Strategic Regional Water Resource Solutions: Annex B2.7: Protected Species Evidence Report

Standard Gate Two Submission for River Severn to River Thames Transfer (STT)

Date: November 2022

Severn to Thames Transfer

Protected species evidence report

STT-G2-S3-123

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Disclaimer

This document has been written in line with the requirements of the RAPID Gate 2 Guidance and to comply with the regulatory process pursuant to Thames Water's, Severn Trent Water's and United Utilities' statutory duties. The information presented relates to material or data which is still in the course of completion. Should the solution presented in this document be taken forward, Thames Water, Severn Trent Water and United Utilities will be subject to the statutory duties pursuant to the necessary consenting processes, including environmental assessment and consultation as required. This document should be read with those duties in mind.

SEVERN THAMES TRANSFER SOLUTION

Protected Species Evidence Report

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1. INTRODUCTION

1.1 BACKGROUND AND DESCRIPTION OF THE STT SCHEME

1.1.1 The River Severn to River Thames Transfer Description

The aim of the Severn Thames Transfer is to provide additional raw water resources of 300 to 500Ml/d to the South East of England during drought, with 500Ml/d preferred by the Water Resources in the South East (WRSE) group's emerging regional plan. The water would be provided from flows in the River Severn and transferred via an interconnector to the River Thames. For the completion of the Gate 2 assessment, a pipeline "Interconnector" has been selected as the preferred option to transfer water from the River Severn to the River Thames.

Due to the risk of concurrent low flow periods in both river catchments, additional sources of water, apart from those naturally occurring in the River Severn, have been identified to augment the baseline flows. These multiple diverse sources of additional water provide resilience in the provision of raw water transfer to the River Thames. A 'put and take' arrangement has been agreed in principle with the Environment Agency (EA) and Natural Resources Wales (NRW) which means that if additional source water is 'put' into the river, then the Interconnector can 'take' that volume, less catchment losses, regardless of the baseline flows in the River Severn itself.

The regional planning process will determine the volume, timing, and utilisation of water to be transferred. The diversity of sources means they can be developed in a phased manner to meet the ultimate demand profile as determined by the regional planning. These additional sources of water are being provided by United Utilities (UU) and Severn Trent Water (STW) who are working in collaboration with Thames Water (TW) to develop this solution. The additional sources are:

- **Vyrnwy Reservoir**: Release of 25Ml/d water licensed to UU from Lake Vyrnwy directly into the River Vyrnwy;
- **Vyrnwy Reservoir**: Utilisation of 155Ml/d water licensed to UU from Lake Vyrnwy and transferred via a bypass pipeline ("Vyrnwy Bypass") to the River Severn;
- **Shrewsbury**: Diversion of 25Ml/d treated water from UU's Oswestry Water Treatment Works (WTW) via an existing emergency transfer (the Llanforda connection), thus enabling a reduction in abstraction from the River Severn at Shelton WTW to remain in the River Severn for abstraction at Deerhurst;
- **Mythe**: 15Ml/d of the Severn Trent Water licensed abstraction at Mythe remaining in the River Severn for abstraction at Deerhurst;
- **Minworth**: The transfer of 115Ml/d of treated wastewater discharge from Severn Trent Water's Minworth Wastewater Treatment Works (WwTW) via a pipeline, to the River Severn via the River Avon at Stoneleigh; and
- **Netheridge**: The transfer of 35Ml/d of treated wastewater discharge at Severn Trent Water's Netheridge WwTW to the River Severn at Haw Bridge, via a pipeline, upstream of the current discharge to the River Severn.

The STT Gate 1 submission was assessed by the Regulators' Alliance for Progressing Infrastructure Development (RAPID) who concluded that it should progress to standard Gate 2. The recommendations and actions received from RAPID and feedback from stakeholders from the Gate 1 process have been reflected in the scheme development and environmental assessments.

1.1.2 Gate 1

The STT Solution was subject to a detailed assessment in Gate 1 with the objective of delivering regulatory assessments of potential environmental effects of the Solution in the context of the All Company Working Group (ACWG) guidance. This methodology is aligned to the Water Resources Planning Guideline: Working Version for Water Resource Management Plan 2024 (WRMP24) so that there is a consistent approach to evaluating potential effects on environmental aspects.

At Gate 1, using the information available, the environmental appraisals did not identify any 'material issues', i.e. any unsurmountable obstacles that mean the scheme is unfeasible due to environmental reasons, at this stage. Both beneficial and adverse effects have been identified, which is to be expected given the scale of the scheme.

These conclusions were reached in the context of identified gaps in understanding, and the stated need for further data and evidence collection to support the Gate 2 investigations, further information on the operation of the scheme, and ongoing dialogue with regulators and other stakeholders.

1.1.2.1 Regulator feedback at Gate 1

Feedback from the regulators was sought before the submission of the Gate 1 submission and incorporated where possible. The environmental regulators also gave feedback as part of their formal Gate 1 review of the scheme. This feedback has informed the approach taken for Gate 2.

1.1.3 Gate 2

The ACWG guidelines set out that Gate 2 builds on Gate 1 activities to improve the detail and breadth of studies for a key decision point for strategic solutions. This will include concept solution designs with reduced uncertainty in costs and benefits and re-testing in revised regional and company models (to support updated decision making and filtering on outputs including those that are mutually exclusive).

At the end of Gate 2, the solution should be developed to a standard suitable for submitting into final regional plans and/or final WRMPs. In this context, this stage (Gate 2) of the programme aims to further enhance the funding portfolio, based on refined and consistent costs and benefits, with suboptimal solutions eliminated and viable solutions carried forward to the pre-planning stage.

To support the programme, the potential environmental effects associated with the STT Solution identified in Gate 1 will be considered in view of updated scheme design, changes in potential operational patterns, feedback on Gate 1 assessments from various regulators and stakeholders and further data gathering, modelling and assessment work completed since the publication of the Gate 1 assessment report[1].

RAPID issued a guidance document[2] in April 2022 to describe the Gate 2 process and set out the expectations for solutions at standard Gate 2.

The guidance stated the environmental assessment methodologies should be consistent with any relevant legislation and guidance, and follow best practice. This includes, where relevant, Water Resource Management Plan (WRMP) guidance for 2024, All Company Working Group (ACWG) guidance[3] and the Environment Agency Invasive Non-native Species risk assessment tool.

1.1.3.1 Overview of the environment assessment approach for Gate 2

Figure 1.1 shows the investigations undertaken for Gate 2 and their interactions, in order to show the full scope of work across both environmental engineering disciplines. Reporting for the environmental investigations is undertaken in a phased way. The Evidence reports (pale blue box in the figure below, and this report) are produced first, that set out the data and evidence to be used in the assessment. The Assessment Reports which use the evidence to determine the potential effect of the STT scheme on the different topics, are produced later (dark blue box in the figure below). Together with other inputs, these reports feed into the production of the statuary reports and summary reports (yellow boxes).

1.1.3.2 Regulator engagement for Gate 2

In order to engage with regulators over the approach, evidence collection, monitoring programmes, and data analysis for Gate 2, the environmental assessment team have held monthly meetings with the EA, NRW and NE, in addition to topic-specific sessions and workshops with technical specialists. The regulators are asked to provide insights and inputs on specific aspects where needed in order to ensure the work undertaken is as robust as possible.

In the monthly meetings, the programme, progress and deliverables are reviewed; issues are raised for clarification and resolution, and the regulators are asked for their views and advice on different topics or issues.

In the sessions with technical specialists, each of the proposed approaches to the topics and statutory reports have been set out and explained. Drafts of documents have been issued, plus other technical notes, to the regulators to solicit feedback on the proposed approaches. Feedback on the drafts has been used to inform the wider environmental assessment for Gate 2 and finalise the approach and reporting.

[1] United Utilities - Water Transfers – RAPID Gate 1 Submission

[2] RAPID (2022) Strategic regional water resource solutions guidance for Gate 2

[3] All Companies Working Group (2020) WRMP environmental assessment guidance and applicability with SROs

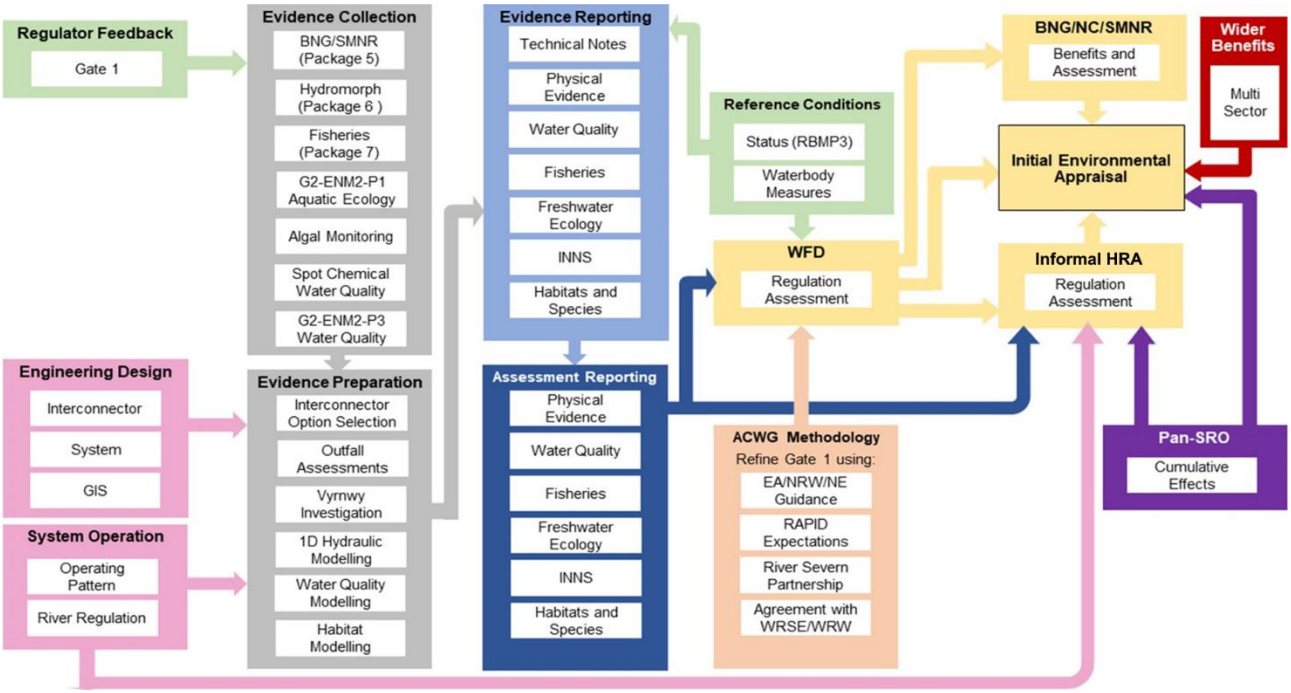

Figure 1.1 Flow chart showing the investigations undertaken for Gate 2 and their interactions

1.2 STUDY AREA

The study area for the Gate 2 assessment covers specific reaches, as shown in **Figure 1.2**:

1. The River Vyrnwy catchment (River Vyrnwy from Vyrnwy Reservoir to the confluence with the River Severn);
2. The River Severn catchment (River Severn from the confluence with the River Vyrnwy to the Severn Estuary), as well as those tributaries of the River Severn which could indirectly be affected by the operation of the STT solution;
3. The Warwickshire River Avon upstream of Warwick to the River Severn confluence; and
4. The River Thames catchment (River Thames from Culham to Teddington Weir).

It should be noted that the consideration of impacts in the River Tame and Trent, from the transfer of treated discharge from Minworth WwTW to the River Avon, is included in the ST Minworth Solution and therefore excluded from the STT scheme assessment.

1.3 AIM OF THIS REPORT

The assessment of any potential impacts on protected species as a result of the operation of the STT should be considered in the context of the ecological requirements of the baseline communities, and the extent to which these requirements will be altered as a result of the operation of the STT Solution

This note provides the evidence and data catalogue that will be used to inform the baseline for protected species communities associated with the proposed STT Solution. The baseline protected species communities will inform the ecological requirements that should be considered in the assessment of the magnitude and significance of any potential impacts associated with the STT Solution. Furthermore, this report identifies the remaining data/evidence gaps, provides a summary of the proposed programme of works and approach to address any data/evidence gaps as part of RAPID's gated assessment process of the Solution.

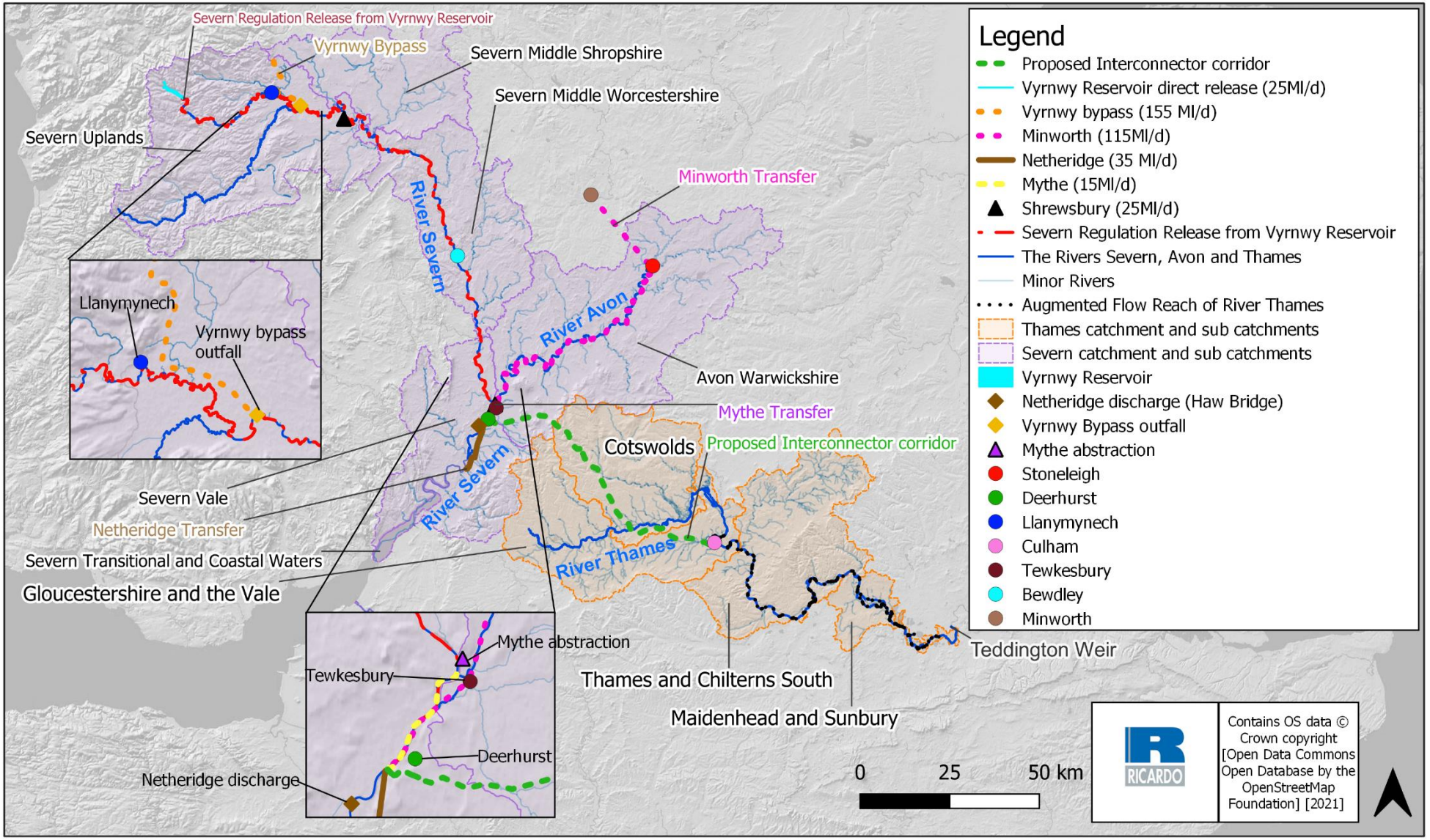

Figure 1.2 Map showing the proposed interconnector corridor

2. EVIDENCE BASE FOR, AND APPROACH TO, THE GATE 2 PROTECTED SPECIES ASSESSMENT

Gate 1 of the STT Solution identified several datasets and studies that form the evidence base for the assessment of effects on protected species. The Gate 1 process also identified where additional data is required to undertake the necessary assessments for Gate 2.

Stakeholder consultation with the environmental regulators for England and Wales also identified additional datasets and studies that would be required to improve the evidence base for the Gate 2 assessments.

This section:

1. Outlines the scope and approach to the protected species assessment tasks that will be undertaken;
2. Summarises the additional data and evidence collection tasks that were completed for Gates 1 and 2 in respect of protected species; and
3. Confirms the evidence base that will be used in the assessment of potential impacts on protected species in Gate 2.

2.1 SCOPE AND APPROACH TO THE GATE 2 ASSESSMENT AND EVIDENCE BASE

The scope of the assessment required for Gate 2 and the approach to undertaking these assessments is described in **Table 2-1** below. This table also includes a summary of the evidence base that will be used to inform the ecological/environmental elements/receptors that require assessment and the extent to which these elements/receptors are altered as a result of the construction and/or operation of the STT Solution.

The evidence base has been summarised in the supporting Excel workbook (*STT_Protected Species_Workbook*). These data were also used to inform the extent of any remaining data or evidence gaps that would result in uncertainty in the assessments of the potential impacts of the STT Solution on the protected species of the associated waterbodies.

The supporting Excel workbook (*STT_Protected Species_Workbook*) includes the following:

- Tables listing the protected species noted from open-source data within 100m of the various waterbodies and potential pipeline routes;
- Site and survey data for targeted surveys completed by the STT Group, including:
    - Water vole[4];
    - Exposed Riverine Sediment (ERS) Invertebrates[5];
    - Higher plants[6];
    - Bryophytes[7]; and
    - Lichens[8].

It should be noted that the occurrences of protected species are further supported by open-source data (e.g. NBN Atlas and NBN Atlas Wales INNS Portal) as well as data requests submitted to Local Biological Record Centres for the River Vyrnwy in 2021.

Note: 3D maps have been embedded in the Excel workbooks that give a greater visualisation of the data than 2D maps. These can be accessed by selecting “insert” on the Excel ribbon, then “3D Maps”, and then “Open 3D Maps” then click to open the “Tour” that appears in the window.

[4] Protected Species Workbook tabs: ‘Water vole sites’, ‘Water vole data Vyrnwy’ and ‘Water vole data Avon’.
[5] Protected Species Workbook tabs: ‘ERS sites’ and ‘ERS data’.
[6] Protected Species Workbook tabs: ‘VPlant, Lichen, Bryophyte sites’ and ‘Vascular plant data’.
[7] Protected Species Workbook tabs: ‘VPlant, Lichen, Bryophyte sites’ and ‘Bryophyte data’
[8] Protected Species Workbook tabs: ‘VPlant, Lichen, Bryophyte sites’ and ‘Lichen data’

2.2 ADDITIONAL DATA COLLECTED DURING GATE 1 AND GATE 2

To provide the necessary Gate 1 data and evidence to inform the environmental assessment associated with the STT Solution, an ecological monitoring programme was implemented by the STT Group in June 2020 (*the 2020 monitoring programme)*. This monitoring programme initially consisted of 37 survey sites across the Severn and Thames catchments. The 2020 monitoring programme included various ecological features, including:

- Macroinvertebrate communities (spring and autumn 2020 and spring 2021 surveys);
- Macrophyte communities (summer 2020 surveys);
- Invasive Non-native species (INNS) (spring and summer 2020 and spring 2021 surveys); and
- Fish communities (summer 2020).

To provide the necessary data and evidence to inform the environmental assessment associated with the STT, an updated ecological monitoring programme was required including specialist protected species surveys. The specialist surveys (below) were necessary to provide more certainty on the distribution of several features/species identified:

- **Higher plant surveys** in the River Vyrnwy, from the Vyrnwy Reservoir to the confluence with the River Banwy. This is to assess species such as Globe flower (*Trollius europaeus*), marsh hawks-beard (*Crepis paludosa*), lesser meadow-rue (*Thalictrum minus*) and stone bramble (*Rubus saxatilis*);
- **Lichen survey** (including Southern Oceanic Woodland Index (SOWI)) and a detailed **bryophyte survey** to determine diversity for the River Vyrnwy (Vyrnwy Reservoir to confluence with the Severn);
- **Exposed Riverine Sediment (ERS) Invertebrate** surveys as the Five-spot lady bird *Coccinella quinquepunctata* has been previously recorded. In the River Vyrnwy from the Vyrnwy Reservoir to the confluence with the River Severn, other species may include the Yellow Crucifer Weevil *Aulacobaris lepidii*.
    - Natural Resources Wales has confirmed that species listed pursuant to Section 7 of the Environment (Wales) Act may also be present. Species found on site may include *Bembidion quadripustulatum, B. testaceum, Bidessus minuttisimus, Cliorismia rustica, Meotica anglica, Rhabdomastix japonica*, and *Thinobius newberyi*; and
- **Water vole (*Arvicola amphibius*) surveys** in the River Vyrnwy, from the Vyrnwy reservoir to the confluence with the River Severn, and the River Avon from downstream of Warwick to Alvaston.

As noted in Section 2.1, the survey locations are presented in the supporting Excel workbook (*STT_Protected Species_Workbook*The survey methodologies were subject to consultation with the relevant regulators prior to implementation of the protected species monitoring programme[9].

[9] Ricardo Energy & Environment (2021). Severn to Thames Transfer SRO. Gate 2- Monitoring Programme – Additional Protected Species Surveys for Higher plants, Lichens, Bryophytes, Water vole, and Exposed Riverine Sediment (ERS) Invertebrates. Report for Thames Water (on behalf of the STT Group). August 2021

Table 2-1 Evidence and approach to the Gate 2 assessment of protected species

Task item	Scope of assessment	Approach to assessment	Evidence Base for Task
Protected species	• Update the Gate 1 assessment using additional baseline data collected during Gate 1 and Gate 2.	• Update the assessment to consider additional species/community data collected during Gate 1 and Gate 2. • Use the updated schemed design and operation for Gate 2. • Consider the interpretation of the fluvial (flow) model, including the flow series at key locations for different scenarios to consider the risk of changes in velocities, depth and wetted margin that may result in changes in community structure, loss of preferred habitat, etc. • Include relevant Solution monitoring programme survey data such as Acoustic Doppler Current Profiler (ADCP), habitat walkovers and River MoRPh survey outputs and additional habitat modelling at key locations. • Update the assessment in consideration of the interpretation of the water quality assessment and model outputs to consider risk of water quality driven changes in community structure. • Suggest further mitigation and/or treatment measures (where required) for design/engineering interface.	• Physical Environment and Water quality assessments will provide scenario outputs to consider in the assessments. • Data from Environment Agency Ecology & Fish Data Explorer from 2010-2021. • Data obtained through data request to NRW. • Acid Watercourses Quality Index (AQUI) and Southern Oceanic Woodland Index (SOWI) data • Open-source data (e.g. NBN Atlas and NBN Atlas Wales INNS Portal). • Data requests submitted to Local Biological Record Centres in 2021. • Targeted surveys completed in 2021, including surveys on higher plant species, lichens, bryophytes, ERS and water vole. • Evidence and literature collated as part of the initial gap analysis of the STT which includes information on fish passes on the River Severn (APEM).

3. CONCLUSIONS

3.1 HIGHER PLANTS, BRYOPHYTES AND LICHENS

3.1.1 Summary of baseline data, uncertainty and data gaps

The available data suggests that protected higher plant species are distributed along most of the River Vyrnwy, mostly upstream of the confluence with the River Banwy. Species such as the Marsh hawk's-beard *Crepis paludosa* appear to be ubiquitous in small populations and are found growing on thin soil and mossy crevices on banks, and on skeletal soils of vegetated shingle bars. Where conditions were particularly favourable, substantial populations of up to 400 plants have been recorded. Much smaller populations of plants such as *Thalictrum minus*, Welsh poppy *Papaver cambricum* and *Hymenophyllum wilsonii* are also present upstream of the confluence with the River Banwy with some populations found roughly >3 m above the waterline in areas of high humidity.

Bryophyte records divide neatly into a suite of upland species of aquatic and marginal rocky habitats, and lowland species of silt-washed trees. Bryophyte populations are recorded to be higher where the rapids were present in the riverine environment. NRW has noted that the bryophytes are notable in a Montgomeryshire context because there are few other watercourses that have this (relatively low) diversity of oceanic species in the study area.

The lichen communities associated with the River Vyrnwy are also highly diverse. In the area near Dolanog, the assemblage is considered to be very close to the threshold for Site of Special Scientific Interest (SSSI) notification (10 species were recorded; the SSSI threshold is 11), and there is an additional scoring species recorded further upstream on the River Vyrnwy. NRW has noted that the available data suggest that this is a notable lichen diversity, especially in Montgomeryshire where no other examples of the assemblage have been documented with several reaches of the river which are probably notifiable as SSSI in a Montgomeryshire context. The presence of *Koerberiella wimmeriana* is remarkable, and would in its own right qualify the river as a SSSI. This is because the species is Red Listed in Wales and was previously unknown in the Montgomeryshire area.

The potential risk to higher plants, bryophytes and lichens should be assessed in the context of the scheme design for Gate 2, as well as the physical environment and water quality assessment outputs (which will have analysed the fluvial (flow) model results, including changes in velocities, depth and wetted margin at key locations for different scenarios).

The Gate 1 assessments relied on open-source data with limited targeted survey data available. Following completion of the targeted surveys for higher plants, the available baseline data is considered sufficient to undertake an assessment of the potential impacts associated with the construction and operation of the STT Solution at Gate 2.

3.2 EXPOSED RIVERINE SEDIMENT INVERTEBRATES

3.2.1 Summary of baseline data, uncertainty and data gaps

Target surveys identified a total of 233 specimens comprising of 30 species. No species of interest listed by NRW were found, however, one Nationally Notable B species was recorded, *Blemus discus*. Two non-native species were found: *Teropalpus unicolor* and *Phacophallus parumpunctatus*. Despite being non-native, both species are naturalised. Of the species recorded, five (the beetles *Bembidion atrocaeruleum*, *B. decorum*, *B. punctulatum*, *Clivina collaris* and *Paranchus albipes*) are known associates of ERS and three of these are new records for the River Vyrnwy. Of the other species recorded, *B. discus*, scarce 7-spot ladybird *Coccinella magnifica* and *Oedostethus quadripustulatus* are very scarce in Wales. *Pomatinus substriatus* is a Vulnerable water beetle which is a SSSI qualifying feature on the River Usk (Lower Usk) SSSI and this is the first record for the River Vyrnwy.

The potential risk to exposed riverine sediment invertebrates should be assessed in the context of the scheme design for Gate 2, as well as the physical environment and water quality assessment outputs (which will have

analysed the fluvial (flow) model results, including changes in velocities, depth and wetted margin at key locations for different scenarios).

The Gate 1 assessments relied on open-source data with limited targeted survey data available. Subsequently targeted surveys for ERS were completed in August 2021. The August 2021 surveys were not completed within the optimum survey period.

Therefore, it is recommended that ERS surveys are repeated. Surveys should be conducted in May to June 2022 (prior to Gate 3), as this is within the recommended survey window and the factors limiting previous survey efforts, such as dense vegetation, will be reduced. As the ERS invertebrates of interest inhabit shingle beds, where the grit size is less than 1cm, future ERS surveys should focus on the habitats to the east of Meifod where bed shingle size is within the suitable parameters.

The requirement for these surveys is subject to the result of the modelling and the risk of increased wetted widths.

3.3 WATER VOLE

3.3.1 Summary of baseline data, uncertainty and data gaps

With regards to riparian mammals such as water vole *Arvicola amphibius*, increased water levels associated with support releases could result in loss of, or damage to, burrows and foraging habitats. Extensive data searches and physical surveys in 2021 identified no record or field signs of water vole along the length of the River Vyrnwy and the associated reaches of the River Avon.

The Gate 1 assessments relied on open-source data with limited targeted survey data available. Following completion of the targeted surveys for water vole (and mink), the available baseline data is considered sufficient to undertake an assessment of the potential impacts associated with the construction and operation of the STT Solution at Gate 2.

3.4 OTHER PROTECTED SPECIES

3.4.1 Summary of baseline data, uncertainty and data gaps

During surveys in summer 2021 when using environmental DNA (eDNA) sampling approaches to inform the risk of distributing Invasive Non-Native Species (INNS), other macroinvertebrates of interest were recorded in the River Vyrnwy between the Vyrnwy Reservoir and the confluence with the River Banwy. These included the freshwater pearl mussel *Margaritifera* and the depressed river mussel *Pseudanodonta complanata*. The freshwater pearl mussel is considered Critically Endangered by IUCN Red list and Nationally Rare whilst the depressed river mussel is considered Vulnerable by IUCN Red list and Nationally Scarce.

The eDNA results from follow up surveys in autumn 2021 did not return any target sequences. This was expected as freshwater pearl mussel in particular, are not very active in the colder months. As such, there remains some uncertainty with regards to the extent of the population of both freshwater pearl mussel and the depressed river mussel in the River Vyrnwy. It is, therefore, recommend that further surveys are completed for both species.

In the case of the freshwater pearl mussel populations, it is recommended that the surveys are completed adopting the Common Standards for Monitoring Guidance protocol for freshwater fauna. This will require a survey of habitat suitability, a physical search/survey to establish abundances and community structure and sampling host fish for the assessment of glochidial presence and development.

It should also be noted that the list of species that are protected under UK legislation, or otherwise conservation-notable is extensive, especially in the terrestrial environment which includes a large number of protected plant species. This includes species listed as of principal importance for the purpose of conserving biodiversity under Section 41 of the Natural Environment and Rural Communities Act (NERC) (2006), species listed as priority pursuant to Section 7 of the Environment (Wales) Act (2016), species that are protected under Section 9 of the Wildlife and Countryside Act (1981), species listed on the IUCN Red List of threatened species

that are vulnerable, near threatened or threatened and species previously listed as priorities for conservation action under the UK Biodiversity Action Plan (UK BAP).

While the distribution and risk to aquatic and riparian species is well understood, following extensive consultation and surveys, the full list of protected species that would be associated with the construction of any pipelines considered in the STT Solution should be considered prior to construction. This may require targeted surveys of the construction corridor to ensure that all mitigation measures, and associated species licences, are considered as part of the project design at Gate 2.