

# **Cynllun Datblygu Lleol Diwygiedig Sir Gaerfyrddin 2018-2033**

PrC2/SS1 Pentre Awel

Datganiad Tystiolaeth

Mai 2024

## Datganiad Tystiolaeth

**Cyfeiriad y Safle:**

Pentre Awel, Llanelli, SA15 2EZ

**Cyfeirnod(au) Cynllunio / Cyfeirnod(au) Cynllun Lleol:**

Cyfeirnod Cynllun Datblygu Lleol Adneuo – PrC2/SS1

Cyfeirnod Cais Cynllunio Amlinellol: S/36948

Materion â Gadwyd yn ôl: PL/03872

**Dyddiad:**

10/05/24

## Diben y Datganiad Tystiolaeth

Paratowyd y Datganiad Tystiolaeth hwn i fynd i'r afael â materion cyflawni mewn perthynas â'r datblygiad ym Mhentre Awel, Llanelli a ddangosir mewn coch yn Atodiad 1.

Mae'n mynd i'r afael â'r dangosyddion cyflawni canlynol:

1. Statws cynllunio'r safle.
2. Unrhyw gynnydd a wneir tuag at gyflwyno cais (ceisiadau) y mae angen ei ganiatáu cyn y gall y datblygiad ddechrau'n gyfreithlon.
3. Unrhyw gynnydd yng ngwaith asesu'r safle sy'n ofynnol ar gyfer cyflwyno cais a/neu cyn y gall datblygiad ddechrau'n gyfreithlon.
4. Unrhyw wybodaeth berthnasol am hyfywedd ariannol sy'n effeithio ar ddechrau'r datblygiad.
5. Unrhyw wybodaeth berthnasol am berchnogaeth safle a chyfyngiadau mynediad sy'n effeithio ar yr asesiad o'r safle neu ddechrau'r datblygiad.
6. Unrhyw wybodaeth berthnasol am ddarparu'r seilwaith y bydd ei hangen i gefnogi / galluogi'r datblygiad.
7. Cyfraddau cyflawni ac adeiladu disgwyledig.

### 1. Statws cynllunio'r safle.

1.1 Rhoddwyd caniatâd cynllunio amlinellol (S/36948) ar 8 Mehefin 2019 ar gyfer y datblygiad Llesiant a Gwyddor Bywyd gan gynnwys: Canolfan Iechyd Cymuned (Sefydliad Gwyddor Bywyd, Canolfan Addysg Llesiant, a Chanolfan Darpariaeth Glinigol) o hyd at 16,500 metr sgwâr (dosbarthiadau defnydd; D1 sefydliad dibreswyl, B1 (B) ymchwil a datblygu busnes, a C2 sefydliad preswyl) Canolfan Fusnes Gwyddor Bywyd (lle swyddfa yn y sector ymchwil a datblygu) o hyd at 10,000 metr sgwâr (dosbarth defnydd B1 (B) ymchwil a datblygu busnes a B2 diwydiant ysgafn). Canolfan Llesiant (Canolfan Ymwelwyr a chyfleusterau corfforaethol, cymunedol, hamdden a chwaraeon) o hyd at 11,000 metr sgwâr (dosbarth defnydd D2 adloniant a hamdden) Byw â chymorth (gofal nyrsio, gofal preswyl, tai

gofal ychwanegol a chyfleusterau adsefydlu clinigol) o hyd at 370 gwely/uned a 7,500 metr sgwâr (dosbarthiadau defnydd; C2 sefydliad preswyl, C3 (A) a C3 (B) preswyl) ardal hamdden awyr agored gysylltiedig, mannau hamdden a therapi, tirlunio a llecynnau cyhoeddus, seilwaith ynni a chyfleustodau; mynediad a pharcio.

1.2 Cyflwynwyd cais Adran 73 i ymestyn y caniatâd cynllunio amlinellol am 5 mlynedd ychwanegol ar 19 Gorffennaf 2022 (Cyf: PP-11385544).

2. Unrhyw gynnydd a wneir tuag at gyflwyno cais (ceisiadau) y mae angen ei ganiatáu cyn y gall y datblygiad ddechrau'n gyfreithlon.

### **Cam 1**

2.1 Cyhoeddwyd cais Diwygiad Anfaterol yn cyflwyno cynllun fesul cam wedi'i ddiweddarau (gan ymgorffori addasiad i ffin Cam 1) i ACLI Sir Gaerfyrddin ym mis Rhagfyr 2021 a'i gymeradwyo wedi hynny.

2.2 Cyflwynwyd Cais Materion a Gadwyd yn Ôl a chafodd ei gymeradwyo'n unfrydol yng nghyfarfod y Pwyllgor Cynllunio ar 23 Mehefin 2022 (fel yr amlinellir isod)

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>Cyfeirnod:</u></b> | <u><i>Ceisir cymeradwyo Materion a Gadwyd yn ôl ar gyfer mynediad, golwg, tirlunio, cynllun a graddfa ar gyfer Cam 1 Datblygiad Llesiant a Gwyddor Llanelli, a elwir bellach yn Bentre Awel ar gyfer datblygu Hwb Iechyd a Llesiant sy'n cynnwys cyfleusterau iechyd, hamdden, addysg, ymchwil a busnes a chanolfan ynni, ynghyd â'r amgylchfyd cyhoeddus cysylltiedig, mannau agored, tirlunio caled a meddal, draenio, cysylltiadau i qerddwyr a beicwyr a pharcio, llefydd parcio ceir a seilwaith ategol gan gynnwys mesurau lliniaru a qwellu o amgylch yr Hwb Iechyd a Llesiant arfaethedig a pherimedr Afon Dafen Newydd, Llynnoedd Delta</i></u> |
| <u>PL/03872</u>          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

2.3 Cyflwynwyd cais SAB ar 26 Mehefin 2022 a'i gymeradwyo'n llawn ar 4 Awst 2022.

2.4 Ceisiadau perthnasol eraill:

- PL/05421 – cyflwynwyd NMA ar 10 Chwefror 2023 er mwyn cofnodi newidiadau i'r dyluniad / cynllun cymeradwy ar gam cynllunio Materion a Gadwyd yn Ôl. Rhoddwyd cymeradwyaeth ar 22 Mawrth 2023
- PL/03872 – NMA ddiwygio geiriad Amod 4. Cymeradwywyd yr hysbysiad o benderfyniad ar 11 Gorffennaf 2023
- PL/06255 - Cyflawnwyd amodau 3 a 5 ar 13 Gorffennaf 2023.

### Amodau cyn cychwyn Cam 1 wedi'u cyflawni:

| Cyflwr | Cwmpas                                                                                                         | Cyflawnwyd |
|--------|----------------------------------------------------------------------------------------------------------------|------------|
| 3      | Manyleb a samplau o'r deunyddiau i'w defnyddio wrth adeiladu arwynebau allanol y datblygiad                    | 13/07/2023 |
| 5      | Cymeradwyo cynllun sy'n nodi'r lleoliadau, yr uchder, y dyluniad, deunyddiau a math o driniaeth ffin i'w chodi | 13/07/2023 |
| 5      | Cynllun Ymchwilio Ysgrifenedig                                                                                 | 13/04/2022 |
| 6      | Ymchwiliadau safle                                                                                             | 07/10/2022 |
| 7      | Risgiau sy'n gysylltiedig â halogiad y safle                                                                   | 31/08/2023 |
| 12     | Gosod pyst a/neu unrhyw gynlluniau sylfaen eraill                                                              | 07/10/2022 |
| 21     | Cynllun Teithio a Strategaeth Arwyddion                                                                        | 31/08/2022 |
| 26     | Cynllun Rheoli Amgylcheddol Adeiladu                                                                           | 31/08/2022 |
| 27     | Clerc Gwaith Ecolegol                                                                                          | 13/04/2022 |
| 28     | System draenio dŵr wyneb                                                                                       | 31/08/2022 |
| 29     | Cynllun goleuadau allanol                                                                                      | 31/08/2022 |
| 30     | Arolwg dyfrgwn a llygod y dŵr ac arolygon adar sy'n gaeafu                                                     | 31/08/2022 |
| 31     | Cynllun Rheoli Ecolegol y Dirwedd                                                                              | 13/04/2022 |
| 32     | Cynllun clustogfa i amddiffyn/gwella Afon Dafen Newydd                                                         | 13/04/2022 |
| 34     | Cynllun Cyfyngiadau'r Dirwedd                                                                                  | 13/04/2022 |
| 36     | Cynllun Dylunio Tirwedd                                                                                        | 13/04/2022 |
| 38     | Cynnal a Rheoli'r Dirwedd                                                                                      | 13/04/2022 |
| 42     | Gorsaf Bwmpio Carthion Northumberland                                                                          | 31/08/2022 |

### 3. Unrhyw gynnydd yng ngwaith asesu'r safle sy'n ofynnol ar gyfer cyflwyno cais a/neu cyn y gall datblygiad ddechrau'n gyfreithlon.

3.1 Mae'r cais cynllunio amlinellol yn cynnwys arolygon, asesiadau ac adroddiadau, gan gynnwys Datganiad Effaith Amgylcheddol, Asesiad Canlyniadau Llifogydd ac Asesiad Trafnidiaeth. Mae'r dystiolaeth hon ar gael trwy Borth Cynllunio CSC (Cyf S/36948).

3.2 Dechreuodd y gwaith adeiladu Cam 1 ym mis Chwefror 2023.

3.3 O dan ddatblygiad Cam 1, mae amrywiaeth o welliannau ecolegol yn unol ag amodau cynllunio amlinellol, gan gynnwys ond heb fod yn gyfyngedig i glustogfa ecolegol 8m o amgylch y mentrau llynnoedd a chynefinoedd (gweler Cynllun Tirwedd Cam 1 atodol).

4. Unrhyw wybodaeth berthnasol am hyfywedd ariannol sy'n effeithio ar ddechrau'r datblygiad.

4.1 Amherthnasol. Gweler rhan 7 isod.

5. Unrhyw wybodaeth berthnasol am berchnogaeth safle a chyfyngiadau mynediad sy'n effeithio ar yr asesiad o'r safle neu ddechrau'r datblygiad.

#### Perchenogaeth

5.1 Mae'r rhydd-ddaliad o dir y datblygiad o dan berchnogaeth Cyd-fenter Arfordir Llanelli – partneriaeth rhwng Cyngor Sir Caerfyrddin a Llywodraeth Cymru.

#### Mynediad

5.2 Fel y nodir yn y prif gynllun tirwedd, bydd Parth 1 yn cynnwys llwybr cerdded/beicio o amgylch y llyn, maes parcio (yn cynnwys 313 o leoedd gyda dyraniadau ar gyfer darpariaeth hygyrch, gwefru cerbydau trydan a beiciau modur), llochesi beiciau pwrpasol ar gyfer defnydd y cyhoedd a staff/tenantiaid (2 yn darparu tua 160 o leoedd) ac safle bws, gyda llecyn troi ar gyfer cerbydau mwy (bysiau, cerbydau nwyddau).

5.3 Bydd symudiadau cerbydau yn cael eu cyfyngu yn bennaf i ymylon y safle, gan gynnal amgylchedd heb geir tuag at lan y llyn. Y brif fynedfa fydd o'r gylchfan bresennol ar y B4304, gan arwain ar faes parcio arhosiad byr ac yn darparu ar gyfer Parth 1 gan gynnwys mynediad i beiriannau tân o amgylch perimedr adeilad Parth 1. Bydd pwynt mynediad eilaidd i hwyluso camau olaf hefyd yn cael ei ymgorffori fel y nodwyd yn y cam cynllunio amlinellol.

5.4 Bydd llwybrau cerdded/beicio yn cael eu darparu o amgylch Llynnoedd Delta a fydd yn rhoi cyfleoedd hamdden ac amwynder gweledol. Bydd mynediad ffurfiol ac anffurfiol i ymyl y dŵr, ynghyd â seddi, yn cael ei ddarparu i annog symudiad ehangach o gwmpas y llyn.

#### Hygyrchedd

5.5 Mae'r safle wedi'i leoli tua 1 cilometr (llai na 15 munud ar droed) o Orsaf Reilffordd Llanelli. Mae nifer fach o wasanaethau bws lleol yn rhedeg drwy'r ardal gyfagos (Llwybr L1 yn cysylltu â Pharc Trostre, Parc Pemberton a'r orsaf fysiau ganolog.

5.6 Fel amod cynllunio, bydd llwybr bws sy'n gwasanaethu Cam 1 Pentre Awel a chamau'r dyfodol yn weithredol cyn cael ei feddiannu'n llesiannol.

5.7 Mae'r safle yn agos at nifer o lwybrau cerdded a beicio allweddol. Mae'r Llwybr Arfordir Cymru pellter hir yn mynd heibio yn syth i'r gorllewin o'r safle, gan ddarparu cysylltiad hamdden a theithio pwysig i aneddiadau ac atyniadau cyfagos ar hyd Parc Arfordir

y Mileniwm. Mae llwybrau clir i gerddwyr tuag at ganol y dref a chysylltiad uniongyrchol i'r gogledd i safle Ysgol Pen Rhos, er nid oes cyfleusterau cerdded neu feicio ar hyn o bryd, gan gyfyngu ar hygyrchedd.

5.8 Bydd Cam 1 yn ymuno â ac yn ymestyn Hawl Tramwy Cyhoeddus presennol ar y safle, gyda llwybr troed/beicio 4.5m o led i'w osod gan ddarparu cysylltiad pwysig o'r gorllewin i'r dwyrain. Yn ogystal, bydd croesfan sy'n cysylltu Pentre Awel â Pharc Arfordirol y Mileniwm yn alluogwr allweddol ac yn rhan o gylch gwaith Cam 1.

## 6. Unrhyw wybodaeth berthnasol am ddarparu'r seilwaith y bydd ei hangen i gefnogi / galluogi'r datblygiad.

6.1 Mae llythyr gan y Cyngor dyddiedig 22 Medi 2020, yn nodi 'Mae'r Datganiad Tir Cyffredin yn cynnig cyfle i ymgynghori'n gynnar ag ymgynghoreion statudol - yn bennaf Cyfoeth Naturiol Cymru (CNC) a Dŵr Cymru (DCWW). Rydym felly'n ystyried ymatebion Dŵr Cymru Welsh Water, CNC ac adran Priffyrdd a Thrafnidiaeth Sir Gaerfyrddin mewn perthynas â'r cais cynllunio sy'n dangos, yn ddarostyngedig i'r amodau a'r cytundebau a nodwyd, nad oes unrhyw wrthwynebiadau heb eu datrys.

### Dŵr Cymru

6.2 Mae perchnogaeth yr orsaf bwmpio bellach wedi'i throsglwyddo yn ôl i Dŵr Cymru drwy gwblhau cytundeb cyfreithiol a104 wedi'i lofnodi a'i selio.

6.3 Gwaith ffynnon wlyb (wet well) – mae hwn yn amod cynllunio. CSC i ddarparu capasiti dŵr budr 33m3 ychwanegol o fewn y rhwydwaith lleol.

6.4 Bydd y prosiect yn cael ei ddatblygu wrth ystyried y canllawiau a'r rhwymedigaethau fel y nodir yn y cam cynllunio amlinellol.

6.5 Derbyniwyd ymateb gan DCWW i S/36948 ar 5 Rhagfyr 2018 a chaiff ei ddyfynnu yn Atodiad 2 isod

,

### Cyfoeth Naturiol Cymru

6.6 *Mae'r caniatâd cynllunio amlinellol yn ei gwneud yn ofynnol i nifer o amodau cyn cychwyn yn ogystal â gofynion eraill gael eu hystyried yn y Materion a Gadwyd yn Ôl.*

6.7 *Derbyniwyd ymateb gan CNC i S/36498 ar 13 Mawrth 2019 ac mae wedi'i nodi yn Atodiad 2*

Adran Prifffyrdd a Thrafnidiaeth Sir Gaerfyrddin

6.8 Ymatebodd Adran Prifffyrdd a Thrafnidiaeth Sir Gaerfyrddin i S/36948 ar 27 Tachwedd 2018. Gellir dod o hyd i'r ymateb yn atodiad 2.

Effaith ar y Gymuned/y Gymraeg –

6.9 Nid ystyrir y bydd datblygiad y safle ar gyfer adeiladu tai yn cael unrhyw effaith andwyol sylweddol ar y Gymraeg nac ar unrhyw gymunedau lleol.

Archaeoleg -

6.10 Mae amod ar y caniatâd amlinellol yn nodi ei bod yn ofynnol i Gynllun Ymchwilio Ysgrifenedig gael ei gyflwyno i'w gymeradwyo gan yr awdurdod cynllunio lleol.

7. Bwriadau cyflawni'r tirlfeddiannwr, pryd y disgwylir dechrau adeiladu a'r cyfraddau adeiladu disgwyliedig:

7.1 Yn seiliedig ar y cynnydd a wnaed hyd yma, gellir cadarnhau y caiff y safle ei ddatblygu o fewn yr amserlenni a nodir isod.

#### Cam 1

- Ar ôl cymeradwyo Achos Busnes Bargen Ddinesig Bae Abertawe ym mis Mawrth 2021, cynhaliodd y Cyngor ymarfer tendro drwy Fframwaith Contractwyr Rhanbarthol De-orllewin Cymru (SWWRFCF) yn haf 2021 i gaffael contractwr ar gyfer Cam 1
- Penodwyd Bouygues UK (BYUK) yn brif contractwr ym mis Hydref 2021 ar drefniant 'dylunio ac adeiladu' dau gam ac ymrwymodd i Gytundeb Gwasanaethau Cyn Adeiladu 15 mis ('cyfnod PCSA') i ddatblygu'r dyluniad manwl, bwrw ymlaen â'r swyddogaeth gynllunio (Cais Materion a Gadwyd yn Ôl, amodau cyn cychwyn) a gwneud gwaith paratoi ar y safle
- Dyddiadau allweddol:
  - Dechrau'r gwaith adeiladu – **Chwefror 2023**
  - Cwblhau Cam 1 - **Hydref 2024**.
  - Cwblhau oddeutu 480m2 o gyfleusterau addysg fesul cam - **Medi 2024**
  - Gwaith i'r lifddor – **Hydref 2024**

#### Cam 2

- Mae gwaith wedi dechrau o ddifrif i archwilio'r galw am, a chwmpas, y cyfleusterau byw â chymorth ym Mharth 2. Bydd hyn yn cael ei ategu gan asesiad o anghenion y boblogaeth leol i lywio'r math a'r cwantwm o ddatblygiad, yn unol â'r paramedrau a'r dosbarthiadau defnydd a nodir yn y cais cynllunio amlinellol.

#### Camau 3 a 4

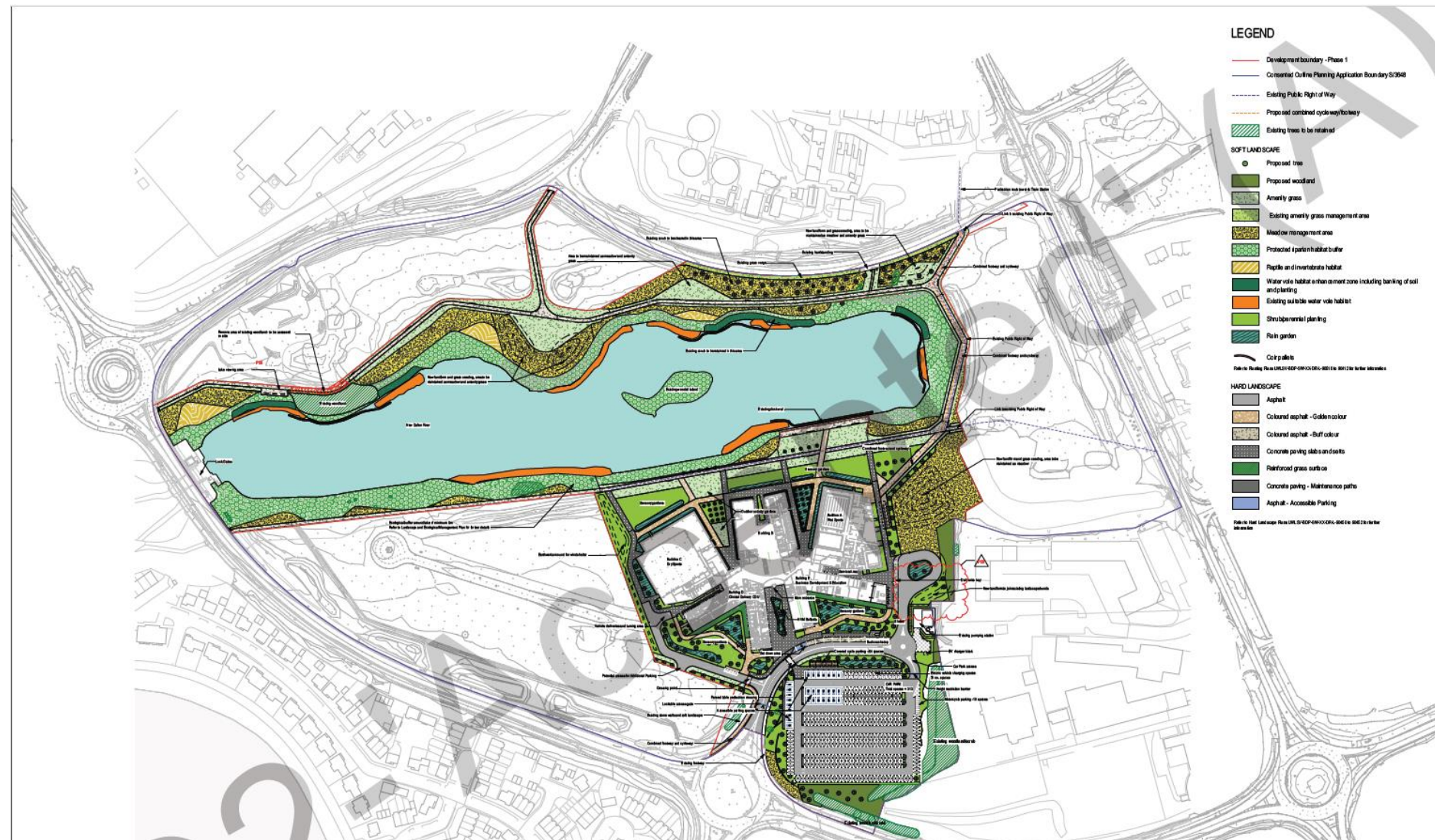
- Mae tîm amlddisgyblaethol wedi'i benodi i ddatblygu dyluniad y cysyniad ar gyfer Parth 3, gan sicrhau dull cydgysylltiedig o gynllunio gofodol ar gyfer y llety byw â chymorth (cam 3) a'r ganolfan ehangu busnes (cam 4), o ystyried eu cyfagosrwydd.

**Ariannu:**

- Mae cyllid ar gyfer ariannu cam 1 wedi'i sicrhau ac yn cael ei wario ar gyfer cyflawni.
- Mae'r holl lwybrau cyllido ar gyfer cyfnodau yn y dyfodol yn cael eu hasesu.

7.2 Gellir darparu diweddariadau pellach wrth i'r gwaith o gyflawni'r safle fynd rhagddynt.

# Cynllun Tirwedd Parth 1 Pentre Awel



## Pentre Awel – Strategaeth Parthau / Fesul Cyfnod Dangosol



LLANELLI - SIR GÂR - CYMRU

# Pentre Awel

LLANELLI - CARMARTHENSHIRE - WALES

### Zone 1

- Research led business development
- Clinical Delivery and Research Centre
- Education & Training

### Leisure

- 8x 25m lane swimming pool, learner pool
- Sports Hall
- Gym
- Dance, Spin and multi-purpose Studios
- Hydrotherapy Pool

### Zone 3

#### Assisted Living

- Individual apartments/houses for sale/rent

#### Business Expansion

- Expansion business space for spin-out activities



### Zone 2

#### Housing

- c. 35 units of social and affordable housing

#### Assisted Living

- Nursing Home (100 beds)
- Residential Rehabilitation (30 beds)
- Extra care facility (90 beds)

### Zone 4

#### Hotel

- Up to 140 bed hotel

#### Housing

- Open market housing

Darparwyd gan  
Delivered by

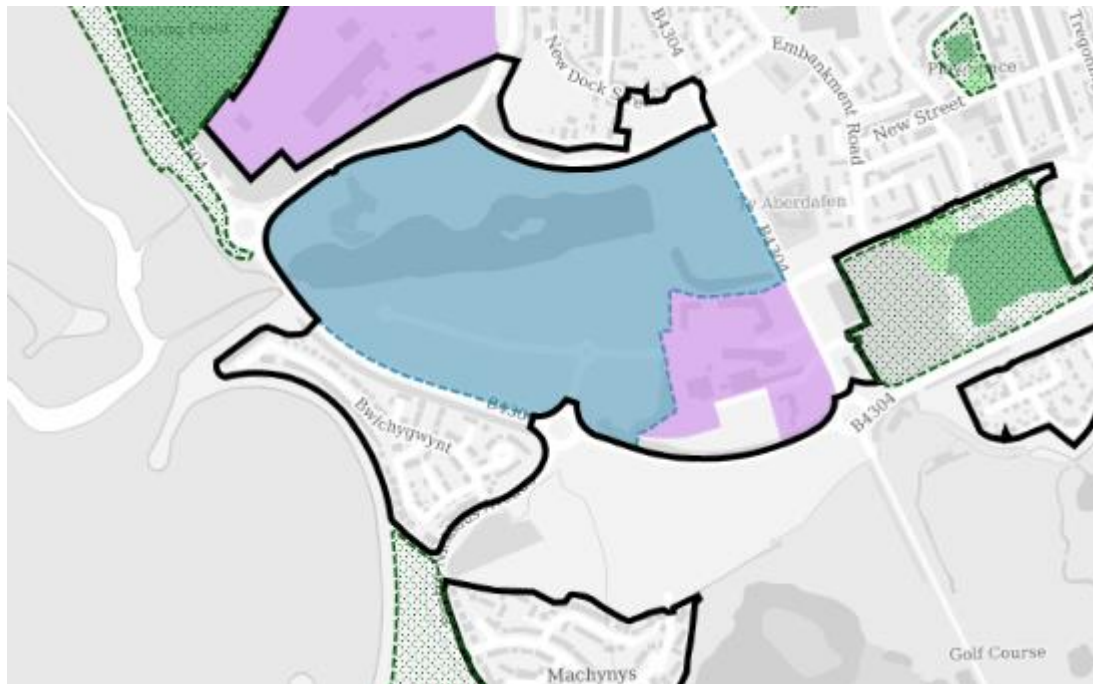


## 8. Asesiad Cyflawni

8.1 Yn seiliedig ar y wybodaeth uchod, ystyrir bod tystiolaeth glir yn nodi y bydd modd cyflawni gwaith y safle o fewn yr amserlenni a nodir yn Nhafliwybr Tai'r Cynllun Adneuo.

8.2 Mae dyraniad y safle yn y Cynllun Datblygu Lleol at ddibenion preswyl wedi cael ei ystyried yn llawn trwy'r fethodoleg asesu safleoedd. Fel rhan o'r broses asesu hon, paratowyd ffurflen safle fanwl. Ystyrir bod polisiâu a chynigion y Cynllun Datblygu Lleol yn gadarn ac yn gyflawnadwy, eu bod yn deillio o sylfaen dystiolaeth gadarn a'u bod wedi'u llunio gan ystyried yr Arfarniad o Gynaliadwyedd mewn ffordd sy'n gyson ag ef. Mae'r dyraniad, a nodwyd yn y Cynllun Datblygu Lleol, yn gwneud darpariaeth ddigonol ar gyfer rhan o anghenion tai yr anheddiad hwn.

## Cynllun Lleoliad y salfe dyrannu PrC2/SS1



## Atodiad 2 - Ymateb Cyfoeth Naturiol Cymru, DCWW a Trafnidiaeth a Phrifyrdd





**Cyfoeth  
Naturiol  
Cymru  
Natural  
Resources  
Wales**

**Ein cyf/Our ref: CAS-186749-H2G0**  
**Eich cyf/Your ref: PL/03877/PL/03872**  
Maes Newydd  
Llandarcy  
Neath Port Talbot  
SA10 6JQ

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Mr Robert Davies  
Carmarthenshire County Council  
Planning Services  
Civic Offices  
Crescent Road  
Llandeilo  
SA19 6HW

**Dyddiad/Date:** 12<sup>th</sup> May 2022

Annwyl / Dear Mr Davies

**BWRIAD / PROPOSAL:**

**PL/03877 - Discharge of Conditions 5 (Written Scheme of Investigation), 27 (Ecological Clerk of Works), 31 (Landscape Environmental Management Plan), 32 (Buffer Zone Scheme), 34 (Landscape Constraints Plan), 36 (Landscape Design Scheme) and 38 (Landscape Maintenance and Management) of S/36948 (Wellness and Life Science Development relating to Phase 1 only of the Outline planning permission S/36948**

**PL/03872 - Approval of Reserved Matters is sought for access, appearance, landscaping, layout and scale for Phase 1 of the Llanelli Wellness and Science Development, now known as Pentre Awel for the development of a Health and Wellness Hub including health, leisure, education, research and business facilities and an energy centre, along with associated public realm, open space, hard and soft landscaping, drainage, pedestrian and cycle links and parking, car parking and supporting infrastructure including mitigation and enhancement measures around the proposed Health and Wellness Hub and the perimeter of the New Dafen River, Delta Lakes.**

**LLEOLIAD / LOCATION:** Delta Lakes, Llanelli.

Thank you for consulting Cyfoeth Naturiol Cymru/Natural Resources Wales on the above applications, which we received in full on 26<sup>th</sup> April 2022.

**We have concerns with the application PL/03877 as submitted. We do not recommend your Authority discharges conditions 31, 32 or 36 in relation to Phase 1 of the outline planning permission S/36948 for the reasons outlined below.**

**We have no objection to the discharge of condition 38.**

**We have no comments to make on the discharge of condition's 5 (Written Scheme of Investigation), 27 (Ecological Clerk of Works) and 34 (Landscape Constraints Plan).**

**We have no detailed comments to make on the reserved matters application.**

**PL/03877 Discharge of conditions of S/36948 relating to Phase 1 only of the Outline Planning permission S/36948.**

**Condition 31 Landscape and Ecology Management Plan (LEMP)**

We have reviewed the 'Pentre Awel, Llanelli – Phase 1. Landscape and Ecology Management Plan (P04)' by Dalcour Maclaren dated March 2021.

We advise that the LEMP is amended to:

- i. Confirm that it covers the site in perpetuity, and includes a commitment to submit a written report of the effectiveness of the plan to the Local Planning Authority (LPA) every 5 years with any arising revisions of the plan to be agreed in writing with the LPA prior to implementation;
- ii. Include details of the desired conditions of otter and water vole habitats (present and to be created) at the site, using attributes with measurable targets which define favourable condition of those habitats and will form the basis of post-construction monitoring (e.g. sward/vegetation height and structure, species composition, extent of scrub, absence of Invasive Non-Native Species etc);
- iii. Specify that the monitoring of otter and water vole habitat will be in respect of assessing its suitability for the species and not just as a Phase 1 habitat survey; and
- iv. Includes provision to submit the results of habitat and species monitoring to the Local Records Centre as well as the LPA.

Until these points are addressed there is not enough information in the LEMP to ensure the protection of otter and water vole habitat and discharge the condition for phase 1.

**Condition 32 Buffer scheme to watercourses/lake etc**

We note the recommendation in the report entitled 'Environmental Statement compliance additional surveys' (Dalcour Maclaren, March 2022), that construction works should avoid the habitats surrounding the lake and should be securely fenced leaving a buffer of up to 10 metres from the lake to prevent vehicle movements or materials storage taking place beyond the construction area.

We also note that drawing LWLSV-BDP-SW-XX-DR-L-90102 (P06) produced by BDP (14 January 2022) illustrates the proposed habitat protection zone and temporary protection fencing around the lake. Unfortunately, with the block colouring obscuring the lake edge and without the inclusion of the areas of habitat mapped as suitable for otters and water voles (as shown on Figure 2 of the report 'Ecological Statement compliance additional surveys'), it is difficult to assess the adequacy of the proposed buffer.

Drawing LWLSV-BDP-SW-XX-DR-L-90102 (P06) needs to be revised to show the lake edge and the areas of habitat mapped as suitable for otters and water voles.

There is insufficient information submitted to ensure the buffer scheme is sufficient. The condition cannot be discharged until it is demonstrated that the minimum 10 metre separation between the lake edge and temporary construction fencing can be achieved and will encompass all areas/habitat identified as suitable for otters and water voles.

## Condition 36 Landscape Design Scheme

### • Water vole

The landscaping masterplan and landscape general arrangement plans noted below, propose a number of areas around the lake margins for water vole enhancements. These are shown on these drawings as broad areas fringing the lake. However some of the areas identified for water vole enhancement appear to encompass areas already identified to be of moderate potential for water voles as identified on Figure 2 of the report entitled 'Environmental Statement compliance additional surveys'. Additionally, the planting plans indicate narrow bands of new planting with an unspecified planting mix along the shoreline/lake banks.

- Drawing LWLSV-BDP-SW-XX-DR-L-90001 (P09) 'Pentre Awel-Phase 1. Landscape Masterplan' by BDP dated 6/1/22;
- Drawing LWLSV-BDP-SW-XX-DR-L-90010 (P06) 'Pentre Awel-Phase 1. Landscape General Arrangement Plan 1 of 3' by BDP dated 14/1/22;
- Drawing LWLSV-BDP-SW-XX-DR-L-90011 (P05) 'Pentre Awel-Phase 1. Landscape General Arrangement Plan 2 of 3' by BDP dated 14/1/22;
- Drawing LWLSV-BDP-SW-XX-DR-L-90012 (P05) 'Pentre Awel-Phase 1. Landscape General Arrangement Plan 3 of 3' by BDP dated 14/1/22.

There is insufficient information, in relation to the areas proposed to be enhanced for water voles, to discharge the condition. The following information is required to support the submission:

- i. A detailed description of the habitat in those areas identified as of moderate suitability for water voles (Figure 2 of the report entitled 'Environmental Statement compliance additional surveys') and an explanation of why additional planting is an appropriate measure to enhance the habitat in these areas for water voles;
- ii. With reference to the remainder of the areas proposed to be enhanced for water voles (identified on landscape masterplan and landscape general arrangement plans), a detailed description of the habitats currently present and their suitability for the water voles, together with clarification of whether additional planting is the only measure recommended to enhance the habitat for the species or whether additional measures would also be appropriate and, if so, details of what those would be;
- iii. Clarification of the specification of the water vole planting mix proposed to be used as indicated on:
  - Drawing LWLSV-BDP-SW-XX-DR-L-90501 (P05) 'Pentre Awel-Phase 1. Planting Plan 1 of 3' by BDP dated 23/1/22;
  - Drawing LWLSV-BDP-SW-XX-DR-L-90502 (P03) 'Pentre Awel-Phase 1. Planting Plan 2 of 3' by BDP dated 31/1/22;
  - Drawing LWLSV-BDP-SW-XX-DR-L-90503 (P03) 'Pentre Awel-Phase 1. Planting Plan 3 of 3' by BDP dated 31/1/22.

In light of the above information if it appears that additional planting is not appropriate at least for those areas identified as already of moderate suitability for water voles, revised planting plans will be required to amend the extent of proposed water vole planting.

- **Visual**

Whereas the proposals are generally acceptable and should help to integrate the built elements with the surroundings, when viewed from the Gower Area of Outstanding Natural Beauty (AONB), we do advise:

- The proposals for the existing woodland involve monitoring of the habitat, with minimal management e.g. removal of scrub and trees as required. There is likely to be some management required to maintain the woodland and trees as a landscape feature, e.g. thinning, re-stocking, coppicing.
- Areas marked as 'proposed woodland' on the Masterplan are shown as woodland fringe shrubs on the detailed planting plans. *Hippophae rhamnoides* can become dominant and invasive and its planting should be reconsidered, similarly *Glechoma hederacea*. The tree planted areas comprise standard trees in grassland and we suggest that some areas of more natural woodland could be created on the site, with a mix of native trees and shrubs.

### **Condition 38 Landscape Maintenance and Management Responsibility Plan**

We note the submission of Drawing LWLSV-BDP-SW-XX-DR-L-90103 (P04) 'Pentre Awel-Phase 1. Landscape Maintenance and Management Responsibility Plan' (BDP, 14/1/2022) and the 2. Landscape Management Plan (LWLSV-BDP-SW-XX-RP-L-90001, P03, BDP March 2022), the ecology sections for which refer to the LEMP.

The areas of soft landscaping around the lake and fringing the built development will be the responsibility of Carmarthenshire County Council.

We are satisfied with the details submitted and have no objection to the discharge of this condition.

### **Protected species**

We note that there are a number of conditions on the outline consent which cover this aspect and the submissions include documents relevant to ones we have not yet been consulted on. We have reviewed this information and our comments can be found in annex 1. It would be helpful if future applications have documents clearly labelled with the condition/s to which they are relevant.

### **PL/03872 Reserved matters**

We understand our advice is sought for the reserved matters application for phase 1 of outline planning permission S/36948. Permission was granted with numerous conditions attached. We note that there are several conditions to be discharged under these reserved matters, some of which will be dealt with under the subsequent phasing of the scheme or as standalone conditions. We look forward to being consulted on these in due course.

We have no detailed comments to make on the reserved matters application recognising the matters of detail will need to be addressed through specific conditions. We continue to advocate that layout plans be informed by an up to date flood consequences assessment.

### **Other Matters**

Our comments above only relate specifically to matters included on our checklist, *Development Planning Advisory Service: Consultation Topics* (September 2018), which is published on our

[website](#). We have not considered potential effects on other matters and do not rule out the potential for the proposed development to affect other interests, including environmental interests of local importance.

We advise the applicant that, in addition to planning permission, it is their responsibility to ensure they secure all other permits/consents/licences relevant to their development. Please refer to our [website](#) for further details.

### **Advice to developer**

#### **Flood Risk Activity permit (FRAP)**

The evidence required to demonstrate compliance with planning policy will also be, at least partially, relevant to FRAP determination for some elements of the proposal. We may not be able to issue FRAPs, where required, for those elements of the proposed development that are reliant on an updated flood consequences assessment demonstrating compliance until the relevant detailed information is submitted.

If you have any queries on the above, please do not hesitate to contact us.

Yn ddifffuant / Yours sincerely

**Sharon Luke**

**Ymgynghorydd Cynllunio Datblygu Uwch / Senior Development Planning Advisor  
Cyfoeth Naturiol Cymru / Natural Resources Wales**

.

## **Annex 1 Protected Species**

We note that the site has been surveyed for bats, otters and water voles.

- **European Protected Species: Legislation and Policy**

Otters and all species of British bats are European Protected Species, legally protected under The Conservation of Habitats and Species Regulations 2017 (as amended). Legal protection relates to the animals themselves and the places they use to rest and breed.

Where a European Protected Species is present and development proposal is likely to contravene the legal protection they are afforded, the development may only proceed under licence issued by Natural Resources Wales, having satisfied the three requirements set out in the legislation. One of these requires that the development authorised will 'not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status (FCS) in their natural range'.

These requirements are translated into planning policy through Planning Policy Wales (PPW) February 2021, section 6.4.22 and 6.4.23, and Technical Advice Note (TAN) 5, Nature Conservation and Planning (September 2009). The planning authority should take them into account when considering development proposals where a European Protected Species is present.

- **Bats**

With reference to the stone wall to the south of the lake which was deemed to have suitable roosting opportunities for bats, we seek further information to clarify that no works will be required to this wall as part of the proposed development. If works to the wall will be required, then further surveys will be required as indicated by the report entitled 'Environmental Statement compliance additional surveys. Pentre Awel (Phase 1). (P01)' by Dalfour McLaren dated January 2022.

We note that the pumphouse building on the eastern end of the lake was considered to have low potential to support roosting bats in 2020, and accordingly was subject to one emergence survey on 7<sup>th</sup> September 2020. We note that no bats were recorded emerging from the building during the survey and that the building will be unaffected by the works.

We welcome the confirmation that none of the trees that will be affected by the development have the potential to support roosting bats.

- **Otters**

We note that the surveys for otters (and water voles) were undertaken on 15<sup>th</sup> and 29<sup>th</sup> September 2020, and we also note that a potential otter resting site was identified underneath an undercut section of the retaining wall/historic wharf on the southern edge of the lake.

The submitted information includes a recommendation that construction works should avoid the habitats surrounding the lake and should be securely fenced leaving a buffer of up to 10 metres from the lake to prevent vehicle movements or materials storage taking place beyond the construction area.

Drawing LWLSV-BDP-SW-XX-DR-L-90102 (P06) 'Pentre Awel-Phase 1. Habitat Protection Zone' by BDP dated 14/1/22 illustrates the proposed habitat protection zone and temporary protection fencing around the lake. However, as indicated above, the block colouring obscures the lake edge and the areas of habitat mapped as suitable for otters and water voles (as shown on Figure 2 of the report 'Ecological Statement Compliance Additional Surveys') are not shown. It is therefore difficult to assess the adequacy of the proposed buffer.

Therefore Drawing LWLSV-BDP-SW-XX-DR-L-90102 (P06) requires revision to show the lake edge and the areas of habitat mapped as suitable for otters (and water voles). The revised drawing should be sufficient to demonstrate that the minimum 10 metre separation between the lake edge and temporary construction fencing can be achieved and will encompass all areas/habitat identified as suitable for otters (and water voles).

- **Lighting**

We welcome that the lighting will largely be confined to the area of the proposed development, with some lighting proposed for the public path south and east of the lake. However in order to comment further on the lighting proposals we seek the following further information:

- i. Clarification of the device maintenance factor used to compile the isolux drawings;
- ii. A revised isolux drawing showing the light spill from the development overlaid a map showing the location and extent of otter and water vole habitat around the lake. The revised drawing to use a device maintenance factor of 1 if it hasn't already done so for (i) above;
- iii. Details of the controls that will be applied to the lighting to reduce the potential impacts of light spill on the movement of nocturnal species such as bats and otters. We advise that lighting around the lake is switched off for at least part of the night (e.g. midnight – 5am) with dimming applied during the remainder of the night.

- **Nationally Fully Protected Species**

### **Water Voles**

Water voles are fully protected under the Wildlife and Countryside Act 1981 (as amended). We note that a pre-application survey for water voles was undertaken at the same time as for otters. Whilst we note that no evidence of water voles was found, two visits are recommended - one in mid-April to end-June, and a second one at least two months later in the second half of the breeding season (June-Sept inclusive) in accordance with the published best practice survey methods set out in section 3.3.10 and Box 2 (Page12) of the Water Vole Mitigation Handbook (2016).

Our comments for water voles are as for otters and lighting above.

### **Cetti's Wabler**

Cetti's Wabler are listed under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). It is an offence to intentionally or recklessly to disturb any wild bird included in Schedule 1 while it is building a nest or is in, on or near a nest containing eggs or young, or disturb dependent young of such a bird. The recommendations made in relation to Cetti's Wabler do not adequately address these issues.

No vegetation clearance should be undertaken within the breeding season unless a survey for Cetti's warbler has been undertaken and all territories accurately mapped. Note that the breeding season should be considered March to September inclusive. For context we undertake a three visit survey (late March to early June), with at least three weeks between visits, to determine the territory locations of Cetti's Warbler at our Newport Wetlands Reserve. The recommendations need to be adjusted to take this requirement into consideration and how the results would inform vegetation clearance. Searches for Cetti's warbler nests will need to be undertaken by someone with the appropriate licence.

We also have concerns regarding the 2 metre buffer suggested in relation to non-Cetti's Warblers. Buffer distances should be ecologically appropriate i.e. provide sufficient protection and/or habitat for to allow nesting birds to complete their nesting cycle as successfully as possible.

In summary we consider that there is insufficient information to confirm the likely impacts of the proposals on bats, otters, water voles and Cetti's warbler and confirm that the proposals are unlikely to be detrimental to the maintenance of the favourable conservation status of the population(s) of species concerned. We would be pleased to review our position and provide further advice when consulted on the information specified above.



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**Ein cyf/Our ref:** CAS-78856-Q6PB

**Eich cyf/Your ref:** S/36948

**Dyddiad/Date:** 11 March 2019

Annwyl / Dear Mr Davies

**PROPOSAL: Llanelli Wellness and Life Science Village**  
**LOCATION: Delta lakes, Llanelli**

Thank you for consulting Cyfoeth Naturiol Cymru/National Resources Wales (NRW) on the additional information submitted in support of the application, which we received on 19 February 2019.

**We recommend that you should only grant planning permission if you attach the following condition on flood risk. This condition would address significant concerns that we have identified, and we would not object provided you attach it to the planning permission.**

**Flood Risk Condition:** The hydraulic model is to be updated to reflect the final design of the development and address the points raised in Natural Resources Wales' Model Review Report: Llanelli Wellness and Life Science Village 2019 Model Review Revision 1. The updated model and Flood Consequence's Assessment are to be submitted for written approval.

**Flood risk**

This reply is in response to Eden Vale Young's submission of the model - February 2019 (Version E). Our Model Review Report, dated 7 March 2019, is attached.

We are satisfied that the model gives a reasonable indication of the flood risk at the site and adjacent areas. Our Model Review Report highlights areas that should be improved and included when updated with the final design for the development. The final design for the development should be based on the results of the hydraulic model and associated Flood Consequence's Assessment (FCA).

Section 4 Conclusions and Recommendations of the Model Review Report summarises our findings and areas that should be addressed. In addition, the FCA must assess for the breach scenario the 0.1% (1 in 1000) probability of occurrence in any year, plus an allowance for climate change.



**Cyfoeth  
Naturiol  
Cymru  
Natural  
Resources  
Wales**

We trust the enclosed information will be helpful. Our comments above only relate specifically to matters that are included on our checklist Natural Resources Wales and Planning Consultations (September 2018) which is published on our website at this link <https://cdn.naturalresources.wales/media/686847/dpas-consultation-topics-august-2018-eng.pdf?mode=pad&rnd=131819256840000000>.

We have not considered potential effects on other matters and do not rule out the potential for the proposed development to affect other interests, including environmental interests of local importance. The applicant should be advised that, in addition to planning permission, it is their responsibility to ensure that they secure all other permits/consents relevant to their development.

Yn ddiffuant / Yours sincerely

**Miss Sharon Luke**

**Ymgynghorydd Cynllunio Datblygu Uwch / Senior Development Planning Advisor**



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**Eich cyf/Your ref:** S/36948

**Dyddiad/Date:** 9 January 2019

Mr Robert Davies  
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SA19 6HW

Annwyl / Dear Mr Davies

**PROPOSAL: Llanelli Wellness and Life Science Village**  
**LOCATION: Delta lakes, Llanelli**

Thank you for consulting Cyfoeth Naturiol Cymru/National Resources Wales (NRW) on the additional information submitted in support of the application, which we received on December 20<sup>th</sup> and January 8<sup>th</sup> and 9<sup>th</sup>.

**We have significant concerns with the proposed development as submitted. We recommend that you should only grant planning permission if the scheme can meet the following requirement and you attach the conditions noted on the appropriate assessment. Otherwise, we would object to this planning application**

We acknowledge that this application is to be taken to committee tomorrow with a resolution to approve subject to the outstanding matters raised by NRW being addressed. Our understanding is that the case will be referred back to the committee should these issues not be resolved.

**Flood Risk Requirement:** Update the hydraulic model to address the points raised in the attached technical review and submit an updated Flood Consequence Assessment based on the model results which shows compliance with Technical Advice Note (TAN) 15.

**Flood risk**

This reply is in response to Eden Vale Young's submission following receipt of our Llanelli Wellness and Life Science Village Model Review, Revision 1, dated 14 December 2018.

We have reviewed Eden Vale Young's response and we maintain that the model has several 'technical errors' which need addressing before we are satisfied it correctly informs the Flood Consequences Assessment. Revision 2 of our Model Review Report, dated 8 January 2019, is attached.

Within Section 4 of the report we have summarised our recommendations which are colour coded. Those in red indicate the aspects where further work is essential to understand the flood risk.

We have also indicated in Section 5, the matters raised in Eden Vale Young's response that require work (again colour coded) as they are deemed to have an impact to the model results and therefore the FCA's conclusions.

Once the points raised in the technical review have been addressed, we would be happy to review the hydraulic model again.

### **Habitat Regulation Assessment**

We have reviewed the amended Appropriate Assessment (Revision 2) received on 9 January 2019.

**We are satisfied with the conclusion of the appropriate assessment in line with The Conservation of Habitats and Species Regulations 2017. NRW concurs that with the inclusion of the conditions proposed the development will have no adverse impact on the integrity of the European Sites.**

The conditions proposed within the appropriate assessment cover above and beyond that which is required to ensure no adverse effect on the European Protected Sites. We acknowledge this is because they also address your wider responsibilities under the Environment (Wales) Act 2016. An example being Condition 13's reference to water voles. As such all our concerns except for flood risk have also been addressed all be it via condition.

We are satisfied that the Appropriate Assessment is linked to a phasing plan for the development.

Your Authority have made the decision that it is appropriate to condition all unresolved aspects/issues raised by NRW during the consultation period except for flood risk. The decision on whether it is appropriate to cover the issues we have identified in that manner is for your Authority and our response is reflective of this approach. We acknowledge that TAN 5 refers to using this approach on appropriate assessments.

We trust the enclosed information will be helpful. Our comments above only relate specifically to matters that are included on our checklist Natural Resources Wales and Planning Consultations (September 2018) which is published on our website at this link <https://cdn.naturalresources.wales/media/686847/dpas-consultation-topics-august-2018-eng.pdf?mode=pad&rnd=131819256840000000>.



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We have not considered potential effects on other matters and do not rule out the potential for the proposed development to affect other interests, including environmental interests of local importance. The applicant should be advised that, in addition to planning permission, it is their responsibility to ensure that they secure all other permits/consents relevant to their development.

Yn ddiffuant / Yours sincerely

**Miss Sharon Luke**

**Ymgynghorydd Cynllunio Datblygu Uwch / Senior Development Planning Advisor**



**Cyfoeth  
Naturiol**  
Cymru  
**Natural  
Resources**  
Wales

# Llanelli Wellness and Life Science Village Model Review

Filippo Scimone

Rev No 2

| Revision | Prepared By     | Changes                                                              | Checked By      | Approved      | Date       |
|----------|-----------------|----------------------------------------------------------------------|-----------------|---------------|------------|
| 0.9      | Filippo Scimone | Frist Draft                                                          | Daniel Jones    |               | 13/12/2018 |
| 1.0      | Filippo Scimone | Final                                                                | Anna Minchinton | Richard Wicks | 14/12/2018 |
| 2.0      | Filippo Scimone | Final with Appendix added with Consultants comments and NRW response | Anna Minchinton | Richard Wicks | 08/01/2019 |

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# 1 Delta Lakes Baseline Model Review Background

Carmarthenshire County Council (CCC) commissioned Ove Arup & Partners Ltd. (Arup) to prepare a planning application and supporting technical assessments for the proposed development which includes a Flood Consequence Assessment (FCA). This is to aid CCC in promoting the development of Delta Lakes (the site) for the proposed Llanelli Wellness and Life Science Village (LWLV). The site lies to the south of Llanelli town centre and was an old industrial area of Llanelli.

The proposal is for mixed development which includes a life science business centre, wellness hub, assisted living, associated outdoor recreation area, access and parking. It has landscaping for leisure and therapy spaces and includes energy and utilities infrastructure.

Eden Vale Young Associates (EVY) were employed to carry out the flood modelling on behalf of Arup to assess the flood risk to and from the development and aid in the production of the FCA written in accordance with Planning Policy Wales and Technical Advice Note (TAN) 15: Development and Flood Risk. Following the original submission to Natural Resources Wales (NRW) in February 2018 and the review conclusions, EVY have undertaken improvements to the model.

## 2 Model Review

This review only covers this iteration of the model with reference to the previous FCA model provided in February 2018 in support of this planning application, however it does not review any previous updates or decisions made to predecessor models. The review covers the following: 1D Domain data, 2D Domain data, Model Stability and Control Files but does not cover the hydrology used in the model, the Manning's values used for the 1D channel or model results. It also only reviews the data from the baseline 1.0% annual exceedance probability and from this concludes if the model is fit for informing the FCA and mitigation options.

***Since version 1 of the report we have now included EVY response to the report and have added NRW comments in section "5 Appendix Consultants Response following NRW Review with NRW response comments".***

### 2.1 General / Data Management

The model is based on a model licenced for use by Natural Resources Wales (NRW), which was originally constructed in 2009 by NRW's predecessor body Environment Agency Wales (EAW) in partnership with CCC. This model was further developed for tidal simulations by EAW.

This model is a cut down version of the licenced model and the limits of the model boundary was agreed with NRW following the initial model review.

#### 2.1.1 Review of Method used to supply Data

The TUFLOW model was supplied to NRW via "NRW Citrix Sharefile" portal. Once the data was supplied NRW, noted that not all the data was included, and a further request was made for the missing data.

An additional 26 compressed files were upload to NRW portal. This compressed data had no reference to which folder the files should be saved into. A further request was made for the data to be supplied with the compressed files having folder paths associated with each compressed file and to provide the data in larger chunks using split function within compression software. Following this request, an email from EVY explained the folder structure that was used, the data was then saved into the folders based on this information supplied.

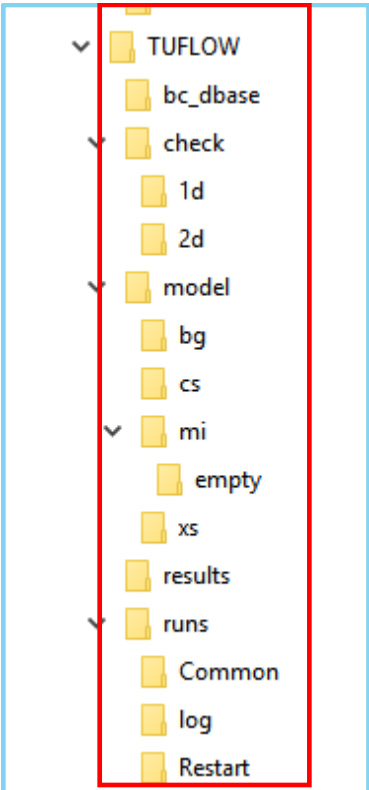
The use of “Split” data with compression software (like WinZip, 7-zip, etc.) improves the efficiency of uncompressing the data and files being saved into the correct folder. The approach has previously been used very successfully with other consultants.

The delay in receiving the data has introduced a seven-day delay in starting the model review, also it has taken a day to ensure the data was transferred into the correct folders as per instruction from EVY.

### 2.1.2 Structure Supplied

NRW expects that TUFLOW model follows the recommended structure as described in the TUFLOW Manual, as this aids the speed of the model review. Table 1 gives the recommended structure with brief description for each folder based on the advice within the TUFLOW manual.

Table 1 TUFLOW Model folder structure

|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>TUFLOW model parent folder, maybe project name.</b></p> <p>Flow and Tidal boundary condition files.</p> <p>Check folders where model auto check files are created.</p> <p>Example of subfolders that maybe used in check folder.</p> <p>Here sits all the GIS data required for the model construction.</p> <p>Bridge data – sit here.</p> <p>Weirs and irregular structures sit here.</p> <p>River network, 2D topology changes etc sit here, and control files. “mi” maybe replaced with “GIS”.</p> <p>Empty folder containing example GIS files.</p> <p>GIS layers containing cross-section locations.</p> <p>Results folder containing all results files.</p> <p>Folder containing all simulation control files.</p> <p>Common control file instructions optional.</p> <p>Log files for all simulation runs.</p> <p>Initial condition (warm start up) start files optional – if used.</p> |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

NRW notes that the structure used by EVY follows closely the above, although it appears not to have a “log” subfolder. Table 2 shows the structure adopted by EVY (information supplied by EVY), which clearly shows that there is no “log” folder.

The exclusion of “log” folder and the fact that the supplied data did not automatically extract to the correct folder may have created misinterpretation where files should be sitting.

Likewise, not having been provided with a technical hydraulic Model User Report (MUR) leads to NRW having to best guess what and where the data sits. The reviewer also has no information on any of the modeller’s assumptions and decisions, which may lead to delays or challenges to the model construction.

### 2.1.3 Error message/Missing files on opening GIS projects

TUFLOW provides several GIS project outputs to open in various GIS software and data to support and aid the model build and Quality Assurance (QA) process of a model.

Table 2 EVY folder structure

|           |
|-----------|
| BCs       |
| Checks    |
| > Model   |
| ▼ Results |
| ▼ Raw     |
| grids     |
| ▼ plot    |
| csv       |
| gis       |
| Runs      |

From the data supplied we note that the following GIS project files have been automatically created for this project:

Aquaveo SMS (SMS) “xmdf sup” project files.

Aquaveo SMS (SMS) “dat sup” project files.

QGIS project as model is a based on “shp” GIS files.

MapInfo Professional Workspace project files (No data as no MapInfo GIS layers used).

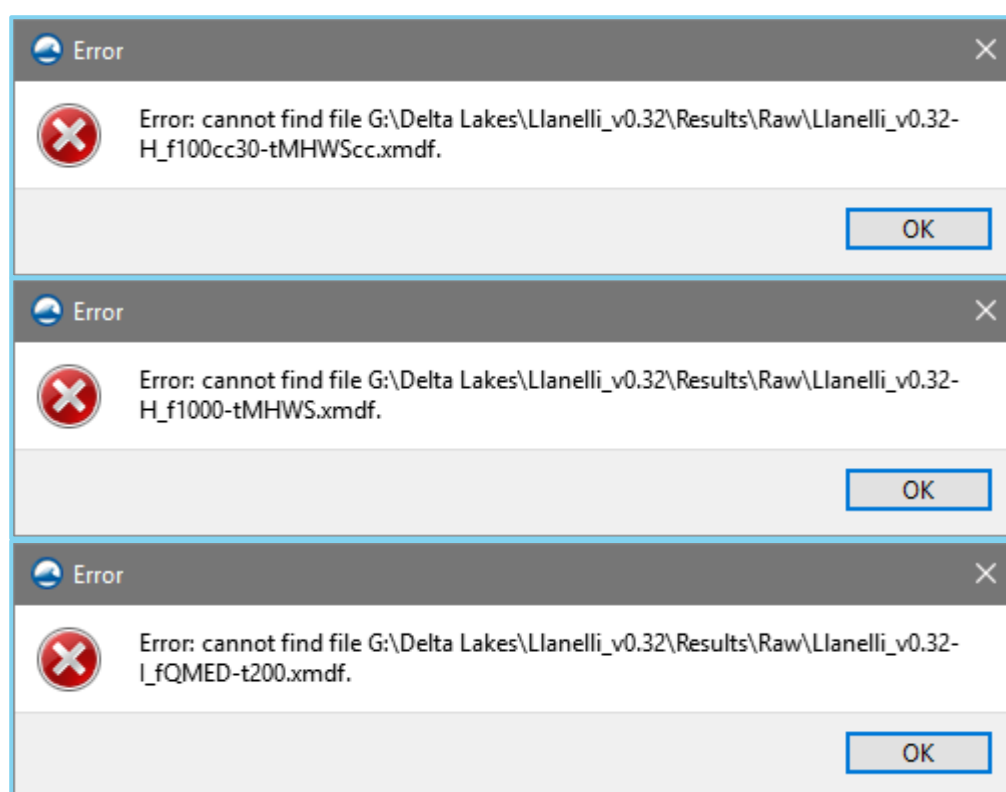


Figure 1 xmdf project not opening correctly

The SMS project files hold the model temporal data from each simulation including the final topology created within the model. It is provided to aid model QA and to examine the performance of the output from the model. The best format is “xmdf” as it creates only one file with all the data within and may be easily compressed by TUFLOW on the fly during the model run.

On opening “\*.xmdf.sup” projects in SMS, the project fails to open completely, due to missing data, Figure 1 below, shows some examples of the error messages.

On opening “\*.ALL.sup” project file, the SMS project did not fully open due to missing data, Figure 2 below, shows some examples of the data missing:

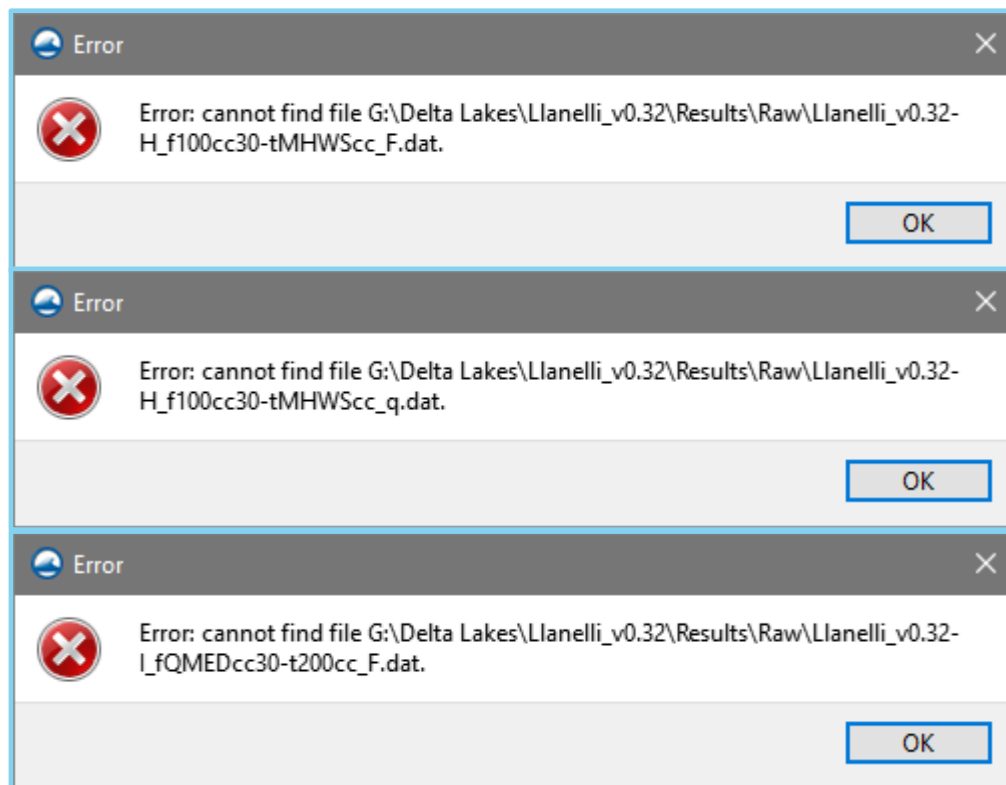


Figure 2 DAT project not opening correctly

When opening a QGIS project once again this does not fully open due to missing data, this happens as the data under “..\Results\Raw\plot\gis” is not full populated. An example of error reported by QGIS is shown in Figure 3 below.

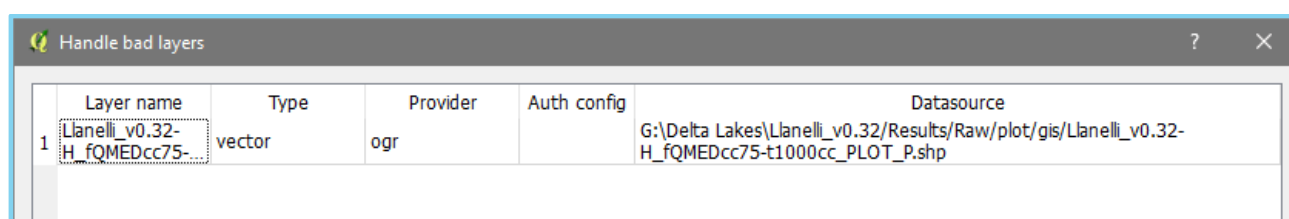


Figure 3 Missing GIS results data

On reviewing contents of the folder, we note that only one simulation scenario data has been supplied i.e. Llanelli\_v0.32-H\_f100-tMHWS.

As the review has progressed, we noted other missing data. The list below indicates some of the missing data, however, this may not cover the full extent of the data missing:

- \*.eof files missing.
- \*TS\*, \*TSF\* etc missing.

## 2.2 Hydrology /Tide Review

NRW has undertaken a review of the data supplied and NRW hydrologist reports concludes that: “The 1.0% and 0.1% AEP flows for the Lliedi, Cille and Dafen are suitable for Modelling”.

The peak tide level is lower than we expect, it appears that the prism effect of the estuary has not been accounted for. This will require a review and clarification provided.

## 2.3 Modelling Software

The model is constructed using TUFLOW 1D/2D software, version 2018-03-AB, which is the current version available at time of writing and model runs.

It is run in TUFLOW “HPC” mode using GPU hardware, which is acceptable for this commission.

## 2.4 Model Control Files

There are four set of control files which cover baseline, proposed and breach scenarios. These are described in Table 1 below, which was provided by the consultant.

Table 3 Information on scenarios runs

| Letter/Code | Description               | Notes       |
|-------------|---------------------------|-------------|
| H           | Baseline Scenario         |             |
| I           | Post Development Scenario |             |
| HX          | Baseline Scenario         | With Breach |
| IX          | Post Development Scenario | With Breach |

We note that no batch files have been supplied which controls the scenario runs.

### 2.4.1.1 \*.ecf Control Files

These files have the commands/instructions that only apply to the 1d domain (river network) of the model. We note that all four files are identical hence we would recommend that the 1d commands are placed within the \*.tcf file using the “Start 1D Domain” and “End 1D Domain” this will help reduce the number of control files created, as the 1d domain is not complex. Reducing the number of control files will help reduce the likelihood of errors being introduced.

These files appear to have the commands applied correctly.

### 2.4.1.2 \*.tcf Control Files

There are four files, the only difference we note is that each one calls a different \*.tgc file. To further reduce the number of files the modeller should consider using “IF Else” statements as per example below (Figure 4), this will further reduce the number of control files.

```
If Scenario == X
! For Scenarios X
    Read GIS Z Shape == GIS layer for X
! For all other Scenarios
    Read GIS Z Shape == non-breach layer
End If
```

Figure 4 IF Else statement example

It is strongly recommended that for HPC models that the “dt” variable is added to the Map Output data types, see Table 4 below.

Table 4 Map Output data types

```
Map Output Data Types == d v q h E ZUK0 ZUK1 ZUK2 ZUK3 dt
```

It is recommended that at least ZUK0 and ZUK2 are also outputted to support the FCA's.

#### 2.4.1.3 \*.tgc Control Files

We note that there are four files and that the naming convention does not follow that as described in Table 1. The control files appear to be correctly constructed, although once again we suggest that the modeller considers using "IF Else" statements to reduce the number of control files, see example in Figure 4.

#### 2.4.1.4 \*.tbc Control Files

This appears correctly implemented.

#### 2.4.1.5 \*.tef Control File

This has the scenario flow/tide levels to be run and appears correctly implemented.

#### 2.4.1.6 \*.tmf Control file

Data appears reasonable, although NRW suggests that the 2D material Manning's values use the MasterMap® "Feature Code" e.g. "10172, 0.02 ! Roads, Tracks and Pavements". This will aid in the review or QA of the data by allowing data to be cross referenced with the original MasterMap® data.

## 2.5 Model Construction – Review of GIS Layers

### 2.5.1 GIS layer details

The following tables provide a list of the GIS data used within the model (excluding the LIDAR), Table 5 Table 5 1d GIS Layer List and Table 6 Table 6 2d GIS Layer List has the full list of layers used in all model scenarios, along with the reviewers comments.

Table 5 1d GIS Layer List

| GIS layer                   | Reviewer Comments                                                  |
|-----------------------------|--------------------------------------------------------------------|
| 1D_BC_CILLE_022_P           | Inflow hydrograph for the 1d Domain, single inflow for all rivers. |
| 1D_BC_DAFEN_022_P           |                                                                    |
| 1D_BC_LLIEDI_022_P          |                                                                    |
| 1D_BG_DAFEN_029_L           | 1d bridges defined a height/width (HW) or Station/Elevation (XZ)   |
| 1D_BG_IRREGULAR_CILLE_022_L |                                                                    |
| 1D_BG_LLIEDI_029_L          |                                                                    |
| 1D_IWL_DAFEN_029_P          | Initial water levels for the Lliedi an Dafen                       |
| 1D_IWL_LLIEDI_022_P         |                                                                    |
| 1D_NWK_CILLE_022_L          | River 1d river networks and manhole GIS layers                     |
| 1D_NWK_DAFEN_029_L          |                                                                    |
| 1D_NWK_DR_025_P             |                                                                    |
| 1D_NWK_LLIEDI_029_L         |                                                                    |
| 1d_nwk_NDUBridge-H_032_L    |                                                                    |
| 1D_NWK_Node_028_P           |                                                                    |
| 1D_WLL_CILLE_022_L          | 1D water level output lines                                        |
| 1D_WLL_DAFEN_022_L          |                                                                    |
| 1D_WLL_LLIEDI_022_L         |                                                                    |
| 1D_XS_CILLE_022_L           | River cross-section layers                                         |
| 1D_XS_DAFEN_029_L           |                                                                    |

| GIS layer          | Reviewer Comments |
|--------------------|-------------------|
| 1D_XS_LLIEDI_022_L |                   |

Table 6 2d GIS Layer List

| GIS layer                      | Reviewer Comments                                                                                                          |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 2D_BC_CODE_1D_023_R            | 1d deactivation code for river channel                                                                                     |
| 2d_bc_bridgeconn_032_L         | We note that 2D_BC_HQ_Trim_v0.26_L layer has no data within it. These layers provide linkage between the 1d and 2d domain. |
| 2D_BC_HQ_Trim_v0.26_L          |                                                                                                                            |
| 2D_BC_HX_CILLE_022_L           |                                                                                                                            |
| 2D_BC_HX_DAFEN_023             |                                                                                                                            |
| 2D_BC_HX_LLIEDI_022_L          |                                                                                                                            |
| 2D_BC_SX_Culv_028              |                                                                                                                            |
| 2d_bc_tidal_v0.02              | Tidal input boundary                                                                                                       |
| 2d_code_llanelli_v0.022_R      | Activates the cells with the model boundary whole                                                                          |
| 2D_IWL_LLIEDI_002_R            | 2d initial flood level                                                                                                     |
| 2d_loc_llanelli_L              | Set orientation of grid                                                                                                    |
| 2d_mat_llanelli_002-2018_R     | Manning's values using MasterMap® base data to apply values to the 2d domain.                                              |
| 2d_mat_llanelli_003-2018_R     |                                                                                                                            |
| 2d_mat_llanelli_004-2018_R     |                                                                                                                            |
| 2d_mat_llanelli_005-2018_R     |                                                                                                                            |
| 2d_mat_llanelli_006-2018_R     |                                                                                                                            |
| 2d_mat_llanelli_007-2018_R     |                                                                                                                            |
| 2d_mat_llanelli_008-2018_R     |                                                                                                                            |
| 2d_tidal_IWL_v0.02_R           | Initial tidal level                                                                                                        |
| 2D_ZA_PONDS_DAFEN_022_R        | Lower bed levels of ponds                                                                                                  |
| 2d_zln_Bynea_Defences_001_L    | Topography altering GIS layers                                                                                             |
| 2d_zln_Bynea_Defences_001_P    |                                                                                                                            |
| 2D_ZLN_CILLE_022_L             |                                                                                                                            |
| 2D_ZLN_CILLE_022_P             |                                                                                                                            |
| 2D_ZLN_DAFEN_002_P             |                                                                                                                            |
| 2D_ZLN_DAFEN_003_L             |                                                                                                                            |
| 2D_ZLN_LLIEDI_022_L            |                                                                                                                            |
| 2D_ZLN_LLIEDI_022_P            |                                                                                                                            |
| 2d_zln_Machynys_Defences_002_L |                                                                                                                            |
| 2d_zln_Machynys_Defences_002_P |                                                                                                                            |
| 2d_zreg_stubbybuildings_022_R  | Adding a 150 mm threshold to buildings                                                                                     |
| 2d_zsh_breach_v001_R           | Topography altering GIS layers, including breach layers                                                                    |
| 2d_zsh_Dafen_v0.22             |                                                                                                                            |

| GIS layer                   | Reviewer Comments |
|-----------------------------|-------------------|
| 2d_zsh_GroundBDY_v032_R     |                   |
| 2d_zsh_MachynysDev_v0.26_R  |                   |
| 2d_zsh_Platforms_v026-C_R   |                   |
| 2d_zsh_PostDev_cgem01_v30_R |                   |
| 2d_zsh_PostDev_cgem02_v30_R |                   |
| 2d_zsh_tidalsmooth_V0.27_P  |                   |
| 2d_zsh_tidalsmooth_v0.27_R  |                   |
| 2d_zsh_Topo_2017_P          |                   |
| 2d_zsh_Topo_2017_R          |                   |

### 2.5.2 Review of GIS Layers

This review is not a QA of the model as this is expected to be done by the consultants as part of their modelling process.

The following list are points the reviewer considers important which either need amendment or justified in the MUR.

On the Afon Dafen there are GIS features which lay outside the model boundary. These should be removed for tidiness although have no impact to the model.

Null GIS record or incorrect GIS Objects should be removed from the GIS layer where present, see \*.tif to identify the GIS layers that cause this issue.

The Afon Dafen has old survey data from 2008, we are unsure why this is the case it is recommended that the data be replaced by the 2018 where available.

Llandeilo Railway junction culvert details is different to what is present (see Figure 8, this diagram is from all the information available to the reviewer and has been collated into a schematic, to best understand the culvert network under the railway line, with dimensions added to represent the best estimated values). Although the modeller may have simplified the schematisation of the culverts, as there is no MUR to justify the culvert details the reviewer must assume that this is incorrect. Note the schematisation of this culvert network is considered important to the flood risk mechanism at this location, therefore, it is important to understand the assumptions the modeller has made at this location.

The sluice gates at the outlet of Delta Lakes do not agree with the latest 2018 survey data. The current configuration is likely to allow more tidal floodwater into the lake, than is possible. As there is no sluice gate it is likely for the higher flood risk tidal events that the lake does not store sufficient flood water and hence may underestimate the flood risk. We strongly recommend that the schematisation is reviewed using the latest survey information, see Figure 5.

Afon Cille outlet from the 2008 survey indicates two culverts and there appears to be only one in the model, this is unlikely to impact the results associated with the Afon Lliedi fluvial risk.

We note the new housing estate has been added into the model and it is assumed that the correct elevation value has been applied there is no other information available to the reviewer.

We note that the Afon Dafen outfall into the estuary has one culvert and the latest survey 2018 indicates that there are two. This is likely to increase the volume of floodwater stored upstream of these culverts and hence the results are likely to be conservative for flood risk at this location.

Structure Dafen\_S5 does not agree with the latest survey, Figure 6 gives the detail of the structure.

We note that several lengths in the 1d nwk layer have a value of -99,999. This value is a special value (data from MIKE 11 data) and must be set to 0 or length of the culvert.

We note that for layer 1D\_NWK\_Node\_028\_P one of the attribute type for Conn\_1D\_2D has been changed to "String", see Figure 7. It is unknown if this has an impact to the model attributes or why this GIS layer is present.

GIS Layer 2D\_BC\_HQ\_Trim\_v0.26\_L within the model is empty, hence has no impact in the model and we are unclear on the modeller intentions for this data.

We note that not all culverts under the railway line are modelled, this may impact on floodwater arriving south of the railway line.

We note that WLL are not provided for all 1d networks.

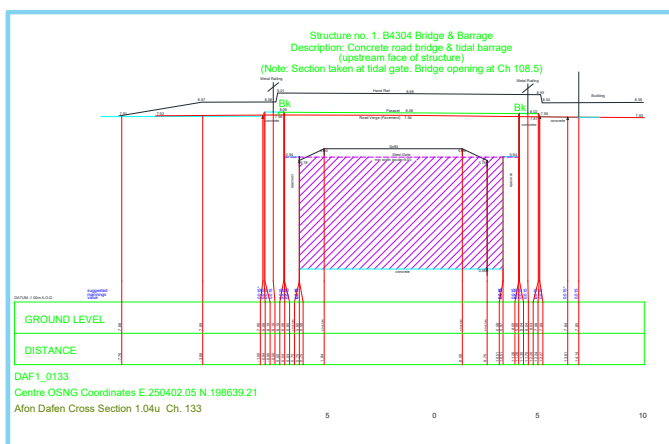


Figure 5 Sluice gate at Delta Lake outlet

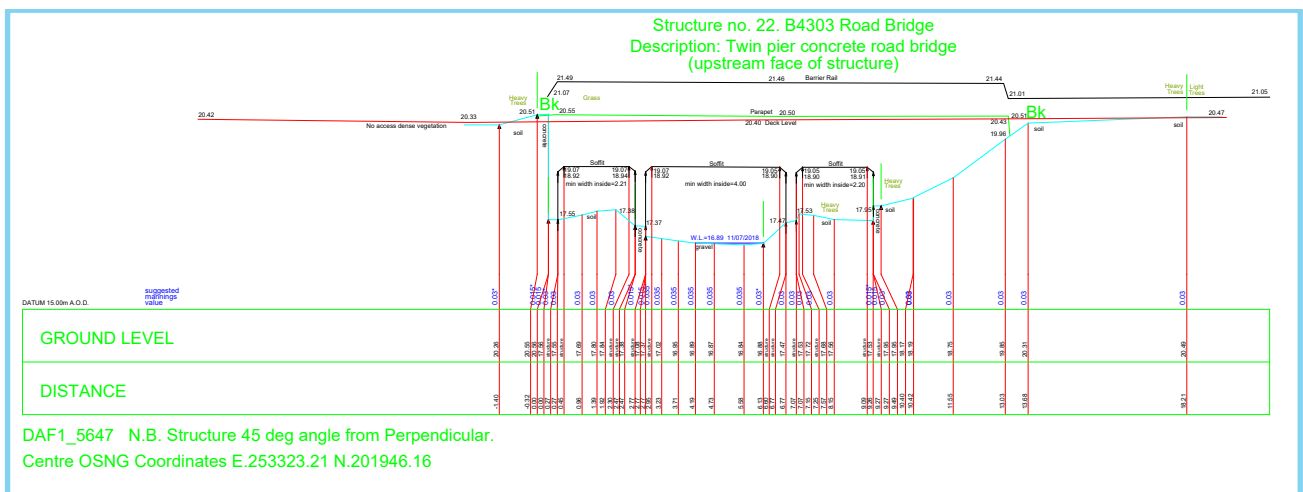


Figure 6 Latest survey (2018) for structure Dafen\_S5

| ID            | Type | Ignore | Bed_Level | ANA       | Conn_1D_2D | Conn_Width | R1      | R2      | R3      | L1d_layer | No_Channel | Pit_Connec |
|---------------|------|--------|-----------|-----------|------------|------------|---------|---------|---------|-----------|------------|------------|
| 1 LL-3.14.5.1 | Node | F      | 1.78000   | -10.00000 | ---        | 0.00000    | 0.00000 | 0.00000 | 0.00000 | 1         | 3          | N          |

Figure 7 Incorrect attribute type for Conn\_1D\_2D

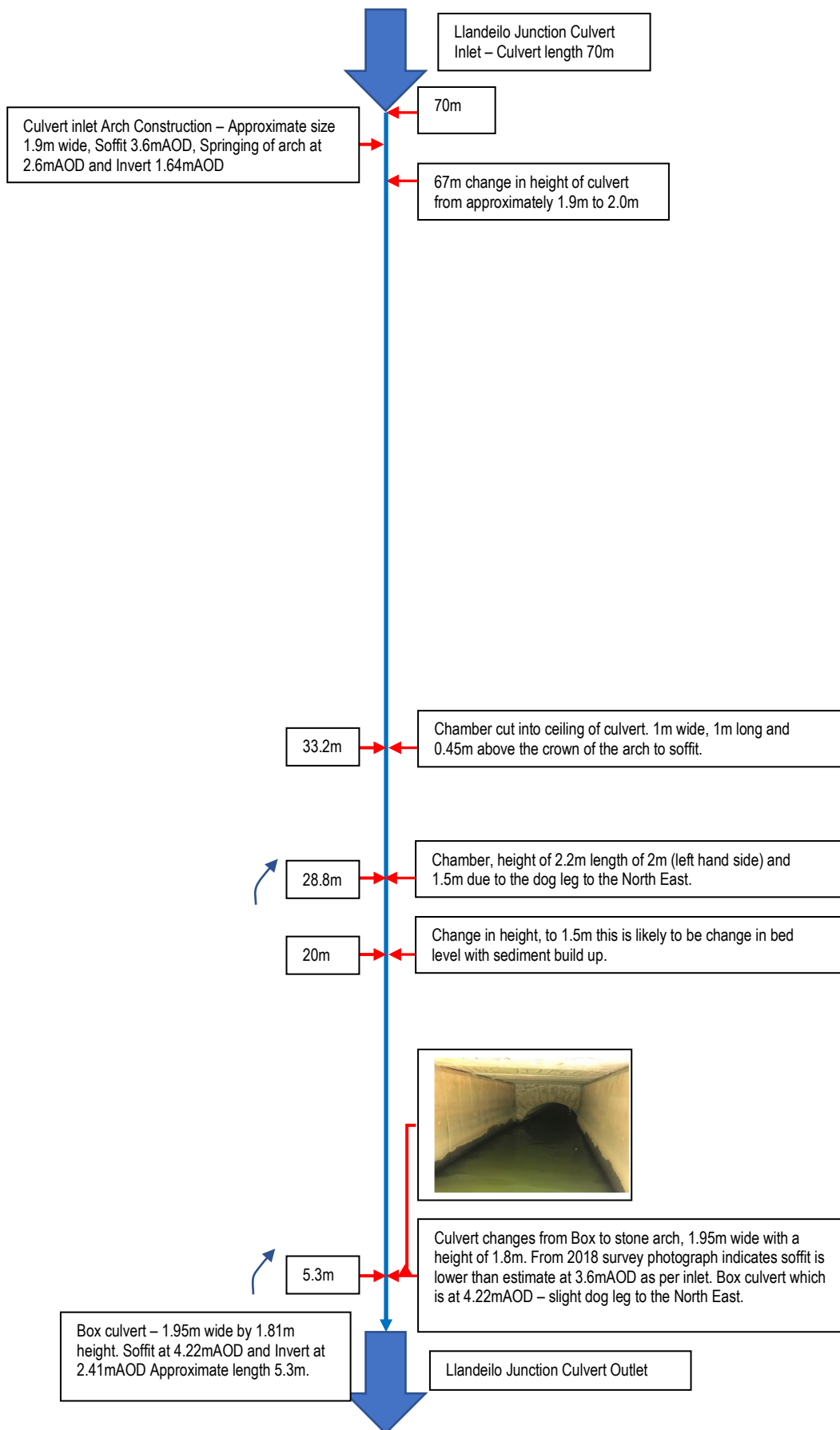


Figure 8 Llandeilo Junction Culvert Information, based on reviewers understanding from several survey documents, note distance measures form outlet to inlet.

## 2.6 Model Stability and Error Messages

The model is HPC GPU model build which is inherently stable within the 2d domain. It is recommended that the following are reviewed for a HPC model to ensure the model is actually stable:

Courant Number – Nu  
Wave Celerity Number – Nc  
Diffusion Number – Nd  
Minimum Timestep – dt

Also, it is important to look at the number of repeated timesteps within the model as this will give an indication of model stability. We note that every scenario has repeated timesteps although these are in the range of 1 to 61 and only occur for “HPC HCN Repeated Timesteps”, this does not occur for the other parameters.

On reviewing “Nu”, “Nd”, and “Nc” values, they all appear to be within the tolerances, although we do note that either “Nd” or “Nc” are at the maximum limit for 100% of time during the simulation runs. We note that “Nd” maximum value recorded is 0.329315 and for “Nc” maximum value of 1.00533, this is outside the recommended values and clarification is needed on this to ensure the model is performing as required.

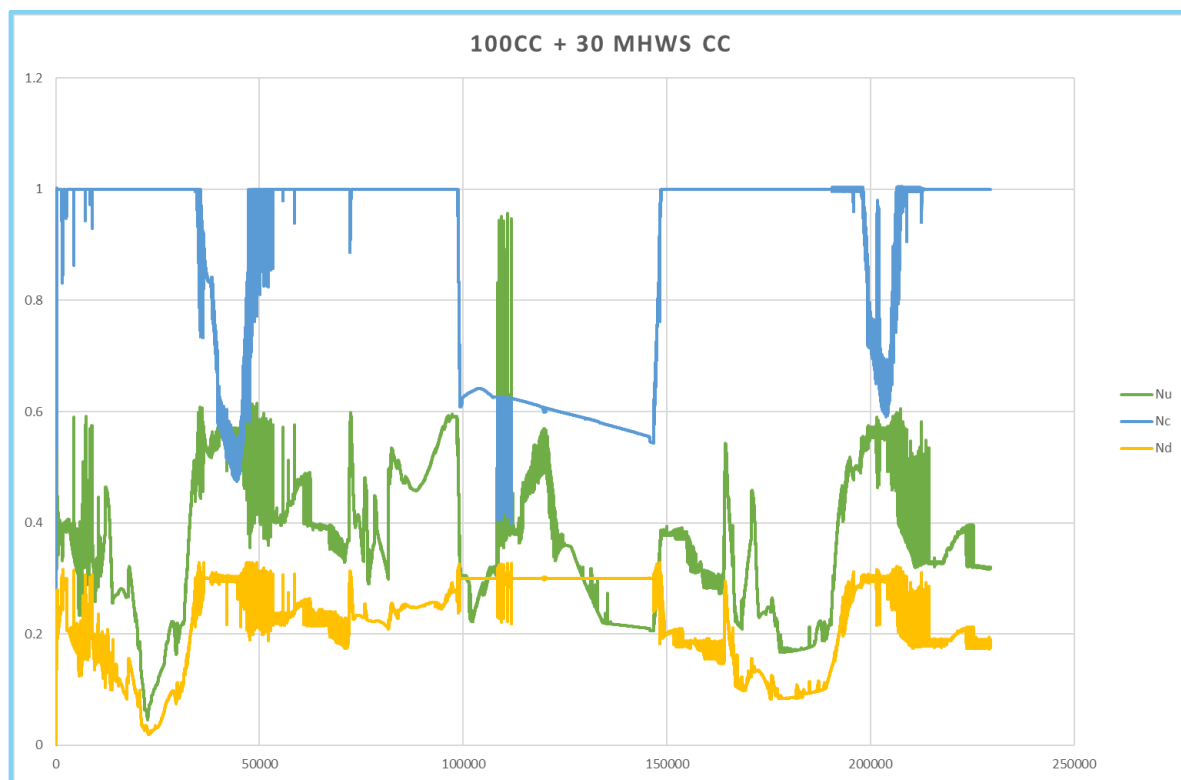


Figure 9 HPC model stability

Figure 10 shows how the dt changes over the duration of the simulation, the dt value appears to be within tolerance for the model. Although we can clearly see that the dt value drops in three locations in the chart. These occur at the same time as the Nc value drops. This would indicate that the model is trying to find a suitable value to remain stable. Clarification is required that this is not impacting the model's performance and not impacting the results.

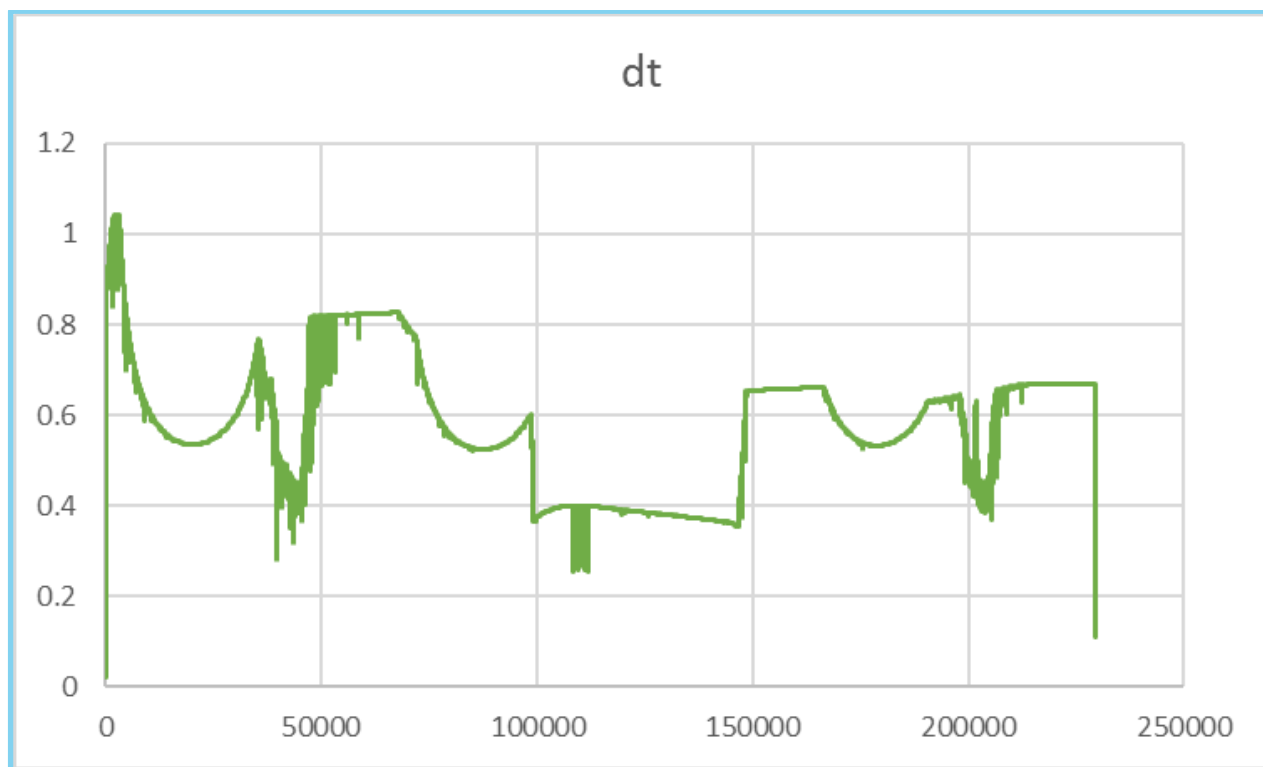


Figure 10 dt values for 100cc+30% and MHW+cc

We note also 1d negative depth within the model. As there is no MUR to explain the impact of these on the model results, this may impact the model output and may need further review.

### 3 Results Review

Although the results appear to reasonable, on first inspection, these have not been reviewed in detail due to the concerns with the model build, schematisation of structures and error messages. Hence no further review was done of these results.

### 4 Conclusions and Recommendations

It is strongly recommended that the modeller reviews all the comments above. We have the summarised following recommendations below which are colour coded as follows:

Green – No change necessary (suggestion for improvement / good practice but which is unlikely to change the model outcome)

Amber – Preferred but not compulsory (non-standard method or method not following guidance but unlikely to have impacted on model results)

Red – Change needed (omission/error that could make the model findings subject to challenge and which requires correction/further work)

- Model built in TUFLOW HPC and was ran on the latest version of the software at time of model runs. TUFLOW HPC is suitable provide data to support the FCA.
- The use of WLL lines for 1d network incomplete, no impact on model results although will affect presentation of results.
- Folder structure different from that recommended, we recommend following the TUFLOW recommend structure, or full documentation provided when supplying the data.
- Reduce the number of control files by using “IF Else” statements or 1d domain commands.
- Recommend using MasterMap® Feature Code to aid QA of data.

- Consider reducing the number of similar GIS layers to reduce likelihood of introduction errors e.g. empty GIS layer, incorrect GIS data type, redundant GIS layer etc.
- Ensure no redundant GIS features that are outside the model boundary are removed, even if there is no impact to the model results.
- Recommend supplying data with full paths and using split function in compression software.
- Ensure the latest 2018 survey data replaces old data were available within the model.
- Ensure critical structures are corrected within the model, e.g. Llandeilo Junction, Delta Lakes sluice gates etc.
- Review the tidal level to ensure the tidal prism effect is applied.
- Fully document Llandeilo Junction culvert and justification if deviating from survey information available.
- Fully document schematisation of hydraulic structure.
- Review attributes within the GIS layers and correct as required, note where these attributes may have a different function e.g. value -99,999 in network GIS layer.
- Review all message within the message log and either amend the model or provided justification on why these are acceptable.
- Ensure outputs from model include variables that aid the QA of the HPC model i.e. "dt".
- Review HPC specific outputs to check model is stable, see section 2.6 for details.
- Ensure that all data supplied for model review to NRW i.e. check files, output files.
- Provide a MUR or a model build technical report

This is NOT a model QA and hence will not identify all errors within the model therefore should be considered as giving pointers for the modeller to check the model build.

This model review has concentrated on the 1.0% AEP plus climate change baseline. The review conclusions and recommendations point us to a concern that the model has not undergone a thorough internal quality assurance process.

For the reviewer to understand the modellers' decisions, NRW require as a minimum what structures are modelled and excluded and any supporting data with either a detailed MUR or model build technical report covering these aspects. Otherwise the reviewer must make assumptions on what was intended by the modeller.

The suggested amendments and points for clarification may only result in minor differences to model output data. However, a robust model able to stand up to close third-party scrutiny is essential when considering this sensitive development proposal. It is also imperative that this base model is as free from error as possible which will in turn produce results that we are confident in supporting an FCA, which the current model is not.

## 5 Appendix Consultants Response following NRW Review with NRW response comments

NRW response to EVY comments on the NRW review are in *light blue italics*

Colour coding is used for points below between points 40 and 59 as per definition is in Section 4 above, we have also colour coded points 11 and 25 in red below as these we believe are most likely to have an impact to the results and hence the FCA conclusions.

Table 7 Responses by EVY and NRW to review document above

| Review Section |                               | Response – EVY and NRW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Subject Area                   | Assessment of impact of adopting NRW suggestions |
|----------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------|
| 1.             | Section 2                     | This comment conflicts with section 2.2 says the hydrology has been reviewed and is fine.<br><i>The report does not cover the actual review of the hydrology, i.e. the reviewer did not review the hydrology, this was completed separate to the model review and the conclusion where supplied within the report.</i>                                                                                                                                                                                                                                                         | Model boundary conditions      |                                                  |
| 2.             | Section 2.1.1 - 2nd paragraph | While this may cause some (perhaps understandable) frustration for the reviewer, this has no bearing on the model's fitness for purpose.<br><i>This has an impact to our review times and is thus more likely to lead to errors in copying data and introducing a delay in the review process.</i>                                                                                                                                                                                                                                                                             | Format of data supplied to NRW | Has no impact on the model results.              |
| 3.             | Section 2.1.2 - 1st paragraph | This is a recommended structure, to enable different types of data to be co-located and also findable. This recommendation forms the basis of EVY's file structure (as seen below), however we have further extended some aspects to better suit our requirements.<br><i>As no documentation was included with the model to cover the structure used by EVY, the reviewer would expect the folder structure as per TUFLOW Manual, consequently this introduced a delay in reviewing the model.</i>                                                                             | Format of data supplied to NRW | Has no impact on the model results.              |
| 4.             | Section 2.1.2- 2nd paragraph  | Indeed we do not have a log folder inside 'Runs', because we take the view that the log is part of a model's outputs and therefore locate it with the rest of the results. This is readily identifiable from the command in the .tcf which specifies where the logs should be saved.<br><i>This is not norm and without documentation makes it difficult for the reviewer to understand where the data sits at the time of copying the data.</i>                                                                                                                               | Format of data supplied to NRW | Has no impact on the model results.              |
| 5.             | Section 2.1.2 - 3rd paragraph | Perhaps, although again a simple examination of the .tcf would reveal where both logs and results may be found. However, the location of the files has no bearing on their contents, nor on the fitness for purpose of the model that created them.<br><i>Agreed that the information is within .tcf file, although this would not normally be checked prior to copying data to folders. Hence reviewer assumes that data structure follows standard practice of having "log" folders under "runs" folders which may be subdivided into subfolders with the scenario runs.</i> | Format of data supplied to NRW | Has no impact on the model results.              |
| 6.             | Section 2.1.2- 4th paragraph  | Reporting of the modelling undertaken <b>has been supplied</b> , including information on data sources, assumptions and decisions?<br><i>NRW may only download data from approved services and the document was not included within the Sharefile link provided by NRW.</i>                                                                                                                                                                                                                                                                                                    | Model document                 | Has no impact on the model results.              |
| 7.             | Section 2.1.3 - 4th paragraph | The statement 'The best format is "xmdf"' is very subjective! For example, in a large model such as this, it would be considered preferable by many to work with the .DAT                                                                                                                                                                                                                                                                                                                                                                                                      | Format of data supplied to NRW | Has no impact on the model results.              |

| Review Section |                               | Response – EVY and NRW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Subject Area                   | Assessment of impact of adopting NRW suggestions                                                                                                                                                            |
|----------------|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                               | files which contain the individual outputs for each type of result. The .xmdf is 3Gb, and therefore very unwieldy; instead accessing the 700Mb .DAT files as required is more flexible and responsive.<br><i>Noted, although both data sets are generated for all simulations runs. We note the DAT file supplied take up approximately 3GBs of space. As both data were generated, we expect that these to be supplied or documented why it was excluded. NRW can use either formats with the software available to the reviewer.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                |                                                                                                                                                                                                             |
| 8.             | Section 2.1.3 - 5th paragraph | We did not supply any of the .xmdf files due to their size. The appropriate .DAT files were issued instead.<br>It is not necessary to have .xmdf files to view/process or otherwise make use of the model outputs when .DAT files are present.<br><i>Not all DAT files were supplied for each of the “*.ALL.sup” project files, we expect all the DAT files to be supplied or documented on what files are excluded and reasoning behind this.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Format of data supplied to NRW | Has no impact on the model results.                                                                                                                                                                         |
| 9.             | Section 2.1.3 - 5th paragraph | These are additional supplemental files which were not supplied due to the file sizes; these outputs are not required to assess the model outputs or performance. The .hV.sup file would have opened all the appropriate files without difficulty (and has been provided by the suppliers for this purpose). The omission of these files is of no relevance to the fitness for purpose of this model.<br><i>Noted – See comments above in point 8.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Format of data supplied to NRW | Has no impact on the model results.                                                                                                                                                                         |
| 10.            | Section 2.1.3 - 7th           | These can be supplied if requested.<br><i>Noted – See comments above in point 8.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Format of data supplied to NRW | Has no impact on the model results.                                                                                                                                                                         |
| 11.            | Section 2.2 - 2nd paragraph   | In order to investigate this in detail it would be necessary to extend the model to encompass the whole of the Bristol Channel. However, given that there is a contraction in the width of the channel from the open sea opposite Burry Port followed by an expansion in the width of the channel opposite Llanelli would suggest, that diffraction of the tidal wave would cause a reduction in peak water level but amounting to no more than a few millimetres by comparison to Nodes 538 and 539. Tidal amplification may occur further up the estuary but at Llanelli this is not considered to be a factor.<br><i>Note - the tidal node points are the tidal boundaries for open coast stretches and hence an additional review is required for estuary stretches of the rivers.</i><br><br><i>The “Proudman Oceanographic Laboratory – M.J. Dixon and J.A.Tawn – Spatial Analyses For The UK Coast – June 1997”, published report includes information on the tidal modelling completed for the Loughor Estuary and this should be used to confirm the PRISM effect at Llanelli. Based on this report NRW view is that the report indicates that the PRISM effect is circa 170mm increase in tidal levels at Llanelli. This value should be added to the latest published tidal level information.</i><br><br><i>Link to report – <a href="http://www.ntsrf.org/sites/ntsrf/files/pdf/other_reports/id112.pdf">http://www.ntsrf.org/sites/ntsrf/files/pdf/other_reports/id112.pdf</a></i> | Model boundary conditions      | May have a negligible impact on tidal inundation.<br><i>This may have additional impact not currently modelled for climate change tidal events which could increase levels by circa 17cms and not mm's.</i> |
| 12.            | Section 2.4 - 2nd paragraph   | The presence or otherwise of batch files has no bearing on the fitness for purpose of the model and its outputs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Format of data supplied to NRW | Has no impact on the model results                                                                                                                                                                          |

| Review Section |                                   | Response – EVY and NRW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Subject Area                   | Assessment of impact of adopting NRW suggestions                                                                                                                                                            |
|----------------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                                   | <i>The provision of the batch files aids NRW in rerunning the model if there is for any reason for us to do so.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                |                                                                                                                                                                                                             |
| 13.            | Section 2.4.1.1 - 1st paragraph   | While the recommendation is noted, the supplied model did not use the option to incorporate 1D commands in the. tcf, and it was not necessary to make the change as it has no bearing on the model, its results or its fitness for purpose.<br><i>Noted</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Format of data supplied to NRW | Has no impact on the model results                                                                                                                                                                          |
| 14.            | Section 2.4.1.2 - 1st paragraph   | Again, noted, but this has no bearing on the model's fitness for purpose.<br><i>Noted</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Format of data supplied to NRW | Has no impact on the model results                                                                                                                                                                          |
| 15.            | Section 2.4.1.2 - 2nd paragraph   | dt can be added as an output.<br><i>This must be added for any future reruns.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Format of data supplied to NRW | Has no impact on the model results                                                                                                                                                                          |
| 16.            | Section 2.4.1.2 - 3rd paragraph   | zuk0 is an output from the model (as may be observed in the. TCF), it just wasn't supplied with this model as it is a large file and unnecessary for reviewing a model or determining fitness for purpose. However it should be noted that the Appendices to the report include hazard output.<br><i>Noted</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Format of data supplied to NRW | Has no impact on the conclusions to the FCA                                                                                                                                                                 |
| 17.            | Section 2.4.1.3                   | Once more, this is the supplied structure and it was necessary to make the change as it has no bearing on anything.<br><i>Noted</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Format of data supplied to NRW | Has no impact on the model results                                                                                                                                                                          |
| 18.            | Section 2.4.1.6                   | This has no bearing on whether the model is fit for purpose.<br><i>The 2d Manning's values applied and the ability to audit the application of these from MasterMap® correctly is important. The ability to cross reference the data aids the reviewer in ensuring the appropriate values have been applied, hence helps the reviewer carryout the review of the model.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Format of data supplied to NRW | Has no impact on the model results<br><i>Inappropriate 2d Manning's applied to the 2d domain may impact results.</i>                                                                                        |
| 19.            | Section 2.5.2 - 10th bullet point | Any negative value will request that TUFLOW makes use of the length of the digitised line to set the pipe length of the element. From the manual: "If a culvert invert has a value of -99999 (after any application of node/pit DS_Invert values), the invert is interpolated by searching upstream and downstream for the nearest specified inverts, and the invert is linearly interpolated."<br>If it is a river section, then while the manual states that -99999 will use the length specified in the MIKE 11 data, in the absence of such data (as is the case here) it is simply a negative number and will use the length of the line.<br>Both of these behaviour may be confirmed by a quick look in the check files.<br><i>Noted – although to ensure the software always performs as expected this value should not be used and may lead to question quality of model build.</i> | Schematisation of structures   | NRW statement is incorrect.<br><i>NRW Statement is correct, on this occasion the software correctly implements the modellers intended outcome. There is no guarantee that this will always be the case.</i> |
| 20.            | Section 2.5.2 - 11th bullet point | Applying the attribute as a string has no impact on its application, as may be observed by a quick look in the check files.<br><i>Noted – although this may lead to question quality of model build.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Schematisation of structures   | Has no impact on the model results                                                                                                                                                                          |
| 21.            | Section 2.5.2 - 12th bullet point | The presence of a file with no data is not going to have any bearing the model results or its fitness for purpose.<br><i>Noted – although this may lead to question quality of model build</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Supply of information to NRW   | May have a negligible impact on fluvial flooding<br><i>What is negligible impact?</i>                                                                                                                       |
| 22.            | Section 2.5.2 - 1st bullet point  | This has no bearing on whether the model is fit for purpose.<br><i>Noted – although this may lead to question quality of model build</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Format of data supplied to NRW | Has no impact on the model results                                                                                                                                                                          |
| 23.            | Section 2.5.2 - 3rd bullet point  | This was beyond the agreed changes to the model.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Format of data supplied to NRW | May have a negligible impact on fluvial flooding                                                                                                                                                            |

| Review Section |                                  | Response – EVY and NRW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Subject Area                 | Assessment of impact of adopting NRW suggestions                                                                                                                                                                                                  |
|----------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                                  | <i>Noted – Although as new data is now available this may lead the model results be challenged.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                              | <i>What is negligible impact?</i>                                                                                                                                                                                                                 |
| 24.            | Section 2.5.2 - 4th bullet point | <p>is unclear what is considered to be missing from our representation of this structure; perhaps the actual manhole chambers have not been explicitly set with this data? It can be added, and whilst it may have some small impact on surcharge volumes from the culverts and there may be a tiny change in flood depths adjacent to the culvert exact representation of the chambers will have no impact on the conclusions of the modelling study. In this context it should be recognised that the risk of flooding to the development is from tidal and not fluvial sources and this is a fluvial issue.</p> <p><i>The culverts at Llandeilo Junction is represented as a Box culvert and not Arch culverts with Box outlet culvert. NRW requires clarification of the justification of using a single culvert and not representing all the culvert changes within the model. Please note that this was commented on in previous review.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Schematisation of structures | <p>May have a negligible impact on fluvial flooding</p> <p><i>What is negligible impact?</i></p>                                                                                                                                                  |
| 25.            | Section 2.5.2 - 5th bullet point | <p>There are two aspects here:</p> <p>1) The latest survey and the original differ by a matter of mm. It was considered that the most reliable source of information would be the as built drawings of the sluice rather than the survey. Whilst a sensitivity test could be undertaken, there is little reason to do so and it would have negligible impact on results.</p> <p><i>Noted</i></p> <p>2) The omission of the gate is consistent with the supplied model and was not requested as part of the updates required for this project. Whilst a sensitivity test could be undertaken, there is little reason to do so and it would have negligible impact on results.</p> <p><i>We noted there is some confusion on the schematisation of this structure as noted by both NRW and EVY, with EVY confirming the omission of the gate. NRW have re-examined this structure it appears that the road culvert is in place with a downstream weir to represent the sluice gate at the upstream face of the culvert. Although, we note that not all the sluice gates are modelled, the simplification of these three structures is unlikely to affect the flood mechanism at this location. It is the opinion of NRW that the schematisation is not ideal although it is likely to produce suitable results for the flood risk from this structure.</i></p> <p><i>Due to this further investigation by NRW of the above we have found several other concerns at Delta Lakes, these are described below:</i></p> <p><i>The lake is empty at model start up, this is incorrect and should be set to at least the surveyed water level of 2.89mAOD or we recommend the normal maintained level, CCC should have this information. NRW on examining the data provided indicates that it takes approximately 20 hours for a fluvial 100cc event to fill the lake.</i></p> <p><i>The inlet culvert Dafen_S2 has a IWL set to 0.0mAOD which is below bed level set in the model of 0.2mAOD.</i></p> <p><i>As the lake is empty there is no outflow from culverts until approximately 50hrs into the simulation (for tidal 200cc) see Figure 11 Delta Lakes outlet culverts flow.</i></p> | Schematisation of structures | <p>May have a negligible impact on fluvial flooding</p> <p><i>NRW believes there could be significant change to outputs in Delta Lakes area once the model has been updated with a start condition of the lake at normal operating level.</i></p> |

| Review Section | Response – EVY and NRW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Subject Area | Assessment of impact of adopting NRW suggestions |
|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------|
|                | <p>The model clearly shows that the sluice gate overtops and the tide flows into the lake. NRW are unable to comment whether the lake will fill and then spill out over the sluice gate due to the lake being dry at start of simulation see Figure 12.</p> <p>The inlet culvert to Delta Lakes is unstable in the later stages of the simulation this will need to be corrected, see Figure 13 and Figure 14.</p> <p>These points above must be corrected.</p> <div><p>Q DAFENCUTC [LLANELLI_V0.32-H_FQMEDCC30-T200CC]</p><p>Figure 11 Delta Lakes outlet culverts flow</p></div> |              |                                                  |

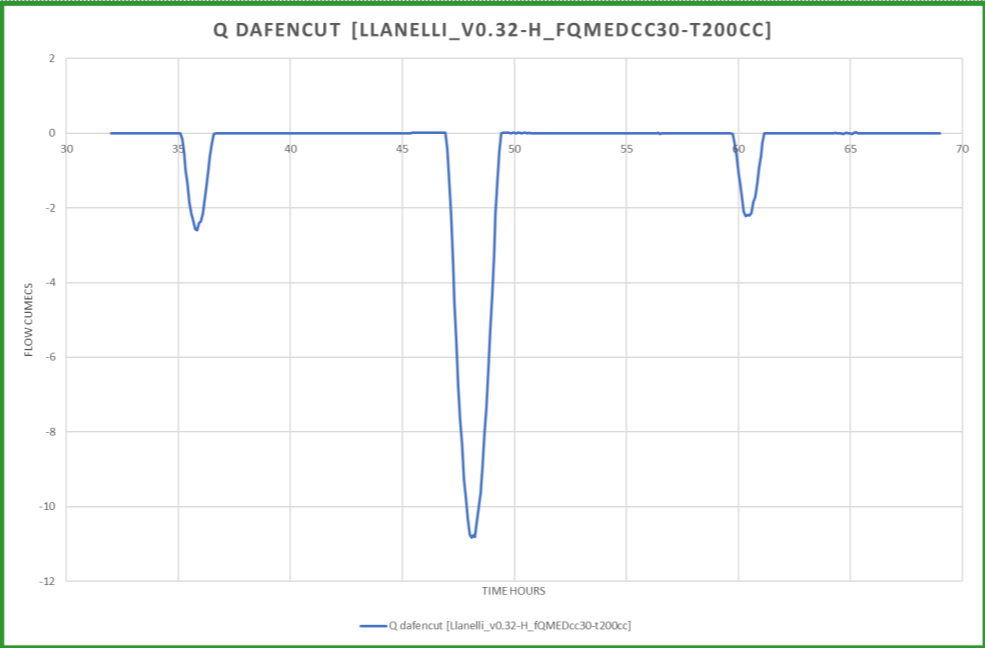


Figure 12 Shows tide flowing into the lake during the peak of the tide cycle

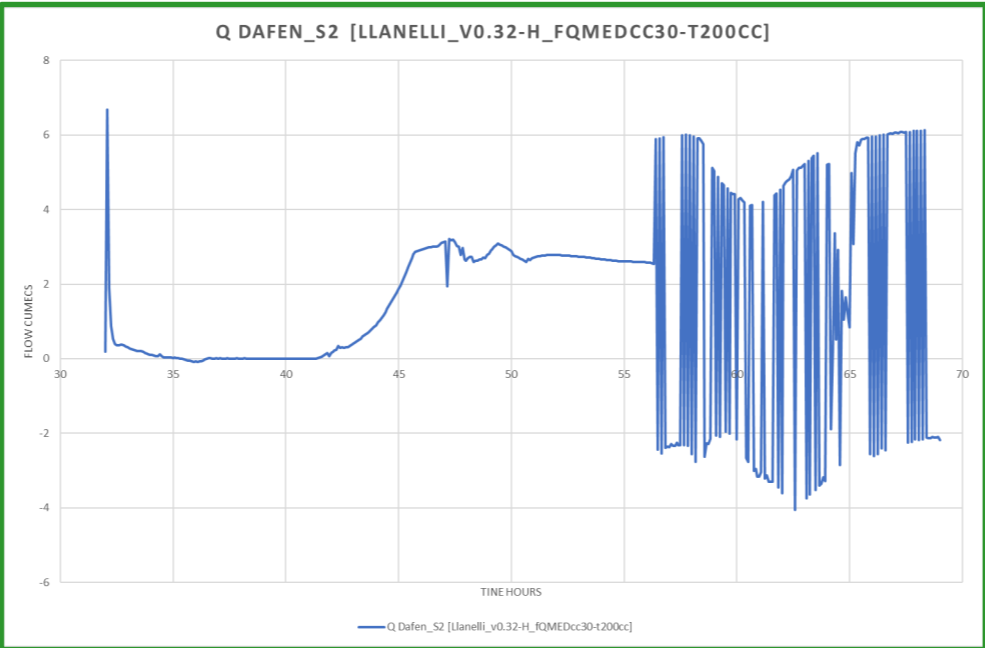
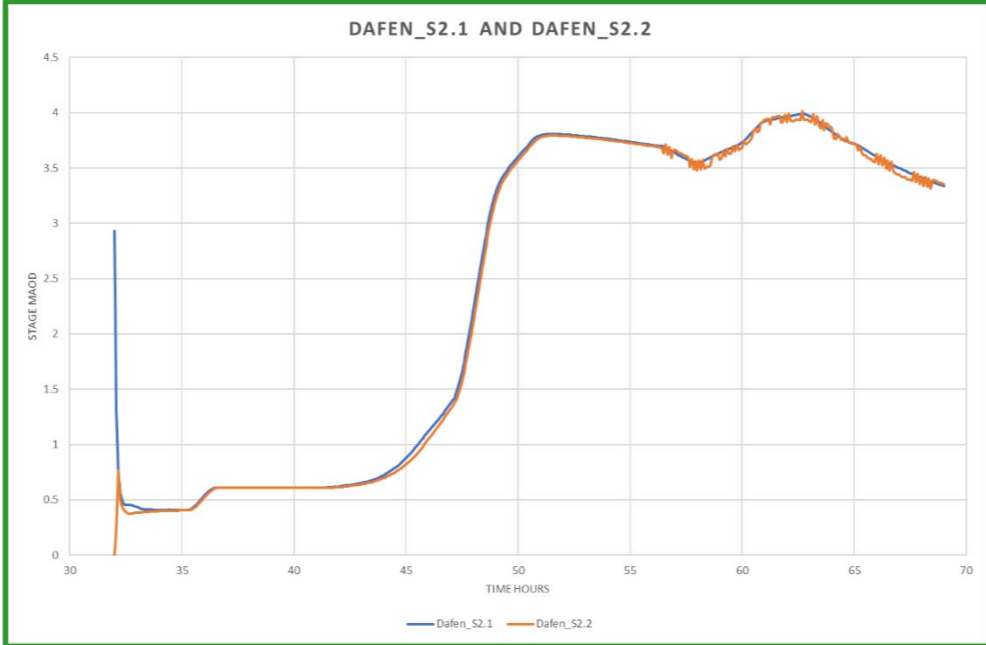


Figure 13 Instability in Culvert at approximately 56hours

| Review Section |                                   | Response – EVY and NRW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Subject Area                   | Assessment of impact of adopting NRW suggestions    |
|----------------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-----------------------------------------------------|
|                |                                   |  <p>Figure 14 Stage outputs showing instability on downstream end of culvert</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                |                                                     |
| 26.            | Section 2.5.2 - 6th bullet point  | Two parallel conduits have been represented using a single network element with the geometry adjusted to reflect the capacity of the two pipes. In this context it should be recognised that the risk of flooding to the development is from tidal and not fluvial sources and this is a fluvial issue.<br><i>Noted – we note the dimensions appear to be for one culvert.</i>                                                                                                                                                                                                                                                                                                                                                 | Schematisation of structures   | Has no impact on the model results                  |
| 27.            | Section 2.5.2 - 7th bullet point  | The housing estate platform level is based upon information supplied by Arup.<br><i>Noted – although more detail is required in documentation.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Schematisation of structures   | Has no impact on the model results                  |
| 28.            | Section 2.5.2 - 8th bullet point  | Two parallel conduits have been represented using a single network element with the geometry adjusted to reflect the capacity of the two pipes.<br><i>Noted – we note the dimensions appear to be for one culvert?</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Schematisation of structures   | Has no impact on the model results                  |
| 29.            | Section 2.5.2 - 13th bullet point | All of the culvert information we are aware of has been incorporated into the hydraulic model. If there are additional structures they could be incorporated into the model. In this context it should be recognised that the risk of flooding to the development is from tidally dominated and not fluvial sources and this is a fluvial issue. Incorporating the culverts in tidal dominated scenarios will allow more water to pass through the culverts and this could lead to flooding to the north of the railway. However it will have no impact on peak water levels to the south of the railway line and no impact on the conclusions of the study.<br><i>Noted, although NRW cannot confirm if this is the case.</i> | Survey data                    | Has no impact on the conclusions to the FCA         |
| 30.            | Section 2.5.2 - 14th bullet point | This has no bearing on whether the model is fit for purpose.<br><i>This was commented on as part of the model 1d network has WLL and other parts do not.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Results / Output               | Has no impact on the model results<br><i>Agreed</i> |
| 31.            | Section 2.5.2 - 2nd bullet point  | This has no bearing on whether the model is fit for purpose.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Format of data supplied to NRW | NRW statement is incorrect                          |

| Review Section |                             | Response – EVY and NRW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Subject Area    | Assessment of impact of adopting NRW suggestions                         |
|----------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------------------------|
|                |                             | <i>Noted – although this may lead to question quality of model build why these errors are present and make the model results open to challenge.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                 | <i>NRW is correct there are incorrect or NULL GIS records.</i>           |
| 32.            | Section 2.6 - 3rd paragraph | <p>That is what the adaptive timestepping is intended to achieve; it's choosing the largest possible timestep while not exceeding those tolerances. So it is expected behaviour that one of the three limiting parameters would be at maximum at all times.</p> <p><i>Noted – NRW only requested clarification that the model is performing as required. Although the modeller may wish to note the following from TUFLOW release notes 2017 –</i></p> <p><i>Repeated timesteps are an indication the 2D HPC solution is numerically “on-the-edge”. Models that have a high number of repeated timesteps should be sensitivity tested by reducing the control number limits using “Control Number Factor ==” .tcf command. For example, repeat the simulation using “Control Number Factor == 0.8” and compare the results. If there are acceptably immeasurable changes in the results, then running at the default control number limits can be considered satisfactory.</i></p> | Model stability | <p>NRW statement is incorrect</p> <p><i>NRW statement is correct</i></p> |
| 33.            | Section 2.6 - 3rd paragraph | <p>While these values exceed the target tolerance, they remain less than the threshold for repeating a timestep (which is documented as being 20% above the control number limit). The presence of these numbers is therefore not cause for concern.</p> <p><i>See comments above in point 32.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Model stability | <p>NRW statement is incorrect</p> <p><i>NRW statement is correct</i></p> |
| 34.            | Section 2.6 - 4th Paragraph | <p>It happens at these times because this is where Nd becomes the dominant limiting factor, which permits the Nc to drop.</p> <p><i>See comments above in point 32.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Model stability | <p>NRW statement is incorrect</p> <p><i>NRW statement is correct</i></p> |
| 35.            | Section 2.6 - 4th Paragraph | <p>This is simply the expected reaction of the adaptive timestepping! For much of the simulation Nc is the controlling limit, and the other parameters are not at their limits; but at times Nd is more significant and controls the timestep, permitting the Nc to fall to a lower value. So no, this is not impacting the model's performance and is not impacting results; this is the software behaving as it should</p> <p><i>See comments above in point 32.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Model stability | <p>NRW statement is incorrect</p> <p><i>NRW statement is correct</i></p> |
| 36.            | Section 2.6 - 5th Paragraph | <p>The presence of negative depths are</p> <p>a) during the wetting of the model and</p> <p>b) are not near our area of interest</p> <p><i>Noted – NRW only requested clarification that the model is performing as required.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Model stability | Has no impact on the model results                                       |

| Review Section | Response – EVY and NRW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Subject Area                 | Assessment of impact of adopting NRW suggestions                                                                                                                                                                         |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 37.            | <p>Section 2.6 - 2nd paragraph</p> <p>Because the adapting timestepping is selecting a next-timestep-size based on the data from the preceding timestep, it sometimes overshoots and ends up applying a timestep that is too large (due to the changing velocities and depths as the simulation progresses); when this happens and tolerances are exceeded significantly then TUFLOW will repeat the timestep.</p> <p>Repeated timesteps is in indication of a more rapid change in depth, velocity or velocity grade (and hence turbulence); that can indicate 'untoward behaviour in the model, or can simply be the expected reaction of the flood waters in the situation presented (such as when an embankment is first overtopped, or a small depression fills up quickly). It should not be taken as a sign something is wrong, although it can be an indication that something might be wrong. In this instance, we are satisfied everything is fine.</p> <p><i>Noted – NRW requested clarification that the model is performing as required. Although the modeller may wish to note the following from TUFLOW release notes 2017 –</i></p> <p><i>Repeated timesteps are an indication the 2D HPC solution is numerically “on-the-edge”. Models that have a high number of repeated timesteps should be sensitivity tested by reducing the control number limits using “Control Number Factor ==” .tcf command. For example, repeat the simulation using “Control Number Factor == 0.8” and compare the results. If there are acceptably immeasurable changes in the results, then running at the default control number limits can be considered satisfactory.</i></p> | Model stability              | <p>NRW statement is incorrect<br/><i>NRW statement is correct</i></p>                                                                                                                                                    |
| 38.            | <p>Section 2.6- 4th Paragraph</p> <p>Edenvale Young is not aware of guidance associated with this statement "the dt value appears to be within tolerance for the model"?</p> <p><i>Noted – NRW comment relates that the model was performing well when looking at “dt” value and that it wasn’t running at the lowest possible value which would indicate the model was at its limits of stability. The modeller may wish to note the following from TUFLOW release notes 2017 –</i></p> <p><i>The minimum permissible target timestep allowed by the HPC solver is set using the .tcf command below. By default this is set to the minimum of 0.1s or the cell size divided by 200 m/s. In most cases, where there is no erroneous data or poor model setup, the target timestep will always be well above the default minimum timestep.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Model stability              | <p>NRW statement is incorrect<br/><i>NRW statement is correct</i></p>                                                                                                                                                    |
| 39.            | <p>Section 3</p> <p>While there remain questions about a couple of structures, this should not prevent a valid assessment of the tidal flood propagation. I'm not clear what error messages this refers to, as there are no error messages associated with the model.</p> <p><i>NRW noted that, while there are no “error” messages, the large number of messages as noted below from the “message log file” could provide uncertainty over the model results.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Schematisation of structures | <p>Has no impact on the conclusions to the FCA.<br/><i>EVY have previously comment that there “May have a negligible impact on fluvial flooding” Without justification of their definition of negligible impact?</i></p> |

| Review Section        |                               | Response – EVY and NRW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Subject Area                   | Assessment of impact of adopting NRW suggestions                                                                                                                              |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
|-----------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------------|---|------------|---|------------|---|------------|---|--------------|---|--------------|---|--------------|-----|--------------|---|--------------|----|--------------|---|--------------|--|--|
|                       |                               | <table><tr><th>Number of occurrences</th><th>Message number</th></tr><tr><td>12</td><td>CHECK 1152</td></tr><tr><td>1</td><td>CHECK 2099</td></tr><tr><td>2</td><td>CHECK 2118</td></tr><tr><td>2</td><td>CHECK 2370</td></tr><tr><td>1</td><td>WARNING 0300</td></tr><tr><td>6</td><td>WARNING 1100</td></tr><tr><td>1</td><td>WARNING 1313</td></tr><tr><td>587</td><td>WARNING 1991</td></tr><tr><td>3</td><td>WARNING 2073</td></tr><tr><td>10</td><td>WARNING 2118</td></tr><tr><td>2</td><td>WARNING 2218</td></tr></table>                                                | Number of occurrences          | Message number                                                                                                                                                                | 12 | CHECK 1152 | 1 | CHECK 2099 | 2 | CHECK 2118 | 2 | CHECK 2370 | 1 | WARNING 0300 | 6 | WARNING 1100 | 1 | WARNING 1313 | 587 | WARNING 1991 | 3 | WARNING 2073 | 10 | WARNING 2118 | 2 | WARNING 2218 |  |  |
| Number of occurrences | Message number                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 12                    | CHECK 1152                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 1                     | CHECK 2099                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 2                     | CHECK 2118                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 2                     | CHECK 2370                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 1                     | WARNING 0300                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 6                     | WARNING 1100                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 1                     | WARNING 1313                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 587                   | WARNING 1991                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 3                     | WARNING 2073                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 10                    | WARNING 2118                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 2                     | WARNING 2218                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                |                                                                                                                                                                               |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 40.                   | Section 4 - 2nd bullet point  | As noted, no impact on model results<br><i>Just impacts presentation of results.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Supply of information to NRW   | Has no impact on the model results                                                                                                                                            |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 41.                   | Section 4 - 3rd bullet point  | We can provide this if necessary, although it's really not that complicated and this has no bearing on whether the model is fit for purpose<br><i>Noted – better documentation of folder structure would reduce time the reviewer spends locating/saving the data.</i>                                                                                                                                                                                                                                                                                                           | Model stability                | Has no impact on the model results                                                                                                                                            |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 42.                   | Section 4 - 4th bullet point  | This has no bearing on whether the model is fit for purpose<br><i>Noted</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Format of data supplied to NRW | Has no impact on the model results                                                                                                                                            |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 43.                   | Section 4 - 5th bullet point  | This has no bearing on whether the model is fit for purpose.<br><i>The ability to cross reference the data aids reviewer in ensuring the appropriate values have been applied, hence this will help the reviewer carryout the review of the model.</i>                                                                                                                                                                                                                                                                                                                           | Format of data supplied to NRW | Has no impact on the model results                                                                                                                                            |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 44.                   | Section 4 - 6th bullet point  | This has no bearing on whether the model is fit for purpose.<br><i>Noted – although this will help in the review of the model and ensure less likelihood of errors during model build.</i>                                                                                                                                                                                                                                                                                                                                                                                       | Format of data supplied to NRW | Has no impact on the model results                                                                                                                                            |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 45.                   | Section 4 - 7th bullet point  | This has no bearing on whether the model is fit for purpose.<br><i>Noted –although this may lead to question quality of model build why these errors are present and make the model open to challenge.</i>                                                                                                                                                                                                                                                                                                                                                                       | Format of data supplied to NRW | Has no impact on the model results                                                                                                                                            |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 46.                   | Section 4 - 8th bullet point  | This has no bearing on whether the model is fit for purpose.<br><i>Noted – although this reduces the time NRW has too extract the data and transfer to the correct folders. This being a more efficient process for both parties.</i>                                                                                                                                                                                                                                                                                                                                            | Format of data supplied to NRW | Has no impact on the model results                                                                                                                                            |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 47.                   | Section 4 - 9th bullet point  | Where relevant, this has already been undertaken<br><i>Where New Survey data has or has not been used must be documented. During the review we note that Structure Dafen_S5 has only <b>TWO</b> culverts modelled while the latest survey confirms that there are <b>THREE</b> present.</i>                                                                                                                                                                                                                                                                                      | Survey data                    | May have a negligible impact on fluvial flooding<br><i>What is negligible impact?</i>                                                                                         |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |
| 48.                   | Section 4 - 10th bullet point | As noted the Sluice data has been taken from the As built survey which we regard as the most reliable source of information. Chambers, could add the to the model but it is considered that it will have a minimal effect in relation to fluvial flooding and no impact on tidal inundation.<br><i>See point 25 re sluice gates and Delta Lake initial model start up conditions and model stability at this location. It is vital that this is corrected. NRW strongly recommends that the latest survey data is used to replace older data wherever possible. Also, to use</i> | Survey data                    | May have a negligible impact on fluvial flooding<br><i>NRW believes there could be significant change to outputs in Delta Lakes area once the model has been updated with</i> |    |            |   |            |   |            |   |            |   |              |   |              |   |              |     |              |   |              |    |              |   |              |  |  |

| Review Section |                                      | Response – EVY and NRW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Subject Area              | Assessment of impact of adopting NRW suggestions                                                                                                                                                           |
|----------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                                      | <i>the data to correct poor data within the model as identified within the report. Or provide justification/clarification on reasoning for the decision made.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                           | <i>a start condition of the lake at normal operating level.</i>                                                                                                                                            |
| 49.            | Section 4 - 11th bullet point        | In order to investigate this in detail it would be necessary to extent the model to encompass the whole of the Bristol Channel. However, given that there is a contraction in the width of the channel from the open sea opposite Burry Port followed by an expansion in the width of the channel opposite Llanelli.<br><i>See point 11 above re Proudman Oceanographic Laboratory – M.J. Dixon and J.A.Tawn – Spatial Analyses For The UK Coast – June 1997.</i><br><br><i>Link – <a href="http://www.ntsrf.org/sites/ntsrf/files/pdf/other_reports/id112.pdf">http://www.ntsrf.org/sites/ntsrf/files/pdf/other_reports/id112.pdf</a></i> | Model boundary conditions | May have a negligible impact on tidal inundation<br><i>What is negligible impact?</i>                                                                                                                      |
| 50.            | Section 4 - 12th & 13th bullet point | Please refer to the model document<br><i>This document was not available to the reviewer at the time of the model review, nor is there a detailed report on decisions made by the modeller.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                            | Model document            | Has no impact on the model results                                                                                                                                                                         |
| 51.            | Section 4 - 14th bullet point        | There is nothing wrong with the attributes as applied<br><i>These are highlighted as it does not follow either the table structure or the use of attribute values in the table as per the instruction stated within the latest TUFLOW manual.</i>                                                                                                                                                                                                                                                                                                                                                                                          | Model set up              | NRW statement is incorrect<br><i>NRW Statement is correct, on this occasion the software correctly implements the modellers intended outcome. There is no guarantee that this will always be the case.</i> |
| 52.            | Section 4 - 15th bullet point        | There are no concerns with the messages produced by TUFLOW<br><i>Noted – NRW request clarification that the model is performing as required.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Results / Output          | NRW statement is incorrect<br><i>NRW Statement is correct</i>                                                                                                                                              |
| 53.            | Section 4 - 16th bullet point        | This can be added to the output but would require running the models again, However, NRW has checked the dt applied throughout the simulation (see point 38) and noted that it was acceptable. Accordingly it is not understood why this comment is classified as red.<br><i>For HPC models the “dt” output is important to identify any stability issues within model, this is essential during the consultants QA process. This also helps in the review process if there any issue with the model. Reviewing the statement this should be an amber comment.</i>                                                                         | Results / Output          | NRW statement is incorrect<br><i>NRW Statement is correct</i>                                                                                                                                              |
| 54.            | Section 4 - 17th bullet point        | The model applies adaptive timestepping and is doing so correctly within the default constraints of the software. We could run a sensitivity which tightens the constraints.<br><i>See previous comments for section 2.6 point 32 to 38, NRW requires clarification that the model is performing as required</i>                                                                                                                                                                                                                                                                                                                           | Model stability           | NRW statement is incorrect<br><i>NRW Statement is correct</i>                                                                                                                                              |
| 55.            | Section 4 - 18th bullet point        | All relevant files have been supplied<br><i>For NRW to review a model we would expect all model files for scenarios run with redundant and out of date files excluded. If files are excluded these must be documented.</i>                                                                                                                                                                                                                                                                                                                                                                                                                 | Model document            | NRW statement is incorrect<br><i>NRW Statement is correct</i>                                                                                                                                              |
| 56.            | Section 4 - 19th bullet point        | Reporting has been provided<br><i>No Report supplied via NRW Sharefile link.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Model document            | NRW statement is incorrect<br><i>NRW Statement is correct</i>                                                                                                                                              |
| 57.            | Section 4 - 3rd Paragraph            | This is slanderous! EVY has undertaken a thorough review, which picked up various items, including those which were not identified by NRW in the initial review, all of                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                           | Has no impact on the model results                                                                                                                                                                         |

| Review Section |                           | Response – EVY and NRW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Subject Area | Assessment of impact of adopting NRW suggestions                                                                           |
|----------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------------------------------------------------------------------------------------------------------------------------|
|                |                           | <p>which have been corrected. The majority of the items identified here are irrelevant to the fitness for purpose of the model and its results, especially so in the context of the study for which it is being applied.</p> <p><i>NRW note from above that the model has under gone a review, we point to two statements (see points 25, 26 and 28 above) which state that culverts have been combined as one, on reviewing this we note that these appear not to be the case. Furthermore, NRW has not been provided with certificate/documentation of the QA process undertaken by EVY, nor any documentation of decisions made by EVY.</i></p>                                                                                         |              |                                                                                                                            |
| 58.            | Section 4 - 4th Paragraph | <p>This is reasonable, however it should be stressed that such reporting was supplied</p> <p><i>No Report supplied in NRW Sharefile link.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              | Model document                                                                                                             |
| 59.            | Section 4 - 5th Paragraph | <p>Many of them will result in no change whatsoever, as they points have no bearing on the contents of the model nor the results it generates.</p> <p>Some of the items are subjective, such as the preference for a new survey, simply because it's newer.</p> <p>Some of the items may make some difference, but not to the outcomes of the study and hence were outside of scope.</p> <p>And finally, some of the items may have merit, such as the inclusion/position of the sluice gate.</p> <p><i>NRW review is not a full Quality Assurance. New survey data is the current best available information using latest techniques and indicates some data previously collected data from various parties is unfitting for use.</i></p> |              | <p>Has no impact on the conclusions to the FCA</p> <p><i>Some of the model changes may impact the FCA conclusions.</i></p> |



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Carmarthenshire County East Council  
Civic Offices  
Crescent Road  
LLANDEILO  
SA19 6HW

**Date: 12/05/2022**  
**Our Ref: PLA0065182**  
**Your Ref: PL/03872**

Dear Sir/Madam

**Grid Ref: SS503986 250760 198632**

**Site: Llanelli Wellness and Life Science Village, Land at Delta Lakes, Llanelli, Carmar**

**Development: Approval of Reserved Matters is sought for access, appearance, landscaping, layout and scale for Phase 1 of the Llanelli Wellness and Science Development, - full description on application**

We refer to your planning consultation relating to the above site, and we can provide the following comments in respect to the proposed development.

### **SEWERAGE**

We have no objection to the application for approval of the reserved matters subject to compliance with the requirements of the drainage conditions (Condition 40 on S/36948) imposed on the outline planning permission, and the subsequent applications to vary the conditions thereon.

Our response is based on the information provided by your application. Should the proposal alter during the course of the application process we kindly request that we are re-consulted and reserve the right to make new representation.

If you have any queries please contact the undersigned on 0800 917 2652 or via email at [developer.services@dwrcymru.com](mailto:developer.services@dwrcymru.com)

Please quote our reference number in all communications and correspondence.

Yours faithfully,

Clare Powell  
Development Control Officer  
Developer Services



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We welcome correspondence in  
Welsh and English

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Nghymru rhif 2366777. Swyddfa gofrestredig: Heol Pentwyn  
Nelson, Treharris, Morgannwg Ganol CF46 6LY.

Carmarthenshire Council,  
Ty Elwyn,  
Town Hall Square,  
Llanelli,  
Carmarthenshire,  
SA15 3AP.

**Date: 05/12/2018**  
**Our Ref: PLA0033336**  
**Your Ref: S36948**

Dear Sir / Madam,

**Grid Ref: 250835, 198642**

**Site: Delta Lakes, Llanelli**

**Development: Outline application for Wellness and Life Science Development**

Further to our recent discussions we are pleased to confirm that, following the completion of our capital investment scheme scheduled for 31<sup>st</sup> March 2020, capacity will be available at our Northumberland Sewage Pumping Station to accommodate the development flows proposed. We can also confirm that the surface water removed from the Draka development has not been factored in to our rainscape work in the catchment and is therefore available to apportion to the development to satisfy the requirements of the Burry Inlet & Loughor Estuary Memorandum of Understanding.

The completed foul Hydraulic Modelling Assessment (HMA) provides solutions to accommodate the development and these are aligned to the applicants phasing proposals. To reflect the outcomes of the HMA, we can propose the following conditions and advisory notes in respect of the development.

- No buildings on the application site shall be occupied earlier than 31<sup>st</sup> March 2020, unless the upgrading of Northumberland Sewage Pumping Station, into which the development shall drain, has been completed and written confirmation of this has been issued to the Local Planning Authority by Dwr Cymru Welsh Water.

*Reason: To prevent hydraulic overloading of the public sewerage system, to protect the health and safety of existing residents and ensure no pollution of or detriment to the environment.*

- No occupation of the development shall be made until the necessary improvements to the public sewerage system as identified in the Hydraulic Modelling Assessment (Ref: 132-SW186) have been completed and confirmed in writing to the Local Planning Authority. These improvements shall align with the following phased approach as detailed in the applicants latest drainage strategy (October 2018),
  - Phase 1 shall connect to Delta Lakes Sewage Pumping Station following the delivery of Hydraulic Modelling Assessment Option 4;

- Phase 2 shall connect by gravity to new manhole MH1 which is upstream of manhole SS51980801;
- Phase 3 & 4 shall be pumped to new manhole MH1 which is upstream of manhole SS51980801 via a new Sewage Pumping Station and rising main.

*Reason: To prevent hydraulic overloading of the public sewerage system, to protect the health and safety of existing residents and ensure no pollution of or detriment to the environment.*

- No surface water and/or land drainage shall be allowed to connect directly or indirectly with the public sewerage network.

*Reason: To prevent hydraulic overloading of the public sewerage system, to protect the health and safety of existing residents and ensure no pollution of or detriment to the environment.*

- The proposed development site is crossed by a 1600mm sewer outfall from Northumberland Sewage Pumping Station. A detailed scheme for its protections shall be submitted and agreed by Dwr Cymru Welsh Water in advance of the submission of reserve matters applications.

*Reason: To protect the integrity of the public sewer and avoid damage thereto, to protect the health and safety of existing residents and ensure no pollution of or detriment to the environment.*

- No buildings on the application site shall be occupied until a point of connection on the water supply system has been identified by a hydraulic modelling assessment, which shall be first submitted to and approved by the local planning authority. Thereafter the connection shall be made in accordance with the recommended connection option following the implementation of any necessary reinforcement works to the water supply system, as may be identified by the hydraulic modelling assessment.

*Reason: To prevent hydraulic overloading of the water supply system, to and ensure no detriment to existing residents and the environment.*

### **Advisory Notes**

- The applicant may need to apply to Dwr Cymru / Welsh Water for any connection to the public sewer under S106 of the Water Industry Act 1991. If the connection to the public sewer network is either via a lateral drain (i.e. a drain which extends beyond the connecting property boundary) or via a new sewer (i.e. serves more than one property), it is now a mandatory requirement to first enter into a Section 104 Adoption Agreement (Water Industry Act 1991). The design of the sewers and lateral drains must also conform to the Welsh Ministers Standards for Gravity Foul Sewers and Lateral Drains, and conform with the publication "Sewers for Adoption"- 7th Edition. Further information can be obtained via the Developer Services pages of [www.dwrcymru.com](http://www.dwrcymru.com).
- The applicant is also advised that some public sewers and lateral drains may not be recorded on our maps of public sewers because they were originally privately owned and were transferred into public ownership by nature of the Water Industry (Schemes for Adoption of Private Sewers) Regulations

2011. The presence of such assets may affect the proposal. In order to assist us in dealing with the proposal the applicant may contact Dwr Cymru Welsh Water to establish the location and status of the apparatus. Under the Water Industry Act 1991 Dwr Cymru Welsh Water has rights of access to its apparatus at all times.

Our response is based on the information provided by your application. Should the proposal alter during the course of the application process we kindly request that we are re-consulted and reserve the right to make new representation. If you have any queries please contact the undersigned on 0800 917 2652 or via email at [developer.services@dwrcymru.com](mailto:developer.services@dwrcymru.com).

Please quote our reference number in all communications and correspondence.

Yours faithfully,



Rhys Evans  
**Lead Forward Plans Officer**  
**Developer Services**

---

**From:** J Robert Davies  
**Sent:** 09 June 2022 13:47  
**To:** REG Planning Consultations  
**Subject:** FW: Pentre Awel

PL/03872 – Highways Response

---

**From:** Morgan, Geraint <Geraint.Morgan@atkinsglobal.com>  
**Sent:** 09 June 2022 11:56  
**To:** J Robert Davies <JRoDavies@carmarthenshire.gov.uk>; Aaron Z Evans <ZAEvans@carmarthenshire.gov.uk>  
**Subject:** Pentre Awel

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**Rhybudd:** E-bost allanol yw hwn ac nid oedd yn tarddu o'r Cyngor. Byddwch yn ofalus wrth glicio dolenni neu atodiadau agoriadol. Pan fyddwch yn ansicr, defnyddiwch y botwm 'Report Message'.

Rob

Please see below our suggested conditions and other observations for Pentre Awel. Please let us know if you want us to include this in a formal response form..

**Recommendation:**

Any permission that the Planning Authority may give should include the following condition(s).

**Condition(s):**

1. The access, visibility splays and turning area required, shall be wholly provided prior to any part of the development being brought into use, and thereafter shall be retained unobstructed in perpetuity. In particular, no part of the access, visibility splays, or turning area, is to be obstructed by non-motorised vehicles.
2. Prior to the occupation of any part of the development herewith approved, the required access roads and foot(ways/paths) from the existing public highway shall be laid out and constructed strictly in accordance with the plans herewith approved, to at least the base course levels, and with the visibility splays provided.
3. The parking spaces and layout shown on the plans herewith approved shall be provided prior to the use of the development herewith approved. Thereafter, they shall be retained, unobstructed, for the purpose of parking only. In particular, no part of the parking and turning facilities is to be obstructed by non-motorised vehicles.
4. All surface water from the development herewith approved shall be trapped and disposed of so as to ensure that it does not flow on to any part of the public highway.

5. No surface water from the development herewith approved shall be disposed of, or connected into, existing highway surface water drains.

**Reason(s):**

In the interests of highway safety.

**Other Observation(s):**

1. Any amendment or alteration of an existing public highway in connection with a new development shall be undertaken under a Section 278 Agreement of the Highways Act 1980. It is the responsibility of the developer to request the Local Highway Authority to proceed with this agreement and the developer is advised that the total costs of entering into such an agreement, as well as the costs of undertaking any physical works on site, shall be met by him.
2. Developers shall take positive measures to prevent surface water ingress to this site from the adjacent highway.
3. Without prior consent from the Sustainable Drainage Approval Body (SAB) no surface water from the development herewith approved shall be disposed of, or connected into, existing highway surface water drains/systems.

Kind Regards


**Geraint Morgan** *MTCP*

Principal Transport Planner

UK & Europe

Engineering, Design and Project Management

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Head of Highways and Transport

5123

S/36948

S/36948/P016927/(H&T)/KJ

27<sup>th</sup> November 2018

Head of Planning Services

FAO: Mr ROBERT DAVIES  
TY ELWYN, LLANELLI

WELLNESS AND LIFE SCIENCE DEVELOPMENT INCLUDING: COMMUNITY HEALTH HUB (INSTITUTE OF LIFE SCIENCE, WELLNESS EDUCATION CENTRE AND CLINICAL DELIVERY CENTRE) OF UP TO 16,500 SQM (USE CLASSES; D1 NON-RESIDENTIAL INSTITUTION, B1 (B) BUSINESS RESEARCH AND DEVELOPMENT, AND C2 RESIDENTIAL INSTITUTION). LIFE SCIENCE BUSINESS CENTRE (OFFICE SPACE IN THE RESEARCH AND DEVELOPMENT SECTOR) OF UP TO 10,000 SQM (USE CLASS B1 (B) BUSINESS RESEARCH AND DEVELOPMENT AND B2 LIGHT INDUSTRIAL). WELLNESS HUB (VISITOR CENTRE AND CORPORATE, COMMUNITY, LEISURE AND SPORTING FACILITIES) OF UP TO 11,000 SQM (USE CLASS D2 ASSEMBLY AND LEISURE). ASSISTED LIVING (NURSING CARE, RESIDENTIAL CARE, EXTRA CARE HOUSING AND CLINICAL REHABILITATION FACILITIES) OF UP TO 370 BEDS/UNITS AND 7,500 SQM (USE CLASSES; C2 RESIDENTIAL INSTITUTION, C3(A) AND C3(B) RESIDENTIAL). ASSOCIATED OUTDOOR RECREATION AREA, LEISURE AND THERAPY SPACES; LANDSCAPING AND PUBLIC REALM; ENERGY AND UTILITIES INFRASTRUCTURE; ACCESS AND PARKING ON LAND AT DELTA LAKES, LLANELLI

LLANELLI WELLNESS AND LIFE SCIENCE VILLAGE, LAND AT DELTA LAKES, LLANELLI

I refer to your consultation request on the above planning application and would comment as follows:

### **Appraisal**

#### ***Initial Response on Outline Planning Application***

#### **LWLV Outline Planning Application Review**

The Highways Planning Liaison Team has undertaken a review of the transport related documents submitted for the Llanelli Wellness Centre and Life Science Village (LWLV) Outline Planning Application. Whilst the focus of the review has been on the Transport Assessment (TA) and Travel Plan (TP), consideration has also been given to further information provided in the Design and Access Statement (DAS) and Planning Statement (PS).

The comments outlined below reflect the discussions and recommendations made at the May 30<sup>th</sup> meeting attended by Carmarthenshire County Council (CCC), ARUP and Atkins. For consistency purposes, the comments are structured in line with the formal response provided by the Highways Planning Liaison Team during Pre Application Consultation (PAC).

### **Transport Assessment and Travel Plan**

The LWLV TA and TP considers the transport impacts and requirements of the development based on a masterplan that represents an indicative proposal for the LWLV. More definitive proposals for the LWLV are unlikely before the development partners are confirmed. Consequently, both the TA and TP only provide a broad approximation of the likely impacts and requirements. Further iterations of the TA along with the individual travel plans (detailed and unit specific TPs) will be required to fully understand the transport impact and requirements of the final development proposals for LWLV. Consequently, transport related conditions will be required as part of any outline permission granted for the scheme.

The following comments are made in relation to the TA and TP supporting the Outline Planning Application:

Chapter 7 of the TA presents the 'Highway Capacity Assessment' undertaken for the LWLV. In reply to CCC's PAC response, the TA now includes additional analysis on pages 28 and 29:

- Setting out the target mode splits from the Framework Travel Plan for the LWLV; and
- Presenting a revised percentage impact assessment for the study area junctions.

No additional junction capacity analysis has been undertaken utilising the revised mode splits and associated traffic forecasts; with the TA stating that the revised figures are targets and have not therefore been used to inform the junction capacity assessments presented in the TA. Furthermore, no additional analysis has been provided with regards to the proposed phasing strategy for the development; required to determine the trigger points for the various mitigation proposals.

**An assessment should be provided within the TA that considers the traffic impact of the development based on the target mode splits and other elements of the LWLV Transport Implementation Strategy (TIS). This should be reflected utilising the junction models constructed for the study area. The highway mitigation proposals should be reviewed accordingly (both in relation to the above comments and more specific comments outlined below) and cross referenced with the proposed phasing strategy for the development so that trigger points can be identified for the various mitigation proposals.**

### **Public Transport**

The following comments were made by CCC in response to the PAC submissions for the LWLV development:

- On site bus waiting infrastructure should be of a high quality with real time information; and
- Bus priority measures should be considered to complement any bus proposals for the site i.e provision of new services or re-routing/extension of existing services.

**No additional information has been provided in the TA to address the above comments. Nevertheless, these elements can only be progressed once agreements have been reached with the bus operator on a bus service to serve the site. These agreements will need to be developed and confirmed during the relevant reserved matters stage and it is recommended that a joint approach be made for service improvements in conjunction with other development proposals in the area e.g. Llanelli North Dock Development.**

### **Walking and Cycling**

Active Travel work by CCC has led to the creation of Integrated Network Maps (INM) for the county; which forms the basis for improving connectivity between communities and to key leisure and employment sites.

Following CCC's recommendation during PAC, the INM's are now included in the TA. The TA also outlines proposals for walking and cycling improvements in the immediate vicinity of the development site and outlines elements that remain under consideration.

**Clarity is required as to exactly which improvements will be implemented as part of the development proposals. Further information should also be provided in the TA to demonstrate how the proposals will improve opportunities for walking and cycling between the site and surrounding areas (which may house future LWLV employees) and amenities (e.g. Llanelli Railway Station and Town Centre). Connectivity should be considered not only in relation to existing provision but also in terms of CCC's aspirations (as set out in the INMs) for future improvements.**

### **On Site Transport Infrastructure - Parking and Drop Off Facilities**

The following key comments were made by CCC in response to the PAC submissions for the LWLV development:

- It is recommended that the TA includes an indication of the likely parking provision based on the land uses and areas currently anticipated. The parking proposals can then be adjusted and agreed as the development proposals progress and are ultimately confirmed;
- There will be a requirement for some of the parking spaces to have electric charging points and for some further spaces to have the associated infrastructure in place for electric charging facilities to be provided in the future. The exact provision requirements will need to be agreed with CCC; and
- The TA explains that a coach drop-off facility will be provided on site and that the detailed design of this facility will be progressed at reserved matters stage. It is recommended that a drop off facility for taxis also be considered as part of this work.

Indicative parking numbers are now provided in Chapter 5 of the TA (5.9 Page 21); outlining a requirement for 620 spaces. It should be noted that 389 of these are based on forecast trip generation as opposed to CSS Wales guidelines. The TA explains that parking numbers will be subject to further revision as the application progresses.

**Whilst no additional information is provided in the TA, following comments made by CCC during PAC, regarding the provision of electric charging facilities or drop off facilities, all parking elements can be progressed and confirmed as part of the future reserved matters applications.**

### **On Site Transport Infrastructure – Access**

The following key comments were made by CCC in response to the PAC submissions for the LWLV development:

- The Swept Path analysis provided in the TA shows significant encroachment (into the adjacent carriageway or onto highway boundary land) when large refuse collection vehicles (utilised to show a worst case scenario) are entering and exiting the site. The TA should explain that the designs presented in the TA are conceptual and that the designs will be developed in due course and agreed as a reserved matter; and
- Road Safety Audits will be required to support the vehicular site access proposals.

**The Swept Path analysis is no longer presented in the TA and no commitments are provided in relation to associated Road Safety Audits. Access will therefore need to form part of a reserved matters application and Road Safety Audits will be required during detailed design of the site accesses.**

### **Off Site Highway Improvements – Mitigation**

The off-site highway improvements will be key in terms of mitigating the potential traffic impact of the LWLV development. In light of the forecast capacity problems (without improvements in place), mitigation is proposed at the following junctions:

- (J.1) Sandy Road Roundabout

**The improvements proposed at this junction need to be reconsidered; with consideration given to the existing congestion problems at the roundabout that have arisen following installation of the Iscoed Road / A484 Sandy Road Traffic Signals. Improvements to these junctions are essential in demonstrating that the proposed development can be accommodated from a transport perspective. CCC are currently progressing with work to improve operations at the Iscoed Road / A484 Sandy Road Traffic Signals; with the improvements scheduled to be trialled during the school summer holiday period. Should these schemes prove effective, CCC may require proportional contributions towards the implementation costs of these A484 improvements.**

- (J.10) B4304 Station Road / Queen Victoria / Murray Street Signals

**The proposed alterations to the signal timings could have a detrimental impact on pedestrians crossing at the junction. On this basis, consideration should be given to a localised signage strategy (see comments below on J.13 Trostre Roundabout for further information) that would minimise the volume of development traffic at the junction.**

- (J.12) Trostre Road / Trostre Park Road Roundabout

**It has been agreed that no improvements are required at this junction as part of the LWLV development; given that improvements are anticipated in conjunction with development aspirations for land adjacent to the roundabout.**

- (J.13) Trostre Roundabout – The TA should include options for improving this junction in conjunction with a localised signage strategy to direct LWLV traffic along the most appropriate and least congested routes; and
- (J.15) Half Way Signals – The proposal to prohibit the right turn movements from Llandafen Road and Glyncoed Terrace at the junction are not considered appropriate. The proposed improvement scheme should therefore be re-considered.

**Proposed improvements to the above junctions (J.13 - Trostre Roundabout and J.15 - Half Way Signals) are currently being considered by CCC as part of a package of improvements to the A4138. This package of improvements will be required to accommodate the LWLV and other major developments proposed within the Llanelli area. CCC may require proportional contributions towards the cost of implementing the A4138 schemes.**

## **FURTHER INFORMATION RECEIVED - LWLV OUTLINE PLANNING APPLICATION REVIEW**

The Highways Planning Liaison Team has undertaken a review of the updated Transport Assessment supporting the Llanelli Wellness Centre and Life Science Village (LWLV) Outline Planning Application.

For consistency purposes, the comments are structured in line with the initial response provided by the Highways Planning Liaison Team in relation to the Outline Planning Application. The comments made previously are shown in bold italic text whilst our latest comments are provided in bold red text.

### **Transport Implementation Strategy Modelling**

***An assessment should be provided within the TA that considers the traffic impact of the development based on the target mode splits and other elements of the LWLV Transport Implementation Strategy (TIS). This should be reflected utilising the junction models constructed for the study area. The highway mitigation proposals should be reviewed accordingly (both in relation to the above comments and more specific comments outlined below) and cross referenced with the proposed phasing strategy for the development so that trigger points can be identified for the various mitigation proposals.***

The Rev A Transport Assessments forms part of the ES Addendum; uploaded to the Planning Portal on 30/10/2018. The Transport Assessment has been updated to include a sensitivity test which outlines the potential traffic impact of the development proposals if a potential signage strategy and a successful Travel Plan were to be introduced.

The signage strategy is proposed to redirect traffic from the B4304 Station Road towards Llanelli Town Centre and the A4138 corridor towards the M4. For the purposes of this sensitivity test, it has also been assumed that the Travel Plan could reduce the proportion of car drivers from 68% to 58%. The Transport Assessment explains that the sensitivity test does not represent the most robust assessment scenario in the Transport Assessment and has therefore not been included in the Traffic Chapter of the ES and does not therefore change the assessment outcome of the April 2018 ES.

**Trigger points for the various mitigation proposals have not been identified within the TA. However, the trigger points have been identified by the Local Highway Authority and initial details of the necessary highway mitigation has been assessed for each individual development phase as currently proposed.**

### **Public Transport**

***No additional information has been provided in the TA to address the above comments (relating to Public Transport). Nevertheless, these elements can only be progressed once agreements have been reached with the bus operator on a bus service to serve the site. These agreements will need to be developed and confirmed during the relevant reserved matters stage and it is recommended that a joint approach be made for service improvements in conjunction with other development proposals in the area e.g. Llanelli North Dock Development.***

Section 5.7.1 of the Transport Assessment now states that Bus Service Agreements will need to be developed and confirmed during the relevant reserved matters stage. It also states that a joint approach would be a beneficial approach for service improvements in conjunction with other development proposals in the area.

**The LWLV development should not be occupied until a bus service agreement is confirmed for the site. Furthermore, the bus service for the site together with the necessary bus stop infrastructure should be secured and in place when the development opens to maximise bus use (8%) and to discourage use of the car for site travel.**

## Walking and Cycling

***Clarity is required as to exactly which improvements will be implemented as part of the development proposals. Further information should also be provided in the TA to demonstrate how the proposals will improve opportunities for walking and cycling between the site and surrounding areas (which may house future LWLV employees) and amenities (e.g. Llanelli Railway Station and Town Centre). Connectivity should be considered not only in relation to existing provision but also in terms of CCCs aspirations (as set out in the Integrated Network Maps - INMs) for future improvements.***

Section 5.6 of the Transport Assessment sets out the walking and cycling improvements proposed as part of this application including:

- several pedestrian and cycle crossings on the Coastal Link Road; and
- a commitment to provide high quality routes through the development site.

The Walking and Cycling proposals by the applicant to support the LWLV is as follows:

- Three crossings on the B4304 Coastal Link Road between the Copperhouse Roundabout and Delta Lakes Roundabout, including two signalised crossings and an uncontrolled crossing with a pedestrian refuge island.
- A signalised crossing for pedestrians and cyclists (TOUCAN) 125m south-east of the Copperhouse Roundabout; providing a link between the Millennium Coastal Path and the Shared footway cycleway through the LWLV development site. To accommodate pedestrians and cycles, this crossing would have a width of 6m, and a pedestrian refuge island, given the width of the road is 9.5m.
- A site access with a ghost island arrangement is proposed with the Coastal Link Road, 250m north-west of the Delta Lakes Roundabout. An uncontrolled pedestrian crossing with a refuge island is proposed directly west of this junction, providing an opportunity for pedestrians to cross near the junction. A second pedestrian crossing with a refuge island is proposed 160m west of the Delta Lakes Roundabout, adjacent to a potential link with the residential development to the south.
- The potential for a signalised crossing is being explored directly west of the Delta Lakes Roundabout. Whilst there is an existing uncontrolled pedestrian crossing with a refuge island at this location, it is considered that residents and visitors of the LWLV development will increase pedestrian footfall to the eco-park. As a result, a controlled crossing is being considered. This could be a TOUCAN crossing to provide a link for cyclists to the Millennium Coastal Path.
- In addition to the crossings on the Coastal Link Road, an uncontrolled pedestrian crossing with a refuge island is proposed on The Avenue, approximately 70m south of the junction with Northumberland Road. A 4m wide shared footway/cycleway is also proposed on western side of The Avenue between the Machynys Roundabout and the junction with Northumberland Road.
- A footway is proposed on the south side of Copperhouse Road and Northumberland Road, providing a link between the Coastal Link Road and The Avenue.
- Cycle parking for staff and visitors will be provided in accordance with the adopted CSS Wales Parking Standards (2008).

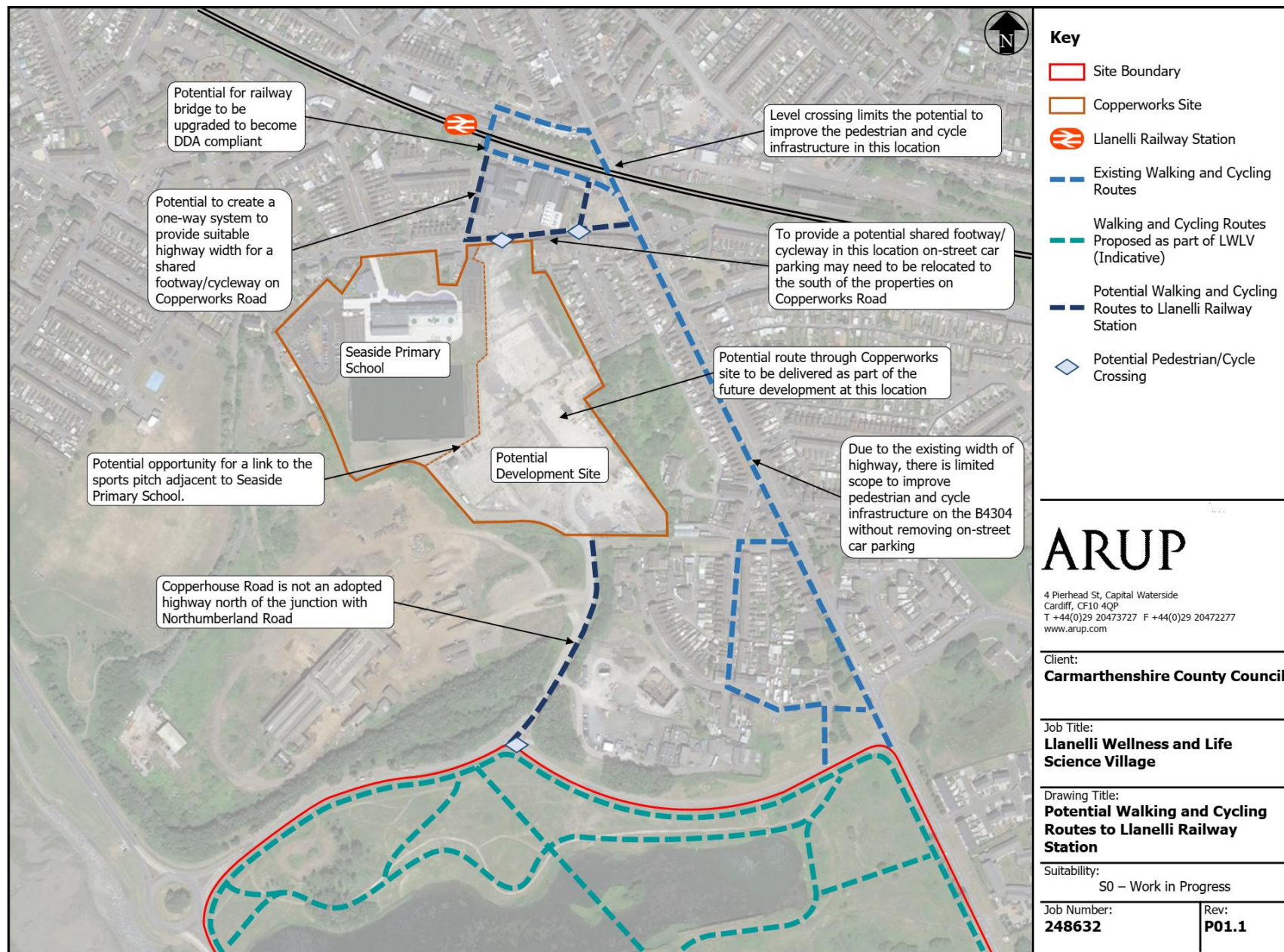
**It is unclear at this stage whether the signalised crossing directly west of the Delta Lakes Roundabout (as per the 4<sup>th</sup> bullet above) is to be provided or not. Clarification is therefore required on this matter. Furthermore, any crossing provided at this location would need to be a Toucan Crossing; accommodating both pedestrians and cyclists accessing the site from the coastal path.**

Within Section 5.6 of the TA it is explained that further contributions towards the pedestrian and cycle network (as presented in the INMs for Llanelli) is not considered to be required; given the significant improvements already proposed (as outlined in the bullets above). It is also explained that CCC requested that potential pedestrian and cycle links, between the development site and Llanelli railway station, be explored, including the possibility of utilising the Copperworks site that has been partially developed for a primary school. Nonetheless, it is explained that these routes require land outside of the redline boundary and the extent of the adopted highway and therefore it is not possible to provide these potential routes as part of the LWLV proposals. The potential routes are presented on Figure 12 (copied overleaf) and require 3rd party land including the Copperworks site.

This section of the TA concludes by stating that:

- the Copperworks site is understood to be identified as a potential development site which could provide the walking and cycling route towards the railway station; and that
- an alternative route along the B4304 is not considered to be viable without the removal of on-street parking which is anticipated to be unacceptable.

**Proposals for provision of routes in accordance with the requirements of the Active Travel (Wales) 2013 Act have not been provided, however the Local Highways Authority have published INMs. In particular, current proposals include active travel links from Copperhouse roundabout towards the Trostre roundabout (see drawing no. 40432/FEA01). A request is made for developer contributions to provide the new link between the Copperhouse roundabout and the junction with Northumbria Road. The consideration is a contribution of £47,000 towards provision of this route.**



## On Site Transport Infrastructure - Parking and Drop Off Facilities

***Whilst no additional information is provided in the TA, following comments made by CCC during PAC, regarding the provision of electric charging facilities or drop off facilities, all parking elements can be progressed and confirmed as part of the future reserved matters applications.***

Section 5.9 of the Transport Assessment explains that LWLV is seeking outline planning approval and that the quantum of parking has not yet been agreed. Consequently, the parking spaces presented on the Site Layout Plan are illustrative. Nonetheless, initial parking estimates are presented in Table 7 (copied below); albeit that they will be subject to further revision as the application progressed

**Table 7: Initial Parking Provision Estimate**

| Land Use                                                 | Factor                                                                               | Quantum                                                                                         | Parking Requirements |
|----------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|----------------------|
| Institute of Life Science and Life Science Business Park | 1 space per 80m <sup>2</sup>                                                         | 17,500m <sup>2</sup>                                                                            | 219                  |
| Wellness Education Centre                                | Teaching hospital not included within parking standards.                             | Parking requirements based on forecast vehicle trip generation                                  | 75                   |
| Clinical Delivery Centre and Rehabilitation Centre       | 4 spaces per practitioners and 1 space per 3 ancillary staff                         | Data not available at this time, parking requirements based on forecast vehicle trip generation | 63                   |
| Wellness Hub                                             | 1 space per two facility users and 1 space per 3 spectators                          | Data not available at this time, parking requirements based on forecast vehicle trip generation | 123                  |
| Nurses Care Home and Assisted Living                     | 1 space per resident staff<br>1 space per 3 non-resident staff<br>1 space per 4 beds | Data not available at this time, parking requirements based on forecast vehicle trip generation | 128                  |
| Sport Pitches                                            | 12 spaces per pitch                                                                  | Two 5-a-side pitches considered to equate to one full sized pitch                               | 12                   |
| <b>Total</b>                                             |                                                                                      |                                                                                                 | <b>620</b>           |

**The application for planning permission is in outline with all matters reserved. Further submissions and approval for on-site parking will be required as part of the future reserved matters applications.**

## On Site Transport Infrastructure – Access

***Swept Path analysis is no longer presented in the TA and no commitments are provided in relation to associated Road Safety Audits (for the site accesses). Access will therefore need to form part of a reserved matters application and Road Safety Audits will be required during detailed design of the site accesses.***

Section 5.8 of the Transport Assessment outlines that a total of five vehicle accesses are proposed into the development site, as set out below:

- Southern access via the Delta Lakes roundabout;
- Priority junction with a ghost island arrangement on the Coastal Link Road;
- Two simple priority junctions with the Avenue; and
- A simple priority junction with Copperhouse Road.

The Transport Assessment also states that detailed design of these site accesses will form part of the reserved matters application and will be subjected to a Road Safety Audit. Nonetheless, the preliminary designs of the site access arrangements are presented and described in the Transport Assessment.

**The application for planning permission is in outline with all matters reserved. Further submissions and approval for the site accesses will be required as part of the future reserved matters applications.**

## Off Site Highway Improvements – Mitigation

*The off-site highway improvements will be key in terms of mitigating the potential traffic impact of the LWLV development. In light of the forecast capacity problems (without improvements in place), mitigation is proposed at the following junctions:*

- ***(J.1) Sandy Road Roundabout***

*The improvements proposed at this junction need to be reconsidered; with consideration given to the existing congestion problems at the roundabout that have arisen following installation of the Iscoed Road / A484 Sandy Road Traffic Signals. Improvements to these junctions are essential in demonstrating that the proposed development can be accommodated from a transport perspective. CCC are currently progressing with work to improve operations at the Iscoed Road / A484 Sandy Road Traffic Signals; with the improvements scheduled to be trialled during the school summer holiday period. Should these schemes prove effective, CCC may require proportional contributions towards the implementation costs of these A484 improvements.*

- ***(J.10) B4304 Station Road / Queen Victoria / Murray Street Signals***

*The proposed alterations to the signal timings could have a detrimental impact on pedestrians crossing at the junction. On this basis, consideration should be given to a localised signage strategy (see comments below on J.13 Trostre Roundabout for further information) that would minimise the volume of development traffic at the junction.*

- ***(J.12) Trostre Road / Trostre Park Road Roundabout***

*It has been agreed that no improvements are required at this junction as part of the LWLV development; given that improvements are anticipated in conjunction with development aspirations for land adjacent to the roundabout.*

- ***(J.13) Trostre Roundabout – The TA should include options for improving this junction in conjunction with a localised signage strategy to direct LWLV traffic along the most appropriate and least congested routes; and***

- ***(J.15) Half Way Signals – The proposal to prohibit the right turn movements from Llandafen Road and Glyncoed Terrace at the junction are not considered appropriate. The proposed improvement scheme should therefore be re-considered.***

*Proposed improvements to the above junctions (J.13 - Trostre Roundabout and J.15 - Half Way Signals) are currently being considered by CCC as part of a package of improvements to the A4138. This package of improvements will be required to accommodate the LWLV and other major developments proposed within the Llanelli area. CCC may require proportional contributions towards the cost of implementing the A4138 schemes.*

Section 8 of the Transport Assessment (Mitigation Chapter) confirms that the following junctions are forecast to exceed practical capacity in the future year scenario 2023 with Committed Development and the LWLV in place:

- Junction 1: A484/Coastal Link Road/Sandpiper Road Sandy Roundabout;
- Junction 10: Station Road Traffic Signals;
- Junction 13: A4138/Trostre Road/A484 Trostre Roundabout; and
- Junction 14/15: Halfway Traffic Signals.

## Mitigation - Travel Plan and Signage Strategy

Section 8.1 (Travel Plan and Signage Strategy) explains that further analysis has been undertaken to reflect the impacts of the proposed sustainable travel measures on the mode split, and the resulting traffic impact of the development on the local highway network. Outline targets have been developed to reduce the overall number of trips made to the site by car (drivers). The target model split is set out in Table 28 (copied below).

**Table 28: Modal Split Targets presented in the Framework Travel Plan**

| Mode                               | TS Modal Split | Travel Plan Year |             |             |             |             | Target Modal Split |
|------------------------------------|----------------|------------------|-------------|-------------|-------------|-------------|--------------------|
|                                    |                | 1                | 2           | 3           | 4           | 5           |                    |
| Car driver                         | 68%            | 66%              | 64%         | 62%         | 60%         | 58%         | 58%                |
| Car passenger                      | 7%             | 8%               | 8%          | 8%          | 8%          | 9%          | 9%                 |
| Public transport (Bus/coach/train) | 5%             | 5%               | 6%          | 7%          | 8%          | 8%          | 8%                 |
| Cycling                            | 2%             | 2%               | 2%          | 3%          | 3%          | 3%          | 3%                 |
| Walking                            | 17%            | 18%              | 19%         | 19%         | 20%         | 21%         | 21%                |
| Taxi                               | 1%             | 1%               | 1%          | 1%          | 1%          | 1%          | 1%                 |
| <b>Total</b>                       | <b>100%</b>    | <b>100%</b>      | <b>100%</b> | <b>100%</b> | <b>100%</b> | <b>100%</b> | <b>100%</b>        |

Using the target modal split and signage strategy, a revised percentage impact is presented on Table 29 of the TA. Table 29 from the TA is copied below alongside the original percentage impact (TA Table 21) whereby no signage strategy or revised modal split was applied.

**Table 29: Percentage Impact Assessment (with Travel Plan and Signage Strategy)**

| Junction                                                                | Percentage Impact |       | Original Percentage Impact (Table 21) |       |
|-------------------------------------------------------------------------|-------------------|-------|---------------------------------------|-------|
|                                                                         | AM                | PM    | AM                                    | PM    |
| 1. Sandy Roundabout (A484/Coastal Link Road/Sandpiper Road)             | 7.3%              | 7.4%  | 7.3%                                  | 7.3%  |
| 2. Seaside Roundabout (Coastal Link Road/Queen Victoria Way)            | 11.1%             | 11.5% | 11.0%                                 | 11.2% |
| 3. Lliedi Roundabout (Coastal Link Road/Marine Street/North Dock)       | 15.8%             | 14.2% | 14.6%                                 | 12.8% |
| 4. Copperhouse Roundabout (Coastal Link Road/Copperhouse Road)          | 29.1%             | 12.4% | 26.9%                                 | 10.8% |
| 5. Delta Lakes Roundabout (Coastal Link Road/Delta Lakes/Access Road)   | 35.9%             | 37.3% | 39.1%                                 | 39.5% |
| 6. Machynys Roundabout (Coastal Link Road/The Avenue/Nicklaus Avenue)   | 19.4%             | 18.7% | 22.8%                                 | 21.3% |
| 7. The Avenue/Northumberland Road Priority Junction                     | 8.5%              | 8.8%  | 29.2%                                 | 22.4% |
| 8. The Avenue/Embankment Road/North Dock Road Priority Junction         | 4.4%              | 5.7%  | 24.3%                                 | 18.9% |
| 9. B4304 Station Road/Glanmor Road/Marsh Street Mini-Roundabout         | 1.7%              | 2.5%  | 9.1%                                  | 8.4%  |
| 10. B4304 Station Road/Queen Victoria/Murray Street Signalised Junction | 1.2%              | 1.5%  | 7.1%                                  | 5.7%  |
| 11. Morfa Roundabout (Coastal Link Road/Lower Trostre Road)             | 17.1%             | 16.1% | 17.0%                                 | 15.8% |
| 12. Trostre Road/Trostre Parc Roundabout                                | 10.3%             | 5.2%  | 13.5%                                 | 6.8%  |
| 13. Trostre Roundabout (A484/Trostre Road/A4138)                        | 5.0%              | 5.2%  | 6.6%                                  | 6.8%  |
| 14. A4138/Pemberton Access Signalised Junction                          | 5.5%              | 5.1%  | 7.9%                                  | 7.3%  |
| 15. A4138/ Llandafen Road/Glyncoed Road Signalised Crossroads           | 4.7%              | 4.4%  | 6.7%                                  | 6.2%  |

**The results presented in Table 29 indicate that the Travel Plan and Signage Strategy would have the desired effect of limiting the volume of development traffic travelling through Llanelli Town Centre and the B4304 (The Avenue, New Dock Road and Station Road). This is confirmed in the Junction Assessment Summary Results Tables 22 and 30 of the TA. These tables have been combined and are shown overleaf.**



## Combined TA Tables 22 and 30 – Summary of Junction Capacity Results with and without Mitigation

| Junction                                                                |                                 |        | 2023 with Committed Development and LWLV |        | 2033 with Committed Development and LWLV |        | 2023 with Committed Development and LWLV  |        | 2033 with Committed Development and LWLV |        |
|-------------------------------------------------------------------------|---------------------------------|--------|------------------------------------------|--------|------------------------------------------|--------|-------------------------------------------|--------|------------------------------------------|--------|
|                                                                         | 2023 with Committed Development |        | No Mitigation                            |        |                                          |        | With Travel Planning and Signage Strategy |        |                                          |        |
|                                                                         | AM                              | PM     | AM                                       | PM     | AM                                       | PM     | AM                                        | PM     | AM                                       | PM     |
| 1. Sandy Roundabout (A484/Coastal Link Road/Sandpiper Road)             | 0.82                            | 0.94   | 0.91                                     | 1.09   | 1.01                                     | 1.18   | 0.91                                      | 1.09   | 1.01                                     | 1.18   |
| 2. Seaside Roundabout (Coastal Link Road/Queen Victoria Way)            | 0.68                            | 0.70   | 0.80                                     | 0.81   | 0.86                                     | 0.88   | 0.80                                      | 0.81   | 0.86                                     | 0.88   |
| 3. Lledi Roundabout (Coastal Link Road/Marine Street/North Dock)        | 0.41                            | 0.44   | 0.48                                     | 0.61   | 0.52                                     | 0.66   | 0.48                                      | 0.62   | 0.52                                     | 0.67   |
| 4. Copperhouse Roundabout (Coastal Link Road/Copperhouse Road)          | 0.29                            | 0.35   | 0.37                                     | 0.42   | 0.39                                     | 0.45   | 0.37                                      | 0.43   | 0.40                                     | 0.46   |
| 5. Delta Lakes Roundabout (Coastal Link Road/Delta Lakes/Access Road)   | 0.36                            | 0.46   | 0.49                                     | 0.56   | 0.52                                     | 0.60   | 0.48                                      | 0.56   | 0.52                                     | 0.60   |
| 6. Machynys Roundabout (Coastal Link Road/The Avenue/Nicklaus Avenue)   | 0.41                            | 0.49   | 0.48                                     | 0.55   | 0.51                                     | 0.59   | 0.47                                      | 0.55   | 0.50                                     | 0.59   |
| 7. The Avenue/Northumberland Road Priority Junction                     | 0.05                            | 0.05   | 0.05                                     | 0.06   | 0.06                                     | 0.06   | 0.05                                      | 0.06   | 0.06                                     | 0.06   |
| 8. The Avenue/Embankment Road/North Dock Road Priority Junction         | 0.08                            | 0.09   | 0.08                                     | 0.09   | 0.09                                     | 0.10   | 0.08                                      | 0.09   | 0.09                                     | 0.10   |
| 9. B4304 Station Road/Glanmor Road/Marsh Street Mini-Roundabout         | 0.36                            | 0.50   | 0.44                                     | 0.54   | 0.47                                     | 0.59   | 0.38                                      | 0.52   | 0.41                                     | 0.57   |
| 10. B4304 Station Road/Queen Victoria/Murray Street Signalised Junction | 28.9%                           | -6.4%  | 17.4%                                    | -11.7% | 8.4%                                     | -20.3% | 27.7%                                     | -6.9%  | 17.8%                                    | -16.1% |
| 11. Morfa Roundabout (Coastal Link Road/Lower Trostre Road)             | 0.51                            | 0.74   | 0.62                                     | 0.80   | 0.68                                     | 0.89   | 0.68                                      | 0.83   | 0.73                                     | 0.93   |
| 12. Trostre Road/Trostre Parc Roundabout                                | 0.65                            | 0.75   | 0.80                                     | 0.93   | 0.86                                     | 1.01   | 0.76                                      | 0.88   | 0.82                                     | 0.96   |
| 13. Trostre Roundabout (A484/Trostre Road/A4138)                        | 0.91                            | 0.99   | 1.04                                     | 1.04   | 1.13                                     | 1.13   | 1.00                                      | 1.02   | 1.10                                     | 1.12   |
| 14. A4138/Pemberton Access Signalised Junction                          | 49.7%                           | 32.0%  | 49.7%                                    | 4.9%   | 31.2%                                    | 21.4%  | 48.8%                                     | 28.7%  | 37.4%                                    | 21.4%  |
| 15. A4138/ Llandafen Road/Glyncod Road Signalised Crossroads            | -8.0%                           | -11.1% | -15.2%                                   | -16.4% | -24.4%                                   | -25.7% | -14.0%                                    | -13.5% | -23.1%                                   | -22.7% |
| Proposed LWLV Site Access/Coastal Link Road Priority Junction           | -                               | -      | 0.04                                     | 0.06   | 0.04                                     | 0.07   | 0.03                                      | 0.07   | 0.03                                     | 0.07   |
| Proposed LWLV Site Access/The Avenue Priority Junctions                 | -                               | -      | 0.03                                     | 0.06   | 0.03                                     | 0.06   | 0.03                                      | 0.06   | 0.03                                     | 0.06   |
| Proposed LWLV Site Access/Copperhouse Road Priority Junction            | -                               | -      | 0.00                                     | 0.01   | 0.00                                     | 0.01   | 0.00                                      | 0.01   | 0.00                                     | 0.01   |

## Highway Mitigation Proposals and Requirements

As outlined earlier in this report, trigger points for the various mitigation proposals have not been identified within the TA. However, the trigger points have been identified by the Local Highway Authority and initial details of the necessary highway mitigation has been assessed for each individual development phase as currently proposed. Further information is provided below:

- ***(J.1) Sandy Road Roundabout***

The addition of the travel plan and signage strategy provides limited benefit at this junction and the assessment results are similar to the scenarios that do not consider either of these. Consequently, the original improvement scheme remains proposed at this junction to mitigate the impact of the LWLV development trips. This mitigation scheme (as detailed in Section 8.3 of the TA) includes the following:

- Increasing the flare from 5m to 15m on the A484 Pembrey Road entry
- Increase the entry widths of the B4304 Beach Road arm to 7.5m and extend the flare from 10m to 30m.

Section 8.3.1 of the TA also notes that there are existing congestion problems at Iscoed Road / A484 Sandy Road signalised junction that impacts on the operation of the Sandy Road Roundabout. Furthermore, the TA states that it is considered appropriate that a suitable contribution be made to wider improvement in this area should they be implemented by CCC

Whilst it is expected that proposed mitigation at identified sites remote from Sandy roundabout are to be provided via an appropriate agreement with Highways, the works at Sandy Roundabout shall be provided via developer contributions, for which we have requested and agreed a sum of £40,000. The contribution will be used to upgrade Sandy roundabout to mitigate for the proposed development. Whilst we continue to explore major scheme solutions for Sandy roundabout and have a number of conceptual Schemes to develop further these need not delay the discussions for the Wellness Village. This mitigation is required i.e. a trigger point to accommodate traffic generated by Phases 1 and 2.

- ***(J.10) B4304 Station Road / Queen Victoria / Murray Street Signals***

With the addition of the travel plan and signage strategy the impact of development trips is less than 1.5% at this junction. Consequently, no mitigation is proposed at this location and is considered acceptable.

- ***(J.12) Trostre Road / Trostre Park Road Roundabout***

It has been agreed that no improvements are required at this junction as part of the LWLV development; given that improvements are anticipated in conjunction with development aspirations for land adjacent to the roundabout.

- ***(J.13) Trostre Roundabout***

The percentage impact of the proposed development at this junction is 5.0% in the AM peak hour and 5.2% in the PM peak hour. The junction is also forecast to exceed theoretical capacity in both peak periods during 2033.

Given the quantum of planned and committed development proposed in Llanelli, it is stated in Section 8.4 of the TA, that the Trostre Roundabout would benefit from a wider mitigation scheme that considers the impact of all these committed developments, with an appropriate contribution from LWLV.

**Contribution towards the signalisation of the roundabout (A4138 Strategy); to be confirmed following confirmation of the actual development mix during appropriate reserved matters stage(s). This mitigation is required i.e. a trigger point to accommodate traffic generated by Phases 3 and 4.**

- ***(J14/15) Halfway Traffic Signals.***

The percentage impact of the proposed development at Junction 14 is 5.5% in the AM peak hour and 5.1% in the PM peak hour. At Junction 15, the impact of development is 4.7% in the AM peak hour and 4.4% in the PM peak hour.

With the addition of travel plan measures and the signage strategy, Junction 15 is forecast to exceed theoretical capacity in 2023 and 2033 with the addition of LWLV trips. Junction PRC for both the AM and PM peaks in 2023 is in the region of -14%. This shows a slight improvement when compared to the assessment of the equivalent junction scenarios without the benefit of travel plan measures and the signage strategy, where the PRC was -16% and -25% for 2023 and 2033 respectively.

The original mitigation scheme remains proposed at this location which incorporates:

- Extension of the Right Turn Lane from the A4138 to Llandafen Road; and
- Banning right turn movements from Llandafen Road and Glyncoed Terrace

The TA explains that whilst the mitigation scheme is shown to provide a betterment further analysis would be beneficial to understand impacts on neighbouring junctions.

**Contribution towards the improvements proposed at this junction, forming part of the A4138 Strategy; to be confirmed following confirmation of the actual development mix during appropriate reserved matters stage(s). This mitigation is required i.e. a trigger point to accommodate traffic generated by Phases 3 and 4.**

### **Construction Traffic Management**

Section 9 of the Transport Assessment address the management of construction traffic. It explains that the impact of construction traffic on the network is not expected to cause undue inconvenience to other road users given the proximity of the site to the strategic road network. However, to ensure that construction activity is minimised there is a recommendation that the contractor(s) produces a Construction Traffic Management Plan (CTMP) in consultation with CCC.

### **Recommendation**

Any permission that the Planning Authority may give should include the following condition(s).

**Condition(s):**

1. Prior to use of any access road by vehicular traffic, visibility splay in compliance with Technical Advice Note 18 (Transport) page 44 shall be formed and thereafter retained in perpetuity, either side of the centre line of the access road in relation to the nearer edge of carriageway.
2. Prior to the commencement of each and any phase of the development the written approval of the Local Planning Authority shall be obtained for a scheme of parking and turning facilities within the curtilage of the site, and this shall be dedicated to serve the proposal. The approved scheme is to be fully implemented prior to any part of the phase being brought into use, and thereafter shall be retained, unobstructed, in perpetuity. In particular, no part of the parking or turning facilities is to be obstructed by non-motorised vehicles.
3. All surface water from the development herewith approved shall be trapped and disposed of so as to ensure that it does not flow on to any part of the public highway.
4. No surface water from the development herewith approved shall be disposed of, or connected into, existing highway surface water drains.
5. Prior to the commencement of each individual development phase the written approval of the Local Planning Authority is to be obtained for a scheme detailing the provision and frequency of use of facilities for washing down the wheels of construction vehicles prior to entering the public highway.
6. Prior to commencement of each individual development phase a detailed Construction Traffic Management Plan is submitted for the written approval of the Local Planning Authority and thereafter shall be implemented in full and in accordance with the approved details.
7. Prior to commencement of each individual development phase a detailed Travel Plan and signing strategy, setting out ways of reducing car usage, increasing walking and cycling and directing traffic to and from the development, shall be submitted to and agreed in writing by the Local Planning Authority. The detailed Travel Plans shall be implemented and monitored on a yearly basis in accordance with the approved details at a timescale to be approved in writing by the Local Planning Authority.
8. Prior to occupation of any part of the development herewith approved, a Travel Plan Coordinator must be assigned to supervise the Travel Plan in perpetuity.

**Phases 1 & 2**

9. Prior to beneficial occupation of any part of Phases 1 & 2 development herewith approved, provision of a public bus service to serve the site together with necessary bus stop infrastructure shall be submitted for the written approval of the Local Planning Authority.

10. Prior to beneficial occupation of any part of Phases 1 & 2 development herewith approved, Walking and Cycling elements of the overall transport strategy for the site shall be submitted for the written approval of the Local Planning Authority.

### **Phases 3 & 4**

11. Prior to commencement of Phase 3, a Highways Mitigation Phasing Plan shall be submitted for the written approval of the Local Planning Authority and implemented in full.

### **Reason(s):**

In the interests of highway safety.

### **Other Observation(s):**

1. Whilst it is expected that proposed mitigation at identified sites remote from Sandy roundabout are to be provided via an appropriate agreement with Highways, the works at Sandy Roundabout shall be provided via developer contributions, for which we have requested and **agreed a sum of £40,000**. The contribution will be used to upgrade Sandy roundabout to mitigate for the proposed development. Whilst we continue to explore major scheme solutions for Sandy roundabout and have a number of conceptual Schemes to develop further these need not delay the discussions for the Wellness Village. This mitigation is required i.e. a trigger point to accommodate traffic generated by Phases 1 and 2.
2. If the applicant intends to offer the proposed estate road for adoption to the highway Authority under Section 38 of the Highways Act 1980, then he is advised to contact the Authority's Highways Adoptions officer Mr Gary Clarke, at the earliest opportunity.
3. Any amendment or alteration of an existing public highway in connection with a new development shall be undertaken under a Section 278 Agreement of the Highways Act 1980. It is the responsibility of the developer to request the Local Highway Authority to proceed with this agreement and the developer is advised that the total costs of entering into such an agreement, as well as the costs of undertaking any physical works on site, shall be met by him.
4. It is the responsibility of the developer to contact the Streetworks Manager of the Local Highway Authority to apply for a Streetworks Licence before undertaking any works on an existing Public Highway.
5. Where road widening or footway provision is required by the Local Highway Authority, the interests of the landowner are best served by such areas being dedicated to the Local Highway Authority.
6. The applicant is strongly urged to consider provision of electric car charging points. Further advice can be obtained by contacting the Authority's Transport Planning officer Mr Thomas Evans, at the earliest opportunity.
7. The Local Highways Authority have published INMs. In particular, current proposals include active travel links from Copperhouse roundabout towards the

Trostre roundabout (see drawing no. 40432/FEA01). A request is made for developer contributions to provide the new link between the Copperhouse roundabout and the junction with Northumbria Road. The consideration is a **contribution of £47,000** towards provision of this route. Justification for this is to conform with the requirements of the Active Travel Act – this provides an important short link that will connect to the wider Llanelli network currently under development, and in doing so links to key residential retail and public transport sites within the town and connecting the Wellness Village into the wider northern Strategic Link that ties Trostre, the town centre and Prince Phillip Hospital.

8. The LWLV development should not be occupied until a bus service agreement is confirmed for the site. Furthermore, the bus service for the site together with the necessary bus stop infrastructure should be secured and in place when the development opens to maximise bus use ( to achieve the 8% Framework Travel Plan target for public transport) and to discourage use of the car for site travel.

**S G Pilliner.**

Head of Highways and Transport  
Pennaeth Priffyrdd a Thrafnidiaeth