



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

# Llyn Tegid Reservoir Safety Project



## Environmental Constraints and Opportunities Record

Version: 8.0

## Version History:

| Document Version | Date Published | Project Stage  |
|------------------|----------------|--|
| 1.0              | Mar-2018       | <i>Draft Scoping - for NRW internal review</i>                                   |
| 2.0              | June-2018      | <i>Final Scoping - for NRW Enviro PM comment</i>                                 |
| 3.0              | July-2018      | <i>Final Scoping - for NRW internal review</i>                                   |
| 4.0              | Aug-2018       | <i>Final Scoping - for external review</i>                                       |
| 5.0              | Sept-2018      | <i>Final Scoping - following external review</i>                                 |
| 6.0              | Aug-2019       | <i>Draft Update to Part A and completion of Part B – for NRW internal review</i> |
| 7.0              | Sept-2019      | <i>Final Impact Assessment – for NRW review</i>                                  |
| 8.0              | Nov-2019       | <i>Final Impact Assessment – for consenting</i>                                  |

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## i. Crynodeb Gweithredol

Paratowyd y Cofnod Cyfyngiadau a Chyfleoedd Amgylcheddol (ECOR) hwn er mwyn dogfennu'r asesu amgylcheddol sy'n gysylltiedig â chynllunio'r gwaith addasu i strwythurau cronni Llyn Tegid. Mae'r gwaith hwn yn angenrheidiol er mwyn sicrhau bod y strwythurau'n gallu dygymod yn ddiogel â'r gorlwytho o achos stormydd, llifogydd a thonnau; nodwyd bod angen y gwelliannau diogelwch hyn yn adroddiad Adran 10 ym mis Tachwedd 2014.

Cwblhawyd Rhan 1 yr adroddiad hwn ym mis Medi 2018, ar ôl nodi'r opsiwn oedd yn cael ei ffafrio, gydag Adran 1 yn rhoi cyflwyniad i'r cynllun a'r broses asesu amgylcheddol, Adran 2 yn amlinellu'r llinell sylfaen amgylcheddol, Adran 3 yn crynhoi'r broses werthuso opsiynau, ac Adran 4 yn ystyried asesu amgylcheddol cychwynnol a chwmpas arfaethedig asesu pellach. Mae Rhan B bellach wedi ei chwblhau ar gyfer y cam (cynllunio manwl) hwn, gydag Adran 6 yn nodi manylion effeithiau amgylcheddol a lliniaru a ddatblygwyd, ac Adran 7 yn rhoi manylion gwelliannau amgylcheddol i weithredu'r amcanion ehangach sy'n gysylltiedig â'r prosiect. Pan fo angen, cafodd Rhan A ei diweddarau ar gyfer y cam hwn.

Bydd yr ECOR hwn yn cael ei ddefnyddio i roi crynodeb o'r asesu amgylcheddol sydd wedi digwydd i ran-ddeiliaid mewnol ac allanol, rheoleiddwyr, cymeradwywyr a thrwyddedwyr.

Mae'r hoff opsiwn yn cynnwys diogelu glan ogleddol Llyn Tegid yn bennaf, a glan chwith Afon Dyfrdwy, i sicrhau gorlifo diogel yn ystod digwyddiad cynllunio storm. Bydd hyn yn cynnwys atgyfnerthu wyneb y glannau tuag at y tir / i lawr yr afon gyda mat geodecstil 3D ('Enkamat' neu rywbeth tebyg), a gwella'r cerrig mân sy'n diogelu'r llethr i fyny'r afon ar lan y llyn ar hyn o bryd, gyda deunydd carreg ychwanegol wedi ei fewnforio.

Llyn Tegid yw llyn naturiol mwyaf Cymru, ac mae o fewn, ac yn cyfrannu at, ardal werthfawr a golygfaol o Barc Cenedlaethol Eryri. Mae llwybrau troed yno gan gynnwys Hawliau Tramwy Cyhoeddus ar hyd crib glannau'r llyn, sy'n cael eu defnyddio'n aml drwy gydol y flwyddyn. Mae'r Bala'n denu llawer o ymwelwyr ac yn bwysig i'r economi leol. Mae'r llyn a'i chyrsiau dŵr cysylltiedig, Afon Dyfrdwy ac Afon Tryweryn, yn boblogaidd ymysg pysgotwyr, pobl sy'n hoffi chwaraeon dŵr a gweithgareddau hamdden eraill. Mae'r llyn a'i chyrsiau dŵr cysylltiedig hefyd, sydd o bwysigrwydd ecolegol cenedlaethol a rhyngwladol, yn cael eu diogelu o dan Ardal Gadwraeth Arbennig (AGA) Afon Dyfrdwy a Llyn Tegid, safle Ramsar Llyn Tegid a dau Safle o Ddiddordeb Gwyddonol Arbennig (SoDdGA); mae SoDdGA Llyn Tegid yn cynnwys y llyn a SoDdGA Afon Dyfrdwy'n cynnwys Afon Tryweryn ac Afon Dyfrdwy.

Mae Adran 6 (a Thabl 6.1 yn arbennig) yn nodi'r hyn a ddarganfuwyd wrth asesu effeithiau amgylcheddol tebygol a'r lliniaru cysylltiedig a monitro a fydd ei angen. Mae Tabl ii isod yn crynhoi'r pynciau allweddol, yr effeithiau a lliniaru.

**Tabl i – Pynciau Allweddol, Effeithiau Tebygol a Lliniaru**

| Pwnc   | Effeithiau Amgylcheddol a Ragwelir   | Lliniaru   |
|--|--|--|
| <p><b>Poblogaeth ac Iechyd Pobl</b></p>      | <ul style="list-style-type: none"> <li>• Effeithiau dros dro yn ystod y cyfnod adeiladu</li> <li>• Ymyrryd â hamdden – defnyddwyr / defnydd</li> </ul>   | <ul style="list-style-type: none"> <li>• Adfer llwybrau troed yn llwyr i'r un safon neu i safon well ar ôl cwblhau'r gwaith</li> <li>• Gweithredu gwelliannau i arwynebedd, hygyrchedd a manau eistedd llwybrau troed</li> <li>• Cynllunio'r gwaith, gwyradau'r llwybrau troed, a manylion y gwaith adfer i'w cytuno â'r Swyddog Hawliau Tramwy (Cyngor Sir Gwynedd)</li> </ul>  |
| <p><b>Bioamrywiaeth a Gwarchod Natur</b></p> | <ul style="list-style-type: none"> <li>• Gwaith o fewn / effeithiau posibl ar ardal warchoddedig RAMSAR / SoDdGA Llyn Tegid ac ACA Afon Dyfrdwy a Llyn Tegid</li> <li>• Clirio coed / llystyfiant, yn arwain at y posibilrwydd o golli cysylltedd ecolegol gan gynnwys trywydd hedfan ystlumod, a cholli coed sydd â nythod ystlumod</li> <li>• Effeithiau posibl ar rywogaethau a warchodir (dyfrgwn ac ystlumod)</li> <li>• Gwasgariad posibl Rhywogaethau Estron a Goresgynol (INNS)</li> <li>• Effeithiau posibl ar ymlusgiaid (nadoedd defaid)</li> </ul> | <ul style="list-style-type: none"> <li>• Cynnal Asesiad Addas o Reoliadau Cynefinoedd</li> <li>• Strategaeth blannu lliniaru yn cael ei datblygu yn lle swyddogaeth a gwerth ecolegol y coedlinau cyfredol</li> <li>• Sbesimenau o goed gwerthfawr i'w cadw a'u diogelu pan fo'n bosibl</li> <li>• Os bydd coed sydd â photensial uchel o gynnwys clwydfan ystlumod yn cael eu cwmpo, bydd angen archwiliad gan ecolegydd ystlumod trwyddedig yn union cyn cwmpo ac/neu oruchwyliaeth yn ystod y gwaith cwmpo</li> <li>• Darparu blychau ystlumod i gynyddu nifer ac ansawdd y clwydfannau ystlumod sydd ar gael</li> <li>• Arolygon cyn adeiladu ar gyfer dyfrgwn, ymlusgiaid a moch daear</li> <li>• Lliniaru cyn ac yn ystod adeiladu yn erbyn effeithiau ar rywogaethau a warchodir – i'w reoli drwy gynllun Gweithredu Amgylcheddol</li> <li>• CNC yn rheoli rhywogaethau estron a goresgynol (INNS) yn ystod hafau 2018 a 2019. Ymgymryd â gwaith i gael gwared o Glymog Japan a rheolaeth barhaus o Jac y Neidiwr yn ystod gwaith adeiladu yn unol â Chynllun Rheoli Rhywogaethau Goresgynol</li> </ul> |

| Pwnc                              | Effeithiau Amgylcheddol a Ragwelir  | Lliniaru   |
|-----------------------------------|---|--|
| <b>Dŵr</b>                        | <ul style="list-style-type: none"> <li>• Cyfarwyddiaeth Fframwaith Dŵr (WFD) - Effeithiau niweidiol posibl i statws WFD ac amcanion ACA</li> </ul>  | <ul style="list-style-type: none"> <li>• Defnyddio dulliau rheoli atal llygredd caeth yn ystod gwaith adeiladu</li> <li>• Cael Cymeradwyaeth Systemau Draeniau Cynaliadwy (SuDS) gan awdurdod lleol</li> </ul>                 |
| <b>Tirwedd a Phethau Gweledol</b> | <ul style="list-style-type: none"> <li>• Y prif newid yw colli coed a gwrychoedd ar hyd glannau; bydd hyn yn debygol o fod o ddiddordeb a phryder lleol</li> <li>• Bydd gwelliannau i'r cerrig mân yn arwain at galedu ymddangosiad glan ogleddol y llyn</li> </ul> | <ul style="list-style-type: none"> <li>• Gweithredu Uwch gynllun Tirwedd gan gynnwys plannu coed a gwrychoedd newydd</li> <li>• Coed a gadwyd i gael eu diogelu yn unol â'r Cynllun Diogelu Coed a'r Datganiad Dull</li> </ul> |



## ii. Executive Summary

This Environmental Constraints and Opportunities Record (ECOR) has been prepared to document the environmental assessment associated with the design of modification works to the Llyn Tegid impounding structures. These works are required to ensure the structures can safely accommodate the design storm and associated flood and wave surcharges; the need for these safety improvements was identified by a Section 10 report in November 2014.

Part A of this report was completed in September 2018 following identification of the preferred option, with Section 1 providing an introduction to the scheme and environmental assessment process, Section 2 outlining the environmental baseline, Section 3 summarising the options appraisal process, and Section 4 considering preliminary environmental assessment and the proposed scope of further assessment. Part B is now completed for this (detailed design) stage, with Section 5 outlining the methodology of the environmental assessment, Section 6 detailing the assessment of environmental impacts and mitigation developed, and Section 7 detailing the environmental enhancements to deliver the wider objectives associated with the project. Where necessary Part A has been updated for this stage.

This ECOR will be used to provide internal and external stakeholders, regulators, approvers and permittees with a summary of the environmental assessment undertaken.

The option design consists primarily of protection to the Llyn Tegid northern lake embankment, and left bank of the River Dee, to allow safe overtopping during the design storm event. This will include reinforcement of landward embankment faces with a buried 3D geotextile mat ('Enkamat' or similar), and upgrading of existing rip rap landward slope protection on the lake embankment, with imported stone material.

Llyn Tegid is the largest natural lake in Wales and is located within, and contributes to, a highly valued and scenic area of the Snowdonia National Park. There are footpaths including Public Rights of Way (PRoWs) along the crest of the lake's embankments, which are well used all year round. Bala is a popular visitor attraction and important for the local economy. The lake and its associated water courses the River Dee (Afon Dyfrdwy) and Afon Tryweryn are popular for anglers, water sports enthusiasts and other recreational activities. The lake and associated watercourses are also of national and international ecological importance, protected under the River Dee and Bala Lake Special Area of Conservation (SAC), Llyn Tegid Ramsar site and two Site of Special Scientific Interest (SSSI) designations; Llyn Tegid SSSI covering the lake, and River Dee SSSI covering the Afon Tryweryn and River Dee.

Section 6 (and Table 6.1 in particular) sets out the findings of the assessment of likely environmental effects and the associated mitigation and monitoring that will be required. Table ii below provides a summary of the key topics, effects and mitigation.

**Table ii – Key Topics, Effects and Mitigation**

| Topic  | Predicted Environmental Effects   | Mitigation   |
|--|---|--|
| <p><b>Population &amp; Human Health</b></p>          | <ul style="list-style-type: none"> <li>• Temporary construction stage impacts</li> <li>• Disruption to recreation and leisure users / uses</li> </ul>   | <ul style="list-style-type: none"> <li>• Footpaths to be fully reinstated to an equivalent or improved standard upon completion</li> <li>• Implement enhancements to footpath surfacing, accessibility and seating</li> <li>• Programming of the works, routes of footpath diversions, and specifications for reinstatement, to be agreed with the Public Right of Way Officer (Gwynedd County Council)</li> </ul>   |
| <p><b>Biodiversity &amp; Nature Conservation</b></p> | <ul style="list-style-type: none"> <li>• Works within / potential impacts on the protected Llyn Tegid RAMSAR / SSSI and River Dee and Bala Lake SAC</li> <li>• Tree / vegetation clearance, resulting in potential loss of ecological connectivity including for bat flight lines, and loss of individual trees with bat roosts</li> <li>• Potential impacts to protected species (otter and bats)</li> <li>• Potential spread of invasive non-native species (INNS)</li> <li>• Potential impacts to reptiles (slow worms)</li> </ul> | <ul style="list-style-type: none"> <li>• Habitat Regulations Appropriate Assessment undertaken</li> <li>• Mitigation planting strategy developed to replace ecological function and value of existing tree lines</li> <li>• Valuable specimen trees to be retained and protected where possible</li> <li>• In the event that trees with high bat roost potential are to be removed, inspection by a licenced bat ecologist will be required immediately prior to and/or supervision during felling.</li> <li>• Bat boxes to be provided to increase number and quality of bat roosts available</li> <li>• Pre-construction surveys for otters, reptiles and badgers</li> <li>• Pre and during construction mitigation against impacts to protected species - to be managed through Environmental Action plan</li> <li>• INNS management is being undertaken through the summers of 2018 and 2019 by NRW. Removal of Japanese knotweed and continued management of</li> </ul> |



| Topic                         | Predicted Environmental Effects  | Mitigation   |
|-------------------------------|--|--|
|                               |  | Himalayan balsam to be undertaken during construction in line with Invasive Species Management Plan  |
| <b>Water</b>                  | <ul style="list-style-type: none"> <li>• Water Framework Directive (WFD) - potential detrimental impacts to WFD status and SAC objectives</li> </ul>   | <ul style="list-style-type: none"> <li>• Application of strict pollution prevention controls during construction</li> <li>• Sustainable Drainage Approval to be obtained from local authority</li> </ul>   |
| <b>Landscape &amp; Visual</b> | <ul style="list-style-type: none"> <li>• Main change is loss of trees and hedgerows alongside embankments; likely to be of local interest and concern</li> <li>• Rip rap improvements will lead to a hardening of the appearance of the north lake bank</li> </ul> | <ul style="list-style-type: none"> <li>• Landscape Masterplan including replacement tree and hedgerow planting to be implemented</li> <li>• Retained trees to be protected in accordance with the Tree Protection Plan and Method Statement</li> </ul> |

## Part A

### 1. Introduction

#### 1.1 Background

Llyn Tegid is a natural lake with approximately 2,950m of embankments at its northern end (including the embankments along the River Dee and Afon Tryweryn, which contribute to the lake's function as a reservoir). The outflow is controlled by Bala Sluices, which is a gated water control structure that controls the combined outflow from Llyn Tegid and the Afon Tryweryn. This allows Llyn Tegid to be used for flood control (as a reservoir), and to regulate the River Dee downstream.

Llyn Tegid is registered as a Category A Large Raised Reservoir under the Reservoirs Act 1975. As such there are additional legal duties on Natural Resources Wales (NRW) which include formal inspection by an Inspecting Engineer (IE) from a Reservoir Panel (registered with DEFRA (Department for Environment, Food & Rural Affairs)) and compliance with recommendations made by the IE within their report (known as a Section 10 report).

Following a Section 10 report in November 2014, modifications to impounding structures at Llyn Tegid are required to satisfy Measures in the Interest of Safety (MIOS). The outstanding MIOS related to this project, which are required to be completed by the 30/11/19<sup>1</sup>, are as follows:

*(iii) works are carried out to safely accommodate the design storm and the associated still water flood surcharge and wave surcharge.*

*(iv) a seepage/ stability analysis be carried out on the embankments to try to predict how the embankments will behave in the design flood.*

In accordance with NRW's environmental assessment procedures this Environmental Constraints and Opportunities Record (ECOR) has been prepared to document the environmental assessment associated with the design of the modification works to the Llyn Tegid impounding structures. It will be used to provide internal and external stakeholders, regulators, approvers and permittees with a summary of the environmental assessment undertaken.

Environmental assessment is an iterative process that starts at the inception of a project and continues through options appraisal, detailed design, construction and operation. Good environmental assessment is an integrated process that influences and challenges project options and design, rather than being a standalone paper exercise. However, there is a need for transparency and justification in the decisions and actions taken, which need to be documented.

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<sup>1</sup> A more recent Section 10 Inspection was undertaken on 9<sup>th</sup> August 2019, primarily in response to maintenance concerns. The report from this visit is yet to be issued, but is expected to revise the date the MIOS are to be completed, taking account of investigations since 2014 and acceptable implementation timescales. Completion of the works is anticipated to be March 2022.

At this (detailed design) stage, the ECOR documents the environmental baseline, scope of the environmental assessment, the assessment of environmental impacts and the development of mitigation. The ECOR has been reviewed and updated as the project and environmental assessment has progressed.

The ECOR is structured as follows:

Part A:

- Section 1: Introduction – background to the proposed scheme and environmental assessment;
- Section 2: Environmental Baseline – a description of the baseline scenario for each environmental topic and an overview of the studies undertaken to date;
- Section 3: Options Appraisal – summary of the options appraisal process and identification of the preferred solution;
- Section 4: Environmental Assessment Scoping – scope of the environmental assessment.

Part B:

- Section 5: Assessment Stage – methodology for environmental assessment;
- Section 6: Assessment, Evaluation and Mitigation – assessment of environmental impacts and development of mitigation;
- Section 7: Delivery of Enhancements – potential for project to deliver wider objectives associated with the catchment.

Part A of this ECOR was completed in September 2018 following identification of a preferred option. In addition to the completion of Part B, where necessary Part A has been updated for this (detailed design) stage, which has included:

- Update to Section 2: Environmental Baseline where further survey work has taken place;
- Update to Section 3: Options Appraisal with details of the detailed design.

## 1.2 Sustainable Management of Natural Resources

NRW, in undertaking our work, is required to pursue the Sustainable Management of Natural Resources (SMNR) and to demonstrate the application of the principles of SMNR and Sustainable Development. We think that the environmental assessment process is well aligned with these principles as demonstrated in Table 1.1. The environmental assessment process provides a systematic and transparent way of managing the environmental risks, avoiding, reducing or mitigating environmental impacts and identifying opportunities for delivery of multiple benefits.

**Table 1.1:** *The role of environment assessment in demonstrating the principles of sustainable management of natural resources*

| Principle                | Role of Environmental Assessment  |
|--------------------------|---|
| <b>Manage adaptively</b> | Monitoring and audit of projects and their environmental effects feed back into future projects. Continual improvement. |

| <b>Principle</b>  | <b>Role of Environmental Assessment</b>   |
|---|---|
| <b>Appropriate spatial scale</b>  | The options appraisal or consideration of alternatives determines the study area. Economic, technical and environmental aspects feed into this to ensure that the options/alternatives and their effects are considered at the appropriate scale.                         |
| <b>Collaboration and engagement (Collaboration)</b>                                     | Internal and external stakeholder engagement starts early and continues throughout project development.   |
| <b>Public participation in decision making (Involvement)</b>                            | Public engagement through drop in sessions at key stages in the project or engagement with community or user groups. Consenting route publicises project proposal.  |
| <b>Relevant evidence</b>  | Considers broad environmental baseline and trends with and without project implementation.  |
| <b>Take account of benefits and intrinsic value of natural resources and ecosystems</b> | Identify ecosystem services provided by the natural resources in the study area through internal and external stakeholder engagement. The environmental assessment should seek to maximise wider benefits provided by ecosystems and natural resources in the study area. |
| <b>Short, medium and long term consequences (Long term)</b>                             | Consider environmental effects throughout the life of the project. Planning, construction, operation & decommissioning. Taking into account the evolution of the baseline e.g. climate change.  |
| <b>Prevent significant damage to ecosystems (Prevention)</b>                            | Identify ecosystem services provided by the natural resources in the study area through internal and external stakeholder engagement. The environmental assessment should aim to avoid, reduce or mitigate any negative effects.  |
| <b>Building resilience of ecosystems</b>  | The environmental assessment must consider the effects of a project on the resilience of ecosystems. Then, through options appraisal and input to design, aim to avoid, reduce or mitigate negative effects and maximise positive effects (multiple benefits).            |

By applying these principles throughout the development of our projects we can maximise our contributions to our Well Being Objectives, towards our duty to enhance biodiversity (Section 6 of Environment Act) and the water environment (Water Framework Directive).

Our Well-being Objectives are:

1. Champion the Welsh environment and the sustainable management of Wales' natural resources
2. Ensure land and water in Wales is managed sustainably and in an integrated way
3. Improve the resilience and quality of our ecosystems
4. Reduce the risk to people and communities from environmental hazards such as flooding and pollution
5. Help people live healthier and more fulfilled lives
6. Promote successful and responsible business, using natural resources without damaging them
7. Develop NRW into an excellent organisation, delivering first-class customer service

### 1.3 Project Description

The existing water impounding structures date back to the 1950s and are generally earth embankments with levels controlled by the Bala Sluices, a structure consisting of 4 large vertical lift gates and an additional smaller gate for fish passage. A masonry weir/spillway acts as the overflow to the system.

The existing embankments stretch from a point just to the east of the A494 at SH 92100 35500, around two weirs on the Afon Tryweryn and up to Pont y Bala at SH 92937 36265.

The project involves progression of feasibility studies to progress the following two MIOS:

*(iii) works are carried out to safely accommodate the design storm and the associated still water flood surcharge and wave surcharge.*

*(iv) a seepage/ stability analysis be carried out on the embankments to try to predict how the embankments will behave in the design flood.*

The preferred option consists primarily of protection to the Llyn Tegid northern lake embankment, and left bank of the River Dee, to allow safe overtopping during the design storm event. This will include reinforcement of landward embankment faces with a buried 3D geotextile mat ('Enkamat' or similar) and upgrading of existing lakeshore rip rap protection on the lake embankment, with additional imported stone material.

This preferred option has arisen from an options appraisal process, the starting point of which considered, in addition to the northern lake embankment and left bank of the River Dee, the left and right banks of the Afon Tryweryn. Figure 1 shows (marked as red lines) the extent of the embankments that have been considered within the appraisal process.



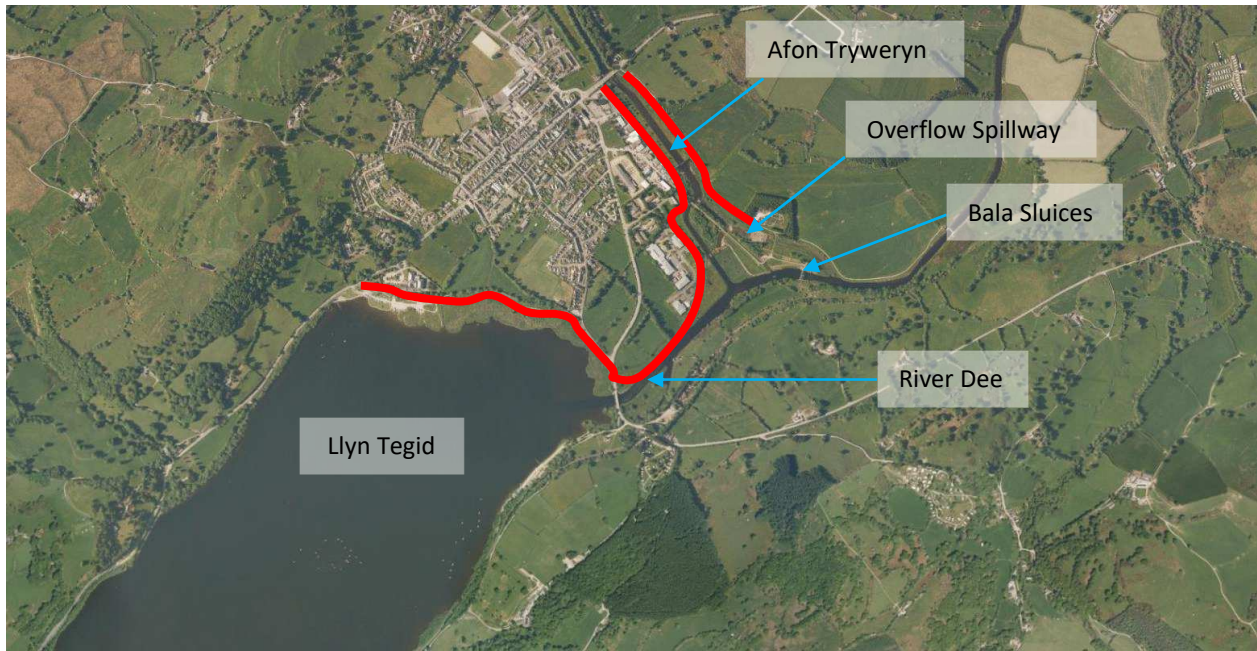


Figure 1 – Location of reservoir embankments and features.

A study area for collection of most environmental data was set at 2km from the outer geographical extent of the embankments for statutory designated sites and at 1km for other data.

Llyn Tegid is the largest natural lake in Wales and is located within, and contributes to, a highly valued and scenic area of the Snowdonia National Park. There are footpaths including Public Rights of Way (PRoWs) along the crest of the lake's embankments, which are well used all year round. Bala is a popular visitor attraction and important for the local economy. The lake and its associated water courses the River Dee (Afon Dyfrdwy) and Afon Tryweryn are popular for anglers, water sports enthusiasts and other recreational activities. The proposals must be developed sensitively to minimise any potential impacts on these activities and the surrounding landscape.

The lake and associated watercourses are also of national and international ecological importance, protected under the River Dee and Bala Lake Special Area of Conservation (SAC), Llyn Tegid Ramsar site and two Site of Special Scientific Interest (SSSI) designations; Llyn Tegid SSSI covering the lake and River Dee SSSI covering the Afon Tryweryn and River Dee. The site is known for its population of a species of whitefish unique to the area (Gwyniad) and the only known UK population of the glutinous snail (*Myxas glutinosa*).

#### 1.4 Project Objectives

The objectives for the project are summarised below:

1. Ensure the Llyn Tegid reservoir embankments will continue to protect Bala in the future.
2. Protect where possible existing features of nature conservation value and improve biodiversity through enhancements to existing habitats.

3. Ensure the proposal represents good value for money and is the lowest cost solution that also meets the regulatory, environmental and other project objectives, and achieves sign off on MIOS by All Reservoir Panel Engineers registered with DEFRA.
4. Through Environmental Assessment and best practice, minimise impacts on: the environment, people and business;
5. Meet sustainability requirements under the Environment (Wales) Act 2016 and Well-being and Future Generations (Wales) Act 2015, and deliver an overall positive benefit through the incorporation of wider benefits into the project.



## 2. Environmental Baseline

### 2.1 Introduction

This section summarises the baseline environmental conditions for environmental receptors and topics within the study area, of the Upper Dee River Catchment. Table 2.1 also outlines the associated challenges and potential opportunities for the project to deliver multiple benefits.

We have reviewed various strategic and local level evidence bases including the following:

- Prioritised Improvement Plan for River Dee and Bala Lake Special Area of Conservation;
- Met office data sets for future climate scenarios;
- Local Development Plans and Policy statements;
- Gwynedd Council Health Impact Assessment, March 2016;
- Gwynedd and Anglesey Well-Being Plan , Gwynedd and Môn Public Services Board, 2018
- Definitive Footpath maps;
- LANDMAP;
- National and Local Landscape Character Assessments;
- NRW/Welsh Government Lle Geo-Portal;
- Agricultural Land Classification;
- ‘A Management plan for trees on flood barrier adjacent to Llyn Tegid, Bala’ (Glendale Services, 2016);
- ‘Core Management Plan (including Conservation Objectives) for River Dee and Bala Lake / Afon Dyfrdwy A Llyn Tegid SAC’ (CCW, 2008);
- ‘Sport Wales Climbing Higher – Next Steps’ (2006);
- Royal Commission on the Ancient and Historical Monuments of Wales;
- NRW Invertebrate Ecologist Michael Howe (14<sup>th</sup> December 2017) Email relating to the *Myxas glutinosa*;
- Bala Lake Railway Trust website;
- Ordnance Survey maps; and
- British Geological Survey website.

A series of four drawings have been produced to map the key environmental constraints for the project (see Environmental Constraints and Opportunities Plans – ECOP 1 – 4, Appendix B). A fifth drawing, ECOP 5, summarises the proposed scheme and identifies key environmental mitigation measures and potential enhancements.

These are included in Appendix B, and are listed below:

- ECOP 1: Population and Human Health;
- ECOP 2: Biodiversity & Nature Conservation;
- ECOP 3: Cultural Heritage;
- ECOP 4: Landscape Character; and
- ECOP 5: Potential Impacts, Mitigation and Opportunities.

There are a number of reports and documents that were produced to inform this assessment of the baseline. These are available upon request and include:

- Llyn Tegid Embankments, Bala, Gwynedd: Preliminary Ecological Appraisal' (Enfys Ecology, 2017)
- Drone mapping and habitat survey outputs (ESDM, July 2018)
- Bat survey results (Egniol Environmental, January 2019)
- Preliminary Landscape and Visual Appraisal (June 2018)
- Preliminary Water Framework Directive Assessment
- Habitat Regulations Screening Assessment
- Geomorphology Technical Note
- Ecosystems Services Assessment
- Environmental Impact Assessment (EIA) Screening Letter
- Enhancement opportunities long-list
- Public Consultation outputs (event 18<sup>th</sup> July 2018)

Following the completion of Part A in September 2018, further survey, assessment and consultation has taken place. Section 6 summarises the findings of these surveys and assessments:

- Aerial, Phase 1 and NVC Survey (Exegesis, August 2018)
- Bat Roost Potential Survey (BVL, October 2018)
- Bat Survey Report (Egniol Environmental, January 2019)
- Tree Survey and Arboricultural Impact Assessment (Tree Solutions, November 2019)
- Phase 1 Habitat Survey Report for additional site areas (BVL, September 2019) (includes validation of previous Phase 1 Habitat Surveys)
- Water Framework Directive Assessment (BVL, September 2019)
- Habitat Regulations Assessment – Appropriate Assessment (BVL, September 2019)
- Consultation Record (Appendix A)
- Pre-application Consultation Report
- Public event Feedback Report

**Table 2.1: Baseline: Challenges and Opportunities**

| Topic – Receptor / Resource                                | Summary of Baseline  | Challenges and Opportunities   |
|--|--|--|
| <p><b>Population &amp; Human Health</b><br/>See ECOP 1</p> | <ul style="list-style-type: none"> <li>• Receptors are the residents of Bala; consider also land allocated for future housing.</li> <li>• PRowS – those most likely to be affected by the scheme are: <ul style="list-style-type: none"> <li>• Y Bala Rhif 4 (along Llyn Tegid embankment crest);</li> <li>• Y Bala Rhif 5 (runs north to south and adjoins Y Bala Rhif 4); and</li> <li>• Y Bala Rhif 1 (runs along the right bank of the Afon Tryweryn and left bank of the River Dee).</li> </ul> </li> <li>• Disabled access to embankment crest paths: surfacing improvements to comply with DDA undertaken approx. 15 years ago.</li> <li>• ‘Go Bala’ promoted routes for walking and cycling and Snowdonia National Park Association (SNPA) Recreational Routes.</li> <li>• Recreational user groups including: <ul style="list-style-type: none"> <li>• Bala Rugby Club;</li> <li>• Bala Adventure and Watersports Centre;</li> <li>• Penllyn Leisure Centre;</li> <li>• National Whitewater Centre;</li> <li>• Bala Angling Association;</li> <li>• Bala Golf Club;</li> <li>• Ramblers Cymru;</li> <li>• Bala Cycle club and</li> <li>• Bala Sailing Club.</li> </ul> </li> <li>• Bala Lake Railway Trust – proposal to extend Bala Railway from Pen-y-Bont Station along line of Llyn Tegid embankment to proposed Bala Town Station (the ‘Red Dragon Project’).</li> </ul> | <p><b><u>Challenges:</u></b></p> <ul style="list-style-type: none"> <li>• Need for effective engagement with local community including residents and user groups.</li> <li>• Potential encroachment into playing fields / Rugby Club.</li> <li>• Potential reduction of access onto PRowS, if not considered as part of option appraisal and design.</li> <li>• Requirements for temporary closure or diversion of footpaths during construction.</li> <li>• Potential reduction of access onto foreshore / lakeside from PRow (Y Bala Rhif 4), depending on option appraisal and design.</li> <li>• Potential detraction from quality of PRowS, depending on option and design.</li> <li>• Potential encroachment into parking areas serving Rugby Club, Penllyn Leisure Centre, Bala Adventure and Watersports Centre and adjacent picnic site, depending on option and design.</li> <li>• Potential impacts from scheme on feasibility of plans for future extension of Bala Railway.</li> <li>• Potential impacts on the Bala Triathlon if rip rap improvement works were to remove the existing access ramp.</li> </ul> <p><b><u>Opportunities:</u></b></p> <ul style="list-style-type: none"> <li>• Promote well-being and access to green spaces with enhancements to existing footpaths and</li> </ul> |

| Topic – Receptor / Resource | Summary of Baseline   | Challenges and Opportunities  |
|-----------------------------|---|---|
|                             | <ul style="list-style-type: none"> <li>• Llyn Tegid is used for recreational activities such as fishing, sailing and canoeing.</li> <li>• The annual Bala Triathlon follows the shores of Llyn Tegid, and an access ramp has been created within the lake embankment rip rap connecting the lakeshore and PRow on the embankment crest, specifically for the Triathlon.</li> <li>• The picnic site adjacent Bala Adventure and Watersports Centre is popular with visitors.</li> <li>• There are a number of recreational and open spaces in Bala town.</li> <li>• Gwynedd Council Health Impact Assessment March 2016 assesses health impacts of Anglesey and Gwynedd Joint Local Development Plan (LDP). In summary the LDP is considered to have the potential to significantly influence health issues through supporting communities and community facilities, addressing accessibility issues in particular in relation to leisure/recreation and health facilities, and improving prospects for employment. Key issues of relevance relating to air and water are summarised in appropriate topic sections below.</li> <li>• Gwynedd and Anglesey Well-Being Plan - nine well-being objectives highlighted, including 'Protecting the Natural Environment' (2) and 'Promoting the use of Natural Resources' (5). Under the latter, children and adults should be enabled to be more active, particularly in the outdoors, by promoting and improving access to natural green spaces.</li> <li>• 'Sport Wales Climbing Higher – Next Steps' (2006) 20 year strategy promoting physical activity, community resources and enhanced access to the outdoor environment, playing fields and sports facilities. Highlights the role of environment agencies in developing access to outdoor activities.</li> </ul> | <p>PRowS, including surfacing and access for all abilities.</p> <ul style="list-style-type: none"> <li>• Potential to optimise and resurface lakeside overspill car park, creating more efficient layout and restoring unused edges to SAC / Ramsar habitat.</li> <li>• Potential additional interpretation / signage and promotion of an improved PRow.</li> <li>• Potential enhancements to spaces immediately south of Penllyn Leisure Centre, including resurfacing, seating and planting.</li> </ul> |

| Topic – Receptor / Resource   | Summary of Baseline   | Challenges and Opportunities   |
|---|---|--|
|   | <ul style="list-style-type: none"> <li>• Open Access Land – 4750 ha CRoW access land 5km east of Bala (Berwyn Mountains) plus smaller areas 0.1 to 80 Ha from 2km from Bala in all directions.</li> <li>• Green wedge identified in SNPA LDP – separates Llyn Tegid and Bala town.</li> </ul>   |  |
| <p><b>Biodiversity &amp; Nature Conservation</b><br/>See ECOP 2</p> | <p>Preliminary Ecological Appraisal (PEA) produced by Enfys Ecology, including Phase 1 Habitat Survey and search for evidence of protected species (undertaken 3rd October 2017).</p> <p><u>Designated nature conservation sites</u><br/>The embankments to be modified fall within 4 statutory sites:</p> <ul style="list-style-type: none"> <li>• Llyn Tegid RAMSAR site;</li> <li>• River Dee and Bala Lake SAC;</li> <li>• River Dee SSSI; and</li> <li>• Llyn Tegid SSSI.</li> </ul> <ul style="list-style-type: none"> <li>• An additional SSSI, Chwarel Gelli-Grin, is just over 1km away to the south.</li> <li>• There are two Local Wildlife Sites (LWS) within 1km of the scheme. These are both areas of broadleaved woodland; Coed Pandy-isaf, around 500m to the east, and Ysgubor-isaf, which is also designated ancient woodland, a short distance north of the site over Pont Y Bala</li> <li>• There are a number of ancient woodlands within 1km of the proposed works; the closest to the works are at Ysgubor-isaf (on the left bank of the Tryweryn upstream of Pont Y Bala and at Eryll-Aran, on the opposite side of the A494 from Penllyn Leisure Centre.</li> </ul> | <p><b><u>Challenges:</u></b></p> <ul style="list-style-type: none"> <li>• Potential impacts on SAC, Ramsar and SSSIs.</li> <li>• The most valuable habitats present are the watercourses; action is required to prevent damage or disturbance to these. This is most likely to occur through discharge of pollutants, from chemicals to spoil and silt laden runoff, which are significant concerns with earthworks next to water.</li> <li>• In-river works not permitted during the salmonid spawning period (17<sup>th</sup> October – 15<sup>th</sup> May) (however not likely to be an issue – no in-river works expected).</li> <li>• Riverside and lakeside ruderal and inundation communities (within the statutory designated sites) should be protected during construction by being fenced off.</li> <li>• Japanese knotweed and Himalayan balsam present and it is an offence to cause them to spread. NRW is undertaking a programme to manage Himalayan balsam and Japanese knotweed around the site area, in advance of project construction commencement.</li> </ul> |

| Topic – Receptor / Resource | Summary of Baseline  | Challenges and Opportunities  |
|-----------------------------|--|---|
|                             | <p><u>Protected species</u></p> <ul style="list-style-type: none"> <li>• Badger – no setts identified, but the habitat is suitable and further surveys will be undertaken within 30m of works area prior to commencement of construction.</li> <li>• Bats – many trees on site have potential to support bats and there are records of bats (including soprano pipistrelle) along the Llyn Tegid northern embankment. Bat surveys required for these trees to assess impacts.</li> <li>• Nesting Birds – records of protected species including osprey, barn owl, peregrine, red kite, kingfisher and others from the area. Only the large mature trees are likely to provide suitable nesting sites.</li> <li>• Reptiles – limited potential habitat for reptiles, and no records in the data search. The habitat is suitable for grass snake and this species is likely to be present. There have been sightings of slow worm near the old railway station (NRW, Dave Thorpe). However provided reasonable avoidance measures are followed during the works, within ecological supervision, further surveys are not proposed.</li> <li>• Amphibians – four scrapes were created for amphibians just outside the proposed works area at the confluence of the Dee and Tryweryn and there are small ponds on the right bank of the Tryweryn. However there is very low likelihood of great crested newts (GCN) and following discussions with NRW and SNPA further surveys are not considered necessary.</li> <li>• Otter – highly likely to be present and extensive records in data search. Artificial otter holts on banks of Afon Tryweryn.</li> <li>• Water vole – ‘limited potential for presence’ identified in Preliminary Ecological Appraisal, however there have been some recent records on the Tryweryn.</li> </ul> | <p>Construction works should consider reasonable avoidance measures to prevent spread; there is also the potential to manage the species as part of existing management plans. Ensure best practice followed in management of Japanese knotweed.</p> <ul style="list-style-type: none"> <li>• No tree felling until bat surveys undertaken and need for bat licence assessed.</li> <li>• Large scale removal of trees or scrub would require mitigation planting. Bat activity surveys (transects) would also be required to assess impacts, as habitat connectivity potentially affected.</li> <li>• Tree felling may require a Felling License, if not undertaken within a Planning Consent. In either situation replanting requirements likely to be specified by Condition</li> <li>• Any tree or shrub removal should ideally take place outside the bird breeding season, (March to September inclusive), if this is not possible, a thorough search for nesting birds should be conducted prior to any clearance.</li> <li>• A full BS5837:2012 Tree survey covering the whole site area will be required to develop the detailed design, inform planting proposals and support a planning application.</li> <li>• Surveys for otter and water vole to be undertaken by ecologist prior to works.</li> </ul> |

| Topic – Receptor / Resource | Summary of Baseline   | Challenges and Opportunities   |
|-----------------------------|---|--|
|                             | <p><u>Invasive Non-Native Species</u></p> <ul style="list-style-type: none"> <li>• Japanese knotweed and Himalayan balsam present along embankments.</li> <li>• Pests and pathogens: ash trees along lake embankment infected with Chalara (ash dieback)</li> </ul> <p><u>Phase 1 Habitats</u></p> <ul style="list-style-type: none"> <li>• Refer to PEA (Enfys Ecology) for details.</li> <li>• The site is mostly made up of water bodies and their riparian and lacustrine vegetation communities, with areas of scrub and broadleaved woodland. Ponds and Rivers, and open freshwater lakes are considered to be Habitats of Principal Biological Importance on Section 41 of the NERC Act 2006, and Priority Habitats on Section 7 of the Environment (Wales) Act 2016.</li> </ul> <p><u>Fish and aquatic species</u></p> <ul style="list-style-type: none"> <li>• Salmon – known to inhabit Llyn Tegid, and salmon fish pass installed at confluence of Afon Tryweryn and River Dee.</li> <li>• Fish grayling - Llyn Tegid is an unusual habitat for the normally riverine <i>grayling</i>.</li> <li>• Gwyniad white fish – Llyn Tegid is one of only six known sites in Britain where <i>Gwyniad</i> is found and is one of the reasons for the lake’s SSSI designation.</li> <li>• Glutinous snail– Llyn Tegid is the only known site in Britain where <i>glutinous snail</i> is found. It is assumed to be found in the lake shallows adjacent to the works area; unlikely to be affected by works if works do not encroach on lake margins (Email Communication: NRW Invertebrate Ecologist Michael Howe (14<sup>th</sup> December 2017)).</li> </ul> | <p><b><u>Opportunities:</u></b></p> <ul style="list-style-type: none"> <li>• Habitat creation to create species rich areas of grassland around the river banks, berms and adjacent areas. Possibly with the aim of creating rare floodplain meadow habitat if feasible. This could be potential compensatory habitat for any encroachment onto the lake foreshore habitats.</li> <li>• Potential to improve connectivity between existing scrapes and holts by planting scrub/ hedgerow or management change. Provides improved habitat for otters/ birds/ amphibians/ reptiles.</li> <li>• Pond creation close to existing pond (TN 8 of Phase 1 Plan; Enfys Ecology, 2018) - to create a network of habitats for Amphibians and birds.</li> <li>• Mitigation tree and hedgerow planting to improve native species diversity. Trees are dominated by ash (suffering from ash dieback), and hedgerows dominated by hawthorn. Planting of a range of native broad leaf species would be appropriate; black poplar would be of particular benefit.</li> <li>• Planting trees in groups to provide habitat for various native species of mammal/ rodent/ bird/ amphibian/ reptiles.</li> <li>• Linear planting to ensure no net loss of ecological connectivity or resilience.</li> <li>• Wildlife interpretation signage.</li> <li>• Repair existing artificial otter holts.</li> <li>• Addition of bat and bird boxes.</li> </ul> |



| Topic – Receptor / Resource       | Summary of Baseline   | Challenges and Opportunities  |
|-----------------------------------|---|---|
|                                   | <ul style="list-style-type: none"> <li>Freshwater pearl mussel are also known to be found in the rivers downstream of the site and just above the town bridge on the Tryweryn and are listed as Endangered on the IUCN Red List.</li> </ul> <p><u>Urban tree cover / Tree Preservation Orders (TPOs)</u></p> <ul style="list-style-type: none"> <li>A tree survey and management plan for trees along Llyn Tegid embankment has been produced for NRW (by Glendale Services, 2016). This is not a BS5837:2012 Arboricultural Survey, and it does not cover the river embankment areas.</li> <li>There are TPOs in Bala on the opposite side of the A494 from the works; these will not be affected by the works (these are not shown on the ECOP as we do not hold a licence for this data).</li> </ul> | <ul style="list-style-type: none"> <li>Create more areas for amphibians to provide food source for otter.</li> <li>Works to the lakeshore should be limited, but it is possible that reinstatement could include measures to manage scrub and improve wetland habitat by de-compaction and potentially lowering ground levels to raise the water table (minimally in very specific locations).</li> <li>Manage invasive non-native species (INNS) in the area through a treatment programme.</li> <li>Consider long-term, post-works plan for the management of INNS</li> <li>NRW land ownership presents opportunities: NRW has several land holdings associated with Bala sluices, also Canolfan Tryweryn and much of the Tryweryn itself, including a 6-foot strip on both banks. At Canolfan Tryweryn there is approx. 4.6 ha of land (largely unused) including old clay pigeon site – consider potential for tree planting. The former station on the right bank of the Dee is also NRW. Welsh Water also have extensive land holdings in area – consider opportunities on their land.</li> </ul> |
| <p><b>Land</b><br/>See ECOP 1</p> | <ul style="list-style-type: none"> <li>The northern shore of Llyn Tegid is a popular recreational area and visitor attraction, with a well-used PRow along the embankment crest, and leisure facilities in close proximity, including Bala Rugby Club, Penllyn Leisure Centre and Bala Watersports and Adventure Centre.</li> </ul>   | <p><b><u>Challenges:</u></b></p> <ul style="list-style-type: none"> <li>Potential encroachment into Green Wedge and adjacent land uses due to embankment widening.</li> </ul> <p><b><u>Opportunities:</u></b></p>   |

| Topic – Receptor / Resource       | Summary of Baseline   | Challenges and Opportunities   |
|-----------------------------------|---|--|
|                                   | <ul style="list-style-type: none"> <li>The lake is separated from Bala town centre by a strip of land designated as Green Wedge.</li> <li>Industrial development at Bala Enterprise Park separates Bala town centre from the Afon Tryweryn.</li> <li>Bala Railway, a visitor attraction, runs along the south east of Llyn Tegid, and there is a proposal to extend the railway along the line of the northern Llyn Tegid embankment.</li> <li>The bedrock geology of the area to the north of the lake, where the proposed works are, is characterised by mudstones and siltstones of marine origin including Glyn Gower siltstone, Allt Ddu mudstone, Moelfryn mudstone and Penstrowed grits formations. This is overlain by a mixture of alluvial sand and gravel, silt, clay and some areas of made ground. The bed of Llyn Tegid itself comprises acidic rock, giving rise to soft water, overlaying a glacially cut basin.</li> </ul> | <ul style="list-style-type: none"> <li>The proposed works will reduce the risk of failure of the reservoir embankments. This ultimately provides benefit to property, infrastructure and agricultural land.</li> <li>Replacement tree and hedgerow planting and additional tree and hedgerow planting in surrounding areas with a range of native broad leaf species.</li> <li>To work with Bala Lake Railway Trust to develop designs which do not prevent railway extension plans.</li> </ul>  |
| <p><b>Soil</b><br/>See ECOP 1</p> | <ul style="list-style-type: none"> <li>According to the Predictive Agricultural Land Classification (ALC) model for Wales, the area surrounding the town of Bala is dominated by a combination of Grade 3b and 4 land with some areas of grade 5 land. Planning policy defines Grade 3b as moderate quality, Grade 4 as poor quality and Grade 5 as very poor quality. This classification is based on the long-term physical limitations of land for agricultural use. If additional detail is needed with regard to the quality of agricultural land, a detailed survey will be required.</li> <li>There is a Historic Landfill site to south east of Bala, on the left bank of the River Dee approx. 200m downstream of Llyn Tegid.</li> </ul>   | <p><b><u>Challenges:</u></b></p> <ul style="list-style-type: none"> <li>Current and previous industrial land use in scheme area may have contaminated the land. Ground investigations will inform the design. This will provide further detail of the affected land, including identification of any potentially contaminated, hazardous or harmful material.</li> <li>Management of INNS on Llyn Tegid embankment (knotweed and balsam) required prior to works.</li> <li>For soil import there may need to be appropriate permits or exemptions. Alternatively material movement may be carried out under a CL:AIRE</li> </ul> |

| Topic – Receptor / Resource | Summary of Baseline   | Challenges and Opportunities  |
|-----------------------------|---|---|
|                             | <ul style="list-style-type: none"> <li>• There are a number of disused quarries and pits south east of Bala along the Afon Hirnant, the closest of which is approx. 1.5km from the proposed works.</li> <li>• The scheme is located within a ‘Minor’ Groundwater Vulnerability Area.</li> <li>• INNS (Japanese knotweed and Himalayan balsam) are known to be present along Llyn Tegid embankment.</li> </ul>   | <p>DoWCoP declaration, negating need for permit/exemptions.</p> <p><b><u>Opportunities:</u></b></p> <ul style="list-style-type: none"> <li>• Providing benefits from management of INNS. Consider long-term, post-works plan for the management of INNS.</li> </ul>   |
| <b>Water</b>                | <ul style="list-style-type: none"> <li>• Water Body: Tryweryn - Dee to Mynach, (ID: GB111067051900) – overall water body status: ‘Moderate’</li> <li>• Water Body: Dee - Alwen to Llyn Tegid (ID: GB111067052240) – overall water body status: ‘Moderate’</li> <li>• Water Body: Llyn Tegid (ID: GB31134987) – overall water body status: ‘Poor’</li> <li>• ‘Gwynedd Council Health Impact Assessment’, March 2016: Overall, water quality is good, although there is a constant risk of water pollution incidents occurring. The Environment Agency’s river basin management plan for the Western Wales River Basin District, identifies a number of challenges to surface water quality including: diffuse pollution from agricultural activities; diffuse pollution from historical mines; physical modification of water bodies; point source pollution from water industry sewage works; and acidification</li> <li>• Flows within the Dee/Tryweryn are highly regulated under the Dee Regulation Scheme, required to ensure effective management of water resources. This is a major example of advanced river basin management, combining the supply of water, flood alleviation, fishery management, recreation and hydro-power generation. Three reservoirs, Llyn Tegid, Llyn Celyn and Llyn Brenig assist in</li> </ul> | <p><b><u>Challenges:</u></b></p> <ul style="list-style-type: none"> <li>• Potential discharge of pollutants from chemicals, to spoil and silt laden runoff.</li> <li>• Flood risk management and water resources “use” of the waterbodies.</li> <li>• Interruptions to sediment (gravel) supply.</li> <li>• Potential for works to aggravate blue green algal blooms through the release of additional nutrients into the water.</li> </ul> <p><b><u>Opportunities:</u></b></p> <p>Potential WFD benefits include:</p> <ul style="list-style-type: none"> <li>• Floodplain meadow habitat creation – feasibility to be assessed.</li> </ul> |

| Topic – Receptor / Resource | Summary of Baseline  | Challenges and Opportunities   |
|-----------------------------|--|--|
|                             | <p>managing flows in the River Dee. This regulated system has however impacted on geomorphology: the Tryweryn is notably lacking in mobile gravel deposits and through much of its length has limited flow diversity and a uniform morphology.</p> <ul style="list-style-type: none"> <li>• The Tryweryn was canalised in 1952.</li> <li>• Llyn Celyn proves a significant barrier to sediment movement within the system cutting off the upper catchment from the lower. This has resulted in sediment starvation downstream and consequent effects on fluvial geomorphology.</li> <li>• Llyn Tegid is known to suffer with blue green algae.</li> </ul>  |  |
| Air                         | <ul style="list-style-type: none"> <li>• 2015 Local Authority Emissions Statistics show Gwynedd to have a total of 669 kt CO<sub>2</sub> for all sectors (<b>Error! Hyperlink reference not valid.</b><a href="https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2015">https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-2015</a>). This represents a 13.9% reduction since 2007. With no Large Industrial Installations in the region, the largest sector for CO<sub>2</sub> emissions is Road Transport, and the second highest sector total is from Industry &amp; Commercial Electricity.</li> <li>• No Air Quality Management Areas have been declared for the region.</li> </ul> | <p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>• Local residents may be sensitive to changes in local air quality, in particular young children, the elderly or those with respiratory or other health problems; manage dust generation and emissions from vehicles and machinery during construction.</li> </ul> <p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>• Any mitigating factors to reduce transport requirements and opportunities for wider benefits that would reduce dependence on motorised traffic would help support Gwynedd Council's initiatives to reduce the carbon footprint of the region in accordance with Welsh and UK Government targets and NRW's Carbon Positive Project. However, it is noted that construction projects are not listed as key areas of</li> </ul> |

| Topic – Receptor / Resource                  | Summary of Baseline  | Challenges and Opportunities   |
|--|--|--|
| <p><b>Climate</b></p>                        | <ul style="list-style-type: none"> <li>The Snowdonia climate is largely maritime and is characterised by weather which is often cloudy, windy and wet, yet relatively mild. The mean annual temperature in Bala ranges from 5-12.7 °C. Average annual rainfall is approximately 1300mm per annum (<a href="https://www.metoffice.gov.uk/public/weather/climate/gcmmn3nzy">https://www.metoffice.gov.uk/public/weather/climate/gcmmn3nzy</a>).</li> <li>From Gwynedd Council Health Impact Assessment March 2016, as a result of climate change, annual average temperatures in Wales are projected to increase by 1.3°C by the 2020s, 2.0°C by the 2040s and 3.3°C by the 2080s, against the 1961 to 1990 baseline. Overall the county can also expect drier summers and more irregular/ extreme weather events, such as high rainfall/ wetter winters.</li> </ul> | <p>improvement in the Cyngor Gwynedd Carbon Management Plan 03/11/2009.</p> <p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>Emissions from construction plant and machinery should be mitigated as far as practicable through good construction practice such as the use of locally sourced materials and adherence to a robust Construction Traffic Management Plan</li> <li>A carbon calculator was applied to the short listed options as part of the options appraisal; the option with the lowest carbon footprint was selected as the preferred option. This will be developed further during detailed design and in construction.</li> </ul> <p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>The proposed works will reduce the risk of failure of the reservoir embankments, which would potentially increase as a result of climate change.</li> <li>Offsite locations for carbon mitigation are present in the peat highlands near Llyn Tegid.</li> </ul> |
| <p><b>Material Assets</b><br/>See ECOP 1</p> | <ul style="list-style-type: none"> <li>The main transport infrastructure through the town consists of the A494 and intersection with the A4212 and B4391. This can get very busy during the summer months and during events such as the triathlon.</li> <li>Bala is small market town within a predominantly rural area.</li> <li>Local amenities are focussed along y Stryd Fawr (A494).</li> <li>Community facilities include two primary schools, one secondary school and churches. Recreational amenities are focussed at the</li> </ul>  | <p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>Community engagement and consultation to help ensure appropriate mitigation for impacts on material and community assets.</li> <li>Construction transport using local roads requires careful planning and management to minimise impacts, including programming to limit adding to peak seasonal traffic</li> </ul>   |

| Topic – Receptor / Resource   | Summary of Baseline  | Challenges and Opportunities   |
|---|--|--|
|   | <p>lakeside. These include Penllyn Leisure Centre, Bala Watersports &amp; Adventure Centre, Bala Rugby Club &amp; playing fields, Bala Sailing Club, and The Loch Cafe.</p> <ul style="list-style-type: none"> <li>• Bala Lake narrow-gauge railway runs along the southern side of Llyn Tegid for approximately 4.5 miles between Bala and Llanuwchllyn and serves primarily as a tourist attraction; the Bala Lake Railway Trust are proposing an extension to the Bala Lake Railway (the ‘Red Dragon Project’).</li> <li>• Bala Waste Water Treatment Works is located to the east of the town on the left bank of the Tryweryn and is owned and operated by Dŵr Cymru Welsh Water.</li> <li>• There is a land drainage pumping station on the embankment to the right of Penllyn Leisure Centre.</li> </ul>  | <ul style="list-style-type: none"> <li>• Options appraisal to consider proposed extension of Bala Lake Railway, aiming to avoid any impact on the feasibility of that proposal.</li> </ul> <p><b>Opportunities:</b></p> <ul style="list-style-type: none"> <li>• The proposed works are being designed to reduce the risk of uncontrolled release of water from the reservoir and as such serve to protect local material assets.</li> </ul>   |
| <p><b>Cultural heritage</b><br/>(including architectural and archaeological aspects)<br/>See ECOP 3</p> | <ul style="list-style-type: none"> <li>• There are three Scheduled Monuments within 500m of the proposed works: <ul style="list-style-type: none"> <li>• Castell Gronw Castle Mound, part of the Llanfor Roman Military complex, just south of the River Dee / Afon Dyfrdwy outlet from Llyn Tegid;</li> <li>• Tomen Y Bala Castle Mound, just south of Pont-y-Bala and within Bala Conservation Area; and</li> <li>• Llanfor Roman Fort and Camps, to the north of the River Dee and Afon Tryweryn confluence.</li> </ul> </li> <li>• There are no proposed works within Bala Conservation Area. However, the upstream extent of works on the Afon Tryweryn is approx. 100m from the Conservation Area boundary.</li> <li>• There are many Listed Buildings / structures within the Conservation Area, but these are unlikely to be affected by the works.</li> </ul> | <p><b>Challenges:</b></p> <ul style="list-style-type: none"> <li>• Project to consider proposed extension of Bala Lake Railway.</li> <li>• Potential impacts on the setting of Listed Buildings / structures including Pont-y-Bala.</li> <li>• Design finishes to be sympathetic to their surroundings, including cultural heritage assets.</li> <li>• Historic landscape interest and policies by SNPA; if an EIA is required Cadw, as statutory consultee, will consider impacts on historic landscapes as a material planning consideration; a statutory EIA or ASIDOHL is however not required.</li> <li>• Limited scope for archaeological impacts as advised by Gwynedd Archaeological Trust.</li> </ul> |

| Topic – Receptor / Resource                         | Summary of Baseline  | Challenges and Opportunities   |
|---|--|--|
|   | <ul style="list-style-type: none"> <li>• The works on the Afon Tryweryn may extend up to Pont Y Bala, the bridge carrying the A494 over Afon Tryweryn, which is Grade II Listed.</li> <li>• Bala and Ffestiniog dismantled railway along the right bank of the Afon Tryweryn</li> <li>• Rhiwlas Registered Park and Garden is located on the left bank of the Afon Tryweryn, approx. 1km upstream of Pont Y Bala (to the north of the extents shown on the ECOP).</li> <li>• The entire works area is within Bala and Bala Lakesides Registered Landscape of Special Historic Interest. Key features include: <ul style="list-style-type: none"> <li>• 19<sup>th</sup> Century enclosed field systems in the Bala hinterland;</li> <li>• Well defined earthworks relating to the dismantled Bala and Ffestiniog Railway; and</li> <li>• Open pasture with mature trees in the River Dee floodplain.</li> </ul> </li> <li>• Mesolithic flint work has previously been discovered along the north east shore of Llyn Tegid; this may have been the site of a seasonal hunting camp (Gwynedd Archaeological Trust).</li> <li>• A desk-based assessment (DBA) has not been undertaken (under advice from Gwynedd Archaeological Trust).</li> </ul> | <p><b><u>Opportunities:</u></b></p> <ul style="list-style-type: none"> <li>• Any archaeological studies undertaken to inform the works could promote further understanding of local heritage assets.</li> </ul>  |
| <p><b>Landscape &amp; Visual</b><br/>See ECOP 4</p> | <ul style="list-style-type: none"> <li>• LANDMAP is the formally adopted methodology for landscape assessment in Wales, and NRW expects all landscape impact assessments in Wales to apply the use of LANDMAP. NRW, SNPA and Gwynedd Council have analysed LANDMAP in their landscape character assessments. These character assessments have therefore been used to inform the landscape baseline.</li> </ul>   | <p><b><u>Challenges:</u></b></p> <ul style="list-style-type: none"> <li>• The National Park is a highly sensitive landscape receptor; consult with SNPA.</li> <li>• If significant effects are likely a Landscape and Visual Impact Assessment may be required.</li> <li>• Potential adverse impacts to the character of the lakeside area, due to increased scale of embankments and tree / vegetation loss.</li> </ul> |



| Topic – Receptor / Resource | Summary of Baseline   | Challenges and Opportunities  |
|-----------------------------|---|---|
|                             | <ul style="list-style-type: none"> <li>• The majority of the proposed works are within Snowdonia National Park (SNP) and NRW’s National Landscape Character Area (LCA) 06: Eyri/Snowdonia.</li> <li>• This area of the SNP falls within SNPA’s LCA16: Llyn Tegid A Dyffryn Dyfrdwy/ Upper Dee Valley. Key characteristics of this LCA include: <ul style="list-style-type: none"> <li>• Landscape defined by the deep glacial basin of Llyn Tegid;</li> <li>• Land rising up either side to create a classic U-shaped valley;</li> <li>• River Dee (Afon Dyfrdwy) and its tributaries flowing through the landscape;</li> <li>• Historic pattern of small, irregular fields divided by stone walls or hedgerows with frequent hedgerow trees;</li> <li>• Strongly pastoral landscape;</li> <li>• Llyn Tegid recognised as an internationally important mesotrophic lake supporting valued swamp and wetland habitats along its shoreline;</li> <li>• Much of the area within the Bala landscape of Special Historic Interest;</li> <li>• A sparse settlement of farmsteads and small hamlets nestled in valleys, linked by winding lanes and tracks;</li> <li>• Tracts of open access and common land on higher ground;</li> <li>• Landscape with a strong sense of place, surrounded by spectacular scenery with views afforded to Meirionnydd hills and mountains.</li> </ul> </li> <li>• The works are on the periphery of SNP, adjacent Gwynedd Council’s LCA12: Llandderfel, Bala Hinterland Special Landscape Area and NRW’s National LCA15 Dyffryn Dyfrdwy A Llangollen/Llangollen and the Vale Of Dee.</li> </ul> | <ul style="list-style-type: none"> <li>• Removal of vegetation along lake embankment has the potential to open up views across the lake from users of the PRow and adjacent receptors.</li> <li>• Loss of visual amenity due to increased scale of embankments, and tree / vegetation loss.</li> <li>• Trees not affected by the works should be protected in line with BS5837.</li> </ul> <p><b><u>Opportunities:</u></b></p> <ul style="list-style-type: none"> <li>• Screen planting opportunities between Afon Tryweryn and Bala Enterprise Park, improving visual appearance alongside the PRow.</li> <li>• Management of (off-site) areas of existing woodland / vegetation, including selective thinning / tree works / inter-planting to optimise age and species diversity, and overall ecosystem health.</li> <li>• Public seating areas along PRow looking over lake.</li> </ul> |

| Topic – Receptor / Resource | Summary of Baseline   | Challenges and Opportunities |
|-----------------------------|---|------------------------------|
|                             | <ul style="list-style-type: none"> <li>• There are no proposed works within Y Bala Conservation Area, however the upstream extent of works on the Afon Tryweryn is approx. 100m from the Conservation Area boundary.</li> <li>• Indicative vegetation cover extracted from LiDAR is shown on the ECOP. There are trees along the embankments which are to be affected by the works; large mature trees set within short grass line the Llyn Tegid northern embankment and scattered trees and hedgerows are present on the left bank of the River Dee. The banks of the Tryweryn are covered by grass and scrub with saplings. There is a small copse of mature trees a short way downstream of Pont Y Bala on the left bank of the Tryweryn.</li> </ul> <p><u>Likely visual receptors include:</u></p> <ul style="list-style-type: none"> <li>• Users of the PROWs along the embankments, i.e.: <ul style="list-style-type: none"> <li>• Y Bala Rhif 4 (on Llyn Tegid embankment crest);</li> <li>• Y Bala Rhif 5 (runs north-south and adjoins Y Bala Rhif 4); and</li> <li>• Y Bala Rhif 1 (runs along the right bank of the Afon Tryweryn, and the left bank of the River Dee).</li> </ul> </li> <li>• Motorists / pedestrians using the A494 and Heol Tegid.</li> <li>• Cyclists on regional cycle routes 12 and 15.</li> <li>• Users of outdoor recreation facilities including Bala Rugby Club, Penllyn Leisure Centre, Bala Watersports &amp; Adventure Centre and picnic site.</li> <li>• Lake users including sailors and anglers.</li> <li>• Residents of Bala and outlying properties.</li> <li>• Users of the Loch Café.</li> <li>• Users of Bala Lake Railway.</li> </ul> |                              |

| Topic – Receptor / Resource      | Summary of Baseline  | Challenges and Opportunities  |
|----------------------------------|--|---|
| <p><b>Cumulative effects</b></p> | <ul style="list-style-type: none"> <li>• Bala is located within the boundaries of SNPA. SNPA is the Local Planning Authority (LPA) for all works which fall within the national park boundary, otherwise Gwynedd Council is the LPA for development outside of the SNP boundary and also the Highways Authority.</li> <li>• A preliminary search of current and recently determined planning applications has been undertaken at the time of writing (September 2019) using SNPA and Gwynedd Council’s online planning services to capture any applications which could result in cumulative effects. No current (undecided) planning applications have been identified. There are a number of approved planning applications in the town. These generally appear to be minor applications (such as single storey extensions to a dwelling).</li> <li>• Llyn Celyn Reservoir Flood Study (Dŵr Cymru Welsh Water) – currently ongoing study. Llyn Celyn is upstream on the Afon Tryweryn.</li> <li>• Proposed Bala Lake Railway extension crosses an embankment which is part of the proposed flood defence works, however no planning application has been submitted to date.</li> </ul> | <p><b><u>Challenges:</u></b></p> <ul style="list-style-type: none"> <li>• The construction of developments that have been through the planning process have the potential to result in changes to the current baseline environment. The developments that have been identified to date however are generally considered to be low-key. An additional check for applications will be undertaken as part of any further assessment.</li> </ul> <p><b><u>Opportunities:</u></b></p> <ul style="list-style-type: none"> <li>• Where possible and relevant the proposed development should seek opportunities to complement or enhance the function of the approved applications.</li> </ul> |

## 3. Options Appraisal

### 3.1 Introduction

Both a 'long list' and 'short list' stage options appraisal were undertaken before the preferred option was identified.

### 3.2 Long list appraisal stage

A 'long list' of potential options was identified and appraised (Jan-Feb 2018) with consideration of the technical feasibility of a number of basic options for the improvement of the reservoir embankments. The options considered were:

- Raise embankments
- Raise embankments and provide a wave wall
- Protect / strengthen embankments without raising (protect only option)
- Protect / strengthen embankments, and lower them in specific locations

The technical appraisal process ruled out any lowering options, and concluded that a 'protect only' option (the least environmentally disruptive) could be applied to the Afon Tryweryn right bank and River Dee left bank, with no works required at all on the Afon Tryweryn left bank. A number of possible scenarios were left for consideration at the short list stage for the Llyn Tegid lake embankment.

### 3.3 Short list appraisal stage

The focus for the short list stage was to consider a range of options / combinations of options, for the Llyn Tegid lake embankment. The embankment was divided into four sections, and various combinations of 'Protect', 'Raise', and 'Raise+ Wave Wall' were assessed. The assessment process considered the following criteria for each of the options / combinations, before selecting the preferred option at a multi-disciplinary workshop.

- Risk
- Programme
- Planning and Environmental Consents Risk
- Buildability
- Environmental: Population & Human Health
- Environmental: Biodiversity & Nature Conservation
- Environmental: Landscape & Visual
- Stakeholders: Bala Railway
- Stakeholders: Businesses adjacent to embankment
- Operation / Maintenance
- Protection of downstream assets
- Rip rap
- Impacts on existing assets

Option 3, 'Protect' only for all embankments, was the most favourable for all criteria considered, and was ultimately accepted by the project team as the basis of the preferred option. This option was considered the most favourable under all the environmental and stakeholder criteria applied to the option selection process, therefore in terms of potential environmental and community impacts it is clear that the least disruptive option was selected.

The Ecosystem Services Assessment Report (BVL, 2018) considers the positive and negative impacts from both a 'protect' and a 'raise' scenario, in relation to the ecosystem services people get from the site's natural capital assets. It includes an ecosystem resilience assessment and identification of multiple-benefit opportunities.

### 3.4 Option Design

Following the identification of the preferred option, further detailed design was undertaken which is the focus of the environmental assessment (Section 6) and on which planning permission will be sought. The option design is summarised below and detailed in drawings 122918-BVL-Z0-00-DR-C-10001 (Overview Plan) and 122918-BVL-Z0-00-DR-C-10002 to 122918-BVL-Z0-00-DR-C-10007 (Detailed Plans).

Protection of the **River Dee** embankment (left bank).

- A berm up to 6m wide will be installed on the landward / dry side toe along some sections of the embankment, increasing the ground levels typically by 300-400mm. The extents of this are shown on the design drawings.
- Embankment protection will consist of a 3D geotextile membrane installed under the topsoil surface on the landward / dry side of the embankment, upon completion the surface will be grassed as existing. The protection will extend over the berm where present, or otherwise approximately 2m beyond the existing embankment toe line.
- There are no expected significant changes in the visual scale of the embankment itself, despite minor changes in crest levels to reinstate the 'as-built' levels where necessary, and the formation of the berm noted above.
- There will be tree and vegetation clearance required to enable works, mainly as a result of the construction of the berm.
- Note – there were initially expected to be similar protection works on the right bank of the Afon Tryweryn, but this is no longer considered to be a requirement.

Protection of the northern **lake** (Llyn Tegid) embankment:

- A berm up to 6m wide will be installed on the landward / dry side toe along some sections of the embankment, increasing the ground levels typically by 300-400mm. The extents of this are shown on the design drawings.
- Embankment protection will consist of a 3D geotextile membrane installed under the topsoil surface on the landward / dry side of the embankment, upon completion the surface will be grassed as existing. The protection will extend over the berm where present, or otherwise approximately 2m beyond the existing embankment toe line.
- 'Rip rap' works: the existing slate stone rip-rap protecting the northern shore (wet side) of the embankment will be removed and replaced with imported granite (or similar) stone, while existing granite will be re-used. The removed slate will be reprocessed for use elsewhere on the site where possible, such as for infilling the bandstand area, constructing the berm or resurfacing the overflow car park. Proportionally the imported stone will make up approximately 80%-100% of the overall stone rip-rap. Visually this face of the bank will become harder (existing vegetation to be removed) and the stone will be 'rougher' / more angular, as required to improve performance in reducing wave energy.

- There are no expected significant changes in the visual scale of the embankment, despite minor changes in crest levels to reinstate the 'as-built' levels where necessary, and the formation of the berm noted above.
- The embankment at the 'bandstand' will be realigned, currently the alignment causes a concentrating effect of wave energy increasing stress on the embankment during storm events. This will result in some incursion into the ecologically designated lake foreshore (SSSI, SAC and Ramsar – see Section 6).
- The majority of existing trees, scrub and hedges will need to be removed to enable the works, including all trees growing within the rip rap. Where possible key trees considered to have landscape and amenity value, or ecological value will be retained (see Tree Survey and Arboricultural Impact Assessment (Tree Solutions, 2019)).

It is expected that the works will start in late 2020 and take approximately 2 years to complete.

## 4. Scope of Environmental Assessment

### 4.1 Introduction

An EIA Screening Opinion Request was submitted to SNPA Planning Department on 14<sup>th</sup> June 2018, setting out the preferred option, environmental baseline and key receptors, and initial consideration of likely significant effects. A Screening Opinion was received from SNPA on 20<sup>th</sup> July 2018 confirming that EIA would not be required.

Although the project is not subject to Statutory EIA and therefore an Environmental Statement is not required, a non-statutory Environmental Assessment will be undertaken to ensure that the likely environmental effects are understood and considered in the planning process, with appropriate mitigation incorporated where required.

The Environmental Assessment will identify environmental impacts (both positive and negative) from the proposed scheme and report these in Part B.

One of the purposes of this scoping exercise is to seek agreement with the planning authority, statutory agencies and stakeholders on the approach to be taken. Standard methods for survey and assessment will be used where available and modified where appropriate to the scale, location and nature of the proposed scheme.

The scoping process aims to identify what the likely effects of a proposed scheme are and to determine those that are likely to be significant and therefore included within the scope of the non-statutory Environmental Assessment.

### 4.2 Scoping Assessment

The aim of the scoping assessment process is therefore to 'scope in' only those issues considered to have potential to give rise to likely significant impacts either during construction or operation. Where we have identified suitable mitigation to avoid, reduce or remediate negative impacts these measures will be included in the Environmental Action Plan and/or the scheme design and will be scoped out of further assessment.

Following consideration of the baseline environment, predicted potential impacts and mitigation, the receptors / topics that require further detailed assessment have been identified in Table 4.1. This scoping exercise has considered potential predicted construction and operation phase impacts and opportunities. However, we have not considered decommissioning phase impacts given that flood risk management measures proposed would be required in perpetuity.



**Table 4.1 - Environmental Topics Scoped-In /-Out of Environmental Assessment**

| Topic – Receptor / Resource                   | Predicted Potential Effects   | Preliminary Mitigation   | Scoped-In /- Out and Phase*<br><br>* Phases:<br>C: Construction<br>O: Operation |
|---|---|--|---|
| <b>Population &amp; Human Health</b>          | <ul style="list-style-type: none"> <li>• Unlikely to create permanent adverse impacts</li> <li>• Likely temporary construction stage impacts.</li> <li>• Disruption to recreation and leisure users / uses:               <ul style="list-style-type: none"> <li>- Bala Rugby Club</li> <li>- Bala Adventure and Watersports Centre,</li> <li>- Penllyn Leisure Centre,</li> <li>- Picnic site and parking area adjacent to Bala Adventure and Watersports Centre</li> </ul> </li> <li>• PRowS               <ul style="list-style-type: none"> <li>- Y Bala Rhif 4 (along Llyn Tegid embankment crest)</li> <li>- Y Bala Rhif 5 (runs north to south and adjoins Y Bala Rhif 4); and</li> <li>- Y Bala Rhif 1 (runs along the right bank of the Afon Tryweryn and left bank of the River Dee)</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Footpaths to be fully reinstated to an equivalent or improved standard.</li> <li>• Opportunities to improve the standard of footpath surfacing / accessibility / seating to be explored during detailed design.</li> <li>• Programming of the works, routes of diversions, and specifications for reinstatement, to be discussed and agreed with the Public Right of Way Officer (Gwynedd County Council).</li> <li>• Required mitigation during construction (inc management of construction noise) to be controlled through EAP.</li> </ul> | <p><b>C: In</b><br/><b>O: Out</b></p>   |
| <b>Biodiversity &amp; Nature Conservation</b> | <ul style="list-style-type: none"> <li>• The site is a sensitive location, with some of the works falling within:               <ul style="list-style-type: none"> <li>- Llyn Tegid RAMSAR site;</li> <li>- River Dee and Bala Lake SAC;</li> <li>- River Dee SSSI; and</li> <li>- Llyn Tegid SSSI.</li> </ul> </li> </ul>  | <ul style="list-style-type: none"> <li>• Habitat Regulations Assessment screening process undertaken for outline design. Appropriate Assessment undertaken at detailed design stage assesses impacts on the designated sites and details suitable mitigation / compensatory measures where necessary.</li> </ul>   | <p><b>C: In</b><br/><b>O: In</b></p>  |

| Topic – Receptor / Resource | Predicted Potential Effects  | Preliminary Mitigation   | Scoped-In /- Out and Phase*<br><br>* Phases:<br>C: Construction<br>O: Operation |
|-----------------------------|--|--|---|
|                             | <ul style="list-style-type: none"> <li>• Works within the protected Llyn Tegid RAMSAR / SAC / SSSI site include: <ul style="list-style-type: none"> <li>- Tree and scrub clearance</li> <li>- Potential realignment of embankment at the ‘bandstand’ area, with approximately 1,400m<sup>2</sup> (currently envisaged as worst case scenario) land take.</li> </ul> </li> <li>• Additional tree / vegetation clearance required to majority of working area.</li> <li>• Potential ecological impacts include loss of ecological connectivity including for bat flight lines, and loss of individual trees with bat roosts.</li> <li>• Potential impacts to protected species (otter and bats and potentially fish).</li> <li>• Potential spread of INNS.</li> <li>• Potential impacts to reptiles (slow worms).</li> </ul> | <ul style="list-style-type: none"> <li>• Phase 2 bat surveys comprising ground inspections of trees for potential bat roosts have been completed, with further activity transects on-going and tree-climbing and also emergence tree surveys undertaken from May to October 2018.</li> <li>• A mitigation planting strategy focussed on replacing the ecological function and value of the existing tree lines. This will aim to ensure no net loss in ecological resilience or connectivity.</li> <li>• Particularly valuable specimen trees on the landward (dry side) embankment faces are being identified and potentially retained and protected.</li> <li>• Protected species mitigation to include: <ul style="list-style-type: none"> <li>- Bats – as above.</li> <li>- Reptile and amphibians - possible habitat within rip rap for common species. Reasonable Avoidance Measures to be developed. Surveys not considered practical. Potential ecological watching brief during construction (e.g. for Slow worm, during vegetation clearance; also possible provision of artificial refugia).</li> <li>- Great Crested Newt Surveys are not being taken forward as scoped out.</li> <li>- Otter: Survey and Reasonable Avoidance Measures to be developed to prevent impact to otter.</li> <li>- Contractors will follow good construction practice laid out in construction/environmental documents to prevent</li> </ul> </li> </ul> |   |

| Topic – Receptor / Resource | Predicted Potential Effects   | Preliminary Mitigation  | Scoped-In /- Out and Phase*<br><br>* Phases:<br>C: Construction<br>O: Operation |
|-----------------------------|---|---|---|
|                             |   | <p>a negative impact. An Environmental Action Plan will summarise all actions required to mitigate impacts on the environment.</p> <ul style="list-style-type: none"> <li>- Fish migration season, water vole, glutinous snail and Gwyniad white fish; no likely significant effects expected.</li> <li>- Clearance works will be programmed to avoid bird nesting season.</li> </ul> <ul style="list-style-type: none"> <li>• NRW has established a contract for removal of Himalayan balsam through the summers of 2018 and 2019, prior to construction. Japanese knotweed will be similarly treated.</li> <li>• NRW will require Biosecurity Risk Assessments from their contactors.</li> <li>• Any further mitigation required during construction to be controlled through EAP.</li> </ul> |   |
| <b>Land</b>                 | <ul style="list-style-type: none"> <li>• Significant impacts on neighbouring land uses have been avoided by avoiding selection of options involving significant changes to embankment scale / footprint.</li> </ul>   | <ul style="list-style-type: none"> <li>• The proposed works will reduce the risk of failure of the reservoir embankments. This ultimately provides benefit to property, infrastructure and agricultural land.</li> <li>• Any further mitigation required during construction to be controlled through EAP.</li> </ul>   | <b>C: Out<br/>O: Out</b>  |
| <b>Soil</b>                 | <ul style="list-style-type: none"> <li>• No likely effects on surrounding soil quality</li> <li>• Topsoil over the existing embankments to be stripped and replaced, with no significant requirement for imported material anticipated.</li> <li>• There is expected to be some land take within neighbouring agricultural land.</li> </ul> | <ul style="list-style-type: none"> <li>• Negotiations with agricultural land owners over land take.</li> <li>• Beneficial effects from management of invasive species</li> <li>• For soil import there may need to be appropriate permits or exemptions. Alternatively material movement may be carried out under a CL:AIRE DoWCoP declaration, negating need for permit/ exemptions.</li> </ul>  | <b>C: Out<br/>O: Out</b>  |

| Topic – Receptor / Resource | Predicted Potential Effects  | Preliminary Mitigation  | Scoped-In /- Out and Phase*<br><br>* Phases:<br>C: Construction<br>O: Operation |
|-----------------------------|--|---|---|
|                             |  | <ul style="list-style-type: none"> <li>Any further mitigation required during construction to be controlled through EAP.</li> </ul>   |   |
| <b>Water</b>                | <ul style="list-style-type: none"> <li>Preliminary WFD Assessment undertaken during options appraisal process. The three affected water bodies are: <ul style="list-style-type: none"> <li>Dee - Alwen to Llyn Tegid – ID: GB111067052240</li> <li>Tryweryn - Dee to Mynach – ID: GB111067051900</li> <li>Llyn Tegid - ID: GB31134987</li> </ul> </li> <li>Preliminary WFD Assessment identifies potential detrimental impact on structure of lake shore, macrophyte and fish refuge areas quality elements if, as a result of the works, some of the lake foreshore is lost or disturbed.</li> <li>Potential that permanent change to areas of the lake foreshore may prevent achievement of ‘Good’ WFD status and the SAC objectives in the future.</li> </ul> | <ul style="list-style-type: none"> <li>Further detailed WFD compliance assessment may be required in relation to lake shore habitats. All other impacts have been scoped out in the draft WFD Compliance Assessment, available upon request.</li> </ul> | <p><b>C: In</b><br/><b>O: In</b></p>  |
| <b>Air</b>                  | <ul style="list-style-type: none"> <li>No permanent effects on air quality.</li> <li>Possible temporary construction stage effects from routine construction operations (can be</li> </ul>   | <ul style="list-style-type: none"> <li>Any required mitigation during construction to be controlled through EAP.</li> </ul>   | <p><b>C: Out</b><br/><b>O: Out</b></p>  |

| Topic – Receptor / Resource | Predicted Potential Effects   | Preliminary Mitigation   | Scoped-In /- Out and Phase*<br><br>* Phases:<br>C: Construction<br>O: Operation |
|-----------------------------|---|--|---|
|                             | managed through standard construction management procedures).   |  |   |
| <b>Climate</b>              | <ul style="list-style-type: none"> <li>The project will not affect climate, although there may be small scale / localised effects on microclimate resulting from vegetation clearance.</li> </ul>   | <ul style="list-style-type: none"> <li>Any required mitigation during construction to be controlled through EAP.</li> <li>Carbon calculator required from contractor.</li> </ul>   | <b>C: Out</b><br><b>O: Out</b>  |
| <b>Material Assets</b>      | <ul style="list-style-type: none"> <li>The proposed works are being designed to reduce the risk of uncontrolled release of water from the reservoir resulting from embankment failure, and as such serve to protect local material assets.</li> <li>No significant adverse impacts are considered likely, however temporary construction stage effects may be experienced by recreational amenities at the lakeside including Penllyn Leisure Centre, Bala Watersports &amp; Adventure Centre, Bala Rugby Club &amp; playing fields and The Loch Cafe.</li> <li>Bala Lake Railway Trust is proposing an extension to the Bala Lake Railway (the 'Red Dragon Project') which could be affected by the project.</li> <li>Bala Waste Water Treatment Works is located to the east of the town on the left</li> </ul> | <ul style="list-style-type: none"> <li>Effective engagement with owners / operators of recreational amenities, and Bala Lake Railway Trust, through design development and construction phases.</li> <li>Pumping station operators to be consulted and considered in design.</li> <li>Any required mitigation during construction to be controlled through EAP.</li> </ul> | <b>C: Out</b><br><b>O: Out</b>  |

| Topic – Receptor / Resource  | Predicted Potential Effects  | Preliminary Mitigation   | Scoped-In /- Out and Phase*<br><br>* Phases:<br>C: Construction<br>O: Operation |
|--|--|--|---|
|  | <p>bank of the Tryweryn and is owned and operated by Dŵr Cymru Welsh Water.</p> <ul style="list-style-type: none"> <li>• There is a land drainage pumping station on the embankment to the right of Penllyn Leisure Centre.</li> </ul>   |  |   |
| <p><b>Cultural heritage</b><br/>(including architectural and archaeological aspects)</p> | <ul style="list-style-type: none"> <li>• No likely significant effects on cultural heritage assets due to the distance between the proposed works and these features / assets, combined with the limited scale and nature of the proposed works themselves.</li> <li>• Gwynedd Archaeological Trust has advised no likely significant archaeological impacts from scheme and no Archaeological Desk Based Assessment required.</li> </ul>  | <ul style="list-style-type: none"> <li>• Cultural heritage assets have been identified and plotted on constraints maps, which will be passed on to the contractor.</li> <li>• Any required mitigation during construction to be controlled through EAP.</li> </ul>   | <p><b>C: Out</b><br/><b>O: Out</b></p>  |
| <p><b>Landscape &amp; Visual</b></p>   | <ul style="list-style-type: none"> <li>• Preliminary Landscape and Visual Appraisal (BVL, 2018).</li> <li>• Main area of change is loss of trees and hedgerows alongside embankments – particularly the lake embankment,</li> <li>• Effects also from rip rap improvement works which will lead to a hardening of the visual appearance of the north lake bank.</li> <li>• Overall, the scheme is unlikely to result in significant permanent landscape or visual effects, provided that adequate reinstatement</li> </ul> | <ul style="list-style-type: none"> <li>• Tree Survey, Arboricultural Impact Assessment, Tree Management Plan &amp; Tree Protection Plans (to BS5837:2012) required.</li> <li>• Landscape reinstatement and mitigation measures, including replacement planting, are to be developed and implemented.</li> <li>• On-going landscape architect input to design development and development of enhancement opportunities.</li> <li>• On-going consultation with SNPA over landscape issues and design development.</li> </ul> | <p><b>C: In</b><br/><b>O: In</b></p>  |

| <b>Topic –<br/>Receptor /<br/>Resource</b> | <b>Predicted Potential Effects</b>  | <b>Preliminary Mitigation</b> | <b>Scoped-In /-<br/>Out and<br/>Phase*</b><br><br>* Phases:<br>C: Construction<br>O: Operation |
|--|---|-------------------------------|--|
|  | and mitigation measures are developed, but noted that changes, particularly tree loss, could be of local interest and concern, therefore landscape & visual has been scoped in for further consideration. |                               |  |



Where no potential significant environmental effects are predicted, these topics have been scoped out; justification for these topics is provided in Table 4.2.

**Table 4.2 - Scoping Justification: Topics Scoped Out (summary)**

| Environmental Topic    | Phase*<br>* Phases:<br>C: Construction<br>O: Operation                       | Justification   |
|------------------------|--|---|
| <b>Land</b>            | <ul style="list-style-type: none"> <li>• C: Out</li> <li>• O: Out</li> </ul> | <ul style="list-style-type: none"> <li>• Significant Impacts on neighbouring land uses have been avoided by avoiding selection of options involving significant changes to embankment scale / footprint.</li> <li>• The proposed works will reduce the risk of failure of the reservoir embankments. This ultimately provides benefit to property, infrastructure and agricultural land.</li> <li>• Any further mitigation required during construction to be controlled through the EAP.</li> </ul>  |
| <b>Soil</b>            | <ul style="list-style-type: none"> <li>• C: Out</li> <li>• O: Out</li> </ul> | <ul style="list-style-type: none"> <li>• No likely effects on surrounding soil quality</li> <li>• Topsoil over the existing embankments to be stripped and replaced, with no significant requirement for imported material anticipated.</li> <li>• There is expected to be some land take within neighbouring agricultural land.</li> <li>• Negotiations with agricultural land owners over land take.</li> <li>• Beneficial effects from management of invasive species.</li> <li>• Any further mitigation required during construction to be controlled through the EAP.</li> </ul> |
| <b>Air</b>             | <ul style="list-style-type: none"> <li>• C: Out</li> <li>• O: Out</li> </ul> | <ul style="list-style-type: none"> <li>• No permanent effects on air quality.</li> <li>• Possible temporary construction stage effects from routine construction operations (can be managed through standard construction management procedures).</li> <li>• Any required mitigation during construction to be controlled through the EAP.</li> </ul>   |
| <b>Climate</b>         | <ul style="list-style-type: none"> <li>• C: Out</li> <li>• O: Out</li> </ul> | <ul style="list-style-type: none"> <li>• The project will not affect climate, although there may be small scale / localised effects on microclimate resulting from vegetation clearance.</li> <li>• Any required mitigation during construction to be controlled through the EAP.</li> <li>• Climate calculator will be produced for design and construction.</li> </ul>  |
| <b>Material Assets</b> | <ul style="list-style-type: none"> <li>• C: Out</li> <li>• O: Out</li> </ul> | <ul style="list-style-type: none"> <li>• The proposed works serve to protect local material assets.</li> <li>• No significant adverse impacts are considered likely.</li> </ul>   |

| Environmental Topic  | Phase*<br>* Phases:<br>C: Construction<br>O: Operation                       | Justification  |
|--|--|--|
|  |  | <ul style="list-style-type: none"> <li>• Effective engagement with owners / operators of recreational amenities, and Bala Lake Railway Trust, through design development and construction phases</li> <li>• Any required mitigation during construction to be controlled through EAP.</li> </ul>   |
| <b>Cultural heritage</b><br>(including architectural and archaeological aspects) | <ul style="list-style-type: none"> <li>• C: Out</li> <li>• O: Out</li> </ul> | <ul style="list-style-type: none"> <li>• No likely significant effects on cultural heritage assets due to the distance between the proposed works and these features / assets, combined with the limited scale and nature of the proposed works themselves.</li> <li>• Gwynedd Archaeological Trust has advised no likely significant archaeological impacts from scheme and no Archaeological Desk Based Assessment is required.</li> <li>• Cultural heritage assets have been identified and plotted on constraints maps, which will be passed on to the contractor.</li> <li>• Any required mitigation during construction to be controlled through the EAP.</li> </ul> |

A summary of further surveys / investigations / assessments required to inform the design and construction method for the proposed scheme and impacts assessment is included in Table 4.3.

**Table 4.3 - Scope of Environmental Assessment during detailed design**

| Environmental Topic                           | Scope   |
|---|---|
| <b>All topics</b>                             | <ul style="list-style-type: none"> <li>• Develop EAP to describe mitigation and control measures required to protect the environment.</li> </ul>  |
| <b>Population &amp; Human Health</b>          | <ul style="list-style-type: none"> <li>• Appraise standard of existing footpath surfaces / gates / stiles / accessibility to inform opportunities for enhancements (detailed design).</li> <li>• Identify patterns of use of local amenities, roads and PRowWs, and consult with Public Right of Way Officer and Highways Authority (Gwynedd County Council) to inform programming of the works, routes of diversions etc</li> </ul>  |
| <b>Biodiversity &amp; Nature Conservation</b> | <ul style="list-style-type: none"> <li>• Habitat Regulations Assessment screening.</li> <li>• Appropriate Assessment and suitable mitigation / compensatory measures.</li> <li>• Phase 2 bat surveys - activity transects, tree-climbing and emergence tree surveys.</li> <li>• Ecological watching brief during construction (e.g. for Slow worm, during vegetation clearance), otter, pollution control inspections.</li> <li>• Preconstruction species checks and surveys, inc badger, otter and water vole</li> <li>• A mitigation planting strategy to ensure no net loss in ecological resilience or connectivity.</li> <li>• Protected species mitigation to include:               <ul style="list-style-type: none"> <li>- Reptile and amphibians - Reasonable Avoidance Measures (surveys not considered necessary or practical).</li> </ul> </li> <li>• Complete Himalayan balsam / Japanese knotweed treatment through the summers of 2018 and 2019, prior to construction.</li> <li>• Biosecurity Risk Assessments to be produced addressing how to manage the risk of spreading <i>Chalara</i> (ash dieback), and INNS.</li> <li>• Complete investigation / design of potential enhancements including:               <ul style="list-style-type: none"> <li>- Rationalisation of the car parking on the lake foreshore</li> <li>- Wet grassland habitat development and scrapes</li> <li>- Replacement hedge / tree planting</li> <li>- Identification of valuable trees on the landward embankment faces to be retained and protected.</li> </ul> </li> </ul> |
| <b>Water</b>                                  | <ul style="list-style-type: none"> <li>• Detailed WFD compliance assessment required for potential impacts on lake shore habitat.</li> </ul>  |
| <b>Landscape</b>                              | <ul style="list-style-type: none"> <li>• Tree Survey, AIA, &amp; Tree Protection Plans (to BS5837:2012)</li> <li>• Landscape reinstatement and mitigation measures, including replacement planting, to be developed during detailed design.</li> <li>• Agree above with all land owners.</li> <li>• Establish future maintenance arrangements for all landscape mitigation and improvement works.</li> </ul>  |

| Environmental Topic | Scope  |
|---------------------|--|
|                     | <ul style="list-style-type: none"><li>• On-going landscape architects' input to design development and development of enhancement opportunities.</li><li>• On-going consultation with SNPA over landscape issues and design development.</li></ul> |

### 4.3 Potential Environmental Enhancements

A draft list of potential environmental enhancements is provided below. These will be developed further during the detailed design stage, with a final list of environmental enhancements taken forward into project delivery reported in Section 7.

#### Recreation / wellbeing

- Promote well-being and access to green spaces with enhancements to existing footpaths and PRowWs, including surfacing and access for all abilities.
- Potential additional interpretation / signage and promotion of an improved PRow network.
- Enhancements to the spaces immediately to the south of Penllyn Leisure Centre, including resurfacing, seating and planting; combined with increased light and views of lake from tree clearance, this will enhance the appearance and micro-climate of this area.
- Public seating areas along PRow looking over lake / potential for a feature bench to replace the 'bandstand'.
- Wildlife interpretation signage near grassland areas (see also ecological, below).
- Improvements to spatial arrangement and functionality of lakeside overspill car park (see also ecological, below).

#### Ecological

- Potential to optimise and resurface lakeside overspill car park, creating a more efficient layout and restoring unused edges to SAC / Ramsar habitat.
- Lakeshore reinstatement could include measures to manage scrub and improve wetland habitat by de-compaction and potentially lowering ground levels to raise the water table (minimally in very specific locations i.e. the bandstand area).
- Habitat creation to create species rich areas of grassland meadow around the river banks, berms and adjacent areas (4-5ha approx.). Soil testing undertaken to inform recommendations during detailed design.
- Potential to improve connectivity between existing scrapes and holts by planting scrub/ hedgerow or management change. Provides improved habitat for otters/ birds/ amphibians/ reptiles.
- Pond creation close to existing pond (TN 8 of Phase 1 Plan; Enfys Ecology, 2018) - to create a network of habitats for amphibians and birds.
- Repair existing artificial otter holts.
- Addition of bat and bird boxes.
- Create more areas for amphibians to provide food source for otter.
- Planting trees in groups to provide habitat for various native species of mammal bird/ amphibian/ reptile.
- Manage INNS in the area through a treatment programme. Consider long-term, post-works plan for the management of INNS (Himalayan balsam and Japanese knotweed).

#### Tree and hedgerow planting related mitigation

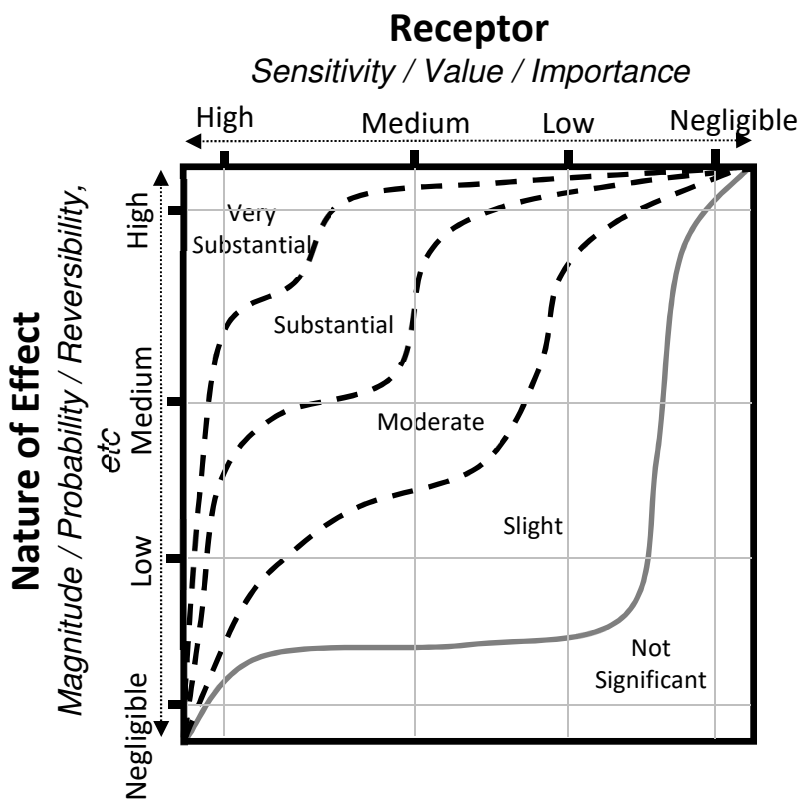
- Mitigation tree and hedgerow planting to improve native species diversity. Trees are dominated by ash (suffering from ash dieback), and hedgerows are dominated by hawthorn. Planting of a range of native broad leaf species would be appropriate; native black poplar would be of particular benefit.
- Linear planting to ensure no net loss of ecological connectivity or resilience.
- Consider long-term, post-works plan for the management of INNS
- NRW land ownership presents opportunities: NRW has several land holdings associated with Bala sluices, also Canolfan Tryweryn and much of the Tryweryn itself, including a 6-foot strip on both banks. At Canolfan Tryweryn there is approx. 4.6 ha of land (largely unused) including old clay pigeon site – consider potential for tree planting. The former station on the right bank of the Dee is also owned by NRW. Welsh Water also have extensive land holdings in area – consider opportunities on their land.
- Screen planting opportunities between Afon Tryweryn and Bala Enterprise Park, improving visual appearance alongside the PRow.
- Management of (off-site) areas of existing woodland / vegetation, including selective thinning / tree works / inter-planting to optimise age and species diversity, and overall ecosystem health.

## Part B

# 5. Assessment of Environmental Impacts and Development of Mitigation

## 5.1 Methodology

This section describes the assessment of environmental effects of topics that were deemed to be potentially significant during the Scoping Stage. The most common methodology used to evaluate significance is to compare the magnitude of the predicted effect with the sensitivity of the receiving environment. In this approach 'magnitude' and 'sensitivity' are used as descriptors of a wide range of different factors. 'Magnitude' includes the spatial extent of the effect; the time period over which the effect will occur; and whether the effect is permanent or reversible.



Impact significance is determined by considering magnitude in relation to the sensitivity of the receptor impacted, and over what timescales. This is demonstrated in Table 5.1 and 5.2.



**Table 5.1 - Matrix for Determining Impact Significance**

| Receptor Sensitivity | Magnitude of Effect |            |            |            |            |
|----------------------|---------------------|------------|------------|------------|------------|
|                      | Very High           | High       | Medium     | Low        | Very Low   |
| Very High            | Major               | Major      | Moderate   | Minor      | Negligible |
| High                 | Major               | Moderate   | Minor      | Minor      | Negligible |
| Medium               | Moderate            | Minor      | Minor      | Negligible | Negligible |
| Low                  | Minor               | Minor      | Negligible | Negligible | Negligible |
| Very Low             | Minor               | Negligible | Negligible | Negligible | Negligible |

**Table 5.2 - Timescales to inform assessment of significance**

| Terminology | Timescales  |
|-------------|---|
| Short term  | During the construction and up to 1 year following completion |
| Medium Term | Up to 5 years following completion of the project             |
| Long Term   | Between 5 and 15 years following completion of the project    |
| Permanent   | Greater than 15 years following completion of the project     |

Table 5.3 gives some further guidance for assigning significance categories.

**Table 5.3 - Examples for defining significance categories**

| Significance category | Example   |
|-----------------------|---|
| <b>Major</b>          | <ul style="list-style-type: none"> <li>• results in a breach in legislation of statutory objectives</li> <li>• affects the integrity of sites or species designated as being of national or international importance</li> <li>• causes an identifiable impact on human health either directly or through effects on the determinants of health</li> <li>• is of an extent to result in a dominant change to the character of an area or environmental feature</li> <li>• where economic valuation occurs, is of sufficient magnitude to result in a change to the preferred option</li> </ul> |

| Significance category | Example   |
|-----------------------|---|
| <b>Moderate</b>       | <ul style="list-style-type: none"> <li>• identifiable impact, but does not affect the integrity of sites or species designated as being of national or international importance</li> <li>• affects the integrity of sites or species designated at a regional, county or local level</li> <li>• results in a significant change to human behaviour within the affected community</li> <li>• results in a material change to the character of an area or environmental feature</li> <li>• affects the integrity of an environmental site of local community value (such as for nature conservation, recreation)</li> </ul> |
| <b>Minor</b>          | <ul style="list-style-type: none"> <li>• impacts on, but does not affect the integrity, of a site or species designated at a regional, county or local level.</li> <li>• affects the integrity of a site with no designation or recognised nature conservation value</li> <li>• results in small change in human behaviour within the affected community</li> <li>• has a noticeable (but not material) effect on the character of an area</li> <li>• impacts on, but does not affect the integrity of an environmental site of local community value (such as for nature conservation, recreation).</li> </ul>           |

## 5.2 Spatial and temporal scales for assessment

The EIA Regulations and the SMNR and SD principles all require us to consider an appropriate spatial and temporal scale for the project, taking into account the potential pathways for effects.

Study areas for each receptor scoped into this environmental assessment have been defined in their respective technical reports and assessments.

## 5.3 Cumulative effects

In considering significance of impacts on receptors we must also identify likely effects on those ecosystem services identified as a priority at scoping stage. We must also consider the role of stakeholders in our significance assessment as this allows us to take into account the services that people and communities value rather than just their intrinsic value. This leads us in to the cumulative and indirect effects of the project.

## 6. Assessment, evaluation and mitigation

This section includes assessment for those topics where a potential significant impact was identified during scoping. Further studies that have been undertaken are summarised and significance assigned to any residual impact, after mitigation has been identified.

Mitigation measures and monitoring requirements identified during impact assessment have been carried through into the Environmental Action Plan (EAP) (Appendix C). The EAP will manage the environmental effects before, during and after construction.

**Table 6.1 - Summary of the assessment of impacts and residual effects**

| Topic / receptor / resource | Summary of assessment undertaken  | Mitigation and monitoring required   | Impact level / scale (after mitigation)  |
|-----------------------------|---|--|--|
| Population and human health | <ul style="list-style-type: none"> <li>No further surveys or assessments have taken place since those recorded in Table 2.1 and 4.1.</li> <li>Minor short term impact during construction to users of PRowS, Bala Rugby Club, Bala Adventure and Watersports Centre, Penllyn Leisure Centre, lake picnic and parking area.</li> <li>A comprehensive Access Audit has been undertaken in accordance with British Standard ‘BS 8300-1:2018 - Design of an accessible and inclusive built environment (Part 1 – External Environment)’, which identified potential access improvements that can be made to existing footpaths along the lake embankment, River Dee embankment and Afon Tryweryn embankment.</li> </ul> | <ul style="list-style-type: none"> <li>Footpaths will be fully reinstated and resurfaced with tarmac, and existing gates replaced to ensure that access to all users is provided where necessary.</li> <li>Programming of the works, routes of diversions (temporary and permanent (if required)), and specifications for reinstatement, to be discussed and agreed with the Public Right of Way Officer (Gwynedd County Council) and Public Path Order applied for where required.</li> <li>Required mitigation during construction (including management of construction noise) to be controlled through EAP – e.g. working hours, schedule work to commence outside of peak tourist season, etc.</li> <li>Upon completion construction compounds to be reinstated to former uses (agricultural land). Enhancements discussed in Table 7.1 to promote wellbeing, recreation and access have been incorporated into scheme design, including footpath resurfacing, new footpath between Penllyn Leisure Centre and lakeshore car park and resurfacing of lakeshore overflow car park to create a more efficient and formalised layout.</li> <li>Public consultation events have taken place with views and suggestions incorporated into scheme design where possible.</li> </ul> | <ul style="list-style-type: none"> <li>Following implementation of mitigation, impact on population and human health is not considered to be significant.</li> </ul> |

| Topic / receptor / resource | Summary of assessment undertaken   | Mitigation and monitoring required   | Impact level / scale (after mitigation)   |
|-----------------------------|--|--|---|
| Biodiversity                | <ul style="list-style-type: none"> <li>• Further surveys and assessment have taken place since those recorded in Table 2.1 and 4.1, these are:               <ul style="list-style-type: none"> <li>– Aerial, Phase 1 and NVC Survey (exegesis, 2018)</li> <li>– Bat Roost Potential Survey Report (Black &amp; Veatch, 2018)</li> <li>– Bat Survey Report (Egniol Environmental, 2019)</li> <li>– Phase 1 Habitat Survey Report for additional site areas (Black &amp; Veatch, 2019), which includes validation of previous Phase 1 Habitat surveys</li> <li>– Habitats Regulations Assessment – Appropriate Assessment</li> </ul> </li> <li>• The aim of the Aerial, Phase 1 and NVC Survey was to update and improve on the Phase 1 survey recorded in the PEA (Enfys Ecology, 2018).               <ul style="list-style-type: none"> <li>– The Phase 1 survey reclassified some of the Phase 1 habitats identified in the previous survey due to a combination of the timing of the survey and the availability of high resolution aerial imagery. Despite this, no further Phase 2 surveys than those identified in the PEA were considered necessary.</li> <li>– The NVC survey recommends various measures to improve species diversity throughout the scheme area and found that the scheme is unlikely to result in significant impacts on NVC communities.</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• A mitigation planting strategy has been developed which focusses on replacing the ecological function and value of the existing tree lines. This aims to ensure no net loss in ecological resilience or connectivity. The recommendations identified in the NVC Survey have been incorporated into the mitigation planting strategy.</li> <li>• Particularly valuable specimen trees (category A) and any trees identified as having high bat roost potential are to be retained where possible. In the event that a tree with high bat roost potential is to be removed then inspection by a licenced bat ecologist will be required immediately prior to and/or supervision during felling. Felling will be carried out under a bat licence.</li> <li>• Further bat surveys may be required if construction compound affects mature trees not previously surveyed.</li> <li>• Bat boxes will be provided to increase the number and quality of bat roosts available.</li> <li>• Other protected species mitigation to include:               <ul style="list-style-type: none"> <li>- Reptile and amphibians - possible habitat within rip rap for common species.</li> </ul>               Reasonable Avoidance Measures to be taken including ecological watching brief during construction (e.g. for Slow worm, during vegetation clearance; also possible provision of artificial refugia). Establishment of construction compound should be undertaken under ecological watching brief             </li> </ul> | <ul style="list-style-type: none"> <li>• Following implementation of mitigation, impact on biodiversity is not considered to be significant.</li> </ul> |

| Topic / receptor / resource | Summary of assessment undertaken   | Mitigation and monitoring required  | Impact level / scale (after mitigation) |
|-----------------------------|--|---|---|
|                             | <ul style="list-style-type: none"> <li>• The bat survey report produced by Egniol Environmental (2019) reports the findings of a bat roost inspection survey, emergence survey, transect activity survey and a static activity survey. The surveys followed on from the PEA (Enfys Ecology, 2018) and the Bat Roost Potential Survey Report (Black &amp; Veatch, 2018). <ul style="list-style-type: none"> <li>– The bat roost inspection survey identified six trees with high bat roost potential, although no evidence of bats was observed at the time of the survey.</li> <li>– During the emergence survey one brown long-eared bat was observed emerging from a tree. This tree is outside of the main works area and will not require removal.</li> <li>– Emergence, transect and static detector surveys identified considerable bat activity in the area including foraging and commuting bats. Due to the large areas of pasture and woodland close to the proposed works, it is unlikely that the loss of trees as a result of the proposed works will have a significant impact on foraging for any of the species recorded. There may be some impact from the loss of flight lines/commuting corridors resulting from the felling of trees.</li> </ul> </li> </ul> | <p>to avoid impact to reptiles using rough unmanaged grassland located along some field boundaries.</p> <ul style="list-style-type: none"> <li>- Otter: Pre-construction survey and Reasonable Avoidance Measures to be taken to prevent impact to otter. Artificial otter holts to be examined to identify usage and condition, and relocate and repair where necessary, under licence.</li> <li>- Badgers: Pre-construction check of construction compound area prior to ensure no new setts have been created close to the proposed works.</li> <li>- Buffer zones around boundaries of fields used for construction compounds to protect tree protection zones, ditches and unmanaged grass strips. Encroachment should be prohibited into the buffer zones at all times.</li> <li>- Contractors will follow good construction practice laid out in construction/ environmental documents to prevent a negative impact. The Environmental Action Plan will summarise all actions required to mitigate impacts on the environment.</li> <li>- Clearance works will be programmed to avoid bird nesting season (March to September inclusive).</li> </ul> <ul style="list-style-type: none"> <li>• NRW is managing Himalayan balsam and Japanese knotweed through the summers of 2018 and 2019, prior to construction, including Japanese knotweed treatment with herbicide.</li> </ul> |   |

| Topic / receptor / resource | Summary of assessment undertaken   | Mitigation and monitoring required   | Impact level / scale (after mitigation)  |
|-----------------------------|--|--|--|
|                             |  | <ul style="list-style-type: none"> <li>• During construction the Invasive Species Management Plan will be adhered to throughout the construction phase with stands of Japanese knotweed to be removed and any remaining Himalayan balsam managed and removed.</li> <li>• NRW will require Biosecurity Risk Assessments from their contactors.</li> </ul>   |  |
| Water                       | <ul style="list-style-type: none"> <li>• Preliminary WFD Assessment identified potential detrimental impact on structure of lake shore, macrophyte and fish refuge areas quality elements if, as a result of the works, some of the lake foreshore is lost or disturbed. Potential that permanent change to areas of the lake foreshore may prevent achievement of 'Good' WFD status and the SAC objectives in the future.</li> <li>• Subsequent WFD Compliance Assessment concluded that for the three surface waterbodies and one groundwater body there is no risk of deterioration or prevention of the water body achieving its objectives as a result of the project, either alone or in combination, and no further consideration under the Water Framework Directive/Regulations is required in order to determine the application.</li> </ul> | <ul style="list-style-type: none"> <li>• Application of strict pollution prevention controls during construction, to include the use of bio oils with all hydraulic equipment and machinery, no refueling to be undertaken within or near watercourses or lakeshore areas, spoil to be stored on geotextile for segregation and ease of reinstatement.</li> <li>• Sustainable Drainage Approval to be obtained from local authority</li> </ul> | <ul style="list-style-type: none"> <li>• Following implementation of mitigation, impact on water is not considered to be significant.</li> </ul> |
| Landscape and Visual        | <ul style="list-style-type: none"> <li>• The Preliminary Landscape and Visual Appraisal (BVL 2018) concluded that the landscape and visual impacts resulting from the scheme are not likely to be significant in EIA terms. Whilst some effects, particularly from tree loss, would be likely to generate local</li> </ul>   | <ul style="list-style-type: none"> <li>• A Landscape Masterplan identifying the location, nature and extent of tree and hedgerow planting and other environmental mitigation and enhancement has been developed and will be delivered as part of the project. This provides for 'not net loss' in terms</li> </ul>   | <ul style="list-style-type: none"> <li>• Following implementation of mitigation, impact on landscape and visual amenity is not</li> </ul>        |



| Topic / receptor / resource | Summary of assessment undertaken  | Mitigation and monitoring required   | Impact level / scale (after mitigation) |
|-----------------------------|---|--|---|
|                             | <p>interest and concern, they would not constitute 'moderate' or 'major' levels of significance in EIA terms, and can be offset with appropriate mitigation and enhancement planting. Therefore, a formal LVIA has not been produced.</p> <ul style="list-style-type: none"> <li>• Annotated photographs from two viewpoints have been produced to illustrate the effects of the proposed development on visual amenity.</li> <li>• The removal of trees and other vegetation, including all those trees growing amongst the existing rip rap, is likely to constitute the most notable change in appearance resulting from the project. As a highly scenic area within Snowdonia National Park, the visual amenity around Llyn Tegid is sensitive, however the tree lining of along the northern lake embankment is not considered to be a fundamental component of the area's visual amenity. Consideration by landscape architects of views around Llyn Tegid from key visual receptors has resulted in an assessment that the proposed loss of trees and other vegetation is not likely to have a significant impact on visual amenity.</li> <li>• The formation of a concrete trough for the potential extension of the Bala Lake Railway will also result in some minor landscape and visual effects. The concrete trough will be set into the embankment such that the tops of the edging kerbs will be level with the embankment crest. These kerb lines may appear rather</li> </ul> | <p>of trees, ensuring at least as many will be replanted as felled, whilst delivering replacement ecological function in terms of linear wildlife corridors</p> <ul style="list-style-type: none"> <li>• Measures to protect trees as recorded in the Tree Protection Plan and Method Statement will be followed throughout construction.</li> </ul> | <p>considered to be significant.</p>    |

| Topic / receptor / resource | Summary of assessment undertaken  | Mitigation and monitoring required   | Impact level / scale (after mitigation)                  |
|-----------------------------|---|--|--|
|                             | <p>incongruous in the absence of the actual railway track, however the space between them will be grassed, and it is likely that the grass would eventually grow over and conceal the kerbs, therefore if there were a long or indefinite delay to the delivery of the Bala Railway extension this element of the scheme is unlikely to result in any long term visual effects.</p> <ul style="list-style-type: none"> <li>• A tree survey, Arboricultural Impact Assessment and Tree Protection Plans (to BS5837:2012) and Tree Management Plan have been produced. Where possible trees are to be retained; a particular emphasis has been given to retaining trees considered to have high landscape amenity, or ecological value. Approximately 271 trees and 500m of hedgerow will be removed.</li> <li>• There are also visual effects from rip rap improvement works which will lead to a hardening of the visual appearance of the north lake embankment.</li> <li>• The removal of vegetation along the lake embankment will result in opening views up across the lake for users of the PRow and adjacent receptors, including users of Penllyn Leisure Centre which, at many viewpoints, may be seen as a positive visual effect.</li> </ul> |  |  |
| Cumulative Effects          | <ul style="list-style-type: none"> <li>• A search of current and recently determined planning applications has been undertaken at the time of writing using SNPA and Gwynedd Council's online planning services to capture</li> </ul>   | <ul style="list-style-type: none"> <li>• No cumulative effects have been identified, therefore no mitigation is required.</li> </ul> | <ul style="list-style-type: none"> <li>• None</li> </ul> |

| Topic / receptor / resource | Summary of assessment undertaken  | Mitigation and monitoring required | Impact level / scale (after mitigation) |
|-----------------------------|---|------------------------------------|---|
|                             | <p>any applications which could result in cumulative effects. No current (undecided) planning applications have been identified. There are a number of approved planning applications in the town. These are generally minor applications (such as single storey extensions to a dwelling).</p> <ul style="list-style-type: none"> <li>• Llyn Celyn Reservoir Flood Study (Dŵr Cymru Welsh Water) – currently ongoing. Llyn Celyn is upstream on the Afon Tryweryn. No further work commissioned at present, so no anticipated impact on the Llyn Tegid Reservoir Safety Project given current timescales.</li> <li>• A proposal to extend the Bala Lake Railway includes running new track along part of the crest of the lake embankment. This proposal has yet to be submitted for planning permission and therefore is not considered further in an assessment on cumulative effects. However, where possible the proposed development has been designed such that it will not inhibit the potential future development of the Bala Lake Railway extension if this were to go ahead.</li> </ul> |                                    |   |

## 7. Delivery of enhancements

NRW is required to deliver enhancements / multiple benefits, as required by the:

- Environment (Wales) Act 2016 – Section 4 SMNR Principals and Section 6 Biodiversity Duty;
- Well-being of Future Generations (Wales) Act 2015 and NRW's well-being objectives that derive from this;
- Water Framework Directive – statutory duty to secure compliance and protect and enhance the water environment;
- Habitats Directive – maintain or restore European habitats and species to their favourable conservation status; and
- Birds Directive – upkeep, create and manage bird habitats (Article 3).

There are a number of other drivers such as Core Management Plans for Protected Sites (and Prioritised Improvement Plans), local Well-being Plans and other specific locally led plans. See Section 2 for details of plans and documents reviewed.

Potential environmental enhancements were identified during the Scoping Stage, listed in Section 4.3. These have now been developed further and the following have been confirmed for delivery (subject to landowner agreement) (see Table 7.1).

**Table 7.1 - Confirmed enhancements (subject to landowner agreement)**

| Environmental enhancement (multiple benefits)  | Effectiveness at providing environmental improvement | Timescales                   | Strategic drivers   | Delivery mechanism / indicative cost |
|--|--|------------------------------|---|--------------------------------------|
| <p>Existing footpaths along the lake embankment (i.e. the PROW ‘Y Bala Rhif 4’), River Dee embankment and Afon Tryweryn embankment (i.e. the PROW ‘Y Bala Rhif 1’), will be improved in relation to good practice guidance for accessibility. These works have been informed by a comprehensive Access Audit for the works area and include:</p> <ul style="list-style-type: none"> <li>• Y Bala Rhif 4 is currently surfaced with tarmac, and will be re-surfaced in tarmac, with regularised levels, improved surface quality (eliminating existing problems of tree roots damaging / uplifting surfacing), and reducing gradients where possible.</li> <li>• Y Bala Rhif 1 is currently surfaced with unbound stone, and will be resurfaced in tarmac, to a consistent 2m width.</li> <li>• Pedestrian access control barriers, where present within the construction area, will be removed where practical to do so, or replaced with more accessible solutions where possible.</li> </ul> | <p>Medium</p>  | <p>Long term (10+ years)</p> | <p>NRW wellbeing objective 5<br/> ‘By all Reasonable Means’ (BARM) (NRW, 2017)<br/> British Standard ‘BS 8300-1:2018 - Design of an accessible and inclusive built environment (Part 1 – External Environment)’</p> | <p>Construction contract</p>         |

|   |               |                              |   |                              |
|---|---------------|------------------------------|---|------------------------------|
| <ul style="list-style-type: none"> <li>• Additional waymarker signage and seating will be provided for users of the PROWs.</li> <li>• Where ramps branch off the PROWs to provide access to the lake foreshore and other adjacent spaces, the gradients and widths of these will be optimised as much as possible, within site constraints.</li> <li>• Additional and enhanced public seating areas to be provided along the PROWs</li> <li>• An improvement will be delivered in terms 'clear walking tunnel' requirements, i.e. BS8300-1 and BARM specify vertical and horizontal clear space requirements for accessible routes, which are currently not achieved along Y Bala Rhif 4 due to low and overhanging branches; as a consequence of the required vegetation clearance works Y Bala Rhif 4 will become compliant with both BS8300-1 and BARM in this respect.</li> </ul> |               |                              |   |                              |
| <p>Focus is given to footpath and access improvements between Penllyn Leisure Centre and the lakeshore car park, as a particularly popular and intensively used area, exploiting the benefits of the more open views created by the scheme. The open space to the south of the leisure centre will be enhanced with new hard and soft landscaping, new seating, and</p>   | <p>Medium</p> | <p>Long term (10+ years)</p> | <p>NRW wellbeing objective 5<br/> 'By all Reasonable Means' (BARM) (NRW, 2017)<br/> British Standard 'BS 8300-1:2018 - Design of an</p> | <p>Construction contract</p> |

|  |        |                       |  |                       |
|--|--------|-----------------------|--|-----------------------|
| improved steps and ramped access; linked to this an existing ramp to the foreshore will be re-aligned and reconstructed to a significantly reduced gradient.   |        |                       | accessible and inclusive built environment (Part 1 – External Environment)'            |                       |
| The lakeshore overflow car park (adjacent the Bala Adventure & Watersports building) is to be re-organised and re-surfaced, with a more efficient and formalised layout designed to optimise parking capacity within reduced hard surfacing. There will be a net increase in soft landscape / decrease in hard surfacing as a result, delivering visual enhancements as well as practical improvements through a semi-formal layout. | Medium | Long term (10+ years) | NRW wellbeing objective 2  | Construction contract |
| Associated with the re-organisation of the lakeshore overflow car park, areas of wetland habitat within the protected SAC/Ramsar site which are currently in sub-optimal condition due to compaction from vehicles will be protected from further compaction enabling improvement to habitat condition.  | High   | Long term (10+ years) | NRW wellbeing objective 3<br>WFD objective (Dee River Basin Management Plan 2015-2021) | Construction contract |
| Tree and hedgerow planting will be delivered to mitigate for the tree and hedgerow clearance works. <ul style="list-style-type: none"> <li>• More trees will be planted than are removed.</li> <li>• The species used will be native to the area and similar to those removed.</li> </ul>  | High   | Long term (10+ years) | NRW wellbeing objective 3<br>Eryri Local Development Plan 2016-2031                    | Landscape contract    |



|  |        |                          |  |   |
|--|--------|--------------------------|--|---|
| <ul style="list-style-type: none"> <li>Replacement planting will focus on replacing the ecological function and value of the existing tree lines, with the aim to ensure no net loss in ecological resilience or connectivity</li> </ul> |        |                          |  |   |
| Management and removal of invasive non-native plant species from the lakeshore and river embankments (Japanese knotweed and Himalayan balsam).   | Medium | Medium term (5-10 years) | NRW wellbeing objective 3<br>WFD objective (Dee River Basin Management Plan 2015-2021) | Separate contract prior to construction |
| Changes in grassland management to encourage greater floristic species diversity.  | High   | Long term (10+ years)    | NRW wellbeing objective 3  | Separate contract                       |
| Installation of interpretative signage at key locations.   | Low    | Medium term (5-10 years) | NRW wellbeing objective 1 and 5  | Landscape contract                      |
| Integration of community artwork with the creation of a series of features carved from felled timber, using a local artist to create a locally meaningful narrative.   | Low    | Medium term (5-10 years) | NRW wellbeing objective 1, 5 and 6   | Landscape contract                      |

# Appendices

## Appendix A – Consultation Record

| Consultee  | Date of consultation  | Summary of Response  | Action taken   |
|--|---|--|--|
| <b>NRW INTERNAL CONSULTATION</b>                           |   |  |  |
| Rhodri Parry, Conservation Officer, NRW                    | 16/07/18  | Querying planting along the industrial estate as tree clearance recently required there to enable embankment maintenance | To be considered during detailed design  |
|  |   | Will there be a berm on the wet side of the embankment?  | No berm on wet side, as per option description   |
|  |   | Water Voles “limited potential for presence” – presence recorded recently  | Table 2.1 updated accordingly  |
|  |   | Worth noting that a felling licence will likely be required for large scale removal of trees                             | Table 2.1 updated accordingly  |
|  |   | Queries “measures to improve drainage” on the lakeshore  | Reference to drainage removed from table 2.1   |
|  |   | INNS management – queried the extent of the area covered   | To be reviewed in October 2018 and future year’s treatment planned accordingly   |
|  |   | Opportunity: could we add a long-term, post-works plan for the management of INNS  | Table 2.1 updated accordingly  |
|  |   | Water: worth noting Llyn Tegid suffers from blue green algae   | Table 2.1 updated accordingly  |
|  |   | H.B. removal programme - would a post-work programme be possible?  | Mitigation required during construction to be controlled through EAP. NRW will require Biosecurity Risk Assessments from their contactors. |
|  |   | Unclear whether topsoil will be reused or replaced   | Topsoil over the existing embankments to be stripped and replaced, with no significant requirement for imported material anticipated       |
|  |   | Inconsistencies in wording between the HRA and ECOR  | Wording updated to remove inconsistencies  |
|  |   | How much progress and discussions have been made with the mitigation options?  | Mitigation options we be explored during environmental assessment stage  |
| What is the plan of action for treating Japanese knotweed? | Table 4.3: Complete Himalayan balsam / Japanese knotweed treatment through the summers of 2018 and 2019, prior to |  |  |

| Consultee  | Date of consultation | Summary of Response   | Action taken  |
|--|----------------------|---|---|
|  |                      |   | construction. Table 2.1 refers to application of best practice                  |
|  |                      | Dee Life bid is currently underway and will include Llyn Tegid  | Noted   |
|  |                      | Rhiwlas estate are part of an SMS bid   | Noted   |
| Oliver Lowe, Technical Officer Geomorphology, NRW                | 16/07/18             | Queried why no opportunities being pursued to improve flow diversity and in channel habitat   | LC (email 18/07/18) explained reasons why these suggestions had been ruled out. |
|  | 17/12/18             | Dee Life Bid Update at Detailed Design Start-up Meeting   | N/a   |
| Joel Rees-Jones, Technical Specialist Fisheries, NRW             | 17/12/18             | Dee Life Bid Update at Detailed Design Start-up Meeting   | N/a   |
| Gethin Morris, Environment Team Fisheries Technical Officer, NRW | 10/01/18 to date     | Kept up to date with various scheme updates throughout the appraisal and design process.  | N/a   |
| Matthew Llewellyn, Technical Specialist (Contaminated Land), NRW | 16/07/18             | Agree with the proposal for ground investigation, which will cover concerns in relation to historic land contamination  | N/a   |
|  |                      | Advice on soil import: may need to be appropriate permits or exemptions. Alternatively material movement may be carried out under a CL:AIRE DoWCoP declaration, negating need for permit/exemptions     | Tables 2.1 & 4.1 updated accordingly  |
| Helen Millband, Senior Environmental Planning Officer (WFD), NRW | 16/07/18             | No comments. Have since had discussions on potential links to the EU LIFE bid.  | N/a   |
| Dr Adam Cole-King, Senior International Sites Adviser, NRW       | 16/07/18             | Advice re potential SAC / Ramsar: within the boundary there is 'non-habitat' (i.e. car park, pavement, grassed areas) as well as qualifying habitat; only losses of qualifying habitat would need to be | N/a   |
| Nia Watkin, Senior Conservation Officer, NRW                     | 16/07/18             | Concurs with Adam Cole-King re no need to report loss of non-habitat features within the boundary. Area affected is grassland, not wetland, as reported in NVC survey.                                  | N/a   |

| Consultee  | Date of consultation | Summary of Response  | Action taken  |
|--|----------------------|--|---|
|  |                      | Raised concerns re. effects of woody debris, edge effect on the SAC habitat that is beyond the MG1a, & construction impacts on SAC feature habitat | MJ (email 15/08/18) – initial responses to concerns and assurance they will be considered further during detailed design. |
|  |                      | Request for further info on habitat creation / mitigation  | MJ provided (email 15/08/18)  |
|  |                      | Queried how HRA process will be handled  | MJ (email 15/08/18): NRW will prepare an Appropriate Assessment and submit to SNPA with the planning application          |
| Dave Thorpe, Biodiversity Technical Specialist, NRW                  | 16/07/18             | Advice re salmonid spawning period   | Table 2.1 updated accordingly   |
|  |                      | Disabled access improvements to embankment crest paths – add ref to works undertaken 15 years ago.   | Table 2.1 updated accordingly   |
|  |                      | Advice re treatment of Japanese knotweed   | Table 2.1 updated accordingly   |
|  |                      | Advice re opportunities linked to NRW land holdings  | Table 2.1 updated accordingly   |
|  |                      | Advice re planting opportunities   | Table 2.1 updated accordingly   |
|  |                      | Advice re Freshwater pearl mussel records  | Table 2.1 updated accordingly   |
| David Liddy, Specialist Advisor Recreational Safety, NRW             | 12/03/18             | Advice on recreational use of footpaths on circular walk around Bala.  | Noted and considered in mitigation and enhancement design development.  |
|  | 15/07/19             | Advice on re-planting proposals.   | Noted and considered in mitigation and enhancement design development.  |
| Lajla Cash, Woodland Creation Manager, NRW                           | 03/07/19             | Advice on links from replanting proposals with other tree planting initiatives (e.g. Plant! and Centenary Trees).                                  | Noted and follow up consultation.   |
| Sue Williams, Plant! Programme Manager, NRW                          | 08/07/19             | No real opportunities for scheme linkage due to the scale of re-planting proposed (too small).   | N/a   |
| Charlotte Owen, Woodland Programme Officer (Centenary Trees NRW)     | 07/02/19             | Possible scheme synergies, stay in touch as project develops in detail.  | N/a   |
| Eleanor Goupillon, Woodland Programme Officer (Centenary Trees), NRW | 01/08/19             | Possible inclusion of tree beacons in Tegid planting plans to be considered.   | Noted and considered in planting plans as they are developed.   |
| Conservation, Planning & FRAP Teams, NRW                             | 10/01/18 to date     | Regular updates on scheme progress including site visits (ongoing).  | N/a   |

| Consultee                                       | Date of consultation | Summary of Response   | Action taken   |
|---|----------------------|---|--|
| Sir David Henshaw, Chair, NRW                   | 29/10/18             | Meeting and site visit. Generally supportive of scheme and approach to community and stakeholder engagement and the mitigation and enhancement proposals.   | N/a  |
| Claire Pillman, Chief Executive, NRW            | 29/10/18             | Meeting and site visit. Generally supportive of scheme and approach to community and stakeholder engagement and the mitigation and enhancement proposals.   | N/a  |
| NRW Board                                       | 08/03/19             | Meeting and site visit. Generally supportive of scheme and approach to community and stakeholder engagement and the mitigation and enhancement proposals.   | N/a  |
| FRM Advisory Board                              | 11/10/19             | Site meeting and presentation to update on scheme progress generally. Supportive of scheme and the approach adopted with respect to the potential railway extension. Possibility of including fruit trees in re-planting plans was mentioned. | N/a  |
| EXTERNAL CONSULTATION                           |                      |   |  |
| SNPA, Head of Development Planning, Aled Lloyd, | 06/08/18             | No response to scoping consultation, but have met project officers on three occasions, including a site visit. Provided EIA Screening response – EIA not required.  | N/a  |
| SNPA, County Ecologist, Caroline Wilson         | 06/08/18             | No response to scoping consultation, but have met project officers on three occasions, including a site visit. NRW provided regular updates on ecology surveys. Comments made by Caroline on the bat report were incorporated.                | N/a  |
| SNPA, Tree Officer, Rhydian Roberts             | 06/08/18             | No response to scoping consultation, but have met project officers on three occasions, including a site visit.  | N/a  |
| SNPA, Warden Bill Taylor (now retired)          | 06/08/18             | No response to scoping consultation, but have met project officers.   | N/a  |
| SNPA, Warden Arwel Morris                       |                      | No response to scoping consultation, but has met project officers on site. Supportive of  | Develop plans for car park improvements jointly with SNPA. |

| Consultee   | Date of consultation | Summary of Response   | Action taken   |
|---|----------------------|---|--|
|   |                      | proposals to improve SNPA overflow car park to improve usage and reduce damage to the SAC.  |  |
| SNPA, Head of Property, Edward Jones                      | 06/08/18             | No response to scoping consultation, but have met project officers on five occasions, including a site visit. Regular contact between Edward and NRW's Project Manager. Supportive of proposals to improve SNPA overflow car park to improve usage and reduce damage to the SAC.  | Develop plans for car park improvements jointly with SNPA.   |
| SNPA, Senior Ecologist, Dafydd Roberts                    | 09/04/19             | Suggested potential peatland restoration opportunity at NRW's Foel Boeth (Lordship) plantation at Llanuwchllyn as a wider scheme ecological enhancement.  | MJ (email 20/05/19) – acknowledged possibility that would help with the overall carbon balance of the scheme which will be further investigated.                               |
| Welsh Dee Trust   | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.  | N/a  |
| UK Rafting  | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.  | N/a  |
| Sustrans Cymru, Glyn Evans                                | 06/08/18             | Sustrans would welcome any improvements for non-motorised access including pedestrian and wheeled (for pushchairs, wheelchairs, mobility buggies and cycles) as well as disability improvements and general open access wherever possible.  | Potential for such improvements already identified within ECOR.  |
| Gwynedd Council, Planning Department                      | 06/08/18             | No response to scoping consultation. Previously advised that SNPA would lead on planning (no works now within Gwynedd).   | N/a  |
| Gwynedd Council, Highways                                 | 06/08/18             | No response to scoping consultation, but had provided traffic data previously.  | N/a  |
| Gwynedd Council, Rights of Way Officer, Elizabeth Haynes, | 06/08/18             | No response to scoping consultation, although have been in regular contact with NRW Project Manager including meeting and site visit. Supportive of proposals to improve footpaths and all abilities access. Need to keep in touch regarding temporary footpath closures required | Develop footpath and accessibility improvement plans as part of mitigation and enhancement proposals.<br><br>Passed contact details onto Julian Birley from Bala Lake Railway. |

| Consultee   | Date of consultation | Summary of Response  | Action taken  |
|---|----------------------|--|---|
|   |                      | as part of the scheme. Separate liaison with Bala Lake railway required over interactions with PRow and the proposed extension.  |   |
|   | 07/10/19             | Site visit to discuss accessibility audit comments. Supportive of proposed improvements particularly around surfacing and all abilities improvements.  | Detailed notes developed for access improvements for agreement with PRow Officer and Bala Town Council.   |
| Gwynedd Council, Regeneration Officer, Lindsey Ellis-Edwards                          | 20/06/19             | Meeting to explain background to scheme and mitigation and enhancement opportunities. Broadly supportive of the scheme and the associated environmental and community benefits associated with it. No Gwynedd Council funds available for future maintenance of an informal play area around leisure centre area. Suggested talk to Penllyn Partnership and Bala Town Council regarding future maintenance of scheme enhancements such as these and new seating areas. | Follow up liaison with Penllyn Partnership, Bala Town Council and Penllyn Leisure Centre. Outcome from these discussions was that opportunities were more around accessibility and linkages between the leisure centre and the lake foreshore area rather than planting and informal play areas due to associated maintenance and liability associated. |
| Llandderfel and Llanycil Community Councils (Part of Penllyn Partnership), Hafod Bryn | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.   | N/a   |
| Llangywer and Llanwuchllyn Community Councils (Part of Penllyn Partnership), Lis Puw  | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.   | N/a   |
| Gwynedd Council Councillor (Llandderfel), Elwyn Edwards                               | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates and has talked to various NRW project officers about the scheme at a public drop-in session in July 2018. Also chaired the Celyn, Tegid and Tryweryn Advisory Committee meeting on the 15/10/19 at which an update was given on the reservoir safety project.  | N/a   |
| Gwynedd Council Councillor (Bala), Dilwyn Morgan                                      | 06/08/18             | No response to scoping consultation, but NRW Project Manager has been in regular contact and has met on three occasions. Very supportive of the proposals, especially  | N/a   |



| Consultee  | Date of consultation | Summary of Response   | Action taken   |
|--|----------------------|---|--|
|  |                      | interested and supportive of the mitigation and enhancement (including recreational) opportunities associated with the scheme. Has been a key link in keeping the community updated on scheme developments.   |  |
| Bala Town Council, Lis Pugh and Tony Parry (key contact for scheme with Council) | 06/08/18             | No response to scoping consultation, although the NRW Project Manager has been in regular contact with the council through stakeholder updates and has attended two Town Council meetings and met with Town Council members at a public drop-in session in July 2019. Town Council supportive of proposals to improve footpaths and all abilities access. Concern over timings of the work and impact on local economy.<br><br>Town Council is a key link with local community. | Develop footpath and accessibility improvement plans as part of mitigation and enhancement proposals. Consider phasing of the works to avoid the busiest times in Bala (e.g. start work in Autumn after the main tourist season).<br><br>Continue to liaise with the Town Council including attendance at June and October 2019 meeting. Feedback on impact of the works and details of mitigation and enhancement proposals is key. |
| Cadw   | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.  | N/a  |
| Gwynedd Archaeological Trust, Jenny Emmett                                       | 06/08/18             | No significant archaeological concerns for the scheme. DBA not required.  | N/a  |
| Afonydd Cymru  | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.  | N/a  |
| Ramblers Cymru   | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.  | N/a  |
| RSPB, Christopher O'Brien and cymru@rspb.org.uk                                  | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.  | N/a  |
| Bala Watersports Centre  | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.  | N/a  |

| Consultee   | Date of consultation | Summary of Response   | Action taken   |
|---|----------------------|---|--|
|   | 09/07/19             | Site meeting to understand usage of lake foreshore area by centre and possible enhancements here.   | Take into account usage considerations when developing the SNPA car park improvements and approach to construction access.   |
| Wildlife Trust Wales, Chris Wynn  | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.  | N/a  |
| Gwynedd Council, Bala Leisure Centre, Adam Williams   | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.  | N/a  |
|   | 18/04/19             | Site meeting to update on scheme. Supportive of proposals and keen to work closely with NRW on access and community improvements in this area as part of the wider enhancement plans in-line with WBGA objectives. Continued offer of facilities for future public drop-in session. | Take account of Leisure Centre requirements when developing mitigation and enhancement plans in this area.   |
|   | 09/07/19             | Site meeting to discuss outline sketch of community improvements here.  | Revise approach with lower future maintenance costs and improved linkage with PROW and lake foreshore area.  |
|   | 03/10/19             | Site meeting to discuss revised sketch of community improvements here.  | Well received plan. Amend to remove proposed tree planting due to long term maintenance concerns and other minor comments then send onto Meilir Rhun Huws in Gwynedd Council Estates team. |
| Bala Canoe Club, Richard Lee  | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.  | N/a  |
| Woodland Trust, <a href="mailto:wales@woodlandtrust.org.uk">wales@woodlandtrust.org.uk</a> and Clare Morgan | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.  | N/a  |
|   | 28/08/19             | AIA update sent to Clare and general scheme update.   | N/a  |
| Bala Lake Railway Trust, Julian Birley  | 06/08/18             | No response to scoping consultation. Regular contact and meetings between NRW and Railway Trust Project Managers on scheme integration issues.  | N/a  |

| Consultee                              | Date of consultation | Summary of Response  | Action taken  |
|--|----------------------|--|---|
| Canal and Rivers Trust, Rob Arrowsmith | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.   | N/a   |
| Open Spaces Society                    | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.   | N/a   |
| Welsh Triathlon                        | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.   | N/a   |
| Bala Angling                           | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.   | N/a   |
| Bala Sailing Club                      | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.   | N/a   |
| Sports Wales, Wayne Jenkins            | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.   | N/a   |
| Dŵr Cymru, Ian Brown                   | 06/08/18             | No response to scoping consultation however has been kept informed with regular stakeholder updates.   | N/a   |
| Brian Palmer, Woodland Trust Volunteer | 25/06/18             | Site meeting to explain background to scheme and explore possible synergies between WI and Llyn Tegid planting plans. Concern was raised over the amount of tree removal necessary for the scheme. | Mitigation and enhancement plans development.<br><br>Tree avoidance and protection measures will continue to be developed through detailed design and informed by the tree survey & AIA. Tree impacts will be avoided where possible, however the requirements of this scheme and embankment design standards do dictate a significant amount of tree loss in this case, for which NRW is planning appropriate mitigation planting. |
|  | 06/08/18             | Need to do full tree survey and AIA to BS5837:2012   | MJe (email 22/08/18) – confirmed this will be done  |
|  |                      | Any mitigation requirements produced by the bat surveys should be detailed and controlled  | MJe (email 22/08/18) – confirmed measures to be agreed with Caroline (Wilson) at SNPA   |

| Consultee | Date of consultation | Summary of Response  | Action taken   |
|-----------|----------------------|--|--|
|           |                      | as part of any pre-commencement planning conditions.   |  |
|           |                      | Suggests a reptile survey should be undertaken.  | LC (email 06/09/18) explained approach to mitigation for reptiles  |
|           |                      | Required protection/mitigation from tree report should be controlled by planning and contractual conditions.   | MJe (email 22/08/18) – confirmed measures to be agreed with Rhydian Roberts at SNPA  |
|           |                      | Landscaping plan, scope of works, implementation and maintenance, ecological method statement and ecological and enhancement management plan, should all be provided under pre-commencement conditions.  | MJ (email 22/08/18) – outlined intended approach to landscape and ecological mitigation and enhancement.   |
|           |                      | Would expect a full landscape and visual impact assessment. Requested copy of landscape and visual appraisal.  | Copy of landscape and visual appraisal sent by LC (email 06/09/18).  |
|           |                      | Questioned why no heritage assessment.   | LC (email 06/09/18) explained why a heritage impact assessment is not required   |
|           |                      | All removed hedges should be replaced, with species-rich native trees, sourced from certified suppliers in UK.   | MJe (email 22/08/18) – confirmed will follow this approach.  |
|           |                      | Design should be looked at again to accommodate the retention of most of the trees, due to limited scope for replacement in immediate vicinity.  | Tree avoidance and protection measures will continue to be developed through detailed design and informed by the tree survey & AIA. Tree impacts will be avoided where possible, however the requirements of this scheme and embankment design standards do dictate a significant amount of tree loss in this case, for which NRW is planning appropriate mitigation planting. |
|           | 27/08/19             | Meeting and site visit to update on scheme and mitigation and enhancement plans. Generally positive feedback on proposals and some constructive comments including consideration of hedge species diversity, local acorn collection and community involvement in re-planting activities. | Mitigation and enhancement plans development.  |

| Consultee                       | Date of consultation | Summary of Response  | Action taken  |
|---------------------------------|----------------------|--|---|
|                                 | 07/10/19             | Meeting and site visit to discuss plant health issues of new stock and the AIA for affected trees.   | Minutes of meeting recorded and follow up actions to respond on specific queries raised.  |
| Women's Institute, J Aldridge   | 25/06/18             | Site meeting to explain background to scheme and explore possible synergies between WI and Llyn Tegid planting plans. Concern was raised over the amount of tree removal necessary for the scheme.   | Mitigation and enhancement plans development.<br><br>Tree avoidance and protection measures will continue to be developed through detailed design and informed by the tree survey & AIA. Tree impacts will be avoided where possible, however the requirements of this scheme and embankment design standards do dictate a significant amount of tree loss in this case, for which NRW is planning appropriate mitigation planting. |
|                                 | 06/08/18             | No response to scoping consultation  | Previous comments regarding tree loss were considered and liaison is ongoing.   |
| Women's Institute, S Hodgkinson | 25/06/18             | Site meeting to explain background to scheme and explore possible synergies between WI and Llyn Tegid planting plans. Concern was raised over the amount of tree removal necessary for the scheme.   | Mitigation and enhancement plans development.<br><br>Tree avoidance and protection measures will continue to be developed through detailed design and informed by the tree survey & AIA. Tree impacts will be avoided where possible, however the requirements of this scheme and embankment design standards do dictate a significant amount of tree loss in this case, for which NRW is planning appropriate mitigation planting  |
|                                 | 06/08/18             | No response to scoping consultation  | Previous comments regarding tree loss were considered and liaison is ongoing.   |
|                                 | 27/08/19             | Meeting and site visit to update on scheme and mitigation and enhancement plans. Generally positive feedback on proposals and some constructive comments including consideration of hedge species diversity, local acorn collection and community involvement in re-planting activities. | Mitigation and enhancement plans development.   |

| Consultee  | Date of consultation | Summary of Response   | Action taken   |
|--|----------------------|---|--|
|  | 07/10/19             | Meeting and site visit to discuss plant health issues of new stock and the AIA for affected trees.  | Minutes of meeting recorded and follow up actions to respond on specific queries raised.   |
| Merched y Wawr, Mrs Haf Greene   | 18/09/19             | Site meeting to run through background to scheme and explain mitigation and enhancement proposals.  | N/a  |
| Russell Horsey MICFor (Chartered Arboriculturalist)  | 18/02/19             | 1:1 meeting with Tim Jones (Executive Operations Director, NRW) explaining approach to tree and hedgerow removal, retention and replacement and stakeholder engagement.   | N/a  |
|  | 30/05/19             | Update e-mail on scheme including inviting comments on enhancement proposals.<br><br>Response queried why an AIA for the scheme had not been undertaken earlier and questioned what ecological surveys had been undertaken and when they were commissioned. | MJe (email 07/06/19) – clarified that an existing tree survey undertaken in Nov 2016 was used to inform the appraisal. The recent AIA in 2019 has been undertaken to update this for detailed design. Also confirmed ecological surveys undertaken.                      |
|  | 07/08/19             | Concern raised over new planting bringing in pests and diseases including Oak Processionary Moth.   | MJo (email 09/08/19) – explained best practice procedures and quality control measures that would be implemented to minimise the risk of imported diseases, including the use of UK nurseries where possible and possibility of collecting local acorns for cultivation. |
|  | 07/10/19             | Meeting and site visit to discuss plant health issues of new stock and the AIA for affected trees.  | Minutes of meeting recorded and follow up actions to respond on specific queries raised. Specific queries raised around protection measures of trees to be retained and location of proposed re-planting.  |
| Stakeholders (all internal and external stakeholders specifically listed plus other interested parties). | March 2018 to date.  | Regular stakeholder updates on the scheme including associated press releases, external website and intranet updates and social media posts.  | N/a  |
| General Public – drop in session at Penllyn Leisure Centre   | 18/07/18             | Generally positive responses to the scheme proposals. Some concerns raised over tree  | Continued regular stakeholder updates and drop-in session in November 2019. Take into account concerns in development of mitigation  |

| Consultee  | Date of consultation | Summary of Response   | Action taken  |
|--|----------------------|---|---|
|  |                      | removal, construction disruption on community and tourism.  | and enhancement proposals and timing and phasing of the construction works. |
| General Public – drop in session at Penllyn Leisure Centre | 17/12/19             | Session planned to update the public and stakeholders on the plans in detail as the scheme prepares its full planning application.  |   |
| General Public – Scheme Posters                            | May 19               | Posters and flyers updating generally on the scheme and inviting comment on the environmental, recreational and community benefits associated with it.<br>50 flyers, 10 A4 posters and 4 A3 posters out at various locations around Bala. 6 A3 posters placed on timber posts and boards along the lake shore, Dee & Tryweryn embankments.  | N/a   |
| General Public – Grassland Poster                          | July 19              | Posters explaining meadow habitat trials being undertaken along Dee and Tryweryn embankments inviting comments on environmental enhancement proposals.  | N/a   |
| Local Schools – Educational Training Session               | 20/06/19             | Training session for local schools on Tegid scheme proposals and its role in the wider regulation of the River Dee. Training materials, educational activities and leaflets for school children on the scheme distributed. Free log circle from felled timber and site visit with contractor offered for those attending. Training also offered to the other youth groups who did not attend (Young Farmers Wales, Cylch Meithin, Scouting, Guiding, Glan-Ilyn Outdoor Activity Centre, Grwp Llandrillo Menai).<br><br>No response so far, but awareness in the community raised and material may be used in the 2019/20 school curriculum. | N/a   |
| Lord Dafydd Elis-Thomas, Regional Assembly Member          | 02/08/19             | Meeting and site visit to brief on proposals. Generally supportive of scheme and approach to community and stakeholder engagement and the mitigation and enhancement proposals.   | N/a   |

| Consultee   | Date of consultation | Summary of Response   | Action taken  |
|---|----------------------|---|---|
| Celyn, Tegid and Tryweryn Advisory Committee Meeting (arranged by SNPA) | 15/10/19             | <p>Presentation to the committee updating them on the reservoir safety scheme. Attendees included SNPA officers, Elwyn Edwards (chair) DCWW, NRW and various landowners, businesses and users of the lakeshore environment.</p> <p>Concerns were raised over management of lake levels, NRW were able to explain that the scheme did not alter the Dee Regulations in any way and that higher levels this year had been due to an unusually wet year.</p> <p>Elwyn also asked how many trees were to be replanted and where? NRW responded that at least as many trees that were removed would be replanted and that replacing the ecological function was the primary focus. Discussions are ongoing with landowners to find suitable land locally for replanting.</p> <p>Bala Lake Railway also presented separately at the conference and the cooperation between the two schemes was highlighted.</p> | Further updates at a future meeting of the Advisory Committee if requested to attend (note that this is the first meeting held since 2012). |



## Appendix B – Environmental Constraints and Opportunities Plans

- Sheet 1 of 4 – Population and Human Health (122918-BVL-Z0-00-DR-I-00011)
- Sheet 2 of 4 – Biodiversity and Nature Conservation (122918-BVL-Z0-00-DR-I-00012)
- Sheet 3 of 4 – Cultural Heritage (122918-BVL-Z0-00-DR-I-00013)
- Sheet 4 of 4 – Landscape Character (122918-BVL-Z0-00-DR-I-00014)

**Appendix C – Environmental Action Plan**