Strategic Regional Water Resource Solutions: Annex B2.6: Protected Habitat Evidence Report

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

Date: November 2022

Severn to Thames Transfer

Protected habitat evidence report

STT-G2-S3-109

November 2022

Disclaimer

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SEVERN THAMES TRANSFER SOLUTION

Protected Habitats 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 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 tin the assessment. The Assessment Reports which use the evidence to determine the potential effect of the STT scheme on the different topics, is 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.

[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

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 have been used to inform the wider environmental assessment for Gate 2 and finalise the approach and reporting.

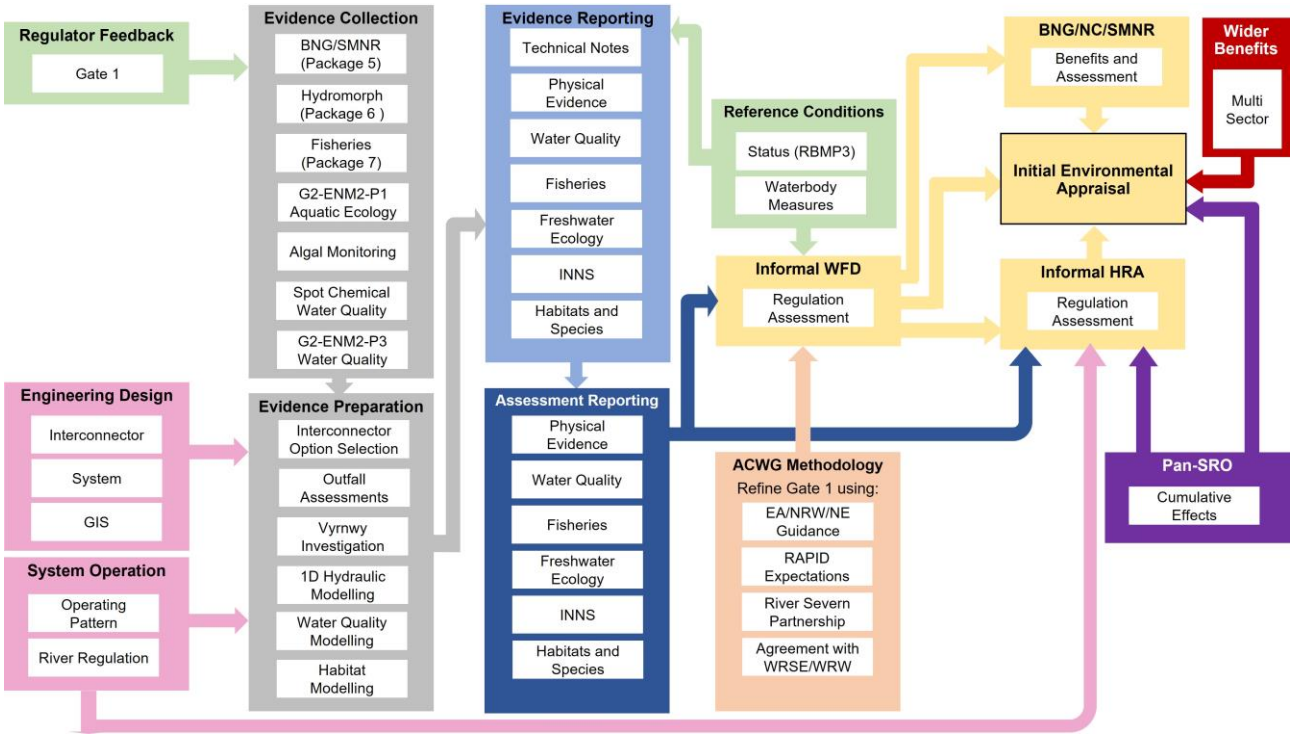

Figure 1.1 Flow chart showing the investigations undertaken for Gate 2 and their interactions

1.2 STUDY AREA

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

1. Lake Vyrnwy Reservoir in Powys (Wales) and the downstream River Vyrnwy catchment to the River Severn confluence;
2. The River Severn catchment (River Severn corridor, 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 (water quality);
3. The Warwickshire River Avon upstream of Warwick to the River Severn confluence; and
4. The 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 Wastewater Treatment Works (WwTW) to the River Avon, is included in the ST Minworth Solution and therefore excluded from the STT scheme.

1.3 AIM OF THIS REPORT

The assessment of potential impacts on protected water dependent terrestrial habitats as a result of the operation of the STT Solution should be considered in the context of the physical requirements of the baseline habitats associated with the Solution, and the extent to which these requirements will be altered.

This note provides the evidence and data catalogue that will be used to inform the potential effects upon protected habitats associated with the proposed STT Solution. The habitat types and their distribution will

inform the physical 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 and evidence gaps, and summarises a proposed programme of work to address them as part of RAPID's gated assessment process.

It should be noted that habitats of international importance (Special Areas of Conservation, Special Protection Areas and Ramsar sites) will be considered under the Habitat Regulations Assessment for the STT Solution, and therefore are not considered in this report. River habitat will qualify as priority habitat either because they are considered to be near-natural, or because they fulfil one or more specific criteria relating to priority species or to particular habitat types with associated aquatic communities. River priority habitat is not included as part of this report as the determining factors for if a river is priority habitat are covered by the following associated STT Gate 2 Evidence reports: Physical Environment and Water Quality Report, Fisheries Evidence report, Macroinvertebrates and Other Aquatic Ecology Evidence report, and the Protected Species Evidence report.

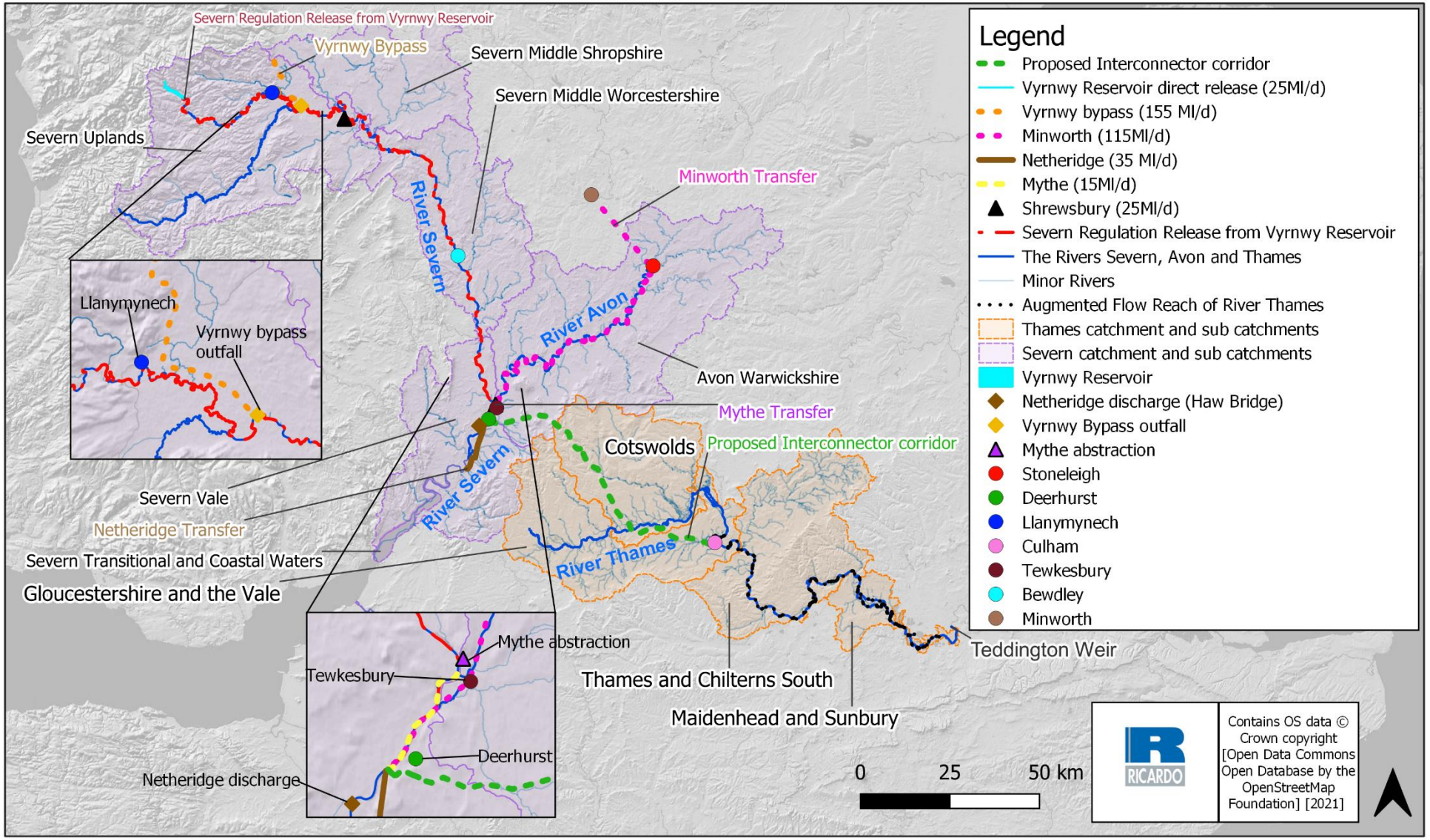

Figure 1.2 Map showing the proposed interconnector corridor

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

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

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

This section:

1. Outlines the scope and approach to the protected habitats 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 habitats; and
3. Confirms the evidence base that will be used in the assessment of potential impacts on protected habitats in Gate 2.

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

The scope of the assessment of protected habitats required for Gate 2 and the approach to undertaking this assessment is described in Table 2.1. This table also includes a summary of the evidence base that will be used to inform the environmental elements/receptors that should be considered in the assessment in terms of how they may be altered as a result of the construction and/or operation of the STT Solution.

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 was subsequently updated to include sites associated with a Thames to Southern Transfer and the Oxford Canal option considered by Thames Water in WRMP19. 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 for Gate 2, the ecological monitoring programme was updated and now includes protected habitat surveys.

The Biodiversity Net Gain (BNG) and Natural Capital (NC) assessment work to date (Gate 1 assessments) relied on the review of literature and existing data, as well as findings from the other environmental assessments. The Gate 1 assessments have identified a number of BNG opportunities and impacts on NC, plus mitigation measures needed to improve the resilience of the waterbodies associated with the STT Solution.

The Gate 1 assessments also identified a number of information gaps that need to be addressed in order to reduce the uncertainty in the current assessments and inform the Gate 2 assessments. A project is currently underway to reduce these uncertainties, which includes targeted walkovers to ground-truth condition assessments, and identify BNG opportunities.

The available data and evidence in Gate 1 also indicated that there was lack of data on the presence of water dependent protected sites and habitats, and their hydrological connectivity in order to describe the baseline communities and the risk to them from the operation of the STT. As such, the 2020 monitoring programme was amended to include the following habitats and protected sites which have been identified within 500m of the relevant waterbodies:

- River Vyrnwy (Vyrnwy reservoir to confluence with the River Severn):
    - Lowland Fens and Reedbeds
    - Purple Moor Grass and Rush Pastures
    - Lowland Meadows
    - Oxbows near Meifod
- River Severn (confluence with the River Vyrnwy to downstream Shrewsbury):
    - Coastal and floodplain grazing marsh
    - Lowland fens
    - River Severn at Montford Site of Special Scientific Interest (SSSI)
- River Avon (downstream Warwick to the confluence with the River Severn):
    - Coastal and floodplain grazing marsh
    - Rectory Farm Meadows SSSI
    - Upham Meadow and Summer Leasow SSSI
- River Severn (confluence with the River Avon to the tidal limit):
    - Coastal and floodplain grazing marsh
    - Severn Ham, Tewkesbury SSSI
    - Old River Severn, Upper Lode SSSI
    - Wainlode Cliff SSSI

Prior to undertaking habitat mapping and hydrological connectivity walkovers, a scoping exercise was carried out to identify survey parcels covering the potentially affected SSSIs and a representative sample of the identified protected habitats. The methodology and results of the scoping exercise were presented in the Gate 2 Monitoring Programme – Protected Habitats scoping report (Ricardo Energy and Environment, 2021) [4].

2.3 EVIDENCE BASE

The evidence base has been summarised in an Excel workbook supplied separately, named *"STT Protected Habitats Workbook".* These data were also used to inform the extent of any remaining data/evidence gaps that would result in any uncertainty in the assessments of the potential impacts of the STT Solution on protected habitats.

The supporting Excel workbook *"STT Protected Habitats Workbook"* includes the following:

- A summary of the scoping exercise results ("Protected habitats – Scoping sheet") (see section above);
- A summary of the survey locations included in the habitat mapping surveys across August and September 2021 ("Prot Hab - survey details sheet");
- Detailed results ("Prot Hab - UKHab full data set sheet") and a summary of the UKhab habitat mapping ("Prot Hab- UKHab summary data sheet") completed in August and September 2021;
- A summary of the results of the Phase 1 habitat mapping completed in August and September 2021 ("Pro Hab - Phase 1 summary data sheet)"; and
- Detailed results ("Prot Hab - hydro connectivity sheet") and a summary of the hydrological connectivity surveys ("Prot Hab - Hydro conn. Summary sheet") completed in August and September 2021.

The locations of the survey parcels identified in the associated workbook "*STT Protected Habitats Workbook*" are presented in the following figures.

Knowledge of the distribution of protected habitats has been further informed through the detailed literature review completed on behalf of the STT Group in 2020 by APEM and reviews of numerous open-source information sources on the location of designated and protect habitats (as collated and presented on Magic Maps).

As per Gate 1, habitats that are protected under UK legislation, including habitats that are considered as principle for conserving biodiversity, were considered. This includes habitats listed as of principal importance for the purpose of conserving biodiversity under Section 41 of the Natural Environment and Rural Communities Act (NERC) (2006), habitats listed as priority in Section 7 of the Environment (Wales) Act (2016) located within 100 m of the zone of influence.

[4] Ricardo Energy and Environment (2021) Gate 2 Monitoring Programme – Protected Habitats. Report for Thames Water (on behalf of the STT Group). ED 15474 . Issue number 2. Date 05 August 2021

Table 2.1 Evidence to be used for the Gate 2 Protected Habitat Assessment

Task item	Scope of assessment	Approach to assessment	Evidence Base for Task
a. Habitat assessment (using UKHab and MoRPh survey data)	• Draft baseline sections to include the data requested from regulators and Local Record Centres • Include baseline data from UKHab and MoRPh River and Estuarine surveys • Complete impact assessment	• Review baseline data to determine the risk to terrestrial habitats during construction and operation of the Solution. • Review baseline conditions to inform the extent of functionally linked habitat. • Suggest further mitigation measures (where required) for design/engineering interface. • Update the assessment to consider additional habitat data collected during Gate 1 and Gate 2. • Update the assessment to consider changes in scheme 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 impact on hydrologically (surface and groundwater) connected habitats. • 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 assessment in consideration of the interpretation of the water quality assessment and model outputs to consider risk of water quality driven changes in vegetation community structure.	• Physical Environment and Water quality assessments will provide scenario outputs to consider in the assessments. • Open-source data on locations of protected habitats including designated sites and priority habitats. • UKHab surveys undertaken by Ricardo for the proposed infrastructure locations undertaken in 2021. • Modular River Physical (MoRPh) surveys undertaken in 2021 by Ricardo for watercourses associated with the proposed infrastructure locations and watercourses subject to hydrological or water quality changes. • Evidence and literature collated as part of the initial gap analysis of the STT.

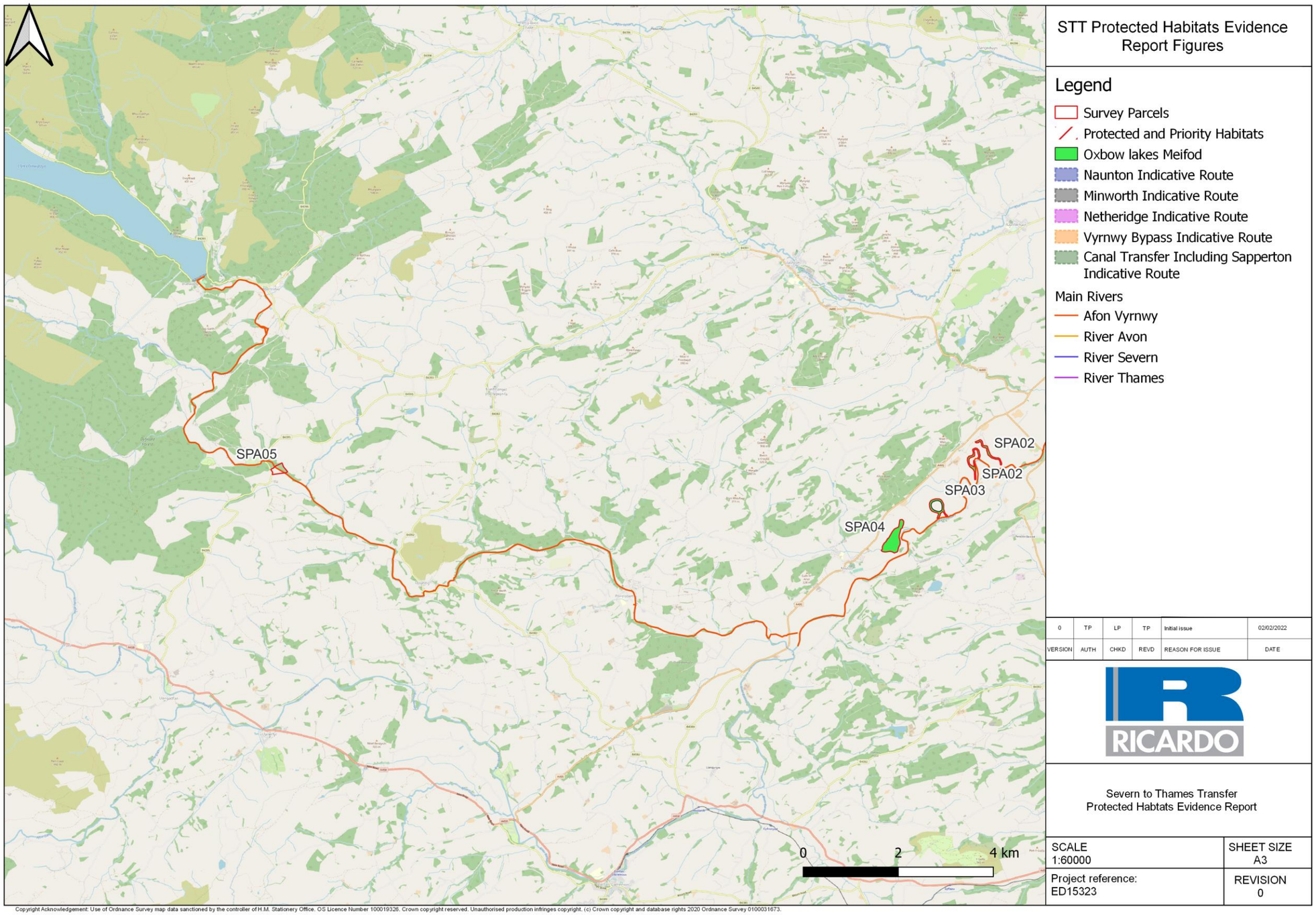

Figure 2.1 Protected habitat survey parcels – River Vyrnwy downstream of Lake Vyrnwy

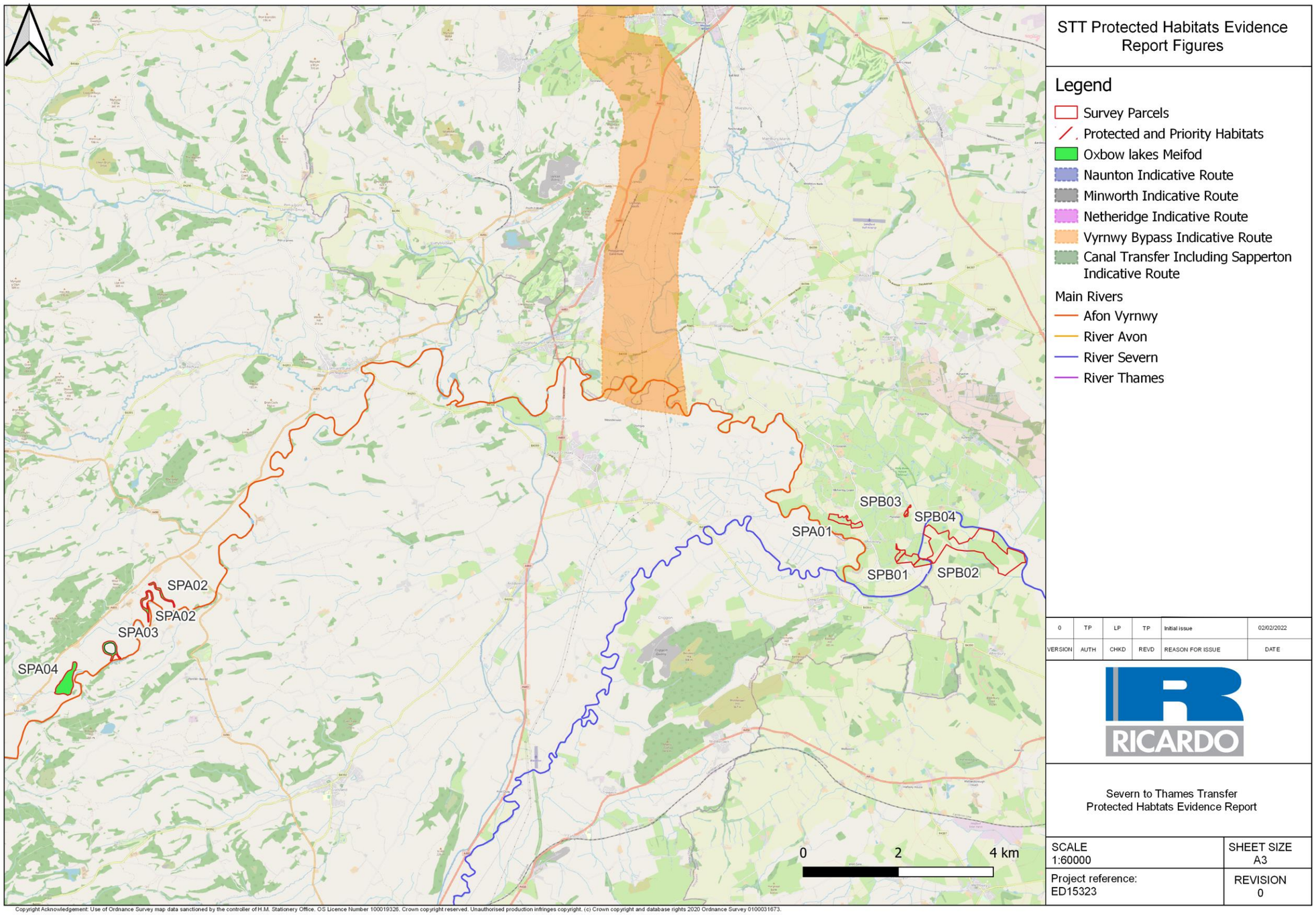

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Figure 2.2 Protected habitat survey parcels – River Vyrnwy upstream of Severn Confluence

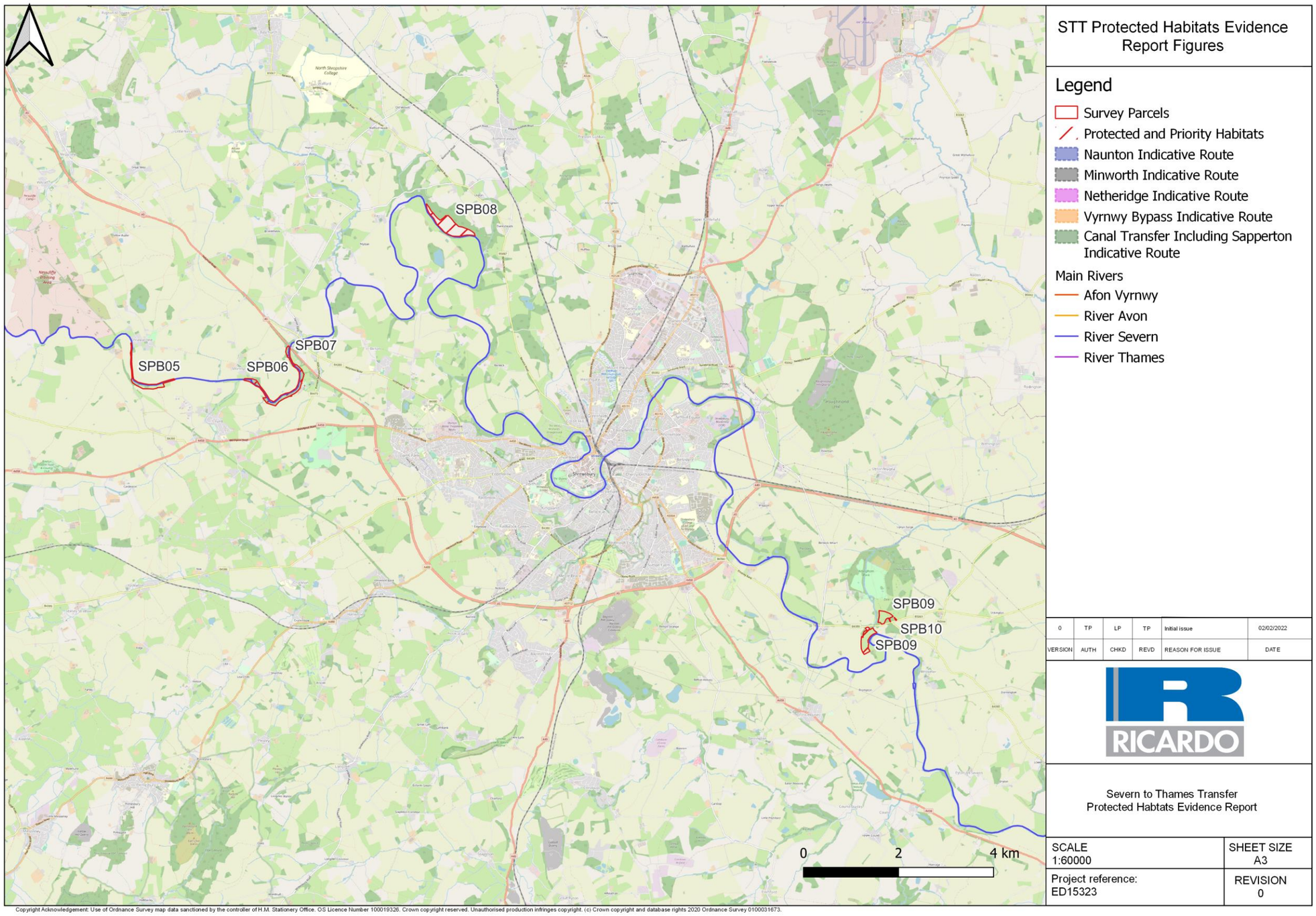

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Figure 2.3 Protected habitat survey parcels – River Severn at Shrewsbury

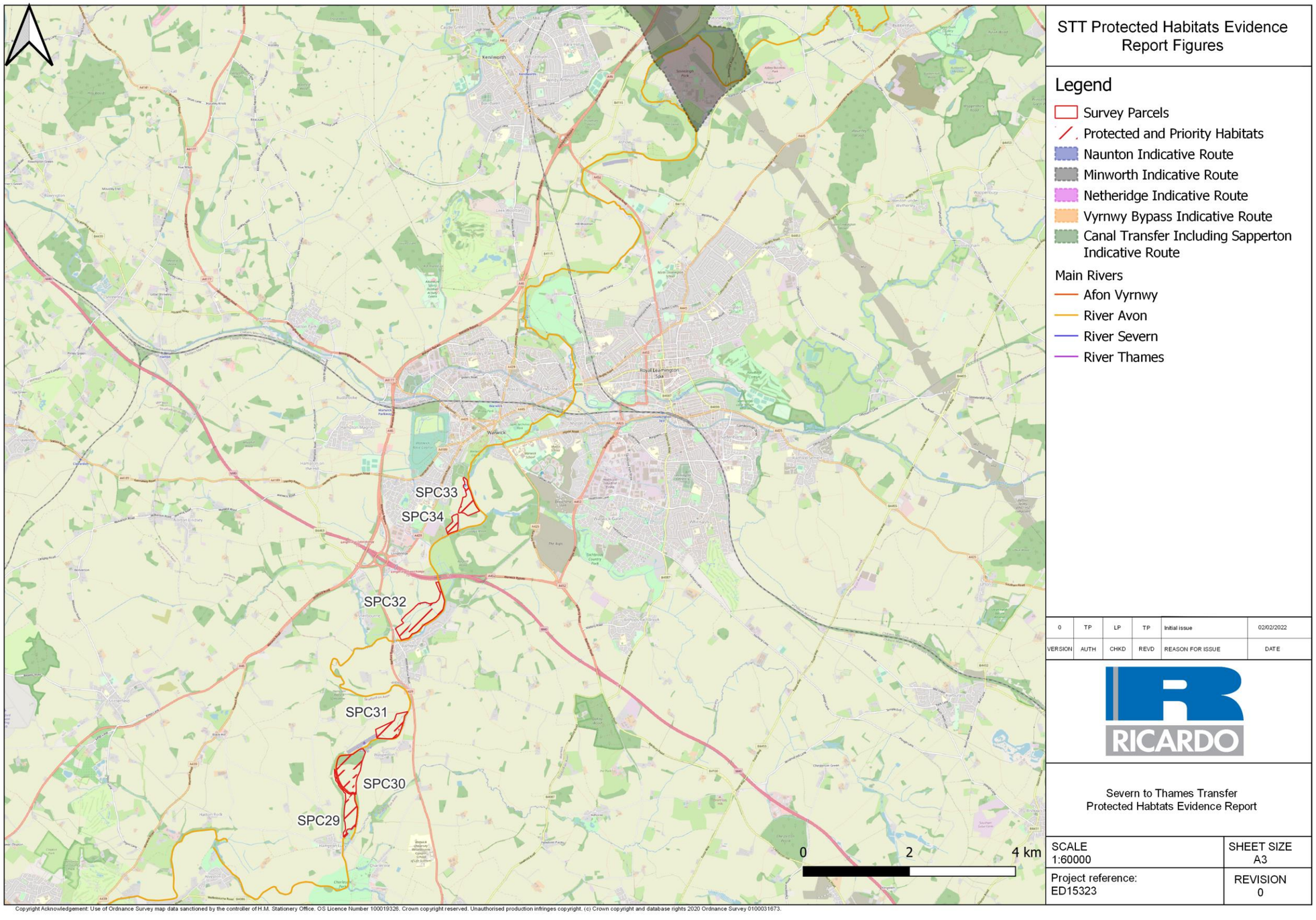

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Figure 2.4 Protected habitat survey parcels – River Avon downstream Warwick

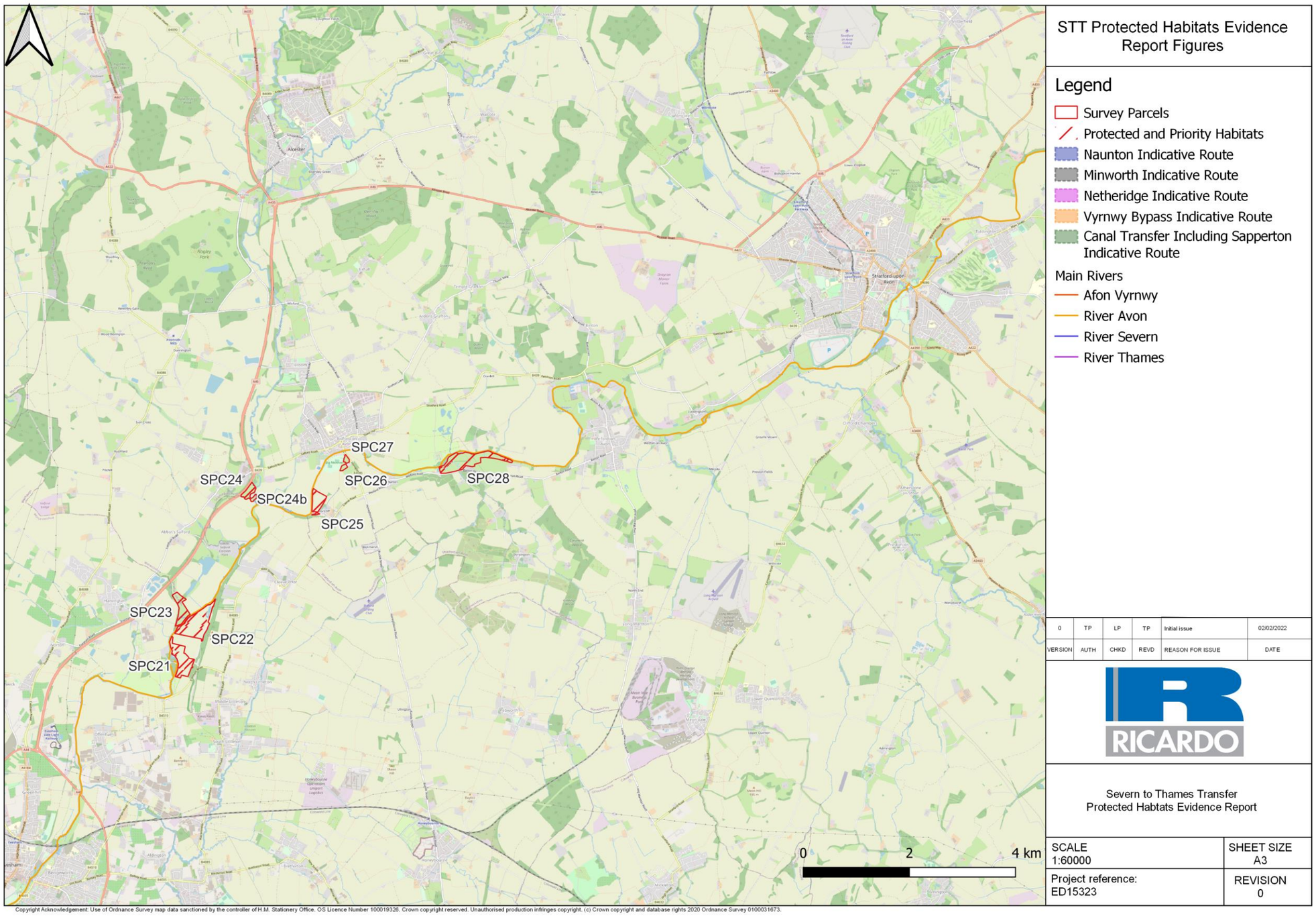

Figure 2.5 Protected habitat survey parcels – River Avon at Stratford upon Avon

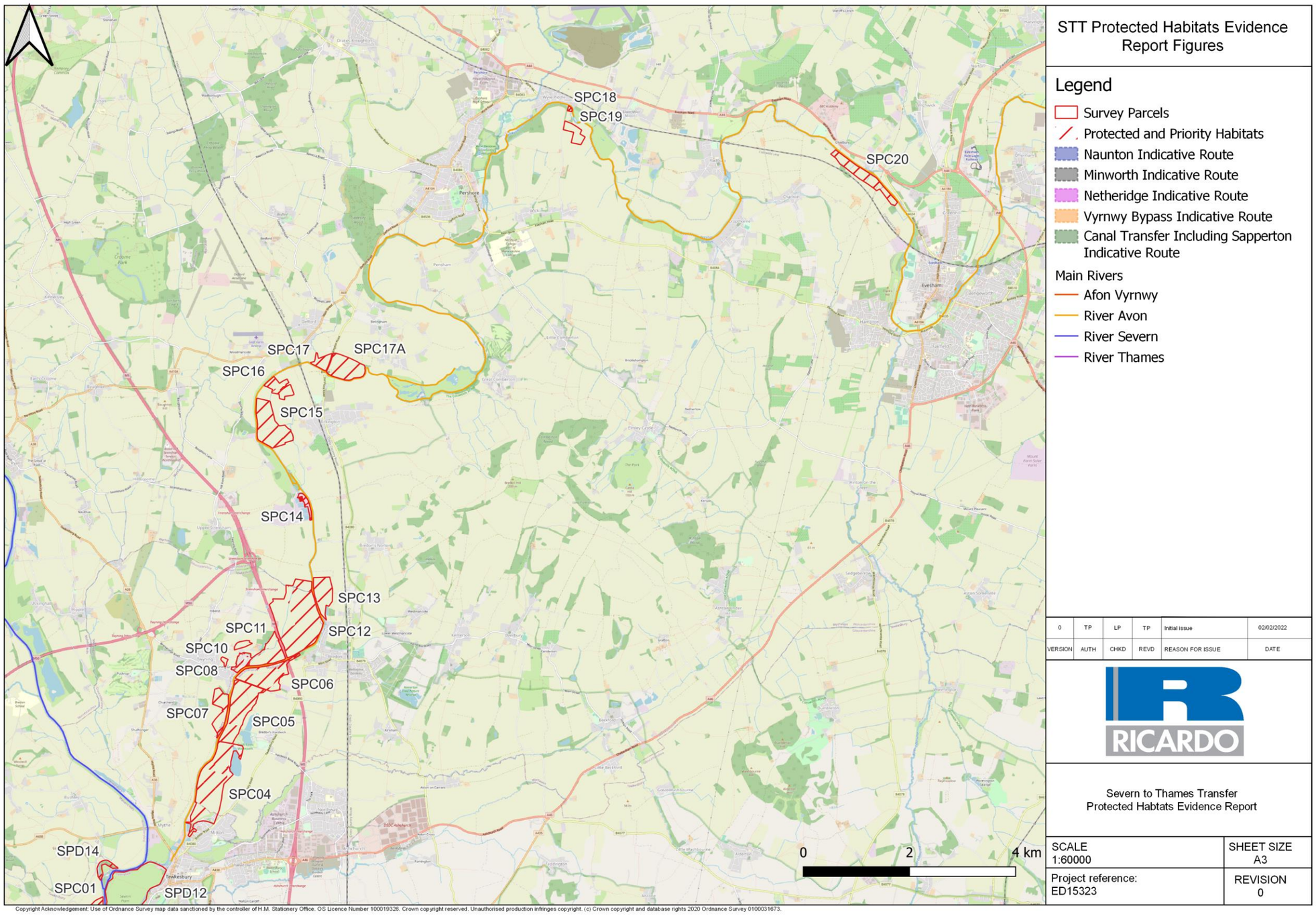

Figure 2.6 Protected habitat survey parcels – River Avon Evesham to Severn confluence

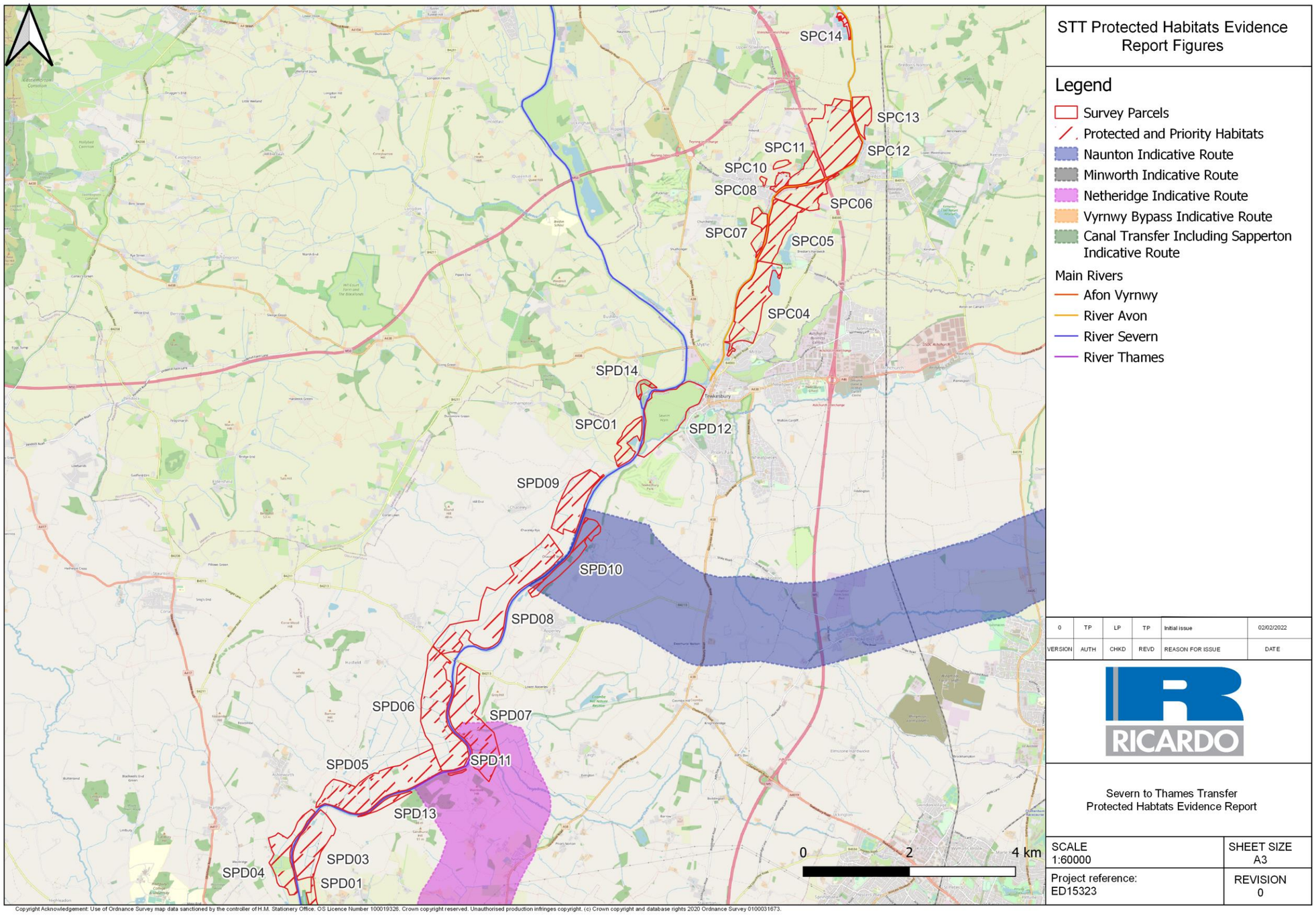

Figure 2.7 Protected habitat survey parcels – River Severn at Avon confluence

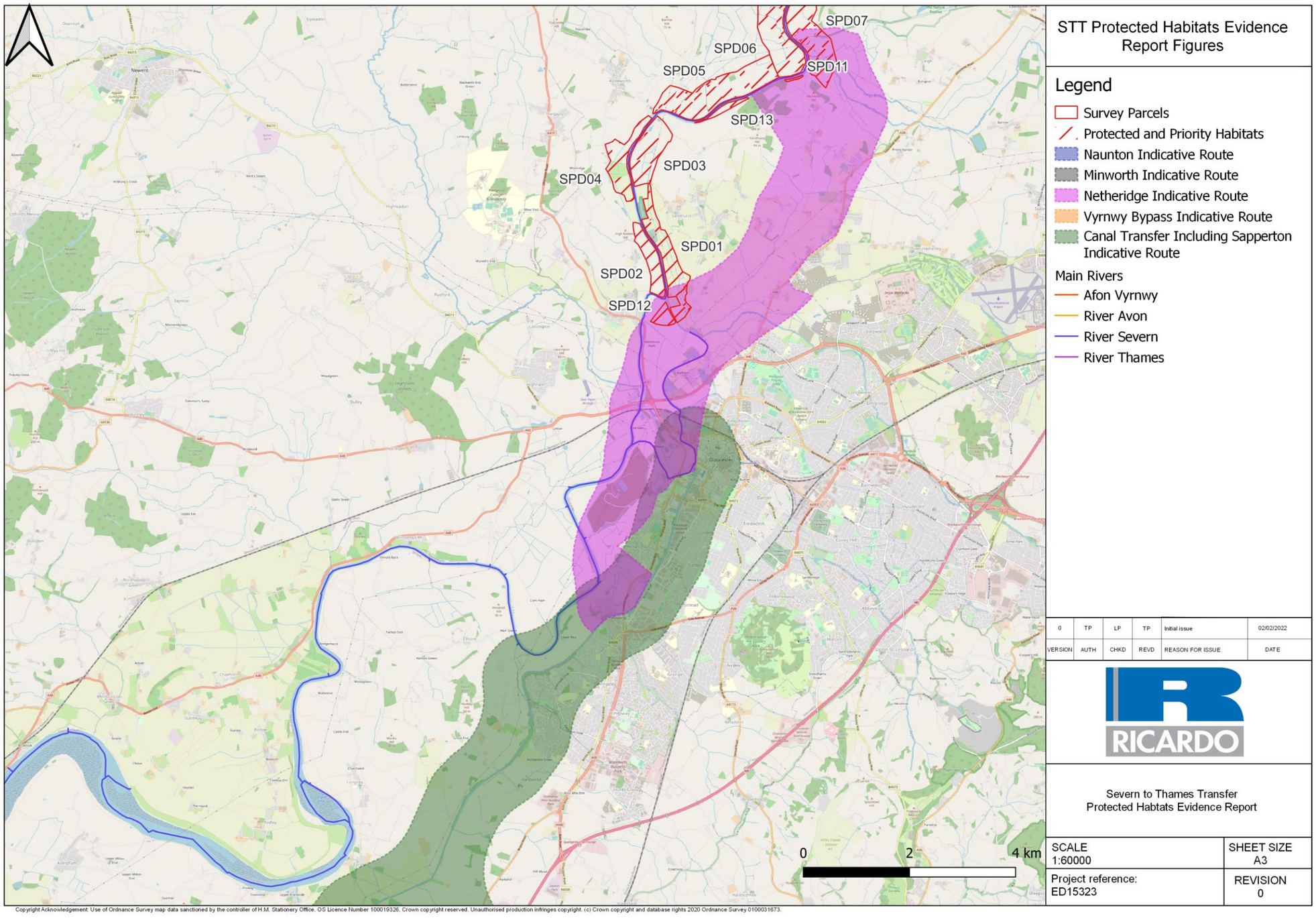

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Figure 2.8 Protected habitat survey parcels – Lower River Severn to Severn Estuary

3. CONCLUSIONS

3.1 SUMMARY OF BASELINE DATA, UNCERTAINTY AND DATA GAPS

Habitat mapping was undertaken at 29 survey parcels across August and September 2021. Overall, the survey parcels in all affected reaches of the River Vyrnwy, River Avon and River Severn, particularly those identified as coastal and floodplain grazing marsh, were dominated by modified/improved grassland, grazed by sheep and cattle or managed for silage.

The survey parcels along all three rivers typically had an area of rough nutrient enriched grassland with tall ruderals and scattered trees along the riverbank. There were areas of neutral grassland/semi improved grassland particularly along the River Avon and Lower River Severn. Drainage ditches were present at most areas that were identified as coastal and floodplain grazing marsh although vegetation in the ditches was limited and the majority were dry at the time of survey.

A total of 25 survey parcel were situated at a height of between 1m and 3m above the water level in the associated main watercourse at the time of survey, although five of the survey sites were at a higher relative elevation of between 3.5m and 5m above the water level of the associated main river reach. A total of 20 of the 29 survey parcels were hydrologically connected to the associated main river reach through the presence of connecting channels. All priority habitats/designated sites were level with the bank-full height of the relevant main river channel, so are likely to experience periodic inundation under flood conditions. Coastal and floodplain grazing marsh was recorded at 14 of the 29 survey parcels; of these 11 had hydrologically connected channels to the associated reaches of the River Severn or River Avon.

The Old River Severn Upper Lode SSSI was in direct hydrological connectivity with the River Severn and depends on the river level to maintain the water level in the old channel and associated wet woodland and marginal/inundated vegetation. At all other sites surveyed, drainage ditches or small streams were present connecting the habitats to the main river channel, but these were typically draining the surrounding land into the main channel.

Overall, the available data is considered sufficient with which to undertake the Gate 2 assessments.

No public access was available at Rectory Farm Meadows SSSI, so the survey parcel was visited via the adjacent public right of way; a survey from outside of the boundary was not possible and there was no public access through the site. The site is located near Bredon in the lower reaches of the River Avon near the Upham and Summer Leasow SSSI. However, results are available from surveys of the surrounding comparable habitats, such as the Upham and Summer Leasow SSSI, and consequently no further survey works are considered necessary to inform the Gate 2 assessments at the Rectory Farm Meadows SSSI.

It was not possible to access the oxbow lake habitat identified in survey parcel SPA03 as there was no public access to the area to undertake the survey. Aerial imagery indicates this feature represents the best example of the oxbow lake habitat in this location with areas of open water remaining available. Further visits would be required, if permission is given from the landowner, to undertake Phase 1 habitat surveys and a hydrological connectivity walkover should hydrological impacts be identified in the reach due to the proposed STT Solution.