefits for migratory fish through contribution to fish pass improvements on the Tawe.

“TLSB has attempted extensive engagement with angling associations along the Rivers, as presented in Appendix 10.7 of the Consultation Report which details, over 54 pages, the extent of this exercise. It is not predicted that any holder of riparian rights on the Tawe will be able to sustain any relevant claim as a result of the making of the Order, on the basis of the insignificance of the predicted impacts. Therefore, riparian rights holders along the Rivers Tawe and Neath are not affected persons in the context of the examination of the Application.”

7.1.2 *The Examining Authority has recently confirmed this by according category 3 status to the Tawe and Tributaries Angling Association Ltd under section 102A of the Planning Act 2008.*

TLSB's Comment(s)

1. The acceptance of TTAAL as an interested party is based on the tests set out S102B of The Planning Act 2008. S102B(4) states that a person is within Category 3 if they “would or **might** [emphasis added] be entitled [...] to make a relevant claim”. The test that can be applied by the ExA in deciding whether or not to accept such a person as an interested party is whether that person would or might be able to make a relevant claim as a result of the making of the Order. It is arguable that all persons *might* be able to make a relevant claim as a result of the making of the Order, as the test that is applied does not consider whether that claim can be sustained. The ExA is excluded from any requirement to undertake due diligence to identify those that may have an interest in the land (s102A (4)).
2. This is different to the requirements placed on the applicant in the identification of those with an interest in the land under s44 (5), which requires the applicant to undertake an exercise of due diligence in the identification of people with an interest in the land. This exercise was undertaken and it was deemed, after the exercise undertaken, that the Project will not have an impact great enough to cause any effect to those holders of riparian rights that could sustain a claim of injurious affection as a result of the making of the Order. The identification of people with an interest in the land undertaken by TLSB at the pre-application is a far more forensic decision than that made by the ExA, in whose interest it is to hold an examination that follows the principles of openness and impartiality.

3. Notwithstanding this, TLSB does not consider that TTAL is an interested party and disagrees that this causes land rights as a person under Category 3 to be engaged by holders of riparian rights on the River Tawe.

7.2 *APPLICANTS FAILURE TO RECOGNISE OUR STATUS*

7.2.1 *We are giving details separately, in reply to Question 7.16 in the Examining Authority's first round of questions, of:*

- *the way in which the applicant has denied us category 3 status and failed to consult us properly in accordance with its own consultation strategy*
- *the applicant's failure by diligent enquiry to identify and consult other category 3 persons (including other riparian and fishery owners like ourselves)*
- *the applicant's failure to notify us and other category 3 affected persons of the acceptance of the application*
- *the applicant's wrongful certification of compliance with the section 58 notification requirements.*

TLSB's Comment(s)

1. As stated in commentary on section 7.1 above, TLSB does not consider this to be the case and has complied with the requirements of pre-application consultation, and made a lawful certification under s59.

7.2.2 *We submit that, because of the above failings, the consent application was submitted prematurely:*

7.2.2.1 *before we were able to discuss our expert fisheries analysis with the applicant*

7.2.2.2 *before discussions about monitoring, mitigation or compensation arrangements.*

TLSB's Comment(s)

1. As set out in Chapter 11 of the Consultation Report, TLSB provided Fish Legal and PASAS with a draft version of the ES prior to the submission of the Application. These comments were taken into account as shown in Appendix 11.3 of the (Consultation Report doc ref 5.1).
2. PASAS and other fishery interests have been able to participate in the examination and have not been disadvantaged.

7.3 *PROTECTION OF OUR INTERESTS*

7.3.1 *As stated above, we are opposed to the application and ask the Examining Authority to recommend refusal.*

7.3.2 *If the application is allowed, we ask the Examining Authority to ensure that secure measures for our protection are included in the Development Consent Order, including:*

7.3.2.1 requirements to implement any mitigation and offsetting measures devised as a result of discussions between the applicant, NRW, ourselves and other interested parties

7.3.2.2 proper monitoring, at the applicant's expense, of the effects of the construction, operation and maintenance of the project

7.3.2.3 offsetting measures to counter an assumed level of harm (as in the case of the Cardiff Bay Barrage), whether or not demonstrated by monitoring, because of the possibility that monitoring might not identify true impacts

7.3.2.4 compensation arrangements to take effect if monitoring shows that fish and therefore our fishery have been harmed

7.3.2.5 requirements to remedy any damaging effects of the project

7.3.2.6 security (eg in the form of a bond) to cover any liabilities which the developer, or any other entity to which responsibility is transferred, fails to honour.

TLSB's Comment(s)

1. The implementation of monitoring to ensure the accuracy of the predicted effects, and to identify the need for any mitigation measures to manage impacts attributable to the Project, will be secured through the AEMP. All monitoring secured via the AEMP will be undertaken by independent consultants and/or a permanent staff of wardens/researchers working to appropriate standards (where possible in conjunction with local institutions, e.g. Swansea University, UWTSO, SEACAMS).
2. Methodologies will be agreed with the relevant planning authorities and NRW; and data will be made available for review by NRW, the local authorities and others for peer review. If a consensus of opinion suggests the Project has brought about adverse change, this will trigger a process capable of securing remedial action.
3. TLSB does not consider that the Project will cause an impact sufficient to warrant the need for compensatory habitat. The commentary on sections 7.1 and 7.2 above is relevant in relation to the inappropriateness of compensation arrangements.
4. In relation to 7.3.2.5, it is not considered that the impacts of the Project on the interests of PASAS will require remediation.

Appendix 1 – Correspondence between TLSB and PASAS

EMAILS BETWEEN TLSB & PASAS RE: MEETINGS & OTHER MATTERS

1. TLSB EMAIL TO PHIL JONES (PASAS), 14 NOVEMBER 2013, OFFERING A MEETING TO FOLLOW-UP DISCUSSIONS AT THE LIBERTY STADIUM EVENT (17 Oct 2013)

From: Gill Lock

Sent: 14 November 2013 17:06

To: Phil Jones

Cc: Fish Legal Admin

Subject: TLSB

Dear Phil

Thank you for your previous email. As part of our on-going engagement with key stakeholders, and in response to recent correspondence, we would like to offer PASAS and Fish Legal the opportunity to review and comment on TLSB's draft ES chapters. With this in mind we have put a DVD in the post today, along with a cover letter. As you are aware, we are also endeavouring to provide a direct response to your representations on the PEIR as soon as possible.

Furthermore, we would like to offer a meeting with Tessa Blazey (Head of Engagement) for Tidal Lagoon Power and myself (Head of EIA), plus representatives from Turnpenney Horsfield Associates to discuss all issues arising. Available dates are as follows (we hope you are able to commit to one of the earlier options so discussions can help inform your response):

4th Dec, available all day

5th Dec, until 1230

6th Dec, 9-11am

16th, 17th and 20th Dec, available all day

We invite your comments on the draft chapters within 28 days of receipt. The draft ES chapters are provided without prejudice and are subject to further TLSB review, including legal review, and the conclusions within each chapter are final only to that extent. The information and assessments included in the draft ES chapters will be accessed by Fish Legal and PSAS on this basis.

This is a non-statutory consultation.

We would like to emphasise that the Planning Inspectorate views consultation as a two-way process, so we ask that you provide to TLSB any information, data or additional concerns (beyond those already submitted) as soon as possible. There is no legal requirement for further consultation with other fishing bodies, but we are happy to provide you with a list of those we have consulted to date if you wish.

I look forward to your response.

Kind regards, Gill

2. TLSB EMAIL CONVERSATION WITH PHIL JONES (PASAS), 2 to 3 DECEMBER 2013, REGARDING OFFER OF MEETINGS IN SUPPORT OF DRAFT ES CONSULTATION

From: Alex Herbert

Sent: 03 December 2013 17:45

To: Phil Jones

Cc: Ray Lockyer; Andrew Kelton; Gill Lock

Subject: RE: Lagoon Consultation

Thanks for the prompt response. Of course, we regret your decision not to meet with us (and our consultants THA) but our offer to meet remains open at any stage of the application process. TLSB welcomes ongoing discussion and engagement with all interested parties – including statutory and non-statutory consultees – beyond 17 December and into the examination.

Regarding the 28-day deadline: as set out previously, this is the legal period for review/response allowed under the Planning Act 2008 for relevant representations on the ES (and all other application documents) following acceptance of an application. We appreciate the efforts required to respond within the deadline. We have requested your comments on the given date in order to have proper regard to them, and to meet our submission date in January.

In the absence of a meeting to discuss your concerns in depth:

- Regarding the draft being “incomplete in critical areas”: while some of the summary tables at the end of the chapter are requiring completion, the full details of the assessment can be found in the main body of the report. The tables at the end are simply to pull together these findings as a summary and relate them to the EIA significance criteria.

- If PASAS wishes to influence the process further, yes of course, we are happy to model scenarios provided by PASAS but no data has yet been provided (as you are aware, we first discussed/requested this on 17 October). We look forward to PASAS providing the data discussed as soon as possible, that we may produce the relevant modelling and share the results with you.

Please get in touch if we can be of further assistance.

Regards, Alex

From: Phil Jones

Sent: 02 December 2013 12:30

To: Alex Herbert

Cc: 'Ray Lockyer'; Andrew Kelton; Gill Lock

Subject: RE: Lagoon Consultation

Mr Herbert

Following discussions with Fish Legal we've concluded that at this stage we think we can achieve as much in writing as we can by meeting.

We are still trying to absorb the draft ES, which is very large but incomplete in critical areas. Eg, Tables 9.24 and 9.25 in Chapter 9, summaries of potential environmental effects on salmon and sea trout, fail to distinguish between smolts, returning adults and kelts and have "XXX" in fields of obvious concern to us.

Gill Lock indicated that it should be possible for various scenarios to be modelled and captured as videos which could be supplied to us, if we supply a range of conditions, different from the ones apparently used by Turnpenny Horsfield.

We'll let you have something as soon as we can. Your "deadline" for responses concerns us. We'll put as much as we can to you by 17th but we assume that we'll still be able to have ongoing discussions after that?

Phil Jones

From: Alex Herbert
Sent: 02 December 2013 10:33
To: Phil Jones
Cc: 'Ray Lockyer'; Andrew Kelton; Gill Lock
Subject: RE: Lagoon Consultation
Importance: High

Good morning Phil,

Sorry to chase but, with Xmas hurtling towards us, I am very concerned that meeting dates we offered on 14 November are still not fixed. For ease of reference, the original list was as follows (though 6 and 16 Dec have now been lost):

4th Dec, available all day

5th Dec, until 1230

~~6th Dec, 9-11am~~

~~16th~~, 17th and 20th Dec, available all day

We felt the best options are the early ones, now this week. They are the best options in that they allow us to talk through the current data/draft and answer questions as early as possible, and for you to provide your own data and allow us to respond. Please could you confirm your availability asap?

Many thanks, Alex

3. TLSB EMAIL CONVERSATION WITH PHIL JONES (PASAS), 30 JANUARY to 3 FEBRUARY 2014, REGARDING SUBMISSION OF THE DCO APPLICATION

No reply received to last email below.

From: Alex Herbert
Sent: 03 February 2014 17:23
To: Phil Jones
Cc: Andrew Kelton; Ray Lockyer; N Teague (APEM)
Subject: RE: Tidal lagoon

Dear Mr Jones,

We intend to submit our application at the end of this week. You will be able to make representations in the relevant representations period in light of all these matters, and we are of course happy to continue discussions, but for the timebeing I will need to defer further answers to Q's 1 and 2.

Alex Herbert

From: Phil Jones
Sent: 31 January 2014 17:56
To: Alex Herbert
Cc: Andrew Kelton; Ray Lockyer; N Teague (APEM)
Subject: RE: Tidal lagoon

Mr Herbert

Thanks.

1. Siting. We understood the reason for re-siting the turbines.

(a) Just to be clear, by micro-siting you mean re-siting (moving), don't you? According to the SOED, micro- in combination with other words usually refers to a reduction in size but that doesn't make sense here. How far do you anticipate moving the turbines? And would their orientation be changed at all? Not having seen the detailed plans and drawings (you denied us sight of them) we don't know what the proposed limits of deviation are, so it's no good saying "within defined limits".

(b) How can you say that your modelling assessed the worst case? It assessed the effects of the turbines in a particular place with a particular orientation, not the worst possible effects in any place or orientation.

2. Sea trout sizes. What THA regards as minor and what we regard as minor are probably very different. Salmon and sea trout are "at risk" in the Tawe. Could we please have details of the effect on the table in para 9.5.3.80..?

3. A supplementary. When are you planning to submit the consent application please?

Phil Jones

From: Alex Herbert

Sent: 31 January 2014 17:21

To: Phil Jones

Cc: Andrew Kelton; Ray Lockyer; N Teague (APEM)

Subject: RE: Tidal lagoon

Dear Mr Jones,

In brief answer to your questions:

Micro-siting of the turbine housing may be undertaken in response to detailed ground survey data. In simple terms, this would occur in order to place the turbine housing on the firmest ground within defined limits. Doing so would not invalidate the modelling (as we have assessed the 'worst case') and is in line with policy, under the Rochdale Envelope principle. The Rochdale Envelope is an approach to consenting and environmental impact, named after a UK planning law case, which allows a project description to be broadly defined, within a number of agreed parameters, for the purposes of a consent application. This allows for a certain level of flexibility prior to construction. As development progresses and more detail and certainty are available, further information regarding potentially impactful elements of the project can be provided. PINS has an advice note here.

With regards sea trout, I checked with THA, who say: "we have now acquired data from NRW for the Panteg trap, and this has resulted in an increase in the length class of fish assessed (up to 85 cm). This has raised the assessed significance of the impact from insignificant to minor".

Kind regards, Alex

From: Phil Jones Sent: 30 January 2014 10:06

To: Alex Herbert

Cc: Andrew Kelton; Ray Lockyer; N Teague (APEM)

Subject: Tidal lagoon

Mr Herbert

I am writing about two points of detail on which I'd appreciate your observations.

1. Siting of the turbines.

(a) In the presentation at the Liberty Stadium in October Ton Fijen, Engineering Director, mentioned the possible resiting of the turbine housing because of adverse seabed conditions.

(b) This is also mentioned in para 6.4.4.2. of the draft ES which says "As discussed in Chapter 4, Section 4.3.1.38, if the turbine/sluice gate housing is micro-sited to the southeast ...".

(c) Our copy of the draft ES doesn't actually have a Section 4.3.1.38.

(d) What's the latest on this please? If the turbine housing is moved, that will invalidate all the modelling, won't it?

2. Turbine mortality.

(a) Para 9.5.3.80 of the draft ES gives projected mortality rates for sea trout. It shows that the bigger the fish the greater the likelihood of strike and mortality. The length-frequency distribution figures quoted are therefore significant.

(b) In fact the figures used are quite wrong, as is the statement in para 1.4.3. of Appendix 9.4 that "Environment Agency fish survey and catch return data give no indication of the size of smolts or returning adults for the rivers discharging into Swansea Bay."

(c) Annual EA fisheries statistics do in fact give sizes for salmon and sea trout caught in the Swansea Bay rivers. See for example Tables 12 and 13 in the attached report for 2009. They show that numbers of sea trout per weight category were: 0-1lb = 120; 1-4lb = 82; >4lb = 40; total = 242. But para

9.5.3.80 shows very different figures, with nothing over 3lbs (50cm).

(d) Further, Environment Agency Wales (now natural Resources Wales) has for many years been trapping salmon and sea trout in the Tawe and much more detailed length-weight distribution data are available than are shown in the published statistics. And I'm sure they'll have details of smolt sizes as well, if you ask them.

Phil Jones

4. TLSB EMAIL CONVERSATION WITH PHIL JONES (PASAS), 4 APRIL to 23 MAY 2014, REGARDING OFFER OF MEETINGS TO DISCUSS FISH PASS & ALL PRECEEDING MATERIALS

From: Alex Herbert

Sent: 23 May 2014 15:38

To: Phil Jones

Cc: Howard Bassford; Gill Lock; Ray Lockyer; Andrew Kelton

Subject: RE: TLSB: research into Tawe Barrage fish pass

OK, we look forward to receiving your written materials. If you have sight of when they will be ready, I would ask you to book a meeting slot as far in advance as possible, for easier diary management on all sides.

With regards the salmonids report, my mistake. PINS must have been referring to the APEM report on the v1 draft EIA chapter, which we have indeed received. Timings of the correspondence were such that I read it as a possible reference to newer material.

Hope to hear from you soon.

Alex

From: Phil Jones

Sent: 23 May 2014 15:04

To: Alex Herbert

Cc: Howard Bassford; Gill Lock; Ray Lockyer; Andrew Kelton

Subject: RE: TLSB: research into Tawe Barrage fish pass

Mr Herbert

We are happy to meet you but we want some things to be in writing first. As I said, we'll email you as soon as we can.

The report that we commissioned (with Fish Legal, Angling Trust and other clubs) was sent to you (DLA Piper) on 4th March, before acceptance of the application. The reference to it in the PINS email of 22nd May shouldn't have been news to you.

Phil Jones

From: Alex Herbert

Sent: 23 May 2014 11:03

To: pmj@abertawe.co.uk

Cc: Howard Bassford; Gill Lock; Ray Lockyer; Andrew Kelton

Subject: RE: TLSB: research into Tawe Barrage fish pass

Mr Jones,

Thanks for your email. Please can you confirm whether you wish to meet, or would prefer only to correspond? You will be aware that the Preliminary Meeting is fixed for 10 June, as well as the various deadlines thereafter. We still feel a meeting would be productive, to discuss the paper we sent to you, at your earliest convenience. Also, we note from PINS' most recent s51 advice of 22 May that you have commissioned new work on salmonid impacts. We would be pleased to discuss your findings in relation to our assessment and if necessary undertake additional modelling runs to compare your results to the ES findings.

Kind regards, Alex

From: Phil Jones

Sent: 22 May 2014 23:55

To: Alex Herbert

Cc: Howard Bassford; Gill Lock; Ray Lockyer; Andrew Kelton

Subject: RE: TLSB: research into Tawe Barrage fish pass

Mr Herbert

Further to your phonecall this morning, when I was just about to go out... We arranged for you to ring again on Friday morning but I now find that I won't be available then either, I'm afraid.

We were planning to reply to your email and to the paper you sent us, which we have now discussed with NRW fisheries staff, and we'll do that as soon as we can.

Phil Jones

From: Alex Herbert

Sent: 08 May 2014 12:17

To: Phil Jones

Cc: Howard Bassford; Gill Lock; Ray Lockyer; Andrew Kelton

Subject: RE: TLSB: research into Tawe Barrage fish pass

Good morning,

I am writing again, noting that two weeks have passed since my last email, and noting your recent correspondence with the Planning Inspectorate. I was prompted to review old correspondence and noted that we have not met formally since your attendance at the EIA event on 17 October 2013, despite our repeated offers. I believe it would be helpful for both parties to meet before the examination (expected to commence in early June) so invite you again to provide possible dates.

I look forward to hearing from you.

Kind regards, Alex

From: Alex Herbert

Sent: 24 April 2014 10:22

To: Phil Jones

Cc: Howard Bassford; Gill Lock; Ray Lockyer; Andrew Kelton

Subject: RE: TLSB: research into Tawe Barrage fish pass

Good morning,

I am writing to follow up my email of 4 April offering a meeting to discuss the project and the memo. We remain keen to recommence discussions. Are you able to provide some suitable dates?

Kind regards, Alex

On 7 Apr 2014, at 10:18, "Phil Jones" wrote:

Mr Herbert

I don't think we could respond to the document without discussing it with NRW. It includes a number of references to new statements by NRW staff - we'd need to check that they've been correctly reported and interpreted.

Phil Jones

From: Alex Herbert

Sent: 05 April 2014 22:18

To: Phil Jones

Cc: Howard Bassford; Gill Lock

Subject: RE: TLSB: research into Tawe Barrage fish pass

Dear Mr Jones,

Without prejudice

When we say "in confidence" our hope is that the document should have limited circulation for now. It is intended as a preliminary document to enable discussions and, as such, involving all those you mention would be unmanageable at the outset. I would have thought that a good approach would be to meet and discuss this, and then to produce something for wider circulation in due course? Therefore, for now I would appreciate it if you restrict circulation to PASAS, Fish Legal and the Angling Trust – for now (i.e. this isn't necessarily a permanent or final arrangement).

I hope you understand this is not intended to hide anything, but rather to make first discussions as productive and easy to conduct as possible - our aim would be to reach a conclusion that everyone can share and publicise.

Mike Case is a senior member of our technical team with a background in environmental science. He does not have fisheries qualifications but you will see the document is not primary research, rather a review of the work of others which we thought was worth discussion, as described above.

Kind regards,

Alex

From: Phil Jones
Sent: 04 April 2014 18:06
To: Alex Herbert
Subject: RE: TLSB: research into Tawe Barrage fish pass
PS.

1. Does "in confidence" preclude us discussing the paper with NRW?
2. Who is Michael Case and what are his fishery qualifications?

Phil Jones

From: Phil Jones
Sent: 04 April 2014 17:07
To: 'Alex Herbert'
Subject: RE: TLSB: research into Tawe Barrage fish pass
Mr Herbert

Thanks. I haven't read the document yet but, when you say "in confidence", can you please indicate what you mean? I'd obviously need to share it with the officers and management committee of Pontardawe and Swansea Angling Society Ltd and with Fish Legal and the Angling Trust. Can I share it with the other clubs on the Tawe (Tawe and Tributaries Angling Association Ltd and Mond Angling Club)? What about other riparian owners on the Tawe?

Phil Jones

From: Alex Herbert
Sent: 04 April 2014 16:11
To: Phil Jones
Cc: Gill Lock; Mike Case; Howard Bassford; Rodican-Jones, Emma

Subject: TLSB: research into Tawe Barrage fish pass

Dear Mr Jones,

We are continuing our efforts to maximise the benefits of the Swansea Bay Tidal Lagoon Project. We have noted the concerns of PASAS and other anglers represented by Fish Legal, and we have conducted an investigation into the Tawe Barrage fish pass and other potential improvements. An internal memo outlining the initial results of the investigation is attached for your information and is provided on a without prejudice and in confidence basis. I hope you agree that it makes for interesting reading.

If you would like to meet to discuss the issues raised in the memo or other matters arising from the submitted application, please let me know and I will coordinate accordingly – we would very much like to recommence discussions with yourselves and Fish Legal as we move towards examination.

We hope that we will be able to agree a Statement of Common Ground, via meetings, in advance of the examination (SoCG are commonly-used means to state areas of agreement and disagreement, allowing the examination to focus on material differences between the main parties). I look forward to hearing from you.

Kind regards,

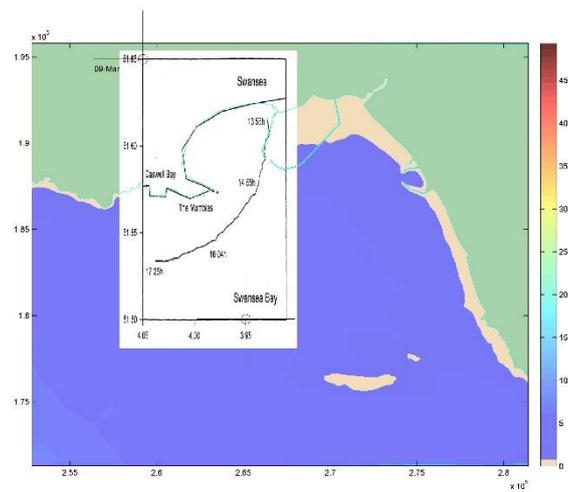
Alex

Appendix 2 – Sensitivity testing for Salmonids: Technical Note.

Prepared by: Jay Willis

Document No.

Date: 31/08/2014



Submitted to:

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Turnpenny Horsfield Associates Ltd

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1 INTRODUCTION

The encounter model described in Appendix 9.3 Encounter Modelling was tested for the impacts of various large changes to initialisation and parameters. The aims of the sensitivity explorations were as follows:

- The primary aim was to check for any illogical or unnatural behaviour that was exposed and to adjust the model in these cases to reflect expert opinion, and thus to ensure the default case was an adequate representation of the predicted likelihood of encounter.
- The second aim was to search for any initialisation case that was significantly worse than the default case.
- The third aim was to search for ways to make the model more efficient by removing computations that were irrelevant, or were unnecessary replications.
- The fourth aim was to test the model when it was confronted with new data that challenged the basic assumptions.

The sensitivity process also served as check for computation (software bugs) or theoretical inconsistencies.

2 THE MEANING OF WORST CASE

The sensitivity tests represent equally plausible alternative predictions based on similar underlying assumptions (axioms). The three core axioms of the model are swim speed, route, and navigational accuracy. Tidal state at initialisation was the other unknown, and rather than run the model for model months rather than days, it was decided to test the extremes (spring, neap, and the full range across high and low in the worst case) Neap was scoped out early as explained in the Appendix 9.3. The core axioms can be calibrated from tagging studies and from many scientific studies. The olfactory routes are built from the same hydrodynamic models in a clearly reported method – again they are scientific statements which are logical and reproducible based on their own axioms. Unless otherwise stated all sensitivity tests run with only one major variation of the parameters, such as a route variation; for instance, an east approach rather than a western approach. Since each model run therefore represents an equally plausible scientific statement based on similar axioms it would be logical to combine them as a single hypothesis. One method would be to average the results over all the sensitivity tests. This would reduce the reported estimated impact, in all cases, as the most impactful variant has been chosen as the default. This is the meaning of worst cases in respect of this choice of reported scenario.

It is important to note that there is no intention or necessity to search for worst cases, in an infinite initialisation space. The model predictions are a logical consequence of the axioms, and are unfalsified (but falsifiable) predictions of the likely outcome across the broad range of all our knowledge about the species in question. The axioms, and thus the model predictions, are not falsified by any known information from any source. Until any are falsified, they all remain equally valid regardless of opinion, expert or otherwise. It is the personal choice of expert opinion to present a particular scenario. However, given the overall uncertainty of models of animals it was decided that presenting the worst cases of the major variants would be a conservative approach.

3 CONFRONTATION WITH NEW DATA

During the process of consultation alternative views were expressed with respect to the axioms of the model, and scientific evidence was presented to us of which we had hitherto been unaware. In all cases we re-calibrated the model with the calibration from the alternative opinion or alternative evidence and report the results here. Specifically this relates to; 1) likely swimming speed of salmon smolt and 2) likely position of olfactory trails for adult trout.

3.1 Smolt speed

1) For salmon smolt swimming, as mentioned in Appendix 9.3, we employed a highly conservative figure around 50% of the lowest estimate from the scientific literature (Hansen & Quinn 1998) average of about 0.17 m/s (dependent on size). We were presented with opinions that the swim speed should be at minimum around 3 times our default, around 0.5 m/s, (PASAS estimate (PASAS written representation and comments)). Other laboratory estimates are of a minimum of 1 m/s (Peake McKinley 1998). We were also made aware of a single track of an acoustically tagged smolt in the exact same migratory journey as the modelled smolt (Moore 1997). It is possible to use the hydrodynamic model to make a vector decomposition of the track at the same tide state as the original (neap) and calculate the swim speed of the observed smolt (0.63 m/s) which was sustained for a period of 4 hours (Technical note: New Tagged Smolt Analysis 580R1101).

3.2 High resolution model with river flow

2) A high resolution model was prepared that included relatively high flows from the rivers Neath, Tawe and Afan. The flow rates were, Q10 exceedance values (a flow rate only exceeded for 10% of time). The purpose of this model was to estimate whether the flow from the rivers, which are assumed to contain an olfactory signal, would get entrained at a high enough concentration in the proposed lagoon to produce a false trail when the lagoon discharged. The model produced a map of

estimated olfactory signal in Swansea Bay. This provided an alternative trail for fish which are assumed to follow an olfactory trail. The sensitivity test was operated on Adult Trout as these were the most heavily impacted (see Technical Note 580R1001).

4 Sensitivity testing for Salmon and Trout smolts and adults

Each of these runs was initially made with 10,000 particles and all the variable parameters which distinguish each species from each other are listed in Appendix 9.3 580R0801. The result in each case is a probabilistic estimate of the likely mortality after the results of each encounter run have been through the STRIKER model. STRIKER is used to calculate the possibility of death caused by multiple passes through the turbines in the appropriate directions.

Table 1. Summary of mortality effects of various scenarios

Species	Sensitivity type	Scenario Ident.	Mortality summary	Notes
Salmon adult	High	TEM-A01a	1%	
	Low	TEM-A01e	1%	
	Spring	TEM-A01a	1%	
	East	TEM-A01c	0.5%	
	West	TEM-A01a	1%	
	Tawe	TEM-A01a	1%	
	Neath	TEM-A01b	0	
	Neath East	TEM-A01d	0	
Salmon smolt	High	TEM-J01a	0.2%	
	Low	TEM-J01i	0.2%	

Species	Sensitivity type	Scenario Ident.	Mortality summary	Notes
	Spring	TEM-J01a	0.2%	
	Tawe	TEM-J01a	0.2%	
	Neath	TEM-J01c	0	
	PASAS	TEM-J01j	0.05%	swim speed 0.5 m/s
	Moore 1997	TEM-J01k	0.05%	swim speed 0.63 m/s
	Peake McKinley 1998	TEM-J01l	0.05%	swim speed 1 m/s
	Moore 1997 – neap	TEM-J01f	0	swim speed 0.63 m/s
Trout adult	High	TEM-A02a	2.5%	
	Low	TEM-A02h	2.5%	
	Spring	TEM-A02a	2.5%	
	East	TEM-A02c	0.5%	
	West	TEM-A02a	2.5%	
	Tawe	TEM-A02a	2.5%	
	Neath	TEM-A02b	0.05%	
	Neath east	TEM-A02d	0	
	High Resolution Olfactory trail	TEM-A02e	1%	Doc. 580R1001 Hi Res water + Q10 rivers
Trout smolt	High	TEM-J02a	0.2%	

Species	Sensitivity type	Scenario Ident.	Mortality summary	Notes
	Low	TEM-j02e	0.2%	
	Spring	TEM-J02a	0.2%	
	Tawe	TEM-J02a	0.2%	
	Neath	TEM-J02c	0	

Table 2. Details regarding sensitivity in similar format to Table 5. Overview results Appendix 9.3

Species	Scenario identifier	No. encountering turbines	Turbine Passes	Difference in/out	Mean mortality %	SE Mortality %
Salmon adult	TEM-A01a	626	1020	0	0.9	0.09
Salmon adult Neath	TEM-A01b	0	0	0	0	0
Salmon adult Eastern	TEM-A01c	210	397	0	0.35	0.06
Salmon adult Neath Eastern	TEM-A01d	0	0	0	0	0
Salmon adult Springlow	TEM-A01e	667	1136	0	0.89	0.1
Salmon smolt	TEM-J01a	109	429	0	0.13	0.04
Salmon smolt Neath	TEM-J01c	2	3	0	0	0
Salmon smolt Neap PSAS 0.5 m/s	TEM-J01e	107	88	0	0.03	0.02
Salmon smolt Neap Moore1997 0.63 m/s	TEM-J01f	50	33	0	0.01	0.01
Salmon smolt SpringLow	TEM-J01i	120	466	0	0.14	0.04
Salmon smolt PSAS 0.5 m/s	TEM-J01j	96	172	0	0.05	0.02

Salmon smolt Moore1997 0.63 m/s	TEM-J01k	104	177	0	0.06	0.02
Salmon smolt PeakeMcKinley1998 1 m/s	TEM-J011	68	97	0	0.03	0.02
Sea trout adult	TEM-A02a	1986	3746	0	2.42	0.15
Sea trout adult Neath	TEM-A02b	10	29	0	0.02	0.01
Sea trout adult Eastern	TEM-A02c	266	528	0	0.33	0.06
Sea trout adult High Resolution Water + flow	TEM-A02e	543	1634	0	0.98	0.1
Sea trout adult Neath Eastern	TEM-A02d	1	7	0	0	0.01
Sea trout adult SpringLow	TEM-A02h	1912	3629	0	2.39	0.15
Sea trout smolt	TEM-J02a	129	502	0	0.16	0.04
Sea trout smolt Neath	TEM-J02c	5	11	0	0	0.01

5 REFERENCES

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