



Inter-regional reconciliation of regional plans – Spring 2022: Summary report

1st July 2022 – Final report



Developed with support from:



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Revision History:

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V1.0	01/07/22	Mark A Smith	RCG Working Group	Final report to RCG WG

Limitation of liability and use

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Reconciliation synopsis

Background

Following production of a rulebook in March 2022 for the reconciliation process, the inter-regional reconciliation of regional plans took place between April and May 2022. The primary focus of the exercise was to agree alignment of strategic transfer options (predominantly SROs) between regional planning groups in the core submission and data tables, for the subsequent draft Regional Plans and Water Resources Management Plans (WRMPs)¹. These draft plans are expected to be publicly consulted on in Autumn 2022.

The lock-down of transfer selections and dates subsequently allows the 'big building blocks' to be in place in order for the draft plans to be developed on time (recognising that continuing work on draft plan development² may give rise to further refinement of scheme dates to be managed strictly through a controlled process beyond reconciliation). Ongoing work running to and beyond (e.g. Gate 2 SRO submissions) the draft plan public consultation may alter the ultimate BVPs determined at the end of the WRMP24 planning cycle, which may require future reconciliation rounds.

Through the stages of the reconciliation process, regions explored and tested the impact key alternative transfer positions may have on the plans in a best-value plan (BVP) context. In addition, it was considered how the reconciliation position may change under different supply-demand balance scenarios to test the resilience of the position.

Position prior to 2022 reconciliation (emerging regional plans)

The 2021 reconciliation process defined the position for the emerging plans published in January 2022 for consultation, which showed:

- No inter-regional transfers had been selected impacting West Country Water Resources Group (WCWRG) or Water Resources East (WRE), except under certain scenarios with use of the STT support options from Water Resources West (WRW) to WCWRG
- Water Resources South East (WRSE) selected, from WRW, the Grand Union Canal (GUC) in 2049 (50 MI/d) and 2060 (further 50 MI/d), plus the Severn Thames Transfer (STT), capacity 500 MI/d starting from 2040 with incremental additions of support options from Netheridge, Minworth and the North West Transfer (NWT) over time.
- The existing transfer of water from WRW to Water Resources North (WReN) was to be retained by WRW, supported by enlargement of the Derwent Valley reservoirs

Early reconciliation themes

Materiality reviews in the early stages of reconciliation considered the impact of the latest supply-demand balance and options information. In particular, supply-demand balances took into account a more consistent basis of environmental destination for the baseline reconciliation position (around BAU/BAU+, as detailed in the main report) than the previous reconciliation. This also benefitted from further clarification on the definition of environmental destination by the Environment Agency for waterbodies in England. The early stages of the process flagged three key considerations:

- A material change in the WRW region in water availability for Severn Trent Water, driven primarily driven primarily by the move to the BAU+ environmental destination scenario for their English sites, of relevance to reconciliation with WRSE and WCWRG

¹ The reconciliation process in autumn 2021, by comparison, informed the development of the emerging region plans.

² For example, some regions are continuing to explore the impact of licence capping on existing sources.

- An updated assessment of the feasibility of the Derwent Valley SRO to meet both WRW and WReN's needs (see following section), impacting on the potential reconciliation with WReN
- Initial WRSE modelling showed several closely competing options in terms of costs, but in particular potential selections of transfers from Water Resources East (WRE) the Anglian to Affinity and WCWRG's supported by the Mendip Quarries SRO.

Transfers between WRW and WReN

Deficits are forecast in WRW in the 2030's due to the impacts of abstraction licence capping (specifically in the Nottinghamshire zone of Severn Trent, and as such mostly independent to other WRW aspects of reconciliation). To fill the resulting deficits, WRW has very limited feasible WRMP options: (1) to utilise the new reservoir enlargement element of the Derwent Valley Reservoirs SRO³ and (2) to cease the existing transfer to WReN. The existing contract for the export of water from the Derwent Valley reservoirs in Severn Trent Water's operational area (WRW) to Yorkshire Water (WReN) terminates in 2084, but there is an option for either party to break the contract in 2035 by giving five years' notice in 2030. Due to limited alternatives for Severn Trent the resulting reconciliation position (to cease the existing transfer) is therefore based on need rather than being a BVP decision.

As part of the RAPID SRO work, different options for raising Derwent Valley reservoirs are being explored to maximise the potential benefits. There is potential that in addition to the reservoir enlargement providing sufficient benefit for WRW's short-term needs (licence capping) and long-term needs (environmental destination), it may also feasibly allow the existing transfer to be retained to meet WReN's needs. Whilst not the primary driver of need, in the long term, the scale of environmental destination in WRW will influence the level of risk of the SRO work not finding a feasible reservoir option to meet both WRW needs and allow the existing transfer to continue.

However, at this time there is significant uncertainty as to the level of benefit and feasibility of the SRO until further work has been completed. Until further definition of the costs⁴ of the scheme are known, it is not possible to determine if the BVP would be for WReN to retain the existing transfer, supported by reservoir raising, or to cease the transfer and implement 'backfill' options in the WReN area (consideration of which is also part of the SRO).

As a result, the plans consider the most likely scenario to be that the existing export from Severn Trent to Yorkshire Water will terminate. An alternative pathway will also be included in the plans to reflect the potential that the SRO will enable the existing transfer to Yorkshire Water to be retained, with a decision point in 2025 following further detailed work.

This represents a change in reconciliation position from 2021 prior to development of the emerging plans (WReN previously included a pathway approach, but the situation is now reversed with respect to the 'preferred plan').

Considering transfers from WRE & WCWRG to WRSE

WRSE modelling showed several options to be broadly comparable in terms of costs and performance, making options selection finely balanced and sensitive to change. The exports from WRE and WCWRG required particular scrutiny as to the availability or viability of the exports, with reference to the in-region needs of those regions in a BVP context.

³ Technically, as well as exploring different option variants for reservoir enlargement, the SRO includes backfill options for Yorkshire Water. However, where the SRO is referred to in the context of this document, the reservoir enlargement component is the focus.

⁴ Noting as a general point that where cost is referred to, these may also include broader attributes than simply capital or operational costs, to include carbon, environmental & social elements as part of the objective function.

In the case of WRE, it was determined that the Anglian to Affinity transfer would have a detrimental impact on the WRE BVP if pursued, in particular to the environmental performance of the regional plan. From a cost perspective, this export would also require increased desalination to be selected in the WRE area to offset the loss of water from an export. This would significantly increase the cost of the export to WRSE above that previously assumed, which would in turn make that option less competitive (noting the finely balanced costs between competing options observed in WRSE's modelling).

For WCWRG, the Mendip Quarries SRO is selected for in-region use, however, further export of water to WRSE was deemed to be subject to significant risk due to uncertainties on the yield and costs of the option at this stage. The SRO is relatively new, and at this time significant cost and availability uncertainty remains. WCWRG therefore considered, like with the WRW-WReN position, that the SRO should be considered within a potential future alternative pathway or sensitivity test in the plan, but not to be included in the core reconciliation position until further work is completed. It is hoped that the amended Gate 2 SRO submission of the Mendip Quarries scheme will provide additional confidence with this scheme, which might allow it to be considered for the revised draft plans next year.

Transfers from WRW to WRSE

Following confirmation of the inter-regional reconciliation position between WRSE and both WCWRG and WRE, focus was made on determining the position with WRW. Significant numbers of model runs were completed. It was recognised early in the process that within WRSE modelling there are a number of closely competing options, particularly in terms of cost, making transfer selection and timing very sensitive to change. This is particularly important for three reasons:

- Whilst a reconciliation position⁵ (to be reflected in the preferred plans) was to be locked down and agreed as part of the process, the identification of key alternative options for reconciliation and public consultation of the draft plans was considered of high importance
- It should be recognised that ongoing work running to and beyond the draft plan public consultation may alter the ultimate BVPs determined at the end of the WRMP24 planning cycle
- Reconciliation decisions did not solely use a single model run output, but were informed by modelling results 'in the round', including exploring scheme selections across different situations and model runs, engineering judgement on the modelling results (e.g. where two closely related options were selected a small period apart) and supporting technical information (e.g. customer preference surveys). Recognising that each model run over time has the potential to subtly change results moving forward beyond reconciliation, this 'triangulation' of information to support reconciliation decisions was important.

The key observations and resulting position are summarised below:

- The selection of the South East Strategic Reservoir Option (SESRO) was stable throughout the model runs relatively early in the planning horizon (typically 2040, but varies depending on drought resilience policy). In option flex tests with SESRO and other Upper Thames reservoirs removed, the STT was then preferentially selected in those scenarios.
- The selection of the GUC transfer option was also stable across model runs, again early in the planning horizon.

⁵ WRSE has a preferred adaptive plan and a pathway used for reconciliation purposes. This is a different approach to the other regions. This is detailed further in Section 2.4.

- Beyond this, several options were closely competing in different model runs. At one stage, in-region transfers to support London were selected (from SES Water), but for reconciliation these were removed on the basis of this water having high dependence upon delivery of demand management, drought measures and borehole options (that had subsequently been considered infeasible due to EA concerns from an environmental perspective).
- In terms of larger strategic options relevant to reconciliation, Beckton desalination, Beckton re-use and the STT (including support options) were all closely comparable cost and BVP metric terms. However, in line with the 2021 reconciliation, the STT featured in a wide range of scenarios across different pathways (although the scale of supporting options differed)
- The STT was selected by WRSE in the reconciliation position over the Beckton options on the basis of the following supplementary information and expert judgement:
 - Operability and reliability considerations, especially given practical experience of desalination in the existing Beckton desalination plant in Thames Water's London area.
 - Customer preferences on options and associated weightings showing transfers to be more preferable than desalination and re-use
 - Option tests and scenarios with SESRO and other Upper Thames Reservoirs removed showing STT then being selected. Following adaptive planning principles, it is thus considered critical to progress with scheme development through the SRO gated process.
 - Frequency of selection of STT across a range of model runs and scenarios/paths.
- It should be noted that both Beckton options (reuse and desalination) remain key alternative options to be consulted upon and presented comparatively to the STT in the draft plans.
- Subsequent to the reconciliation decision, WRSE noted an error with the STT embedded carbon costs for Vyrnwy used in previous modelling results. Whilst not directly used in reconciliation, further model results (available in time for *reference* in this final report) with corrected costs resulted in strategically comparable scheme selections to the reconciliation position. This added further confidence and validation to the reconciled position.

Reconciliation position summary:

Recognising the summary position above, the core reconciliation position is as follows (and detailed further in the main report):

- SESRO selected (typically and therefore assumed 2040, although changes with 1:500 drought resilience policy, at 271 MI/d⁶)
- Minworth to WRSE via GUC selected in 2031 @ 100 MI/d
- STT selected from WRW to WRSE, with 500 MI/d pipeline in 2050 and unsupported abstraction. STT supporting options (informed by WRW identification of available options under BVP conditions) selected are:
 - Netheridge in 2050 @ 35 MI/d
 - North West Transfer (NWT) via Vyrnwy in 2060 @ 135 MI/d
 - (Noting that other STT support options, including more use of the NWT were selected for use within WRW as part of its BVP)
- No new exports from the WRE and WCWRG areas to benefit WRSE
- Cease existing transfer from WRW to WReN from Derwent Valley Reservoirs

⁶ Note conjunctive use benefit varies depending on other schemes selected.

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The above position reflects the reconciliation focus on transfers, noting that SRO options may be selected for in-region use only. SESRO is specifically noted given its link to an alternative pathway relevant to the WRSE and WRW reconciliation position as detailed further in the main report.

Given the various transfer and supporting options from WRW to WRSE, a summary reconciliation position is shown also in the table below:

Table 1 WRW-WRSE updated baseline / core reconciliation position for inclusion in draft plans

WRW-WRSE transfer option selection: reconciled position	Capacity (MI/d)	Implementation date⁷
Minworth via GUC	100	2031
STT pipeline with unsupported abstraction	500	2050
Netheridge via STT	35	2050
North West Transfer: Vyrnwy via STT	135	2060
Minworth via STT (not selected)	X	X
Mythe via STT (excluded due to WRW in-region use)	X	X
North West Transfer via Shrewsbury and STT (excluded due to WRW in-region use)	X	X

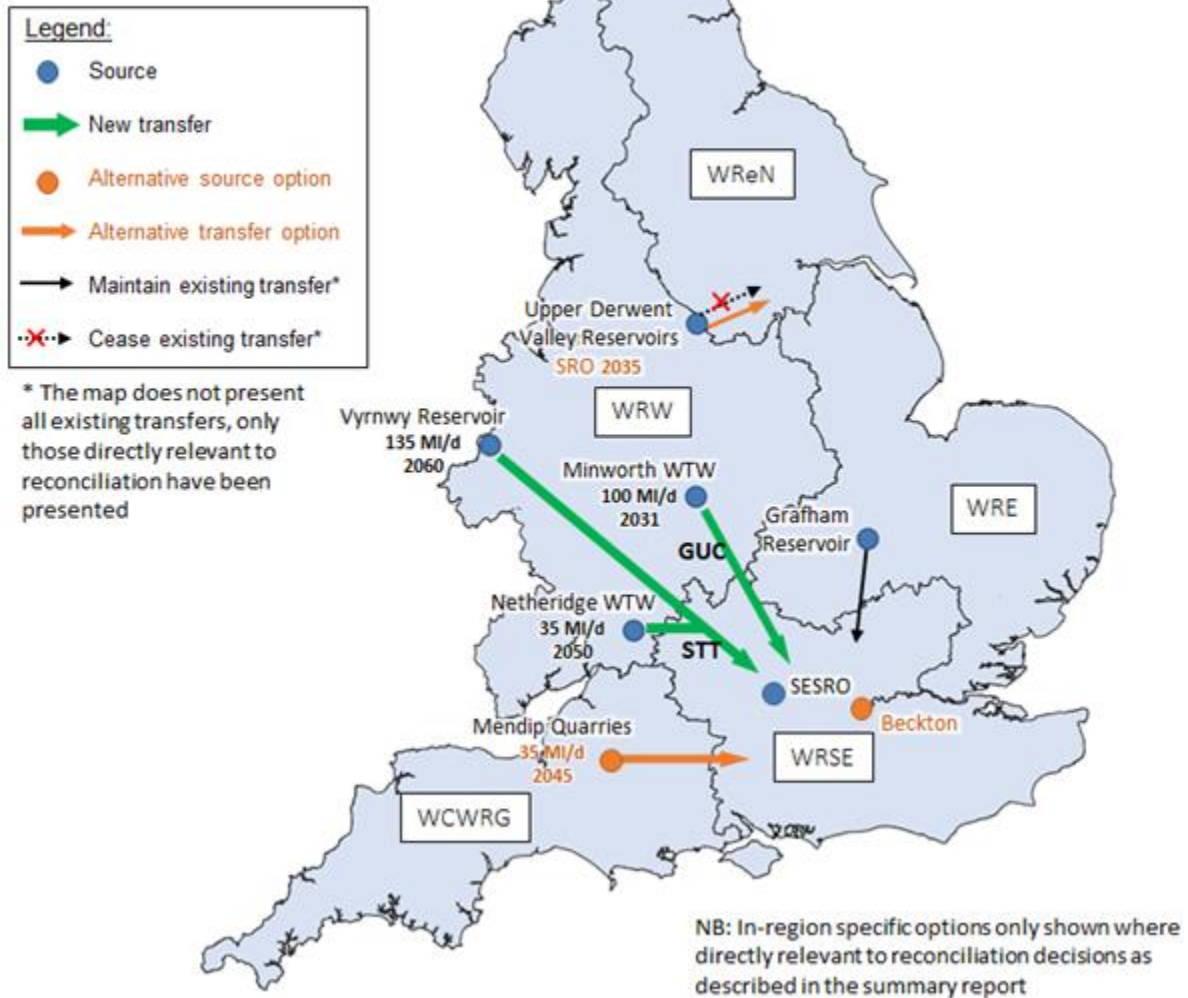
Key alternative options and adaptive pathways to be presented as such in the draft plans are:

- Beckton desalination and re-use, in place of (or preference to) STT – alternative plan option
- Mendip Quarries export of 30 MI/d from WCWRG to WRSE from 2045 – alternative plan option or sensitivity test
- Retain existing WRW to WReN transfer, supported by the Derwent Valley (reservoir expansion) element of the SRO – alternative pathway, with decision/trigger point in 2025 and assumed implementation 2035.
- WRSE plan with SESRO and Upper Thames Valley Reservoirs removed, showing earliest possible date of STT required in 2040 (incremental support added) – alternative pathway

The map overleaf provides a combined, illustrative view of the reconciled position, along with these key alternatives:

⁷ For avoidance of doubt, the implementation date reflects the water into supply or when the scheme is first utilised (i.e. benefit realised).

RECONCILED POSITION (plus key alternatives)



Further specific testing on lower levels of existing transfers from WRE to WRSE are also to subsequently be completed through scenario analysis alongside the core draft plans.

Supply-demand balance (SDB) stress testing⁸ (as detailed in the main body of this report), on the reconciliation plan position to date showed this to be resilient:

- WRE confirmed that low scenarios, for example for environmental destination, would not change the availability of exports to WRSE.
- High compound stress tests by WRW indicated no material impact on the availability of water to WRSE; in part due to the fact that the baseline BAU+ environmental destination scenario already has a very high impact on future water availability (for English parts of WRW).
- The selection of transfers from WRW by WCWRG (STT @ 35 MI/d) also only occurred in the most extreme compound high stress test largely due to very high indicative costs relative to other options for WCWRG (and noting new additional in-region options currently being developed, which reduces the likelihood of STT selection).

⁸ Noting that WRSE modelling includes 9 scenarios as an inherent part of the modelling process.

- For WReN, whilst changes in environmental destination in particular impact on the scale of deficit in the zone, impacting in-region options, this does not impact the reconciliation position. Offsetting options are required to address loss of the existing inter-regional transfer from WRW in all cases.

Risks and recommendations:

A reconciliation position has been required for the draft plans to be developed by all regions on time and with suitable alignment of inter-regional transfers and selection of relevant supply-side schemes. However, there are evident risks of change as the regions continue to work on their plans to the draft stage, and beyond, for example:

- With regards key alternative schemes explored during reconciliation (in particular Mendip Quarries and the Derwent Valley SRO's), revision to RAPID scheme data at the amended Gate 2 milestone for those schemes in Spring 2023 is key.
- There may be further information or maturing positions on any of the specific options considered by regional groups, whether SROs or WRMP level. This also includes the outcomes of SEA and HRA environmental assessments on the draft plans.
- Environmental destination and/or licence capping⁹, in terms of pace, timing and definition of the optimal long-term needs are also highly subject to change as the impact is considered more thoroughly. As the companies work through the licence capping profiles with the EA this autumn any amendments might have a material impact on the regional plans.
- The maturity of BVP practices and understanding is evolving, and potentially constrained by the nature of the regulatory framework at this time; this makes cross-comparison of BVP positions between (rather than within) regions challenging.

With this in mind, the key mitigations recommended in the main report are that:

- The regions conduct a review process to ensure alignment of the proposed submissions with the reconciliation position in August 2022, and to support the approach to consultation.
- A change control process is developed and implemented beyond reconciliation, to manage and review changes that may arise as the regions continue work on their plans. This also supports the above reviews.
- There is open and transparent communication of the above risks in the draft plans, with suitable consultation on the alternative options and pathways, and plan scenarios in line with the reconciliation findings.

⁹ As the companies work through the licence capping profiles with the EA this autumn any amendments might have a material impact on the regional plans.

1. Background

1.1. Background to the 2022 reconciliation

In autumn 2021, the five regional water resources groups¹⁰ undertook two iterative reconciliation rounds to align their respective emerging regional plans in the context of strategic transfers and/or Strategic Resource Options (SROs). This reconciliation process was completed through a series of meetings involving regional planning leads and regulators. In these meetings the representatives of the regions explained their selection of schemes and referenced “best value” criteria. The selection cascaded from one region to another in a pre-determined sequence. Through this cascade there was iteration, as costs and availability of transfer schemes changed due to prior selection.

As part of this process, a set of aligned transfers to be used in the emerging plans considering best value plan (BVP) criteria¹¹ were agreed based on aligned implementation dates and volumes for selected schemes. A full explanation of the reconciliation process, along with a summary of its outcomes, was included in the document ‘*Regional Reconciliation Process – Version 7*’¹². The emerging regional plans¹³ published in January 2022 aligned to the outcomes of reconciliation, and have recently been consulted upon.

Following the consultation process on the emerging plans, the regions needed to repeat a reconciliation exercise to support development of the draft Regional Plans and Water Resources Management Plans (WRMPs) - expected to be consulted on in autumn 2022. The lock-down of transfer selections and dates subsequently allows the ‘big building blocks’ of the plans to be in place around which the draft plans can be developed on time. This document summarises the key outcomes and findings from that activity, which is also supported by other materials from the process (it does not aim to recite all proceedings and discussions in the process entirely, to aid clarity).

As the reconciliation outcomes ultimately inform both the non-statutory draft regional plans as well as the statutory draft WRMPs (which both then also inform the RAPID gated process), there was an aim for increased justification and rigour to be used in the exercise compared to 2021. Therefore, shortly prior to undertaking the reconciliation, a rulebook and supporting materials were produced to define a suitable process to help support completion of reconciliation. The reconciliation rulebook¹⁴ was completed in March 2022, and was endorsed by RAPID’s Regional Co-ordination Group (RCG) and associated Working Group for use in the reconciliation process.

An overarching summary of the reconciliation process, including the bounds and definition of reconciliation itself are included in summary form within Section 2. The second, ‘Spring 2022 reconciliation’ was undertaken to short timescales, with the main effort focussed on the period mid-April to end-May 2022. The process directly involved leads from the regional planning

¹⁰ Water Resources South East (WRSE), Water Resources East (WRE), Water Resources West (WRW), West Country Water Resources Group (WCWRG) and Water Resources North (WRn).

¹¹ The plans were not deemed to be fully BVPs at this stage, albeit they represented the best available view and utilised BVP scoring of the reconciled plans (which may have been based upon ‘least-cost’ options appraisal runs, rather than specifically optimised for BVP criteria). This remains the case in this reconciliation round, with the focus being upon the selection and timing of transfer options to be included within the subsequent regional BVPs.

¹² This document is located on the RCG Working Group area at [Regional Plan Reconciliation V7.pdf](#).

¹³ See Appendix 1 for link to the emerging plan for each region.

¹⁴ Inter-regional reconciliation of regional plans: Spring 2022 Rulebook, 29th March 2022 - [Inter-regional reconciliation Spring 2022 - Rulebook v1.0 for RCG Working Group Use 290322.docx](#)

groups (with input from their group members) and regulatory representatives from the Environment Agency (EA), Natural Resources Wales (NRW) and Ofwat/RAPID¹⁵.

Through the stages of the process, regions explored and tested the impact key alternative transfer positions may have on the plans in a best-value plan (BVP) context, in addition to considering how reconciliation position may change under different supply-demand scenarios to test resilience of the position. An agile, pragmatic approach was required depending on the outcomes of modelling, analysis, reviews and decisions through the process, and given the short timetable involved.

1.2. Sections in this reconciliation summary

The main sections of this report are structured as follows:

- Section 2 – Reconciliation process summary, which recaps in brief on the process as outlined in the rulebook, the definition/bounds of reconciliation, scenario definitions and key participants. It summarises the key supporting documentation available. It helps explain the ‘how’.
- Section 3 – Exploring inter-regional choices and decisions, which provides a summary of the inter-regional review of transfer options, supported by relevant tests, reviews and discussions. It provides the context and explanation of the reconciliation position as defined by the regions, along with key alternatives. It helps explain the ‘why’.
- Section 4 – Reconciliation position and key alternatives, which presents the outcome of reconciliation, in terms of the agreed transfer options and dates to be reflected in the draft plans. It also presents key alternatives relevant to consultation on the plans.
- Section 5 – Recommendations and plan risks, which summarises key recommendations from the process, or relevant residual actions entrained or identified through the process. It also flags the key risks observed during the process relevant to the plan process overall, along with brief suggested mitigations.

This summary report is also supported by the following key supporting templates or files:

- Best-value planning tracker sheets – by regional group
- Materiality review template – by regional group
- Strategic options summary sheet – copy included in Appendix 3
- Meeting records and minutes, plus other archives

¹⁵ The roles of the different participants are summarised in the rulebook, but it is important to note that regulators have advisory and observatory roles in the process, as well as serving as ‘constructive challengers’.

2. Reconciliation process summary

This section aims to recap on the purpose and bounds of reconciliation, along with a brief summary of key aspects of the process and approach. The section does not aim to recite the full rulebook in detail (to which the reader is referenced for a full explanation of the reconciliation process), but does seek to emphasise key aspects as context for the reader. It also summarises some of the key challenges when practically completing reconciliation.

2.1. Purpose of second reconciliation

As stated in the rulebook, the overarching purpose of the second reconciliation is summarised as follows:

- To identify where there have been material changes, at the point of starting reconciliation, that impact on the selection of inter-regional schemes;
- To lock-down and align the selection (or non-selection) of strategic transfer schemes between regions, with agreement of the required volumes and implementation dates¹⁶, for the purpose of the draft regional plans and WRMPs; and,
- To further test and affirm that the selection of aligned transfers are suitable for inclusion according to best value principles¹⁷, and capture the stated justification and evidence for the reconciled inter-regional schemes for each region.

There is inherently a limit to the scope of reconciliation, in particular in terms of how much detail the evidence could be explored in such a short timescale and that was available from the regions (and noting that ultimate assurance lies with the regions and companies themselves). The following section summarises the principles and bounds of reconciliation from the rulebook.

2.2. Bounds of reconciliation

The reconciliation rulebook provides full detail on the principles of reconciliation, around which the approach taken was devised. Given the likelihood and dangers of misinterpretation of the remit of reconciliation, this section summarises fully, as an extract, the bounds of the 2022 reconciliation process:

“What is it?”

- ✓ *A reconciled and agreed/locked-down set of inter-regional strategic transfers, to enable the 5 regional groups to finalise their draft regional plan and WRMP submissions.*
- ✓ *A review of materiality against the autumn 2021 reconciliation position, with further reassessment of the evidence and justification for the previously reconciled inter-regional schemes where these remain unchanged (or in defining revisions).*

¹⁶ For avoidance of doubt, the implementation date reflects the water into supply or when the scheme is first utilised.

¹⁷ As detailed further in Section 2, regional groups will not have finalised, optimised BVPs at this stage (e.g. may be based on cost-effective plan portfolios), but BVP metrics / scores against different transfer alignments can still be used at this stage to support reconciliation.

- ✓ *An opportunity to discuss and explore regional plan positions following consultation and further work completed, allowing transfer schemes, dates and utilisations to be refined.*
- ✓ *A major snapshot, or best current view of the BVPs at the stage of reconciliation.*

What is it not?

- × *Building a single optimised national BVP.*
- × *A locked down set of preferred plans at a regional or WRMP level of detail for all zones and options (inter-regional transfer options to be ‘locked down’ only, for purpose of developing the draft plan submissions).*
- × *A final best value plan.*
- × *An assurance or audit process.”*

It is also important to re-emphasise the definition of ‘evidence’ in the context of the rulebook:

‘Evidence’ in the context of reconciliation (as defined in rulebook)

The reconciliation process *draws on* the underpinning evidence from regions in summary form, e.g. costs, impact on best-value planning area scores, SDB impacts etc. It uses the ‘behind the scenes’ detailed processes and outputs of each region, as best is available at the point of the reconciliation. With this in mind, reviewing ‘evidence’ in the context of reconciliation is rather about ensuring reasonable and plausible justification for the current BVP positions (within the confines of the definition of reconciliation explained earlier in this document), based on the information presented, along with providing a record of the associated dialogue and discussions.

2.3. Stages of reconciliation

Figure 1 shows the conceptual stages of reconciliation. It should be noted that in practice, the process may have a degree of iteration between stages, or some regions may have completed stages at different points in time. That said, several key ‘central’ reconciliation meetings took place at key intervals through the stages, allowing regions to discuss the reconciliation position collectively at a national scale. The reconciliation rulebook fully defined the remit of each Stage, with a suggested structure for each key meeting, in terms of purpose, inputs and outputs.

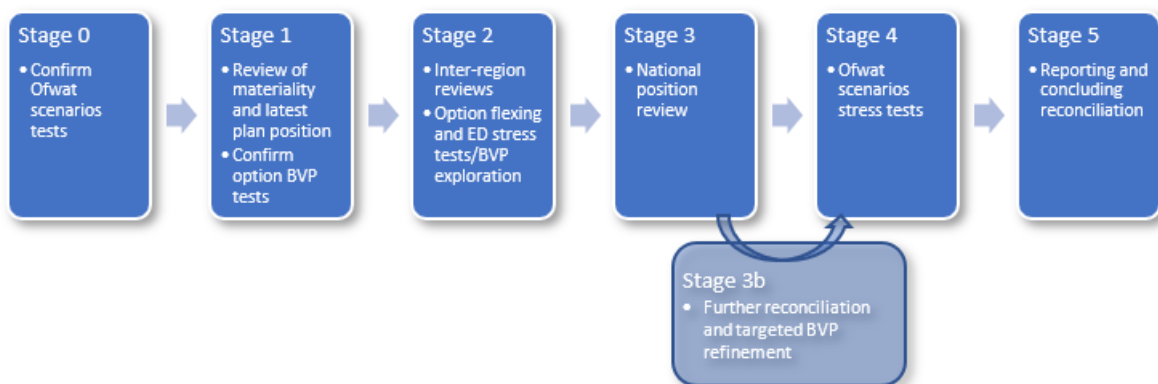


Figure 1 Conceptual stages of reconciliation

Most importantly, Stage 2 was designed to allow exploration of inter-regional reconciliation BVP positions in a parallel manner, rather than the iterative process undertaken over a longer

duration in 2021. This was on the basis of there being an alignment position from 2021 reconciliation to work upon that was still considered to be relevant in the Stage 1 materiality review. The full Stage 1 materiality review for WRSE took place slightly later than other regions to maximise the use of the latest data and position for this critical region (key driver of potential transfer selections). Stage 3b was included to allow for 'extra time', to focus on key residual inter-regional reconciliation issues.

2.4. Scenario alignment across regions for reconciliation

As part of the Spring 2022 reconciliation and rulebook development, significant focus was placed on greater alignment of the baseline position for reconciliation for key plan components, and in particular for environmental destination. The lack of alignment on environmental destination was seen as a key limitation of the Autumn 2021 reconciliation.

Each regional planning group may have a different precise definition for their baseline plan scenario used for reconciliation, given technical choices offered under the planning guidelines. As defined in the rulebook, it was infeasible to seek a fully harmonised technical alignment between regional planning groups. Mandating this in full would also potentially result in the reconciliation process being misaligned with the planning processes being used for the regional plans themselves. Despite this, there has been a high degree of alignment on the major SDB components through reconciliation (Table 2).

The approaches taken by regions to building an adaptive, best-value plan differ, reflecting the specific needs (e.g. SDB deficits), characteristics and risks for the region. The size of the need for WRSE is particularly influential and prominent in reconciliation, and so understanding its approach to adaptive planning is very relevant when considering scenario alignment across regions:

WRSE approach to adaptive planning

The rulebook refers to a baseline position for reconciliation. In the context of WRSE modelling processes there is no single baseline in their planning processes, but rather a 'baseline tree' with branches including structured scenarios (referred to as situations). Plan development is not completed as a single preferred pathway, but as part of building an adaptive plan considers all scenarios across the tree. These scenarios align to the latest PR24 definitions and/or WRMP guidance, thus constituting a range of potential futures.

Given that there is a baseline definition for reconciliation, and a specific baseline considered for the other regions, for reconciliation alignment to the other regions, WRSE have looked at the situations which align best with the baseline for other regions, and used these branches / situations for reconciliation.

This is important with regards the context for the table below. Branches 1 and 4 were deemed to be most comparable to the baseline used for other regions. The difference between these branches reflects difference growth forecasts which are both in line with the WRMP guidance. One growth forecast uses Housing plan plus OxCam; the other growth forecast is Housing plan only. Typically the other regions use housing plan numbers hence the need for WRSE to look at both sets of branches to align with guidance and equivalent situations.

The table below summarises the extent of alignment applied across the regions for the purposes of reconciliation:

Table 2 Alignment of reconciliation scenarios between regions

SDB component	Definition	Regional group position on commonality
Environmental destination (ED) England¹⁸	<p>BAU/BAU+ position as defined in the rulebook, Section 2.3 (see below):</p> <p>– Scenario accounts for local evidence and ground-truthing, where agreed in principle with local regulators. BAU+ should account for Common Standards Monitoring Guidance and European protected areas, where appropriate. For European sites, BAU+ should take account of the locally agreed (with EA/NE) flow target where one has been agreed, and where one has not been agreed the default would be to use the CSMG flow target. BAU should be used where there is no local regulator agreement to the BAU+ scenario.</p>	<p>Latest best estimate of BAU+ applied across most regions (developed with local regulatory engagement applied). Latest position on licence capping included.</p> <p>WCWRG utilised BAU as alternative in line with rulebook where no agreed BAU+ position available.</p> <p>WRSE branches used for alignment with other region baselines uses BAU+</p>
Climate change	<p>RCP6.0 (medium emissions) recommended in rulebook.</p> <p>Baseline in scenarios addendum Vs Ofwat scenarios.</p>	<p>RCP6.0 applied across most regions.</p> <p>WRSE branches used for alignment with other region baselines uses RCP8.5 in line with their regional plan development processes, due to a holistic mapping of climate impacts to the environment destination scenario when modelling across branches (i.e. BAU+ considered high impact and similar to enhanced). Impact of RCP6.0 Vs 8.5 stated as marginal in this context (environmental destination scenarios and growth are key driver of choices).</p>
Demand management policy	<p>Inclusion of regional delivery of PCC and leakage policy objectives by 2050 (as emerging plans)</p>	<p>All regions stated inclusion of demand management towards government policy objectives by 2050 (110 l/h/d by 2050 and 50% leakage reduction), but with some Company level variations on leakage depending on starting position.</p>

2.5. Reconciliation stress test scenarios

In the development of the rulebook, there was an agreed intent by the regions to seek a common baseline where possible, particularly around environmental destination, and to have common scenarios to test, review and contextualise the reconciliation position. This was described in Section 2.3 and 4.5 of the rulebook. It should be noted that a full technical alignment was implausible between regions. This is because each region has specific technical approaches reflecting the nature of their systems and problem characterisation

¹⁸ It should be noted, in general, that for WRW the environmental destination and licence capping scenarios for Wales do not have a material influence either because they are ‘mainly’ not applicable to Wales, or affect zones on a wholly or mainly Welsh basis. WRW

(risk); to deviate from regional approaches would result in a reconciliation being at odds to the planning process itself. For this reason, low and high scenarios around the baseline allowed a way to understand the upward and downward SDB uncertainties or sensitivities, and their impacts from the base position in particular.

A key challenge for the definition and/or implementation of reconciliation scenarios was that this interfaced with existing ambiguities or uncertainties in planning definitions or evolving new definitions. The rulebook therefore only defined scenarios so far, noting two key subsequent areas of development:

- Further clarification from the Environment Agency and Ofwat on environmental destination scenarios (reconciliation mainly being impacted by English requirements, Wales being subject to separate guidance)
- Ofwat common scenarios for demand, climate change and environmental destination

The second item specifically caused delays to the start of reconciliation, until published; a position endorsed by the RCG on the 22nd March. However, further clarity was required by the regions from Ofwat to identify a workable set of scenarios for the purposes of reconciliation and fully understand the published definitions. An additional meeting took place on the 22nd April 2022, organised by Richard Blackwell of WRW to resolve these issues. The final details of the scenario testing approach were endorsed in the RCG meeting of 26th April.

Subsequently, an addendum to the rulebook to summarise the position on common scenarios was published on the 3rd May 2022¹⁹. A summary of the agreed scenarios is shown in Figure 2 (overleaf), noting specific environmental destination scenarios of interest, along with ‘compound’ scenarios to test reconciliation BVP position resilience at the ‘extremes’²⁰.

It is worth noting that significant uncertainty was evident during, and remains following reconciliation with regards environmental destination. Even where (especially in the early stages of reconciliation) fully quantified estimates were not available, the concept of considering scenario sensitivity in the plans was evident in making choices through the process.

¹⁹ [Inter-regional reconciliation Spring 2022 - Rulebook - ADDENDUM on Common Scenarios v1.0 030522.pdf](#)

²⁰ It is worthy of note that in the case of WRSE, each options appraisal model run encapsulates (towards the end of reconciliation) 9 branches or ‘situations’, which span several of the scenario definitions in the above table.

Scenario		Definition
Baseline	<i>ED</i>	BAU/BAU+ position as defined in the rulebook, Section 2.3
	<i>Demand</i>	As regional emerging plans (or latest position) incl. planned delivery against PCC and leakage reduction policy + option selections
	<i>Climate change</i>	RCP6.0 (medium emissions)
Environmental low	<i>ED</i>	Start with BAU+ scenario and use local reviews to remove waterbodies with significant uncertainty about whether the reduction is needed
Environmental high	<i>ED</i>	Enhanced
Compound / global low	<i>ED</i>	Start with BAU+ scenario and use local reviews to remove waterbodies with significant uncertainty about whether the reduction is needed
	<i>Demand</i>	ONS 2018 principal projections; regulations as Ofwat definition
	<i>Climate change</i>	RCP 2.6
Compound / global high	<i>ED</i>	Enhanced
	<i>Demand</i>	Local plan-based projections; regulations as Ofwat definition Retain policy target 110PCC and 50% leakage reduction
	<i>Climate change</i>	RCP 8.5 (RCM)
High demand	<i>Demand</i>	50% of the 110 l/d PCC target achieved

Figure 2 Summary of agreed scenarios position²¹

2.6. Supporting information and outputs

This summary report aims to provide an overview of the outcomes of reconciliation, with a summary explanation of the reason for the resulting position, in a relatively concise form. Behind this summary report lies further detailed supporting information used or produced as part of the process itself, and upon which it is based.

These are depicted in Figure 3, which shows a tiered set of related outputs.

²¹ Table applies to reconciliation in terms of being wholly or mainly England. For WRW, specific Welsh guidance and definitions apply to zones wholly or mainly in Wales and thus subject to Welsh governance; these are not relevant to reconciliation, rather specifically for WRW's own plan development.

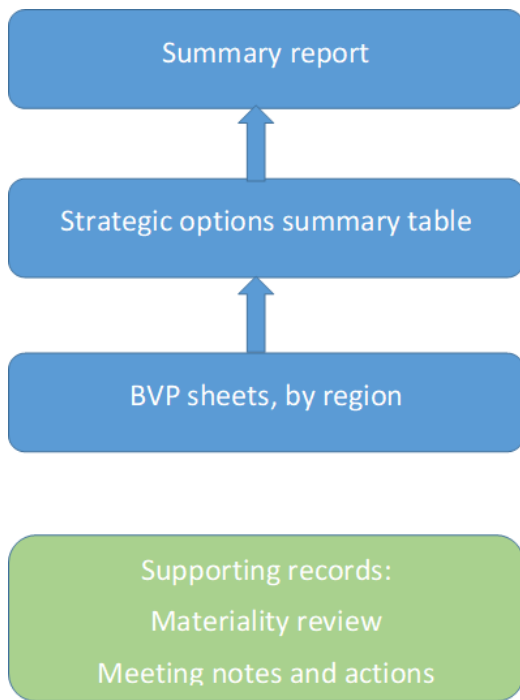


Figure 3 Key reconciliation outputs

The *strategic options summary table* provides a position statement against the key transfer options explored in reconciliation, plus an updated position on key SROs from the 2021 position.

The *regional BVP sheets* (mastered within a single file) were designed to help structure and capture evidence / justification during the process. They serve as a record or holding ground for key BVP portfolio or option tests (to show why a transfer has, or has not been selected, by showing an opposing plan view), along with supply-demand balance (SDB) stress test scenarios (to show how resilient the reconciliation position is to change). They hold both qualitative and quantitative information related to BVP tests²² to evidence the reconciliation position, depending on the information available during reconciliation. In some cases, related BVP or model outputs may sit alongside the BVP sheet, as provided by regions.

The green box summarises other supporting records from the reconciliation. These include the completed *materiality review sheets* produced by each region in Stage 1, used to inform and guide the early stages of reconciliation. In addition, records of *meeting notes and actions* have also been archived, although it should be noted that in some cases specific meeting actions may have been carried beyond the reconciliation process (see Section 5.1) or superseded as requirements changed.

2.7. Key participants and informed parties

The rulebook detailed the specific roles related to reconciliation in Section 5. The RCG Working Group members formed the primary direct participants in reconciliation. Whilst attendance at key meetings varied due to availability, Table 3 summarises the main participants in the overall process:

Table 3 Key participants in 2022 Spring reconciliation

Regional planning lead – WRSE	Meyrick Gough / Nathan Burt
Regional planning lead – WReN	Granville Davies / Suzanne Dunn
Regional planning lead – WRE	Geoff Darch / Ben Fitzsimons
Regional planning lead – WRW	Richard Blackwell / Marcus O’Kane
Regional planning lead – WCWRG	Paul Saynor / Paul Merchant / Tom Sanders
Regional groups and constituent companies	Via regional planning leads
RAPID	Jonathan Dennis

²² Noting as a general point that where cost is referred to, these may also include broader attributes than simply capital or operational costs, to include carbon, environmental & social elements as part of the objective function. Full alignment to WRMP guidance may occur later in the plan process, and as described earlier, plans may not be fully deemed BVPs at this stage with full options appraisal to be completed subsequently.

EA	Lisa Winfield (Tom Schnetler, early phase only)
NRW	Tracey Dunford
Reconciliation support roles	Mark Smith (Hydro-Logic) / Ali Leonard (Newcastle University)

Through the process, the main RCG was kept informed on emerging and residual issues at key stages of the process in April and May. In addition, the Regional Chairs Group was also updated on reconciliation proceedings in advance of the May RCG, via Jean Spencer, in the event of potential escalation needs in the latter stages of the process.

Appendix 2 provides a high-level summary of the core reconciliation meetings.

2.8. Key challenges faced in practice

Prior to Section 3, which provides an overarching storyboard and a summary of the key inter-regional positions in reconciliation, it is also useful to reflect on the practical implementation of reconciliation in line with the rulebook. Agility, flexibility and pragmatism were required to allow the process to progress successfully, as the position unfolded and in response to the information submitted by regional groups.

The following summarises in brief the key challenges faced by the reconciliation process that the regions have had to overcome (in addition to those already recognised in the rulebook in its design):

- Initial challenges to ensure suitable scenario definitions, in particular around environmental destination, and delays to publication of Ofwat common scenarios. The Ofwat publication is derived from the Environment Agency environmental destination scenarios, and further clarifications were also provided in this regard to support the process.
- Fundamental changes to baseline plan positions driven by BAU+ environmental destination definitions and/or licence capping impacting WRW and WReN
- Increased complexity of post-materiality review plan position compared to 2021 reconciliation
 - WRSE model selections showed several options closely competing on costs, requiring further investigations (the schemes are all SROs and therefore the RAPID gated process will provide assurance)
 - Initial WRSE model selections resulted in a complex inter-dependency of plans, with transfer selections from 3 other regions requiring additional further investigation²³.
- Option appraisal model run times to reflect updated positions for WRSE proved challenging, given the additional complexities above and resulting from additional runs needing to be completed as the process unfolded

²³ This highlights that if options are available for export then a more integrated national grid system could be developed, however, water availability currently limits these transfers. As regions go through the planning process, the understanding of water availability will improve.

- Persistent challenges ensuring timely completion of BVP sheets to support process and reviews across several regional planning groups

Despite (and in some cases as a result of) the above challenges, the 2022 reconciliation process has developed a significantly greater understanding of the position of different regions, the key plan sensitivities and alternatives, and therefore a more powerful and established narrative. The reconciliation process enables mitigation of risks of change later in the process, by flagging key areas relevant to plan development and consultation themes. The following sections summarise these outcomes and the agreed reconciliation position.

3. Exploring inter-regional choices and decisions

An extensive series of reviews and meetings was completed through the course of reconciliation. In particular, these meetings served to review the BVP position for each region either at a national level, or through a series of inter-regional meetings focussed on the key potential transfers across regional boundaries. This section serves to provide a summary of these proceedings and each inter-regional position as it evolved through reconciliation. This explains the ‘why’ of reconciliation, where then Section 4 subsequently serves to further distil the reconciliation outcomes agreed for clarity (the ‘what’).

3.1. Storyboard: Reconciliation in brief

The intensive series of reviews and meetings (summarised in Appendix 2) involved significant detailed discussion and dialogue. As explained in Section 2.3, the stages of reconciliation sometimes involved a degree of iteration in practice, or findings at one stage resulted in further additional reviews needing to take place than originally envisaged.

Figure 4 overleaf provides a one-page summary storyboard, that shows the evolution of the reconciliation position from the outset through to the development of this report. It indicates the manner in which the reconciliation picture evolved through iterative review between the regions. Linked to this storyboard, Sections 3.2 to 3.9 then provide a fuller explanation of the outcomes and discussions, in particular around each inter-regional interaction.

3.2. Baseline position prior to Spring 2022 reconciliation

The base position for reconciliation in the context of transfers reflects the reconciliation outcomes of the autumn 2021 process (explained in a separate report), as reflected in the emerging regional plans as published in January 2022. In summary:

- No transfers had been selected impacting WCWRG or WRE. The potential for the STT to support the WCWRG under the River Severn to West Country Transfer was noted as a candidate option under SDB stress tests.
- The impacts of forecast licence changes in the Severn Trent Water Limited (STWL) system identified the need for solutions to a deficit in the Nottinghamshire zone. At present, the contract for an existing transfer from WRW to WReN runs to 2084 but either party has the option of terminating it in 2035 by giving five years’ notice in 2030, and as such, ceasing this transfer represents a feasible option for STWL. In the reconciled plan, the existing transfer of water from WRW to WReN was retained, supported by a new SRO scheme to enlarge the Derwent Valley reservoirs. The reservoir was assumed to support both the needs of Severn Trent Water Limited (STWL) directly as well as Yorkshire Water (YW). Given uncertainties, however, the loss of the transfer was included in the WReN emerging plan as an adaptive pathway, allowing options to backfill any loss to be appraised.
- WRSE selected, from WRW, the Grand Union Canal (GUC) in 2049 (50 MI/d) and 2060 (further 50 MI/d), plus the Severn Thames Transfer (STT, capacity 500 MI/d) starting in 2040. As well as unsupported water available, the STT was selected with supporting options (Netheridge, 2040, 35 MI/d), Minworth (2044, 115 MI/d) and the North West Transfer from Vyrnwy (offset by other supporting resources) developed incrementally over time from 2040 at 75 MI/d rising to a maximum capacity of 205 MI/d in 2065).

It was evident from the early stages of the 2022 reconciliation, associated with the materiality reviews, that either several positions had changed or that the BVP transfer selection was not simply a more detailed validation of the 2021 outputs (Section 3.3).

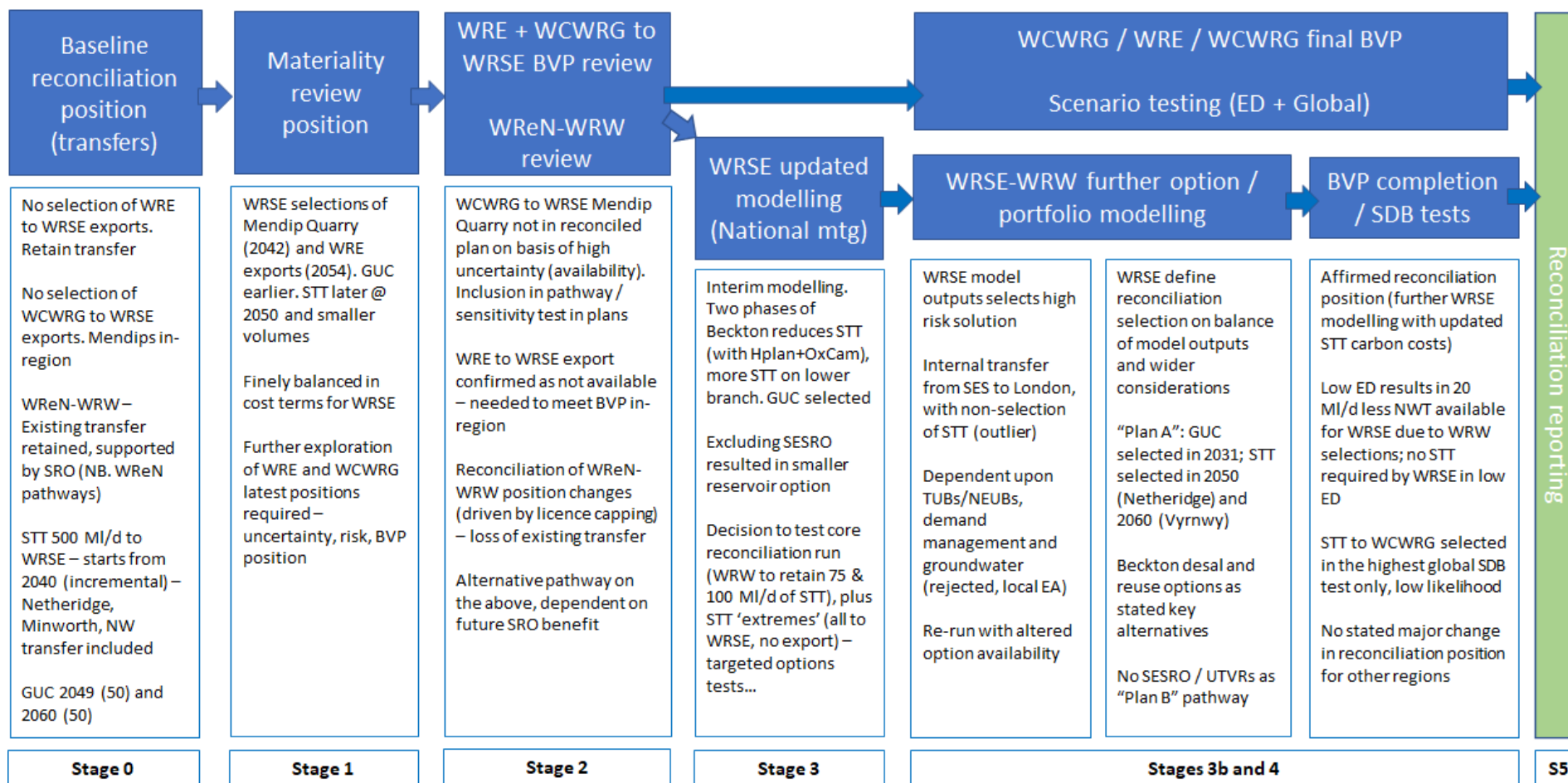


Figure 4 High-level storyboard through reconciliation

3.3. Materiality reviews and early reconciliation themes

Materiality review meetings took place on the 11th April (all regions, initial view WRSE) and 25th April (WRSE full review), supported by completion of a materiality review template by all regions against pre-defined criteria. The latest position was also presented to RCG on the 26th April. Table 4 below summarises the position at the point of the materiality reviews in Stage 1:

Table 4 Summary position at point of Stage 1 materiality reviews

Region	Materiality position summary
WRE	<ul style="list-style-type: none"> Some amendments to environmental destination position, but nothing to impact inter-region transfer selection (although noting potential sensitivity to costs/benefits of WRSE London reuse schemes) Continuing to explore two strategies, with and without WRSE exports, to develop WRE position wrt. costs, BVP etc
WCWRG	<ul style="list-style-type: none"> Marginal change in position with latest environmental destination position and availability of smaller options (<10 MI/d) Possibility STT need may drop out entirely, or only be required in the most extreme scenarios
WRen	<ul style="list-style-type: none"> Updating of environmental destination alters SDB, but does not materially impact inter-region selection (in particular noting that Derwent Valley transfer impacts a specific area in the Yorkshire Grid and driven by WRW needs) Loss of existing transfer could trigger Kielder as candidate in-region option
WRW	<ul style="list-style-type: none"> BAU+ scenario invokes deficits in STWL impacting availability of Mythe, and potentially Minworth, to support STT Initially stated no change to Derwent Valley transfer (but later, position updated on further review, due to feasibility of the SRO option to meet required volumes to both meet both WRW's short-term (licence capping, primary driver) and long-term environmental drivers (environmental destination, influences risks), and to allow the existing transfer to WRen to be retained) BAU or BAU+ scenario previously considered to be a high impact / low likelihood scenario, but EA's WRMP guidelines mean that this has now been adopted as the baseline scenario Testing and review of STT options availability required with WRSE
WRSE	<ul style="list-style-type: none"> Some change in spatial SDB pattern in-region (9 zones stayed the same, 8 zones better (88 MI/d) and 20 zones in worse position (-120 MI/d) Potential risk of licence capping for non-PWS increasing deficits (136 MI/d). Key questions re timings / profiles of interventions. Updates to options costs resulting in later selection of STT (2050), at smaller volumes. GUC selected earlier (2030-35, defers STT). Mendip Quarries (2042) and Anglian to Affinity export (100 MI/d 2045) both selected and replacing STT, but costs very finely balanced. Removing South East Strategic Reservoir Option (SESRO) test shown to select STT and other within region schemes

Most prominently, this stage flagged two major areas of change and exploration:

- Several closely competing options for WRSE in terms of costs, resulting in further detailed review of cost and/or availability of transfers from WRE (Anglian to Affinity) and WCWRG (supported by the Mendip Quarries SRO). This brought about a potentially complex interdependency between 4 regional groups.
- A material change (subsequently identified in reconciliation discussion between Severn Trent and Yorkshire Water) concluded that the Derwent Valley SRO should not be included in the 'most likely' planning scenario due to the fact that the project is at such an early stage of development. Instead the SRO would be used in the alternative pathway scenario. However, given the site-specific nature of the planning problem, the WRW-WReN interaction was considered largely independent of the WRW-WRSE interaction.

3.4. WRW-WReN

Derwent Valley export to WReN

The impacts of licence capping (specifically in this case impacting the Nottinghamshire zone, which has a high groundwater proportion incurring future potential licence reductions), causes a significant SDB deficit for STWL in the 2030's. Specifically, the licence capping is to prevent environmental deterioration, rather than enhancements under environmental destination.

Against this backdrop, the existing contract for the export of water from the Derwent Valley reservoirs in the STWL area (WRW) to Yorkshire Water (WReN) terminates in 2084, although either party has the option to terminate it in 2035 by giving five years' notice in 2030. Ceasing the transfer is a feasible option for STWL in their WRMP.

In addition to the above option to cease the existing transfer, there are limited other feasible WRMP options in the impacted area. The most feasible alternative WRMP option is to increase the capacity of the Derwent Valley reservoirs and this has informed the scope of the RAPID SRO²⁴ scheme. Critically, in STWL's options appraisal modelling, *both* of these options get selected to address the SDB deficits due to licence capping (including under, or irrespective of, a range of long-term environmental destination scenarios). This position was determined not through BVP choices, but rather, due to lack of feasible option alternatives.

The SRO work recognises the impact of loss of the transfer on YW, and therefore is considering a range of options to meet both the STWL and YW needs. The SRO project is exploring a range of different reservoir enlargement options (i.e. larger ones). A new SRO scheme to enlarge the Derwent Valley reservoirs offers the potential to support both the existing transfer to YW and SDB needs in the STWL areas. The emerging plans assumed this would be able to support both WRW and WReN needs within the BVP, allowing the existing transfer to continue (with the loss of the existing transfer included in a pathway in the WReN emerging plan).

Reviews during the Spring 2022 reconciliation determined that the SRO project was still at a very early stage of development and should not be included in the preferred pathway for the draft plans, on balance of:

- Feasibility and uncertainties on the scale of benefit

²⁴ Technically, as well as exploring different option variants for reservoir enlargement, the SRO includes backfill options for Yorkshire Water. However, where the SRO is referred to in the context of this document, the reservoir enlargement component is the focus.

- Requirement for further detailed cost and other information to compare against YW backfill options in a BVP context (WReN)

For the SRO scheme to be included in the preferred plans it would need to be sized to accommodate the impacts on STWL of licence capping in the 2030s as well as the long-term environmental destination scenarios by the 2050s, plus YW's long term needs. STWL's environmental destination need (aligned to BAU+) is bigger in the draft plan compared to the emerging plan – this increases the risk of the SRO project not finding a feasible reservoir option to meet all the needs.

The uncertainties around the SRO scheme mean that YW's WRMP baseline planning assumption is that the existing transfer is likely to terminate from 2035. However, in line with the WReN approach to the emerging plan, an alternative pathway will be included in the draft plans to reflect the potential for that the SRO will be successful for retaining the existing transfer.

It is important to note in the context of the wider reconciliation process that:

- Due to the level of existing and stated potential connectivity between the STWL Nottinghamshire area and the wider system, the problem is considered to be independent of other transfers from WRW; and,
- Loss of the transfer would cause specific sub-zonal deficits for YW requiring specific options to offset the loss of the transfer. These options differ from those required to address more widespread deficits in the Yorkshire Grid zone (e.g. driven by climate change or environmental destination). In short, losing the transfer breaks the existing integrity of the resource zone.

Subsequently, upon confirming the reconciliation alignment position on the existing transfer, attentions focussed on how to present the resulting pathway, particularly in terms of trigger points and dates. At this stage, the agreed position (presented in Figure 5 overleaf) provides the current best or indicative view, recognising ongoing work by both STWL and YW that will in time allow greater understanding of aspects such as options lead times to develop the timeline. Depending on the outcome of both option investigations and ongoing work on environmentally driven licence changes, there remains the potential to defer licence changes and/or contract termination dates to ensure identification and delivery of the long-term BVP. At this time, 2025 marks the key decision point following further detailed work.

Kielder

Although not selected in the 2021 reconciliation, or stated as being selected by WRW at the outset of the Spring 2022 reconciliation (under any scenario modelled at that time), both WReN and WRW conducted BVP option 'flex tests' to demonstrate and understanding the reasons for non-selection. This was also important given the potential for Kielder to be used as an in-region option by WReN in development of the preferred plan to meet other in-region needs driven by the latest BAU+ environmental destination scenario.

The tests evidenced that:

- Kielder is not selected by WRW mainly on the basis of cost, and linked to this carbon impacts. The cost difference to alternative options at this time is significant. Whilst there was slight deterioration other BVP metric areas, minor improvements to flood risk performance and supply resilience were also observed.
- For WReN, BVP qualitative scoring flagged the potential for negative impacts on natural capital, biodiversity and human/social wellbeing linked to greater reservoir drawdowns. In addition, carbon impacts were also stated due to loss of hydropower generation from greater drawdowns, albeit a positive BVP score for flood risk was stated. The scoring flagged potential impacts, but the scale of the impacts would require further work to determine (e.g. linked to any future environmental assessments).

It is also worthy of note that there is ongoing work to explore the availability, costs and benefits of Kielder more fully between United Utilities and Northumbrian Water, associated with the STT RAPID scheme. The outputs of this modelling will also help to better understand the scale of these impacts in more detailed work in future, as well as better understand the level of availability for WRW.

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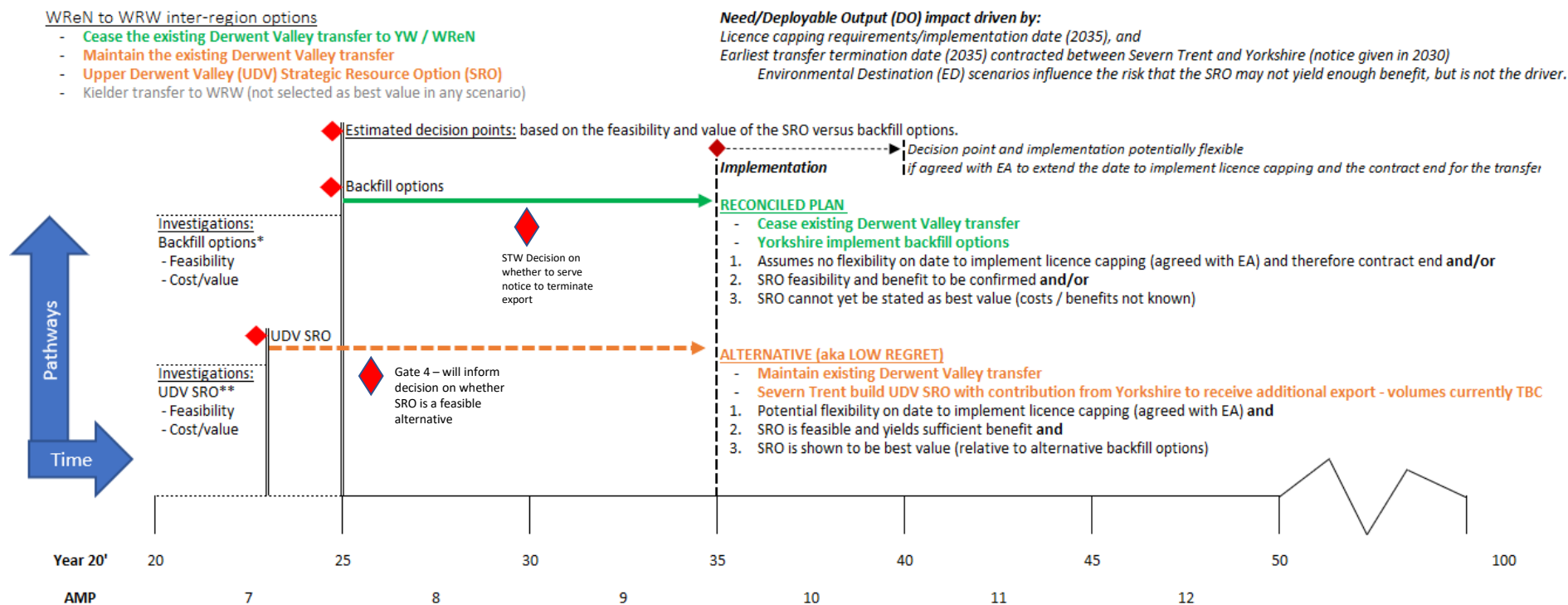


Figure 5 Reconciled plan position for WRW-WReN

NOTE:

- Further work needed to confirm the length of time needed to investigate the feasibility and cost/value of the backfill options
- Gate 2 decision in Spring/Summer 2023 will determine whether the SRO should progress further
- Kielder not selected in any scenario due to significant deterioration in carbon and cost (estimated to have indicative differential of ~£1 billion NPV)
- It is likely that WReN will include the aligned loss of the transfer (in 2035, linked to STWL's selection of the option in their preferred plan) within the 'other changes to DO' row adjustments within WRMP tables; this represents a transparent depiction of the loss of the transfer in an aligned manner from the current YW baseline, but then ensures only options to meet the resulting deficits are included in the WReN/YW preferred plan (i.e. in line with their options appraisal).

3.5. WCWRG-WRSE

Given the selection of the Mendip Quarries SRO in the initial WRSE modelling, further interrogation of the availability of the option for export from WCWRG was undertaken. At the materiality review stage, WCWRG had already flagged uncertainties in the availability of the option. Inter-regional review took place on the 6th May 2022, prior to consolidation of the agreed position in the Stage 3 national review meeting (10th May 2022).

WRSE noted up front of the meeting the options process, which has also been subject to stakeholder review and buy-in on their regional plan. Where an option is submitted to WRSE, then this is included in the investment modelling. Where a scheme is selected, WRSE would require confirmation from the donor region that the region could deliver the option. This put emphasis on the WCWRG position on the availability of the option at this point in time, and the handling of uncertainty on the option in presenting the plans.

WCWRG emphasised the need for the option 'in-region' in terms of the base availability, and so the key uncertainty was around the level of availability at higher levels for export (~30 MI/d). In summary WCWRG outlined that:

- The Mendip quarries SRO is at a relatively early stage of investigation (commenced in 2019) prior to Gate 2 – this contrasts to some other SROs such as the STT which have been worked on incrementally over previous AMPs. This brings high uncertainty in cost, timing and availability / yield (noting that cost in particular was sensitive for WRSE in terms of model selections)
- Availability is considered probably the greatest uncertainty, particularly at higher volumes, with uncertainties on how refill would occur. Review of abstraction from the Avon is at an early stage with the EA, and groundwater modelling has not yet been completed
- At this stage it is challenging to categorically state if the water is available or not, and so inclusion in the WRSE reconciliation would be risky (and not something that could at this stage progress contractually)
- It was difficult to quantify the level of uncertainty on the option, but given the scale and nature of the scheme, if anything the current option costs are considered likely an underestimate
- The option could still be feasible in the long-term, and so it still potentially represents a valid BVP option in future
- Availability of the Poole effluent reuse scheme and the SDB in the Bournemouth area linked to EA review of the River Stour also potentially increases WCWRG in-region needs resulting in extra demand for Mendip Quarries, albeit an evolving picture

On the basis of the above, Mendip Quarries was removed from the reconciled plan, but it was agreed by all that it still remains a potentially good long-term BVP alternative option. The amended RAPID Gate 2 in (currently) April 2023 marks a key stage where the costs and availability of the scheme will be more mature and aligned with those of other SROs. This allows the option to be further considered in the revised draft plan in Spring 2023.

It was agreed that Mendip Quarries would therefore be presented as an alternative plan option, as a pathway (WCWRG) or sensitivity scenario²⁵ (WRSE) respectively. Figure 6 overleaf depicts the reconciled position between the two regions, and the alternative position.

²⁵ This is just a technical distinction, because the WRSE options appraisal process already models several pathways, so it would be onerous to include all alternatives in that process. The main recommendation is that the alternative is documented and presented in the draft submissions, so that it is clear that this may be viable in future.

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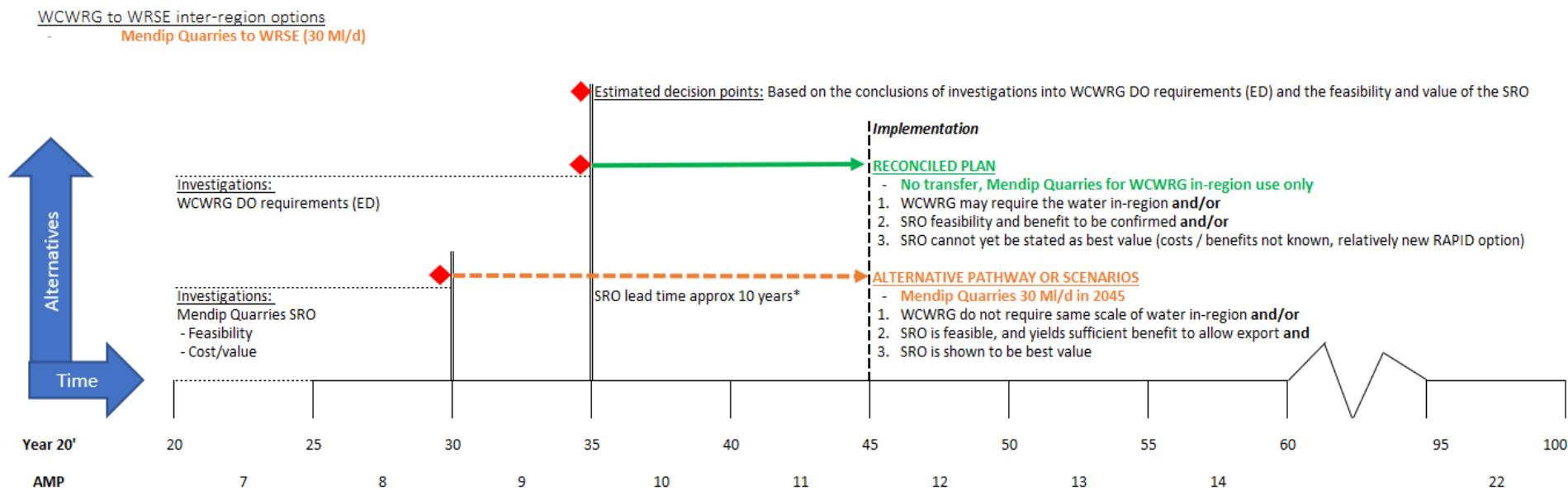


Figure 6 Reconciled plan position for WCWRG to WRSE

NOTE: The assumed lead time from the decision point on the Mendip quarry option to its implementation has been set at approximately and indicatively to 10 years. This is due to the scheme containing a number of independent construction components that can simultaneously be constructed, and the lack of an earth bank or dam wall required during the SROs construction phase.

3.6. WReN-WRE

In the WRE-WRSE review meeting, upon reviewing the regional BVP sheet, a broader question was posed of WRE in terms of the lack of transfers from WReN being included in the plan. The following justification is given for the lack of feasible or selected options from WReN:

- YW, the adjacent WReN Company to WRE, do not have a long-term surplus in the Grid zone without intervention (i.e. offsetting options), and so it is highly likely that water exported to WRE would need to be from the Kielder zone in WReN, resulting in long transfer distances²⁶.
- Transfers have previously been explored as part of exploring strategic options between WReN and WRE, but the export would geographically send water to Lincolnshire, whereas WRE deficits require water in the Cambridge and Essex areas of the region. The Anglian system has numerous resource zones, and whilst there is a degree of interconnectivity by 2025 there won't be much additional capacity because existing transfers are largely utilised in response to WRMP19 drivers including peak licence caps and 1 in 200-year drought resilience.
- From the points above, in combination, the justification for lack of transfers was stated therefore as high cost, high carbon and environmental impact, hence lack of inclusion in the plans.
- Transfers may be viable if YW had (or could create) a suitable surplus and it was the Lincolnshire zone in deficit, but this is not the case. To replicate a pipeline through the Anglian area was stated to be indicatively of the order of £0.4-0.5bn, hence not a cost-competitive option.

3.7. WRE-WRSE

Anglian to Affinity transfer

Based on WRSE modelling using existing options cost data at the materiality review stage, as previously described, the Anglian South Lincolnshire Reservoir (SLR) to Affinity transfer was selected at 100 MI/d capacity²⁷, albeit with very fine margins in terms of costs to other alternative options. This warranted further exploration as to the availability and costs with WRE.

In the 2021 reconciliation, the option was selected for in-region use, but no export component was included. At the point of the 2022 reconciliation, the SLR is still included within the BVP for WRE. As such, it was considered not available for WRSE, and review of the BVP position for WRE concluded the following justification:

- The dominant driver for BVP decision-making related to the significantly worse environmental score under a flex test comparison with the option included, specifically SEA construction and operational impacts, and biodiversity in particular. The results were considered very poor under the test with an export included. As such WRE did not consider this compatible with their BVP position
- In terms of overall BVP performance compared to a no export position, inclusion of the export represented indicatively a 10th percentile (poor) position compared to good performing portfolios

²⁶ It is also worth noting that, driven by the latest BAU+ definitions, Yorkshire Water now have a material deficit to resolve and a transfer from Kielder is a candidate feasible option in draft WRMP.

²⁷ This is the volume to WRSE, noting a potential 150 MI/d overall stated availability; WRSE export reduces the availability to WRE if selected as an in-region option. An alternative 50 MI/d WRSE export option is also included as a feasible option and within the BVP flex tests.

- Cost was materially increased to WRE if an export was selected. Whilst technically this could be recovered from WRSE, the export would turn WRE to higher cost desalination options involving transfer infrastructure, shifting the cost (and carbon) balance further for WRSE
- WRSE stated that with higher desalination costs included, this would result in WRSE not selecting the option given there are other closely competing viable options

Existing Grafham transfer to WRSE

There is an existing transfer from WRE (from Grafham in the Anglian Water area) to WRSE with a capacity of 90 MI/d. Options to either increase or reduce transfers from WRE to WRSE have been investigated. In particular, in the 2021 reconciliation the potential for a so called “reverse trade” (i.e. a reduction in the existing export by 45 MI/d) was explored, which showed that this would approximately double the costs to WRSE compared to the resultant saving for WRE.

The overall position and view on changes to the transfer remains the same for 2022. Whilst WRE option flex tests identified that this would drive less strategic option development, it would prompt more intra-regional transfers (this demonstrated worse BVP scores under some environmental metrics, despite the saving under cost metrics). The reverse trade will still be considered further in a specific scenario alongside the core draft plan, as included in the recommendations later in this document (Section 5.1).

The WRSE-WRE position is summarised in the figure below:

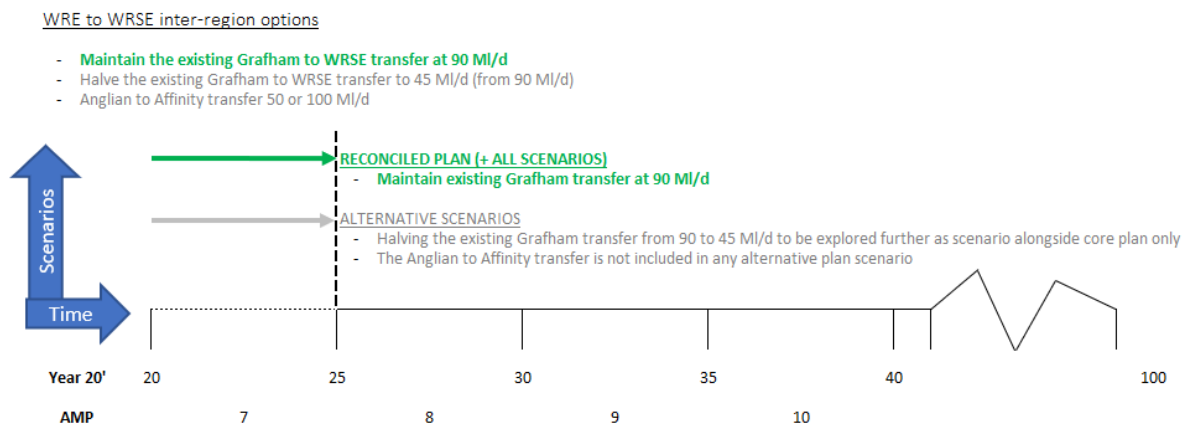


Figure 7 Reconciled plan position for WRE to WRSE

Qualitative SDB assessments by WRE under the alternative SDB common scenarios (e.g. under a low environmental destination scenario) were stated as having no material change in the transfer option position for WRE with regards either option. In part, this is due to licence capping to prevent deterioration being a key driver of need, as opposed to just environmental destination. Despite this, a longer-term question was posed as to the ‘tipping point’ for environmental destination impacts that may result in viable exports from WRE (i.e. reductions in the associated need for desalination options) to aid understanding.

That said, it is also worthy of note that in the WRSE modelling which had initially selected the Anglian to Affinity transfer (under the higher ‘branches’, aligned to the baseline reconciliation position), no new export from WRE was selected under the lower or mid ‘branches’ with low environmental destination impacts. This shows the potentially high number of combinations of futures that could manifest across the regions depending how environmental destination unfolds nationally.

3.8. WRW-WCWRG

The 2021 reconciliation noted the potential for the STT to support the WCWRG via the River Severn to West Country Transfer (35 Ml/d capacity) under high SDB impact scenarios, albeit it was not included in the emerging regional plan. For the Spring 2022 reconciliation, WCWRG also confirmed that this export from WRW was not selected in their current baseline BVP position.

Review of the BVP using an option flex test to reflect inclusion of the WRW export (both permanently, and as a stop-gap measure in the 2030-40s) showed the primary reason for exclusion was on the basis very high relative costs to other options (stated as *the* highest cost option). The cost impact was indicated at around £220m NPV, driven by significant WTW and network improvements being required in WCWRG, plus third-party costs to Canal & River Trust (water is transferred by an existing canal route). As might be expected, the carbon BVP scores were also shown as deteriorating.

Equivalent counter-tests by WRW showed little impact on the BVP scores for the WRW area, in part on the basis that the existing baseline was already providing export to WRSE. The permanent transfer option would have resulted in a reduced export availability to WRSE; however, this observation was superfluous given the non-selection by WCWRG.

Further SDB scenario tests by WCWRG for environmental destination and the global low/high scenarios showed that the WRW export was only potentially required under the extreme 'global high' scenario, with a regional impact of -272 Ml/d. As this is considered extremely unlikely, this demonstrates a robust reconciliation position (the WRW export is not required under high environmental destination or demand scenarios only). It is also noteworthy that new smaller scale feasible options are also being defined by WCWRG (that collectively exceed the volume offered by the WRW transfer, although they are still in development), which is also likely to have the effect that WRW export is even less likely. As such, beyond a general presentation of scenarios in the WCWRG plan in this context, no specific alternative option or pathway is required (Figure 8).

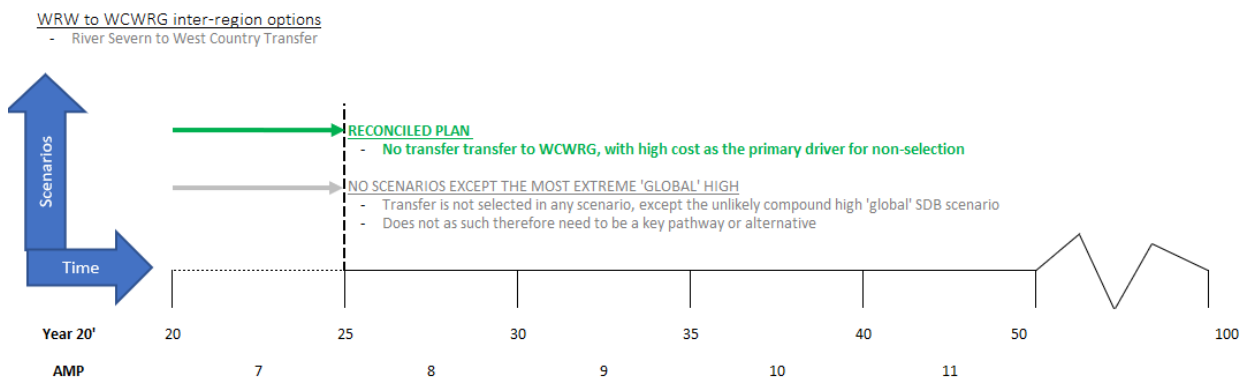


Figure 8 Reconciled plan position for WRW to WCWRG

3.9. WRW-WRSE

WRSE have undertaken significant model runs in support of reconciliation, and the stability or sensitivity of option selection is important in the context of reconciliation decisions. Even at the materiality stage, the GUC formed a stable selection in modelling.

It is also noteworthy for the understanding of inter-regional reconciliation with WRW that SESRO (Abingdon) was also a stable selection in WRSE modelling (typically in 2040, although

changes with 1:500 drought resilience policy, at a capacity of 271 MI/d²⁸). The stated reason for selection of this scheme by WRSE, as can be seen from BVP flex test outputs from options appraisal modelling²⁹, is driven by cost, but also natural capital and biodiversity net gain BVP areas. However, WRSE have undertaken a series of runs to show what happens if any one of the key inter-regional schemes is not developed. At the reconciliation stage this included SESRO, but for the draft regional plan they will also undertake similar plans showing what happens if any of the other key SRO options are excluded.

As described earlier, the reconciliation position with WRW was initially in flux until the export availability position with WRE and WCWRG was confirmed. Upon concluding a 'no export' position for these two regions, focus turned to the reconciliation of WRSE and WRW transfers. By the Stage 3 national reconciliation meeting on the 10th May 2022, WRSE modelling showed:

- Very closely corresponding cost performance between options³⁰, including STT – model selections finely balanced (noting that revised Gate 2 reports in 2023 could influence options costs on aspects such as treatment standards, for example)
- Two phases of Beckton reducing the STT requirements under the higher demand scenario in line with WRMP guidance (with housing plan and OxCam included), however, STT was selected on lower scenario branches.
- Excluding SESRO brought in, for the first time, a smaller reservoir alternative (Marsh Gibbon) to SESRO in the Thames valley
- Netheridge was also observed to be routinely selected, when STT was included

There were general questions, a consistent theme, as to why greater volumes of the STT were not selected (this was later found to be incorrect embodied carbon costs for the Vyrnwy supporting option, a theme returned to later in this report), which entrained:

- Further QA and option cost investigations related to the WRSE modelling
- Detailed review and provision of available supporting options by WRW (provided on the 12th May 2022³¹), noting that between 75-100 MI/d from the North West Transfer (NWT) may be selected in the WRW BVP for in-region use by STWL in different best value tests
- Identification and agreement to progress three 'extreme' option portfolio tests around the broad BVP of transfer to WRSE (to be completed by WRW and WRSE):
 1. Baseline tests without WRE and WCWRG exports, excluding Mythe STT supporting option, with up to 100 MI/d of NWT reserved for use by WRW
 2. As 1, but excluding all WRW-WRSE transfers (no STT / GUC), noting the pre-existing test for exclusion of STT interconnector
 3. As 1, but with STT transfers forced in at 2035 (Vyrnwy, Mythe, Netheridge, Minworth)

Option flex tests undertaken by WRW during the process itself generally showed low elasticity in the BVP metrics, predominantly meaning that the WRSE option appraisal modelling was the key determining factor for the reconciliation position, subject to availability of supporting options from WRW.

Subsequent revised modelling by WRSE, presented in a further WRW-WRSE meeting on the 19th May 2022 (Stage 3b), showed a unique picture compared to previous runs undertaken in

²⁸ Note conjunctive use benefit varies depending on other schemes selected

²⁹ Through comparing runs known as RCG1 & RCG2 (excluding SESRO) and RCG3 & RCG4 including SESRO, which otherwise only differ through the amount of STT support options available to the model (and excluding WRE and WCWRG transfers).

³⁰ Cited as around +/- £80m NPV in an overall programme of around £16bn.

³¹ [Copy of STT resources WRW - Available options provided RB 120522.XLSX](#)

both reconciliation processes. Despite the continued selection of GUC, the STT in this case was not selected³², but rather replaced by a previously non-selected option to export water from the SES Water area (i.e. in-region export). Interrogation of the outputs of the modelling by WRSE showed the internal transfer from SES:

- Utilised groundwater schemes within England that had recently been rejected as options given local EA dialogue by the company (SES Water)
- Was backed up by demand management and drought measures (specifically customer water use restrictions: Temporary Use Bans (TUBs) and Non-Essential Use Bans (NEUBs)), so was deemed to represent a high risk / dependency solution on these savings for this zone

For the purpose of reconciliation, WRSE felt that this represented a high-risk option set that should be excluded. This was also confirmed to be the view of SES Water who ultimately would have to deliver the ambitious demand management savings, and impose TUBs and NEUBs on their customers to support any export. This emphasised the challenge of various closely competing options to meet the South East needs for WRSE, flagging the need to:

- Consider the results of modelling 'on balance', as opposed to a single view in the strategic transfer context of reconciliation, including considering other planning factors
- Ensure alternatives and ongoing work by the regions beyond reconciliation is recognised and dealt with in the plan process, and where relevant in the consultation on alternatives (see recommendations later in this section and report)

Handling options appraisal model sensitivities and closely competing options

It was recognised early in the process that within WRSE modelling there are a number of closely competing options, particularly in terms of cost, making transfer selection and timing very sensitive to change. This is particularly important for three reasons:

- Whilst a single core reconciled plan was to be locked down and agreed as part of the process, the identification of key alternative options for recognition and consultation on submission of the draft plans is considered of high importance
- It should be recognised that ongoing work running to and beyond the draft plan submissions may alter the final BVPs ultimately to be determined at the end of the planning cycle
- Reconciliation decisions have subsequently used not solely a single model run output, but have been informed by a range of modelling results 'in the round' (i.e. observations across a range of scenarios), plus further expert judgement or supporting interpretation of information related to BVP type criteria

³² It should be noted that the findings at this stage resulted in identification of further actions to complete additional QA and interrogation of the model results, to aid understanding. One such area was to ensure carbon costs were appropriately reflected in the WRSE models to avoid double counting, or misalignment with the basis of the WRW costs provided. Tangentially, this flagged that the basis of the STT carbon costs for Vyrnwy was different in terms of how incremental options had been reflected, which has the resulting impact of the STT being lower cost (following correction) than in modelling runs undertaken during the main reconciliation period. This issue had occurred in the data provided as part of the SRO, and following correction, WRSE undertook further modelling to assess the impact against the reconciliation position; this is described later in this section (covering the period post-25th May).

Following further model runs³³ and further interrogation of existing run sets by WRSE, a reconciliation decision was presented at the Stage 4 review meeting on the 25th May (following dialogue on the direction of travel at RCG the previous day).

The following position was presented by WRSE:

- In terms of larger strategic options relevant to reconciliation, Beckton desalination, Beckton re-use and the STT (with support options) were all closely comparable in performance terms. However, in line with the 2021 reconciliation, the STT featured in a wide range of scenarios across different pathways/branches and different model runs.
- The STT was to be selected by WRSE (detailed selection definition in Section 4.2) in the reconciliation position over the Beckton options on the basis of the following supplementary information:
 - Operability and reliability considerations, especially given practical experience of desalination in the Thames area.
 - Customer preferences on options and associated weightings showing transfers to be more preferable than desalination and re-use.
 - Option tests and scenarios with SESRO and other Upper Thames Reservoirs removed showing STT then being selected. Following adaptive planning principles it is thus considered critical to progress with scheme development.
 - Frequency of selection of STT across a range of model runs and scenarios/paths

It should be noted that both Beckton options remain key alternative options to be consulted upon and presented comparatively to the STT in the draft plans. Whilst a reconciliation position is agreed (as summarised in Section 4), further work is ongoing. WRSE, like other regions, will continue to develop its best value plan over the summer of 2022 and therefore there may be further updates in the autumn (see Section 5.1 for further recommendations in this regard, post-reconciliation).

Following the agreed reconciliation position on the 25th May, WRSE also presented further modelling outputs following the correction of STT carbon costs for the Vyrnwy support option. Whilst these were not directly used to update the reconciliation position at this time, the further modelling outputs did provide further supporting weight and evidence to the strategic reconciliation alignment position. Two runs were completed, that showed transfer selection dates around the reconciliation position. In the 15th June draft report feedback and review meeting (Stage 5), the modelling results showed an earlier starting date of 2055 for the Vyrnwy support options, and a subsequent model run with refinements to the scenario data showed Vyrnwy support selections around 2060 (although not all in precisely the same year). These additional modelling runs with revised STT Vyrnwy carbon costs provide additional confidence to the reconciliation position, and understanding of some of the reasons earlier modelling results presented earlier in this section.

Figure 9 overleaf depicts the reconciliation position for WRSE, which is also further detailed in both tabular and map-based forms in Section 4 (along with key alternatives). As a result of the discussions on the WRW-WRSE reconciliation position, it was agreed that it is important in the draft plans to present an alternative pathway or plan position without SESRO and other Thames Reservoirs, by way of context for the basis of STT inclusion in the reconciled plan.

³³ [WRSE RCG update 25052022.pdf](#)

Inter-regional reconciliation of regional plans – Summary report

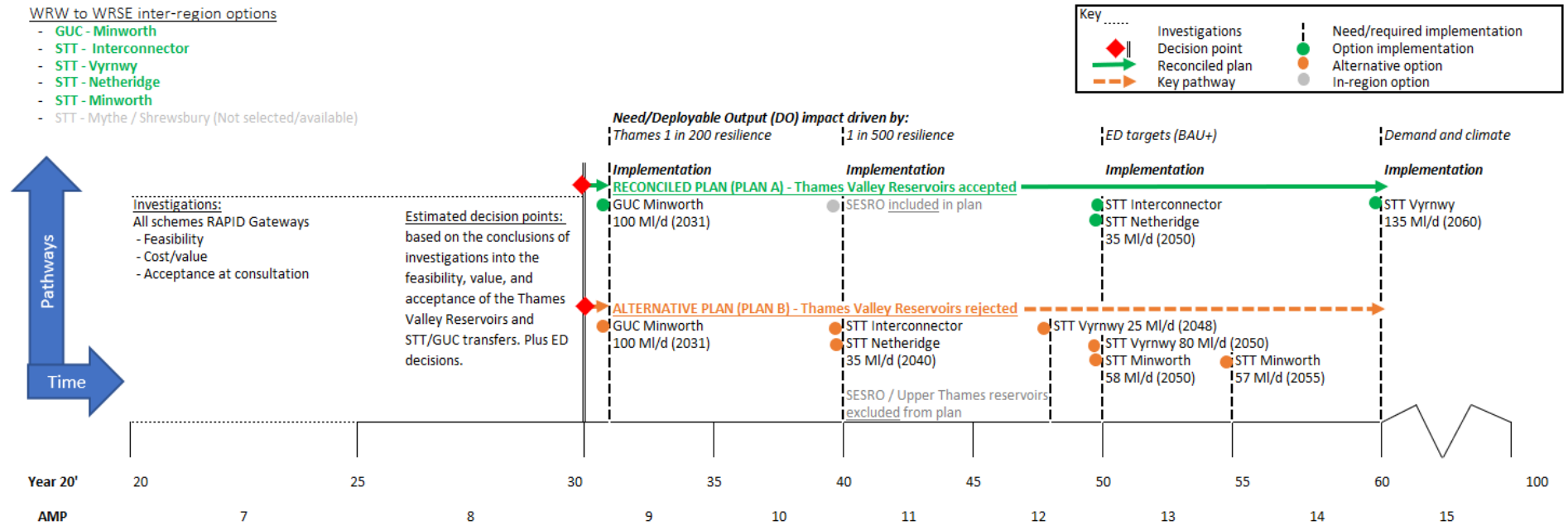


Figure 9 Reconciled plan position for WRW to WRSE

NOTE:

- Beckton desalination and reuse to also be presented as key alternatives options to STT
- Graphic does not depict all options selected by WRSE, but those directly and specifically relevant to the reconciliation process
- The alternative pathway with Thames Reservoirs excluded in effect presents the expected earliest implementation date for the STT

4. Reconciliation position and key alternatives

The previous section provided a summary of the inter-regional interactions and reviews to determine and understand the basis of the reconciliation position. This section distils that down to make clear the reconciliation position agreed upon by the regions, along with key alternative options and pathways relevant to consultation and presentation in the draft plans. It also explains the results of SDB stress test scenarios against the reconciliation position.

4.1. Reconciliation transfer options selections

Figure 10 shows a simple view of the selected transfers (or transfer related options), by contrast to those not selected in the reconciled position. However, there are three salient alternative pathways or options that are also depicted, namely:

- Potential alternative pathway for WRW-WReN, where the Derwent Valley Reservoir SRO is both viable and yields sufficient benefit to allow the existing transfer to YW to continue;
- The potential long-term viability of Mendip Quarries for export to WRSE; and,
- The further selection of Minworth via STT when a pathway is considered without SESRO and other Thames Valley reservoirs.

RECONCILED INTER-REGION TRANSFERS			
Source region	Recipient region	Scheme	
WRW	WRSE	Severn Trent Sources - Netheridge	✓
WRW	WRSE	Severn Trent Sources - Mythe	✗
WRW	WRSE	Minworth (GUC)	✓
WRW	WRSE	Minworth (STT)	↘
WRW	WRSE	North West Transfer (NWT)	✓
WRW	WRSE	Severn Thames Transfer (STT)	✓
WRW	WRSE	Grand Union Canal (GUC)	✓
WRE	WRSE	South Lincolnshire Reservoir (<u>for export</u>)	✗
WRE	WRSE	Fens Reservoir (<u>for export</u>)	✗
WRE	WRSE	Grafham Water (reduce existing export to WRSE)	✗
WRW	WReN	Retain existing Derwent Valley Transfer	✗
WRW	WReN	Derwent Valley Storage Increase + transfer	↘
WRW	WCWRG	River Severn to West Country Transfer	✗
WCWRG	WRSE	Mendip quarries raw water reservoir	↘
WReN	WRW	Kielder transfer	✗

KEY:	
✓	Part of best value plan in the reconciled scenario
✗	Not part of best value plan in the reconciled scenario
(NOTE: that schemes not selected on an inter-regional basis may be included within a region)	
↘	Option included as (or in) a key pathway

Figure 10 High-level illustration of transfer options selected in the core reconciliation position, and transfer related options in alternative pathways

It is important to flag that the schemes in the above table marked as being included in the reconciled plan reflect selections related to transfers or exports between regions. Schemes may be selected for specific in-region use only (noting the option definition may be technically different, or a variant).

Figure 11 below, shows the *in-region* selection of comparable schemes for reference at the point of reconciliation (although does not constitute an exhaustive list of in-region selections of options or SROs, recognising work continues on the draft plans beyond reconciliation – the figure presents those directly focussed on or relevant through reconciliation). SESRO is presented for completeness due to its exploration as explained in Section 3.9 and in an alternative pathway to the reconciliation (Section 4.3). The Mendip Quarries option relates a lower total volume for the option than would have been used if exports were included.

IN-REGION SCHEME SELECTIONS (DIRECTLY COVERED IN RECONCILIATION)		
In-region	Scheme	
WRW	Severn Trent Sources - Netheridge	
WRW	Severn Trent Sources - Mythe	✓
WRW	Minworth (GUC)	
WRW	Minworth (STT)	
WRW	North West Transfer (NWT)	✓
WRW	Grand Union Canal (GUC)	
WRE	South Lincolnshire Reservoir	✓
WRE	Fens Reservoir	✓
WRE	Grafham Water	E
WRW	Cease existing Derwent Valley Transfer to WReN	✓
WRW	Derwent Valley Storage Increase	✓
WCWRG	Mendip quarries raw water reservoir	✓
WReN	Kielder	⬇
WRSE	SESRO (Included in reconciled plan, excluded in alternative pathway)	✓

KEY:

- ✓ Part of best value plan in the reconciled scenario
- Not part of best value plan in the reconciled scenario
- ⬇ Candidate option or alternative, subject to further work on BVP position for draft
- E Existing transfer, retained and no change

Figure 11 High-level illustration of *in-region* selections of options in the core reconciliation position, where directly related to transfers and export decisions

Reconciliation and plan alternatives definitions

Each regional planning group has a different BVP planning framework with regards its approach to (and definition of) different plan pathways, branches, scenario / sensitivity tests etc. Regions should take into account how best to present and consult on key alternatives flagged in this report within their processes. Alternatives need to be recognised and visible within the draft plans published.

4.2. Reconciliation scheme selection and dates and key alternatives

This section explains the reconciliation position, that should be reflected in the draft plans and associated planning tables to ensure alignment between regional groups and WRMPs. The exact timings and volumes have been agreed at this point of reconciliation, however, ongoing work may change these in future (this is discussed further in Section 5). For the purpose of the draft plans any alternative views should be presented alongside the core position agreed³⁴.

The core reconciliation position is summarised as follows:

- No new exports or imports to/from the WRE and WCWRG areas. Existing transfers from WRE maintained as status quo
- Cease existing transfer from WRW to WReN from Derwent Valley Reservoirs, in 2035
- WRW-WRSE transfer and support options as shown in Table 5 below, on the core assumption and reconciliation position of SESRO being selected by WRSE³⁵:

Table 5 WRW-WRSE updated baseline / core reconciliation position for inclusion in draft plans

WRW-WRSE transfer option selection: reconciled position	Capacity (Ml/d)	Implementation date ³⁶
Minworth via GUC	100	2031
STT pipeline with unsupported abstraction	500	2050
Netheridge via STT	35	2050
North West Transfer: Vyrnwy via STT	135	2060
Minworth via STT (not selected)	X	X
Mythe via STT (excluded due to WRW in-region use)	X	X
North West Transfer via Shrewsbury and STT (excluded due to WRW in-region use)	X	X

The map below depicts the reconciled position, with key alternatives around that reconciliation position shown in orange. Further specific details on the definition of key alternatives are also shown overleaf.

³⁴ This is particularly important because the iterative nature of options appraisal modelling and plan development could hypothetically change proposed transfer dates indefinitely, but ultimately, minor shifts in dates should not affect the overall strategic picture. It would generally be expected that following the draft plans and consultation, with new revised Gate 2 submissions, there will be a further opportunity to realign transfer dates and selections accordingly.

³⁵ Typically and therefore assumed 2040, although this changes with 1:500 drought resilience policy, at a capacity of 271 Ml/d (noting the conjunctive use benefit varies depending on other schemes selected).

³⁶ For avoidance of doubt, the implementation date reflects the water into supply or when the scheme is first utilised (i.e. benefit realised).

RECONCILED POSITION (plus key alternatives)

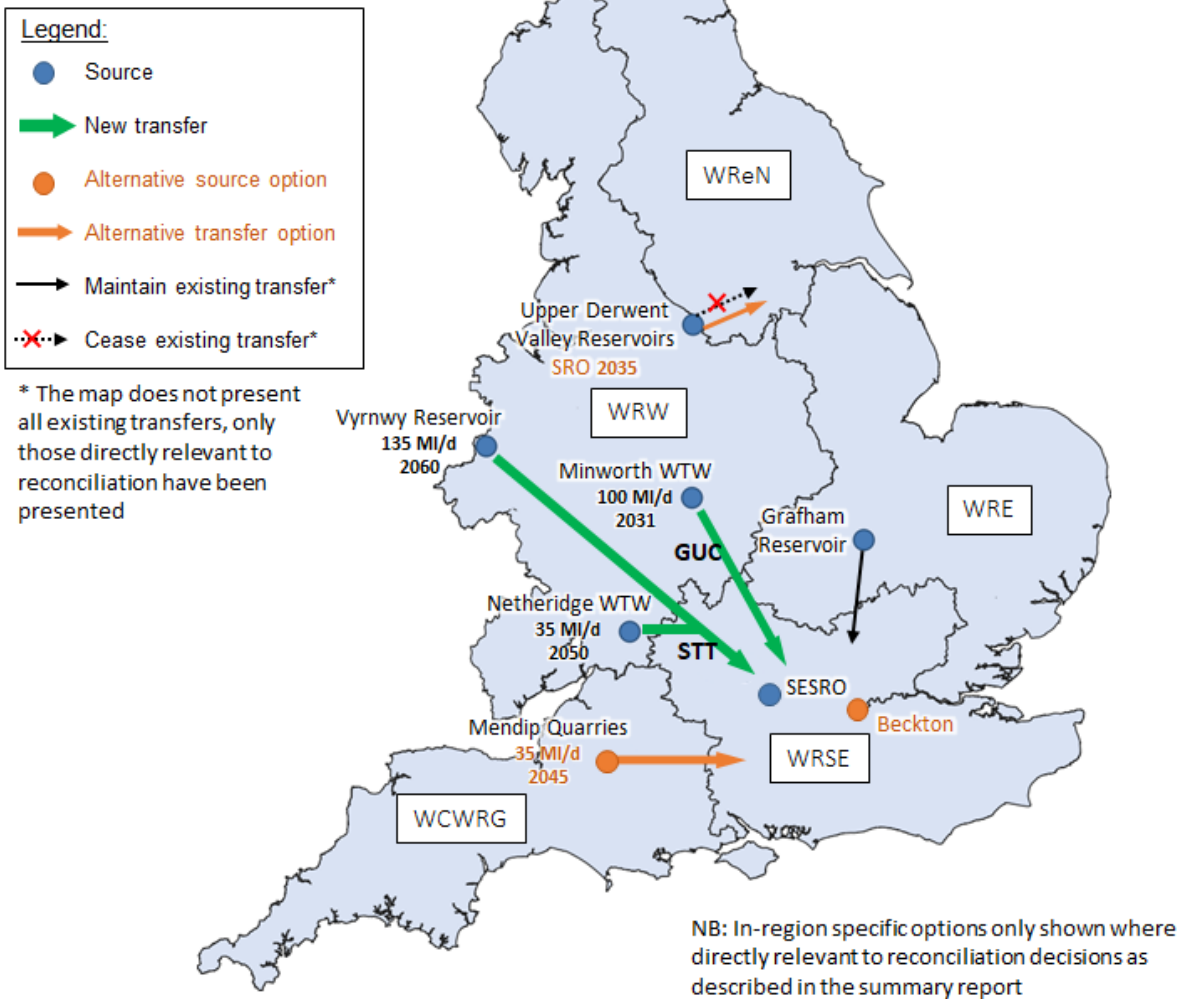


Figure 12 Map based depiction of the agreed inter-regional reconciliation position, with key alternative options under future consideration (directly considered in reconciliation, non-exhaustive of feasible alternatives)

Key alternative options and pathways against reconciliation position

The following should be presented and considered in the draft plans around the reconciliation position:

- Beckton desalination and/or re-use, in place (or preference to) as an alternative to STT – alternative plan options
- Mendip Quarries export of 30 MI/d from WCWRG to WRSE, in 2045 – alternative plan option or sensitivity test. Additional scenario tests of 10 and 20 MI/d exports were also agreed.
- Retain existing WRW to WReN transfer, supported by SRO – alternative pathway, with decision/trigger point in 2025 and assumed implementation 2035.

Separately, the WRSE alternative pathway position with SESRO and Upper Thames Valley Reservoirs removed, shows the earliest possible date of STT required in 2040 (incremental support added) – alternative pathway, and is covered in the following Section 4.3.

Other option driven pathways, scenarios or alternative plans may be included by the regions at their discretion, noting that WRSE in particular modelled 9 situations or branches in each options appraisal. For example, WRSE may, depending on the outcomes of their ongoing plan processes choose to flag alternatives such as the in-region SES export (that has been discounted in reconciliation), Teddington and/or the smaller alternative to SESRO (Marsh Gibbon). It is for each region to consider how best to present alternatives for the purposes of consultation in detail, recognising the context of other underlying key plan questions not explored in reconciliation (e.g. leakage and demand management glidepaths).

4.3. WRW-WRSE: Alternative pathway position without Thames Valley reservoirs

As described in Section 3.9, the consideration of the impacts of excluding SESRO and/or other Thames Valley reservoirs from the options process as part of flex testing is important when considering options requiring development under an adaptable plan.

Figure 13 and

Table 6 shows the transfer related options selected by WRSE from WRW under this alternative position, with Thames Valley reservoirs excluded from modelling. This alternative pathway position provides an understanding of the likely earliest STT transfer date, in 2040.

WRW-WRSE alternative pathway without Thames Valley Reservoirs

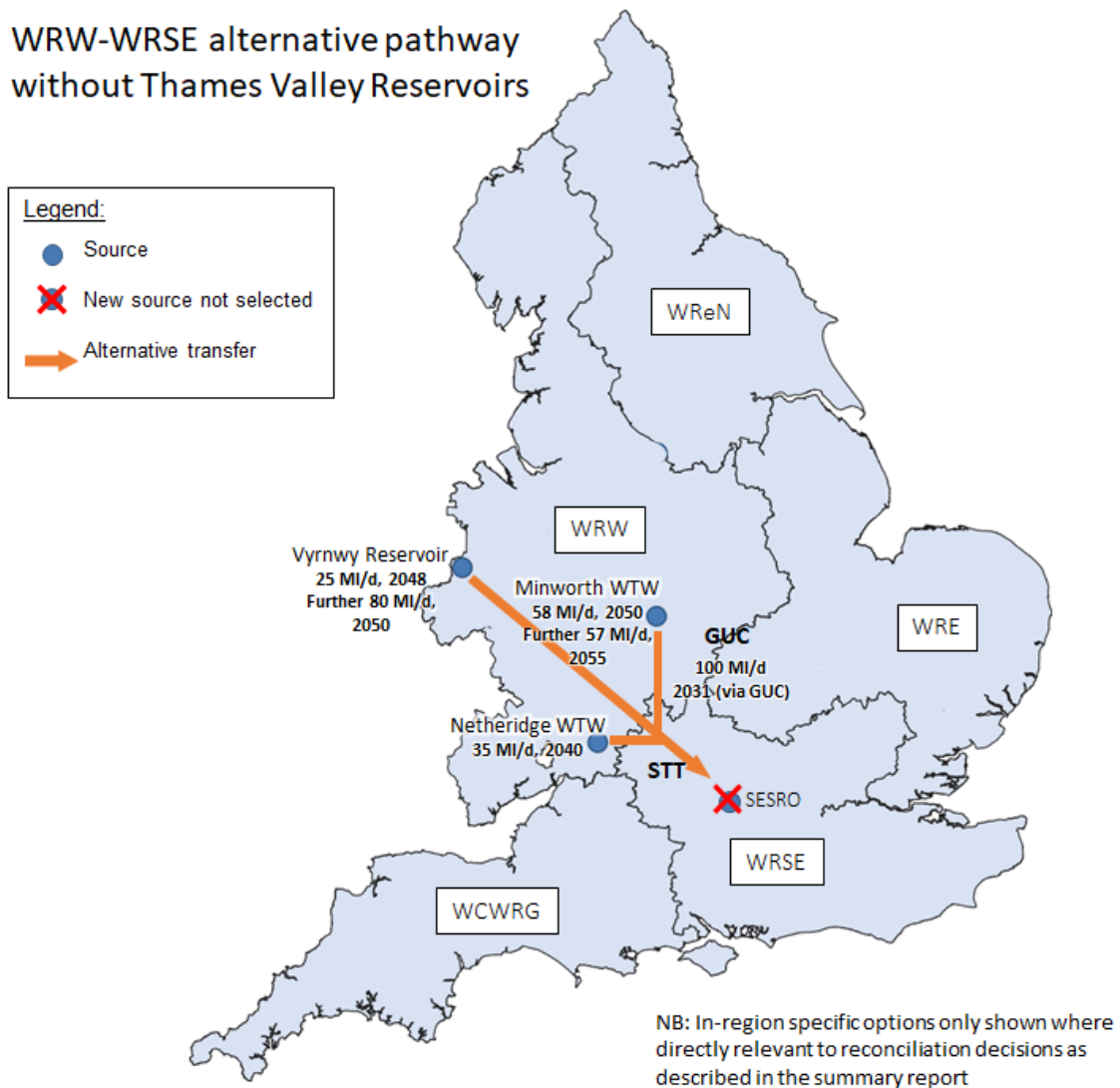


Figure 13 - Map based depiction of changes to WRW option selection under alternative pathway for WRSE without Thames Valley reservoirs

Table 6 WRW-WRSE alternative pathway position excluding SESRO

WRW-WRSE transfer option selection: reconciled position	Capacity (MI/d)	Implementation date ³⁷
Minworth via GUC	100	2031
STT pipeline with unsupported abstraction	500	2040
Netheridge via STT	35	2040
North West Transfer: Vyrnwy via STT	25	2048
	80 (Total 105 MI/d)	2050
Minworth via STT	58	2050
	57 (Total 115 MI/d)	2055
Mythe via STT (excluded)	X	X
North West Transfer via Shrewsbury and STT (excluded)	X	X

4.4. SDB stress test scenarios on reconciliation position

In Stage 4, the impact of SDB stress test scenarios (linked to the Ofwat common reference scenarios, Section 2.5) were considered by each region. This allowed a position statement to be made by each region as to the robustness and sensitivity against the agreed reconciliation position, which was discussed at high-level in the reconciliation meeting on the 25th May 2022.

The maturity of the scenario tests inherently differed across the regions³⁸, although the broad principle of the test or assessment is still useful in terms of considering plan robustness. In some cases this utilised a fully populated BVP sheet, in other cases information was presented in an alternative format and/or used partially completed BVP information. In the case of WRSE, different branches linked to the scenarios are inherently included within the options appraisal process used through reconciliation.

Table 7 below summarises the SDB stress test conclusions (whether in qualitative or quantitative form) available at the time of preparing this summary report³⁹:

Table 7 SDB scenario test and review summary

Region	Stress test position summary
WCWRG	<ul style="list-style-type: none"> Scenario assessments completed, with indicative SDB impacts quantified alongside qualitative BVP impact scoring and narrative

³⁷ For avoidance of doubt, the implementation date reflects the water into supply or when the scheme is first utilised (i.e. benefit realised).

³⁸ Recognising their relatively recent publication and definition, and ongoing work around environmental destination in particular.

³⁹ It is important to note that the tests presented may not represent the final SDB impacts across the Ofwat common scenarios, as work continues by the regions on their plans. Rather, the stress tests represent the best current information available from the regions.

Region	Stress test position summary
	<ul style="list-style-type: none"> • The low and high environmental destination scenarios were deemed to have a SDB impact range of -91 MI/d to -23 MI/d • This could increase the likelihood of Mendip Quarries being available under a low scenario, but the option is still subject to the existing uncertainties. Under the high scenario, the selection of a transfer from WRW is still not selected • The compound low scenario gives a similar picture to the low environmental destination scenario, at indicatively a 35 MI/d benefit to the SDB • The high demand and compound high scenario show impacts of the order of -120 MI/d and -272MI/d respectively; it is only under the latter, unlikely scenario is the WRW transfer selected (which would take place in 2050 @ 35 MI/d), thus showing the resilience of the reconciliation position • Further local options are also being investigated by WCWRG, which may also result in non-selection of the WRW transfer in the high compound scenario in future
WRen	<ul style="list-style-type: none"> • Scenario assessments completed, with indicative SDB impacts quantified alongside qualitative BVP impact scoring and narrative • Given that BAU+ definitions have deteriorated the baseline SDB position, a low environmental destination scenario benefits the SDB by more than 130 MI/d (indicative). However, it only affects in-region selections and not the need to backfill loss of the Derwent transfer. • The global low compound scenario gives a similar picture; generally scenarios are insensitive in terms of direct impacts on reconciliation. • The 50% PCC policy savings scenario has a moderate impact on the SDB at ~30MI/d. • High scenarios show large impacts up to an indicative -110 MI/d. High environmental destination impacts trigger the potential selection of Kielder as an in-region transfer, although this does not impact on reconciliation given non-selection by WRW.
WRW	<ul style="list-style-type: none"> • Presented interim tests in presentation form, comparing baseline position for 2022 reconciliation with BAU+ SDB updates • Compound high SDB scenario results in extra schemes to cope with deficits in WRW, although even in this scenario Netheridge and Minworth are not selected to meet needs in WRW. Vyrnwy is still available to support transfers. • BVP metric scores largely deteriorate (in the above), where there are material changes, as more options are required, particularly impacting carbon (greater use of existing sources, new options and Vyrnwy pumping). Some flood risk benefit is observed. • Under low ED scenarios, Severn Trent selects Vyrnwy for in-region use, but 99 MI/d available for WRSE. Further representation of scenario impacts is described in Section 4.5 below), which demonstrates under different eventualities the benefit of the STT and support options for WRSE and WRW.
WRSE	<ul style="list-style-type: none"> • Alternative branches presented and described through key stages of reconciliation in model outputs to define reconciliation position • GUC and STT typically selected across a range of branches, and in model runs it was sometimes observed that options like Beckton re-use

Region	Stress test position summary
	<p>/ desalination fall out in favour of STT in lower/middle branches (see Section 3.9)</p> <ul style="list-style-type: none"> • Lower branches may change the timing and size of SESRO • NWT via STT not required by WRSE in low environmental destination situations, see Section 4.5 below for interdependency with WRW.
WRE	<ul style="list-style-type: none"> • Environmental destination scenario assessments qualitatively undertaken showed no change to the strategic transfer options position. • A low environmental destination scenario, critically, is clearly stated to not to result in any change to the export availability to WRSE (given scale of legal minimum and licence capping changes). No expected change in marginal cost to WRSE. • Under a high environmental destination scenario, costs are expected to increase by the order of 50%, met by in-region options (more desalination and re-use) • Whilst WRE have stated global SDB scenario tests will be completed post-reconciliation with regards BVP scoring, there is a high confidence and stated position that under the compound low scenario that this would not change WRE’s position on exports to WRSE. • Environmental metrics as well as cost are the main stated reason for no exports to WRSE in BVP terms. Under high scenarios, the benefit of more environmental destination interventions may conflict with the adverse BVP environmental metric impacts.

Overall, the SDB scenario reviews conducted point to a robust reconciliation position. Specifically, the WRE position on exports is not considered to change under different scenario positions, whilst for WCWRG a transfer from WRW is only selected in the most extreme high scenario. WRW-WRSE interactions have directly considered scenarios as part of the modelling during the process, and then been complemented by further specific tests.

4.5. STT and NWT adaptive pathways

Section 4.4 presented a high-level overview of SDB scenario testing across the regions, whilst Section 3.9 and 4.3 explain alternative pathways without SESRO included. Given the complexity of the STT in terms of the interdependency between regions, with the potential for different sharing of water between WRW in-region and WRSE depending on the scenario, this section further draws together the different scenarios in a pathway style view (Figure 14 overleaf).

The STT has a number of different support options: the NWT, Minworth, Mythe and Netheridge, and some of these options in turn could be made available in different sizes or variants. These support options can provide benefit to WRSE, via the STT interconnection, or to WCWRG, or within WRW for Severn Trent or South Staffs Water. This combination of multiple potential sources and multiple potential beneficiaries leads to complexity in the assessment of this system of options. It also highlights a major benefit, which is the flexible, adaptive nature of the STT system. There is a limit to the total amount of support options that could be made available in the system. In the reconciled set of options (Table 4), this constraint was not met: WRSE or Severn Trent (or others) could take more from the system if the options were selected as part of their best value plans. However, it is important to look across a range of other scenarios to show how the allocations might change and in which scenario more or less water might be taken by different participants.

Figure 14, originally developed by WRW and discussed in the Stage 5 reconciliation review meeting and subsequently RCG (21st June 2022), gives an indication from the scenario assessment of the different use of the STT and NWT between regions. The number of potential combinations of scenarios is high, and so the diagram aims only to show the salient combinations, in particular to flag the importance of the ‘no regrets’ development of the STT and support options to meet different needs. In practice, the eventual sharing of resources may change over time, but the flexibility of the scheme selections in reconciliation is therefore demonstrated. In summary:

- SESRO (“Thames res” on the diagram) would be expected to be completed by 2040, with a final decision by 2030 on this and environmental destination.
- Some STT support options would be developed before 2040, which allows WRW to meet interim SDB needs in the period 2040-2050, or alternatively support additionally WRSE in the event of no SESRO in this period.
- In the longer-term, beyond 2050, in lower environmental destination (ED) scenarios, the NWT provides benefit to WRW / STWL in-region as it gets selected as the BVP solution in that eventuality. If WRSE are in a low ED scenario, STT/NWT is not required.
- If WRW are in a low ED situation, but WRSE in a relatively high, BAU+ position then the NWT / STT can provide benefit to both parties, but the available volume is lower to WSRE than in the current reconciliation position. In this situation, if SESRO is unavailable, then NWT use by WRW remains the same, and other support options provide continue to benefit to WRSE via the STT.
- The precise BVP share under different scenarios could be explored further in future as required. A range of further adaptations are plausible and possible, and in practice would need to be explored at the time based on need.

The diagram has been constructed using a “first come first served” allocation where availability constraints are reached. In practice, at future decision points a best value assessment might be undertaken to decide on the actual allocation.

Overall, the use of the STT and NWT schemes across the pathways demonstrates further the rationale behind the reconciliation position in this document, and is resilient to changes in both WRSE and WRW plans in a strategic context.

The earliest date the STT is required to be operational is 2040 and therefore development to enable this needs to continue in the near term.

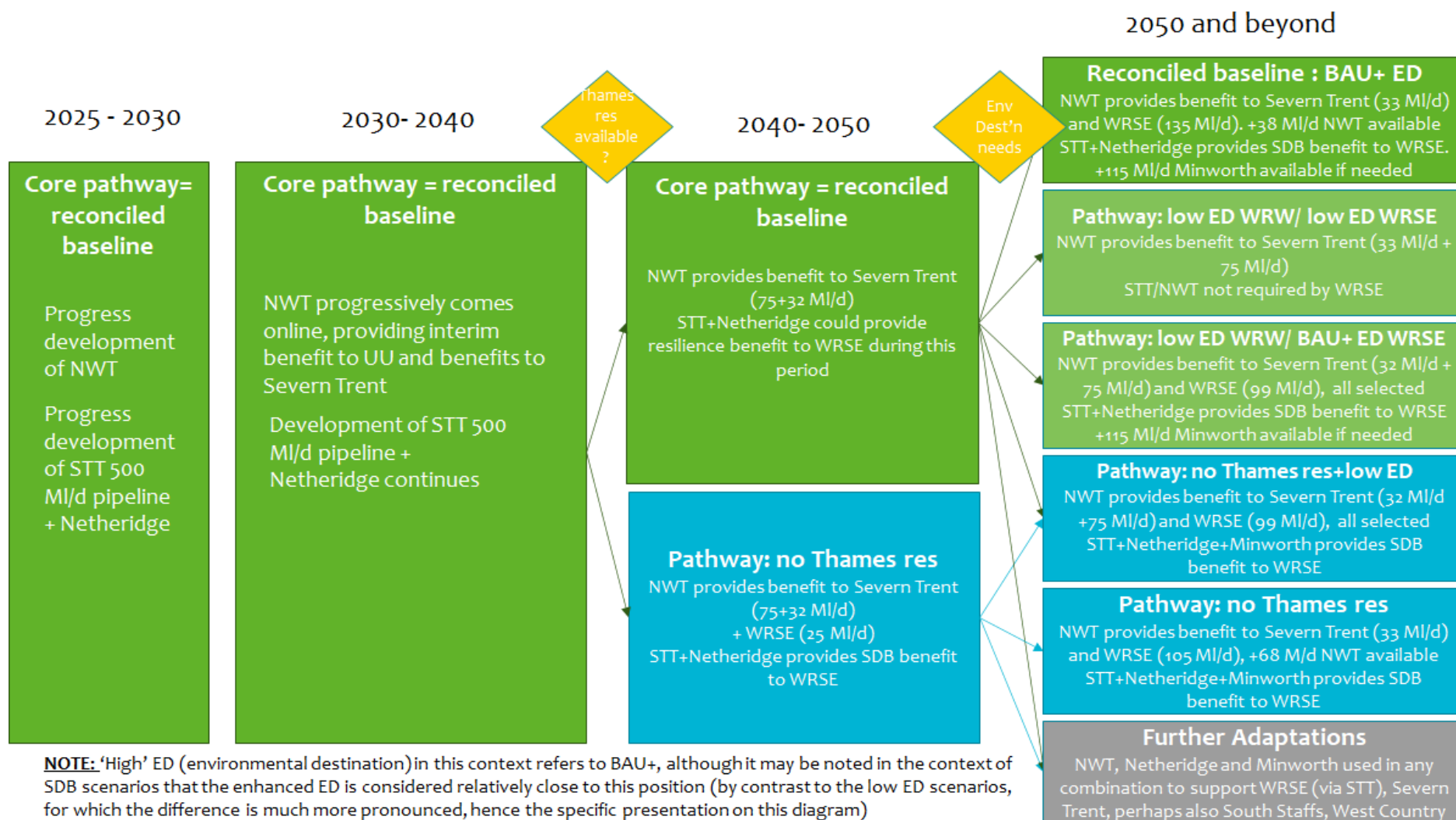


Figure 14 Depiction of potential STT and NWT pathways informed by scenario testing (courtesy of WRW). Yellow diamonds indicate the branching points, although decisions will need to be taken much earlier than the branch-point to allow time for schemes to be implemented. See Figure 9 for an indication of the timing of the Thames reservoir decision.

5. Recommendations and plan risks

A reconciliation position between all regions has been successfully agreed between regional groups, with support, advice and constructive challenge from regulatory representatives and the RCG. The reconciliation process has entrained several ongoing residual actions, recommendations and flagged key risks for the planning process as a whole beyond reconciliation. This section briefly summarises these for reference and use beyond reconciliation and is correct at the time of publishing this report.

5.1. Recommendations and residual/future actions

Topic	Region	Description
<p>Presentation of key alternatives and scenarios</p> <p><u>Key reconciliation recommendation</u></p>	All	<p>A single reconciliation position has been required for the draft plans to be developed by all regions on time and with suitable alignment of transfers. However, there are evident risks of change as the regions continue to work on their plans to the draft stage, and beyond.</p> <p>Revision to RAPID schemes data to the amended Gate 2 for some schemes in 2023 is key, particularly noting the different maturities of options information at this stage, and the sensitivities of WRSE option selections in cost terms. Whilst certain RAPID schemes (e.g. Mendip Quarries, Derwent Valley) have been prominent with regards reconciliation, all WRMP options may be subject to further development which could change their relative cost, benefit and impacts/risks. Environmental destination and/or licence capping, in terms of pace, timing and definition of the optimal long-term needs are also highly subject to change.</p> <p>With this in mind, the key mitigations are open and transparent communication of these risks in the draft plan, with <i>suitable consultation on the alternative options, plans and/or pathways (specifically summarised in Section 4.2 and 4.3), and plan scenarios in line with the reconciliation findings.</i></p>
<p>Regional group review pre-submission of draft plans (August 2022) and change control</p>	All	<p>It is recommended that the regions conduct a review process to ensure alignment of the draft regional plan submissions with the reconciliation position in August 2022 (by 19th August latest).</p> <p>The draft regional and WRMP preferred plans (including submission table entries for the reconciled pathway) must align to the agreed reconciliation position as the 'default' position. The reconciled set of inter-regional schemes, dates or volumes will not (and cannot) materially change at this stage of the planning process, since to do so would compromise the ability to submit a reconciled and assured set of WRMPs by 3rd October 2022 and regional plans by the deadline of 14th November 2022.</p>

Topic	Region	Description
		<p>Recognising that work is continuing by regions on developing their best value regional plans, any changes from the reconciliation position must be very carefully described and managed via a change control process. The change control process would operate and be managed against the 'default' position in reconciliation. Any proposed change from the default reconciled position must weigh up the materiality and consequences for delivery of the plans, and be agreed upfront between regions.</p> <p>The dates of the earliest option availability, as set out in the default position, must be consistent between relevant regional plans. The selection of preferred inter-regional options must be consistently presented in the 25-year WRMP statutory planning period⁴⁰. This means that the volumes and selection of inter-regional transfers must match between 2025-26 and 2049-50.</p> <p>Beyond 2050-51, it cannot be assumed that changes will be immaterial (or be mutually agreeable), and whilst prior consideration can be given to types of potential change that may possibly be accommodated, these will need to be reviewed at the time. However, broadly speaking, it is seen that marginal changes in option selection dates later in the planning period may be less material, but changes in option volumes or availability are likely to be more problematic. Any changes must be agreed upfront between regions.</p> <p>Where changes are deemed to be materially significant, representing a more fundamental change in the basis of the plan, these would need to be presented alongside the technical 'preferred adaptive plan' position with suitable narrative to describe the impact of the change to the supply-demand balance and relative comparison of performance to the reconciled position.</p> <p>As further work is completed and new evidence or insight becomes available during summer 2022, this may give rise to materially different additional alternatives that may need to be consulted upon alongside, or against the preferred plan position aligned to reconciliation. At the August review stage, these may also form discussions as to how these should be consulted upon also.</p>

⁴⁰ As defined in the WRMP Direction 2022 for England and the Water Resources Management Plan Guidance for Wales. The Direction states that the plans start on the 1st April 2025, with the exception of Southern Water which starts on the 1st April 2023.

Topic	Region	Description
		It is important that regional groups fully demonstrate transparency of the decision-making process they are undertaking to reconcile their regional plans. The development of a suitable change control process towards the draft plans is a critical RCG agreed (21st June 2022) action for the RCG Working Group following reconciliation.
Further cost sensitivity tests	WRSE	In Stage 1 of the reconciliation process, it was identified that WRSE, with relevant input from other regions would conduct additional cost sensitivity tests against the reconciliation position. However, given the additional challenges faced during reconciliation these extra runs were not specifically completed. They are recommended for completion as part of ongoing work on the draft plan, although it should be noted that modelling outputs have been interrogated with cost sensitivity in mind, and in part, reconciliation decisions have been taken recognising costs closely compete between options by taking account wider factors.
Further evidencing and exploration of WRE exports	WRE	<p>Whilst a reconciliation position has been determined on WRE exports during reconciliation, it is recommended that further work continues on these potential options, which may further bolster evidence around the reconciliation position and/or allow the potential for these options to be better understood in future. There are 4 key items under this action area:</p> <ol style="list-style-type: none"> 1. Document quantitative BVP metric data in line with reconciliation tests to further evidence WRE position qualitatively graded during reconciliation 2. Further testing and scenario analysis to be completed as part of development of the draft plans on the reverse transfer between Grafham and Affinity i.e. lower level of existing transfer. 3. Marginal costs of WRE exports - Formal updates of marginal costs are expected in June following further modelling, taking into account desalination etc. Whilst these do not change the reconciliation position, these should be provided to WRSE for completeness. 4. Environmental destination (England) tipping points - Further analysis to be completed in 2022 as to likely tipping points whereby the costs of export to WRSE could reduce (i.e. no reliance on desalination etc.)

Topic	Region	Description
Impacts on WRW- WCWRG selection, high compound scenario	WCWRG	WCWRG determined that only the highest compound scenario would result in selection of exports from WRW. As part of developing the draft plan, it is useful to review whether the STT is no longer required under this scenario once additional new in-region options have been taken into account
Latest STT utilisation series	WRSE WRW	Inter-regional transfers are extremely complex and different factors impact the utilisation patterns. It is not practical to continually update such series, given the complex modelling involved, however, following discussions during reconciliation, the existing utilisation series for the STT should be affirmed at a suitable point in the planning process.

5.2. Residual risk areas

The Spring 2022 reconciliation is part of the journey to building the BVPs, in particular towards the draft submission stage. It is impractical to eradicate all potential risks of change later in the process within the regulatory water resources planning timeline and process. Reconciliation is rather a key mitigation for such risks, which originate from outside the reconciliation process (i.e. the wider planning processes). The process of reconciliation in Spring 2022 has significantly increased the understanding of risks and plan sensitivities for both the regional plan and WRMPs.

Further change may occur impacting the BVPs as a result of, amongst other things:

- New policy positions
- The PR24 business plan process
- Outcomes of consultation on draft regional plans and WRMPs
- Amended Gate 2 (and subsequent) SRO submission outputs

Such risks have been discussed and are recognised by both the RCG Working Group and main RCG. Beyond reconciliation, these regional groups will continue to engage and monitor risks around regional plans, and the Regional Chairs Group would represent a suitable escalation route in the event of issues as with reconciliation (*Governance for regional plans*, 14th March 2022).

The table below summarises the most salient risk areas observed during the process:

Figure 15 Salient risks identified during reconciliation

Risk area	Action / mitigation / recommendation
WRSE option selection sensitivity	Lock-down reconciliation position, but ensure reconciliation flags key alternatives as part of narrative. Ensure dRP/WRMPs present key alternatives suitably for consultation. Ongoing dialogue on utilisation and costs of transfers.
Revision to options position at RAPID Gate 2 etc.	As above, but in particular to include pathways/sensitivity tests in the plan process for existing Derwent transfer (WRW-WReN) and Mendip Quarries (WCWRG-WRSE). Present key alternatives for WRSE as previous slide.

<p>Environmental destination and/or licence capping position in England changes (e.g. pace, timing)</p>	<p>Reconciliation flags likely changes in need / availability under different scenarios. dRP/WRMPs should also reflect on these key alternative scenarios, and the impact on BVP positions. Ongoing work to define suitable investigations, future optimal plans etc. is required between regions, companies and regulators, including at the local level.</p>
<p>Ongoing work by the regions creates change in position</p>	<p>As above items, present alternative plan positions as part of process. Plan for further reconciliation in advance, between draft and revised draft RP/WRMPs.</p>
<p>Maturity of BVP processes at national level, including regulatory guidance and/or plan frameworks</p> <p>Challenge to cross-compare BVP positions across regions at national level (England⁴¹)</p>	<p>As explained in the rulebook, the reconciliation process was not designed or expected to develop a single, optimal national plan (noting that, regardless, in optimisation techniques there is often no single optimal outcome, but rather a series of trade-offs to explore in decision-making and consultation).</p> <p>Comparison of different BVP metric areas is inherently challenging, with different ways of presenting metrics being possible (e.g. normalised scores, absolute values etc.). It is recommended that beyond this planning round, lessons learnt, and best practices are defined taking account of common lessons across regions and regulators.</p> <p>The key mitigation at this stage, in part, is acceptance that BVPs are being developed predominantly to meet regional and company level assurance. A fuller ‘step back’ review following submissions of the draft plans, when submissions and regional positions are more stable is appropriate, where further cross-region opportunities may be identified and recommended for exploration in a targeted manner. Mitigation is also achieved through regions continuing to explore suitable alternative options, paths and scenarios.</p>

⁴¹ Specific BVP requirements apply to Wales.

Appendix 1: Key references

Regional emerging plans

- WReN - [Emerging plan for consultation \(waterresourcesnorth.org\)](https://www.waterresourcesnorth.org)
- WRW - [Publications — Water Resources West](#)
- WRE - [The Regional Plan - Water Resources East \(wre.org.uk\)](https://www.wre.org.uk)
- WCWR - [Emerging Plan for Consultation and Comment January 2022 | WCWRG](#)
- WRSE (referred to as Regional Plan Jan 22 consultation document) - [Our regional plan | Water Resources South East \(engagementhq.com\)](#)

Spring 2022 reconciliation rulebook

- “Rulebook” (March 2022) - [Inter-regional reconciliation Spring 2022 - Rulebook v1.0 for RCG Working Group Use 290322.pdf](#)
- “Rulebook addendum on common scenarios” (May 2022) - [Inter-regional reconciliation Spring 2022 - Rulebook - ADDENDUM on Common Scenarios v1.0 030522.pdf](#)

Previous reconciliation methodology & outputs (used to inform rulebook)

- “Regional Reconciliation Process⁴² – Version 7” (January 2022) - [RCG – working group - Regional Plan Reconciliation V7.pdf - All Documents \(sharepoint.com\)](#)
- *Regional_Best_Value_Criteria&score_V2 - to be completed.xlsx* (completed version January 2022) - [RCG – working group - 3. Shared documents - All Documents \(sharepoint.com\)](#)
- *Stress testing summary 20Dec2021.docx* (December 2021) - [Stress testing summary 20Dec2021.docx \(sharepoint.com\)](#)
- *Regional options table_v2_RCG_final.xlsx* (December 2021) - [Regional options table_v2_RCG_final.xlsx \(sharepoint.com\)](#)
- “Assessing materiality v2” (June 2021) - *Materiality_framework_for_resource_plans_v2.docx* - [Materiality framework for resource plans v2.docx \(sharepoint.com\)](#)

Regulatory documentation (used to inform rulebook)

- EA/Ofwat/NRW (November 2021) - *Water resources planning guideline. Draft update November 2021* (plus supplementary guidance)
- Environment Agency consultation responses on emerging plans (except WRSE)
- Ofwat consultation responses on emerging plans (except WRSE)

⁴² Sometimes referred to in earlier forms as “Method Statement: Regional Plan Reconciliation”.

- Appendix 2 Regional Planning, Water Resources National Framework, EA, 2020 - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872222/Appendix_2_Regional_planning.pdf

Other regional planning material (used to inform rulebook)

- *Governance for regional plans* (14th March 2022) – Paper by Richard Blackwell and Paul Leinster

Appendix 2: Summary of key meetings

The table below provides a high-level summary of the key meetings that took place between the regional groups, with regulator where possible. Detailed meeting notes have been retained in the folder [RCG – working group - Meeting record - All Documents \(sharepoint.com\)](#), as compiled by Ali Leonard during the meetings, and subsequently circulated along with summary actions following meetings.

It should be noted that the table does not aim to reflect all aspects of inter-regional discussions, and that this only includes the key reconciliation meetings; it does not reflect all inter-regional interactions or bi-lateral meetings that may have separately taken place to support the process.

Stage	Dates	Description	Outcome
1	Mon 11 th April	Materiality review (all regions, initial WRSE view)	Regions presented updated position statements including notable changes from the autumn reconciliation <ul style="list-style-type: none"> - WRW: bigger deficits in Severn Trent zones due to ED may impact availability of STT support options - WRE: nothing to impact inter-region selection - WReN: nothing to impact inter-regional selection - WCWRG: nothing to impact inter-regional selection - WRSE: potential that changes to branch timings and the profiling of 1 in 200/500 resilience targets may call on STT interconnector earlier
2	Wed 20 th April	WReN & WRW	<ul style="list-style-type: none"> - SVT require termination of the Derwent Valley transfer or the Upper Derwent Valley raising SRO to meet abstraction licence changes - Adaptive pathway required; need to define trigger points, investigations, and lead times of the SRO versus alternative backfill options - Including Kielder resulted in substantial deterioration in carbon and cost - Additional meeting agreed to further evidence the position
0	Fri 22 nd April	Confirm non-option scenario tests (Ofwat scenarios)	Ofwat presented the common scenarios. Regions agreed regionally consistent definitions for the use of scenarios (environmental, climate change, and demand).
1	Mon 25 th April	Materiality update (WRSE)	<ul style="list-style-type: none"> - WRSE selects Mendips and Anglian instead of STT but recognises the sensitivity and uncertainty of this selection - All regions agreed to include an additional scenario test on demand: achievement of 50% of the 110 PCC target
2	Thurs 28 th April	WCWRG & WRW	<ul style="list-style-type: none"> - WRW could accommodate a transfer to WCWRG - WCWRG do not select a transfer from WRW even in high scenarios due to the cost (more than desal) - Lots of uncertainty around the Mendips SRO
2	Fri 29 th Apr	WRE & WRSE	<ul style="list-style-type: none"> - WRSE selects A2AT in 2054 (100 MI/d) but this selection is based on outdated costs that don't reflect support from desal and transport infrastructure - WRSE agrees to carry out further tests to evidence non-selection of the reverse trade from Grafham, and the A2AT - WRE confirms no transfers from WReN due to poor performance across metrics

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2	Wed 4 th May	WRW & WRSE	<ul style="list-style-type: none"> - WRSE latest position: GUC early, SESRO, Mendip, STT later. Excluding SESRO brings STT in earlier. - WRW latest position: SVT require water from Vyrnwy. - WRSE agree to remove Mendip, A2AT and Mythe - WRSE agree to carry out sensitivity runs removing 75 and 100 from Vyrnwy's supply - Additional meeting agreed
2	Thurs 5 th May	WRen & WRW (2)	<ul style="list-style-type: none"> - SVT select to stop the transfer in 2035 in all scenarios because of the introduction of licence capping - Agreed the UDV SRO has too much uncertainty to be included in the reconciled position, but should be an important alternative pathway if it proves to be a best value supply option for both SVT and Yorkshire - Discussion needed with EA over flexibility around time capping dates which impacts the date of cessation of the transfer
2	Friday 6 th May	WCWRG & WRSE	<ul style="list-style-type: none"> - Agreed Mendips too risky but should be included as an important alternative pathway
3	Tue 10 th May	National inter-region reconciliation review	<ul style="list-style-type: none"> - Confirm position so far: - No transfers between WRE-WRSE, WCWRG-WRSE, WRW-WCWRG, WRen-WRE, WRW-WRen. - Cessation of existing WRW-WRen (Derwent Valley) transfer - Alternative pathways identified: UDV and Mendips SROs - WRW-WRSE position still ongoing with sensitivities around branch points and options (Beckton, GUC, STT)
3b	Thurs 19 th May	WRSE & WRW (2)	<ul style="list-style-type: none"> - Work ongoing in both regions - Recognition of the need to explore alternative pathways because of the sensitivity between schemes and the uncertainty of schemes
3b	Mon 23 rd May	WRSE & WRW (3)	<p>Converging on:</p> <ul style="list-style-type: none"> - Reconciled pathway selects SESRO and GUC early, with STT later on - Alternative pathway excluding SESRO results in the selection of STT early in the plan - Beckon (reuse and desal) selected but considered less preferable due to customer preference and operability/resilience/adaptability
4	Wed 25 th May	Final SDB scenario tests review (Low / High) + final transfer position confirmed	<p>Reconciled WRW-WRSE agreed.</p> <p>Other regions confirmed position, with one small change that WCWRG select Severn-West Country transfer in the compound high scenario with significant uncertainty depending on the value and availability of alternatives.</p>
5	Wed 15 th June 2022	Meeting: Reporting draft review	<p>For RCG WG comment and review of draft outputs, and to discuss any region residual actions or evidence to be completed</p>

Appendix 3: Strategic options summary table

The table below summarises the position on the key transfer and strategic options relevant to the reconciliation process, in addition to in-region SROs. It has been updated to reflect the outcomes of reconciliation, from the version originally produced during the 2021 reconciliation, with input and review across the regional groups. The master is located at [RCG – working group - Strategic options table - All Documents \(sharepoint.com\)](#). Work continues on the draft plans, and so under change control further revision of the table may occur beyond reconciliation prior to the submissions. The table distinguishes, via the shading and key, options related to inter-regional transfers directly explored in reconciliation (which may also be used in-region, where stated), from in-region only SROs which are still indirectly relevant through the modelling process. It is also important to note that the list does not constitute all possible options; the regions and companies will have a range of other (generally smaller) options included in their feasible options lists.

Regional plan supply-side strategic options (v5.0)

From an original version agreed by RCG working group 20/12/21 ([Regional options table v2 RCG final.xlsx](#)), and revised to reflect Spring 2022 reconciliation outcomes snapshot.

This tab sets out a summarised list of the strategic supply-side schemes under consideration through the regional plan reconciliation. It sets out some facts about the options and the links and connectivity of those options, as well as a description of the reconciliation outcomes in relation to robustness and sensitivity of those options to the stress testing process. The 'reasonable stresses' that were tested through stress testing were: achieving half of anticipated demand savings, standardising the level of environmental ambition represented, and the impact of the high emissions climate change projections.

To keep this document to a manageable size, regional groups have represented the strategic schemes and transfers under consideration, and the list below does not represent the full suite of supply-side options under consideration. More detailed option information may be found in the lower section of the individual resource zone tabs.

These assessments of option viability and preferences may change in the future as more information becomes available and as a result of consultation. These statements should be taken as indicative to reflect this stage of the regional plan development.

Key of box shading	
	Transfer related options <i>directly</i> explored in reconciliation
	In-region SRO only – not a direct transfer related option for reconciliation

A	B	C	D	E	F	G	H	I	J	K	L	M	O
	Resource zone and water company area of proposed scheme (source of abstraction)	Potential resource zones or regions that could benefit or receive water from scheme	Option Name	In-region or inter-regional option?	Type of option	Proposed scheme development history	Reconciliation BVP assessment	Reconciliation outcome and current status of scheme selection	Earliest year of benefit available	Indicative year of option selection	Maximum capacity or yield of option in MI/d	Indicative unit costs of option (AISC in pence/m3)	Further comments
1	Severn Trent Strategic Grid	Thames Water (SWOX, London), Affinity Water and potentially others in WRSE and WCWRG	Netheridge (Severn Trent Sources - STT)	Inter-regional option from WRW to WRSE (primarily) and WCWRG (as adaptation)	Effluent re-use	Strategic Resource Option under development through the RAPID gated process	Following the update of scheme information in November the Netheridge scheme still gets selected. The Netheridge scheme is always selected in the more challenging situations in the south east of England.	Included in the reconciled plan to meet the needs of WRSE, and potential adaptation into WCWRG noted. Reconciliation assessment accounts for consequential cost to Severn Trent Water being reflected in prices to WRSE companies.	2030	2050 2040 – Alternative pathway with no Upper Thames Valley Reservoirs (UTVRs)	35 MI/d		Selected in alternative pathway by WRSE if Thames Valley Reservoirs are rejected
2	Severn Trent Strategic Grid	Thames Water (SWOX, London), Affinity Water and potentially others in WRSE and WCWRG	Mythe (Severn Trent Sources - STT)	Either in region or inter-regional option from WRW to WRSE (primarily) and WCWRG (as adaptation)	Partial source re-deployment	Strategic Resource Option under development through the RAPID gated process	Following the update of scheme information in November Mythe is not available for selected as it is needed in-region by Severn Trent to meet environmental requirements.	Not included in reconciled plan in terms of exports from WRW, but is included in WRW plan to meet Severn Trent needs.			15		Selected in-region by Severn Trent as part of best value plan.
3	Severn Trent Strategic Grid	Thames Water (SWOX, London), Affinity Water and potentially others in WRSE and WCWRG	Minworth (Severn Trent Sources – GUC/STT)	Both in region and inter-regional option from WRW to WRSE (primarily) and WCRW (as adaptation)	Effluent re-use	Strategic Resource Option under development through the RAPID gated process	Minworth always gets selected for the GUC transfer, and in the alternative pathway for the STT transfer with the UTVRs. Minworth-GUC always gets selected across all three branches in WRSE modelling. In lower branches STT is not selected. If Minworth could only support one of the two transfer routes then the transfer route to GUC would be the preferred route. Minworth does not get selected to meet Severn Trent needs.	Included in the reconciled plan to meet the needs of WRSE, and potential adaptation into WCWRG noted. Reconciliation assessment accounts for consequential cost to Severn Trent Water being reflected in prices to WRSE companies.	2030	2031 (via GUC) @ 100 MI/d 2050 58 MI/d and 2055 57 MI/d (total 115 MI/d) additionally via STT) in alternative pathway with no UTVRs	100 MI/d (GUC) 135 MI/d (Via STT)		GUC element is very stable element if WRSE modelling STT component selected in alternative pathway by WRSE if Thames Valley Reservoirs are rejected.

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	Resource zone and company area of proposed scheme (source of abstraction)	Potential resource zones or regions that could benefit or receive water from scheme	Option Name	In-region or inter-regional option?	Type of option	Proposed scheme development history	Reconciliation BVP assessment	Reconciliation outcome and current status of scheme selection	Earliest year of benefit available	Indicative year of option selection	Maximum capacity or yield of option in MI/d	Indicative unit costs of option (AISC in pence/m3)	Further comments
4a	United Utilities Strategic Zone	Severn Trent, Thames Water (SWOX, London), Affinity Water and potentially others in WRSE (Southern), WCWRG (Bristol and Wessex) and WRW (South Staffs)	North West Transfer (Vyrnwy Aqueduct and United Utilities Sources - STT); Raw water releases from Vyrnwy to River Severn.	Both in-region option and Inter-regional option from WRW to WRSE (primarily) and WCRW (as adaptation)	Partial source re-deployment (Vyrnwy) enabled by network enhancement and new sources	Strategic Resource Option under development through the RAPID gated process	The North West Transfer (Vyrnwy) options get selected by both Severn Trent and WRSE. For WRSE it is selected in the reconciled branch. It is only in the middle to lower branches in which the schemes are not selected. Adaptive planning enables the use of 75 MI/d from the North West Transfer by Severn Trent until the year the scheme is selected by WSE.	Included in the reconciled plan to meet the needs of WRW, WRSE, and potential adaptation into WCWRG noted. Reconciliation assessment accounts for consequential cost to United Utilities being reflected in prices to WRSE companies.	2030	Reconciled plan: 2031-2060: 75 MI/d to Severn Trent From 2060: 135 MI/d to WRSE Alternative pathway (No SESRO) 2031-2050: 75 MI/d to Severn Trent 2048 – 25 to WRSE 2050 – 105 to WRSE (+80) Note dates and volumes refer to water made available by the scheme in the River Severn Uplands.	180 MI/d via Vyrnwy Reservoir (limited by yield of Vyrnwy reservoir)		Selected in 2031 by Severn Trent and 2060 by WRSE in reconciled plan. Selected in an alternative pathway by WRSE in starting 2048 if Thames Valley Reservoirs are rejected, but with 20 MI/d lower volumes than reconciled plan
4b	United Utilities Strategic Zone	Severn Trent, Thames Water (SWOX, London), Affinity Water and potentially others in WRSE (Southern), WCWRG (Bristol and Wessex) and WRW (South Staffs)	Vyrnwy / North West Transfer (Vyrnwy Aqueduct and United Utilities Sources - STT); potable water from Vyrnwy aqueduct	Both in-region option and Inter-regional option from WRW to WRSE (primarily) and WCRW (as adaptation)	Partial source re-deployment (Vyrnwy) enabled by network enhancement and new sources. To benefit WRSE and others the potable water would offset Severn Trent abstraction from River Severn.	Strategic Resource Option under development through the RAPID gated process	This element of the North West Transfer gets selected by Severn Trent. It is not selected by WRSE.	Not included in reconciled plan in terms of exports from WRW, but is included in WRW plan to meet Severn Trent needs. .	2030	Reconciled plan: 2041: 25 MI/d to Severn Trent 2051: additional 6.5 MI/d to Severn Trent 2061: additional 1 MI/d Total 32.5 MI/d of potable water from North West Transfer to Severn Trent	25 MI/d for downstream abstraction on River Severn. Potable connections to Severn Trent could be greater.		Selected in-region by Severn Trent as part of best value plan.
5	Severn Trent Strategic Grid and United Utilities Strategic Zone	Thames Water (SWOX, London), Affinity Water and potentially others in WRSE	Severn Thames Transfer (STT)	Inter-regional option from WRW to WRSE	New raw water transfer using rivers and pipeline or canal	Strategic Resource Option under development through the RAPID gated process	The Severn Thames Transfer is selected as one of the many solutions in the south east of England. This enabling scheme is usually configured with support options. This scheme is always selected in the more challenging situations in the south east of England.	500 MI/d transfer included in the reconciled plan to meet the needs of WRSE. Linked to supporting options: Severn Trent Sources, Minworth and North West Transfer (Vyrnwy Aqueduct and UU Sources) and benefits from unsupported abstraction from the River Severn.	2033	Earliest date of 2040 Used from 2050 with support options for WRSE, with in-region use prior to this date (from 2040). From 2040 for WRSE in alternative pathway without SESRO available.	500 MI/d		-
6	Severn Trent Strategic Grid	Affinity Water	Grand Union Canal (GUC)	Inter-regional option from WRW to WRSE	New raw water transfer using canal	Strategic Resource Option under development through the RAPID gated process	The Minworth / Grand Union canal option is selected across a number of the more challenging situations in the regional plan. These schemes were also selected in the stress tests.	100 MI/d transfer included in the reconciled plan to meet the needs of WRSE. Linked to Minworth supporting option.	2030	2031 – 100 from Minworth	100 MI/d		Forms stable selection in WRSE modelling
7	Anglian Water East Lincolnshire	Anglian Water Ruthamford North and Ruthamford South; Affinity Water	South Lincolnshire Reservoir	Inter-regional option from WRE to WRSE	New reservoir	Strategic Resource Option under development through the RAPID gated process	Initially selected in WRSE model runs at materiality review stage (100 MI/d in 2054), but with costs finely balanced with other transfer or strategic option selection. Included in options BVP test (50 and 100 MI/d exports). Position to retain as a WRE in-region option only, to avoid deterioration of environmental BVP scores. Increases cost of WRE options indicatively (requires recharge to WRSE). Drives WRE to use desalination as substitute option, bringing higher costs to WRSE, which would result in subsequent non-selection.	Selected as an in-region option only; in development as Gate 2 solution	2035-36	2035-36 (N/a, regarding export option)	150 MI/d (50 & 100 MI/d exports tested in reconciliation)		Specifically tested and reviewed in WRSE-WRE inter-regional meeting.

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	Resource zone and water company area of proposed scheme (source of abstraction)	Potential resource zones or regions that could benefit or receive water from scheme	Option Name	In-region or inter-regional option?	Type of option	Proposed scheme development history	Reconciliation BVP assessment	Reconciliation outcome and current status of scheme selection	Earliest year of benefit available	Indicative year of option selection	Maximum capacity or yield of option in MI/d	Indicative unit costs of option (AISC in pence/m3)	Further comments
8	Anglian Water Fenland	Anglian Water WRZs in Cambridgeshire and Norfolk; Cambridge Water	Fens Reservoir	In-region option	New reservoir	Strategic Resource Option under development through the RAPID gated process	Not specifically explored in reconciliation tests as non-export. In scenarios with larger deficits in WRE the option is selected at a larger size.	In development as Gate 2 solution	2035-36	2035-36	99 MI/d		Not included in options flex tests agreed by RCG WG
9	Anglian Water Ruthamford South	Anglian Water Ruthamford South; Affinity Water	Grafham Water	Inter-regional option from WRE to/from WRSE	Transfer	n/a	Included in options BVP test only, as reverse trade (reduce export to SE by 45 MI/d). Not selected in reconciliation following inter-regional review due to cost impacts on WRSE.	Options to either increase or reduce transfers from WRE to WRSE were investigated in 2021 reconciliation, and reviewed in Spring 2022. The reconciled plan includes continuation of the existing transfer volumes. The impact of a 45 MI/d reduction in the transfer previously had approximately double the cost impact on WRSE compared to WRE (2021 reconciliation). Latest costs to be available from WRE by mid-June.	2025-6	n/a	45 MI/d		Inclusion of reverse trade by WRE would result in less strategic options for WRE, but increased intra-regional transfers.
10	Severn Trent Strategic Grid	Yorkshire Water Grid	Cease existing Derwent Valley Transfer	Inter-regional option to stop existing transfer from WRW to WReN regional group	Stop existing transfer	Operational since early 1900s	The ceasing of the existing transfer is now included in the reconciled plan, even with the Derwent Valley Storage Increase (SRO, but note comments column on SRO definition) below. This is not a BVP position, as such, but rather on the basis of a lack of feasible alternatives, driven by the impacts of licence capping in the WRW (STWL) supply area to avoid environmental deterioration. Limits to system connectivity mean options need to benefit the Notts area specifically. There is currently high uncertainty on the scale of benefit from the associated SRO (which is looking at different reservoir enlargement options), as well as cost (very new RAPID scheme), hence this cannot be affirmed as part of the BVP/reconciled plan at this stage. The retaining of the transfer is a plan pathway, but not the reconciled plan position.	Ceasing transfer is in the reconciled plan, due to WRW needs (with lack of feasible alternatives at this time). Existing transfer was originally retained in 2021 reconciliation, but licence capping and uncertainty on benefit of SRO (Derwent Valley, Howden raising) mean that retaining the existing transfer is in a plan pathway following Spring 2022 reconciliation (viewed as almost equal probability). Loss of this existing transfer requires YW to deliver options to offset in-region (could cause in 2035 a deficit in Yorkshire Water Grid of around 40 MI/d under average baseline conditions. This may include intra-regional transfers, but detailed BVP still to be confirmed. Transfer loss impacts on the supply integrity and cause deficit in a specific part of Yorkshire Water Grid, requiring significant in-company investment for Yorkshire Water / WReN. Indicative costs of the order of £200m to develop and construction options to offset the lost water in YW's operating area.	N/A existing	N/A existing (contractually existing transfer ends 2084, but with potential for break from 2035)	40 MI/d annual average, but 68MI/d actual max		Further environmental, commercial and SRO work is ongoing. Potential deferral of licence capping and/or contract end dates could result in better long-term BVP position to be confirmed. WReN and WRW discussed potential future Idle and Torne investigations, but requires further consideration. Technically, the SRO, as well as including different options for reservoir enlargement referred to here, also covers YW backfill options (which have not been directly covered in reconciliation).

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11	Severn Trent Strategic Grid	Severn Trent Strategic Grid and Yorkshire Water Grid (Maintains existing transfer benefit if retained)	Derwent Valley Storage Increase	In-region option, which also allows existing inter-regional Derwent Valley Transfer to continue	Reservoir enlargement	Strategic Resource Option under development through the RAPID gated process.	As above. Currently selected by WRW (STWL) to meet in-region needs, driven by licence capping to avoid environmental deterioration. Depending on the scale of benefit in future, there is potential for this scheme to allow the existing transfer to YW to be continued, but it cannot be included in the reconciled plan (or be stated as the BVP) at this stage at this stage based on the lack of alternatives to SDB deficits in the STWL area. Whilst avoiding deterioration of the environment is the key driver, the environmental destination scenario influences the scale of the challenge and thus the level of risk the benefits of reservoir enlargement are insufficient. Retaining transfer could avoid deterioration of several Best Value Plan metrics in WReN area, if better value than capital, operational and opportunity cost associated with alternative solutions for Yorkshire Water. This remains an alternative plan pathway in combination with retaining the existing Derwent transfer to WReN.	Selected by WRW for in-region use only, along with ceasing of existing Derwent export to WReN. Alternative plan pathway to be presented where SRO yields suitable benefit to allow existing transfer to be retained.	2040	2040	80 MI/d		Risk that the SRO will not be sufficient in future to allow the existing transfer (above) to be maintained is influenced by the environmental destination scenario, but the need is driven by licence capping. Technically, the SRO, as well as including different options for reservoir enlargement referred to here, also covers YW backfill options (which have not been directly covered in reconciliation).
12	Severn Trent Strategic Grid and United Utilities Strategic Zone	Bristol Water and Wessex Water	River Severn to West Country Transfer	Inter-regional option from WRW to WCWRG	Enhance existing canal transfer to Bristol.	New scheme identified through regional planning. United Utilities to Bristol was identified at WRMP19. Linked to Severn Thames Transfer Strategic Resource Option under development through the RAPID gated process.	WCWRG BVP option tests result in non-selection on basis of high costs, with indicative impact of £219.9m NPV.	Not selected in reconciled plan, but remains a feasible option in future.	2030	n/a	35 MI/d		Robust option - water could be used when not needed by other regions. Increases local resilience in Bristol and Bath towns. Potential drought resilience benefits, due to lower correlation of drought events across regions compared to within regions.
13	Bristol Water	Bristol Water and Wessex Water	Cheddar 2	In-region option for WCWRG	New reservoir	Strategic Resource Option under development through the RAPID gated process, has been a feasible option in previous WRMP submissions.	Robust to a reasonable range of stresses and is selected in moderate and/or more challenging adaptive pathways	Lower value option that is likely to only be needed in the more extreme adaptive pathways of the regional plan and/or WRMP24	2030	2030-2040	14 MI/d (treated water), 36 MI/d (raw water)	~150 (WCN to SRN was 390p/m3 of which about half the capex was the pipeline)	Not explored through reconciliation
14	Bristol Water	Bristol Water area, wider WCWRG region and configuration options to export to WRSE in the future	Mendip quarries raw water reservoir	In-region option for WCWRG, with option for inter-regional connection with WRSE in the future	New reservoir	Strategic Resource Option under development, New feasible option for WRMP24	Initially selected in WRSE model runs at materiality review stage (30 MI/d in 2042), but with costs finely balanced with other transfer or strategic option selections. Relatively high uncertainty on cost and availability for export (relatively new RAPID scheme). On this basis, excluded from core reconciled plan and to be presented in plan pathways and/or sensitivity tests.	Selected as in-region option only, but costs and availability uncertainty for export result in non-selection in core reconciled plan. Reflect as key potential alternative, in draft plan pathways and/or sensitivity tests.	2045	2042 in WRSE sensitivity test only; export not selected in core reconciled plan.	30 MI/d	69-84	Note potential future long-term alternatives (further quarries) – coarse level assessment to date only. May represent a BVP option in future, when more information available. Time frame to see benefit maybe reduced due to loss

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													payment being paid to current owner 5 years sooner than operations are planned to be concluded. Two seasons will be required for the new reservoir to be filled.
15	Bournemouth Water	Bournemouth Water, Wessex Water	Poole Effluent Re-use	In-region	Effluent Re-use	Strategic Resource Option under development through the RAPID gated process.	Robust option. Water would be used in all scenarios.	Feasible and cost-beneficial. Has the potential for significant improvement in overall catchment operation. Water would be used to offset sustainability reductions on the Hampshire Avon. Also has the added environmental benefit of reducing nutrient load into Poole Harbour. Opportunity to offset an existing large industrial potable supply but analysis needed to understand the feasibility.	2030	2035	30 MI/d	92	Not explored through reconciliation
16	Thames Water	Thames Water - Affinity Water (Potentially others that extract from the Thames)	SESRO (Abingdon)	In region option for WRSE	New Reservoir of various volumes	Strategic Resource Option under development through the RAPID gated process	This option is consistently selected across all WRSE situations. This scheme is also selected in stress test model runs.	Included in the reconciled plan to meet the needs of WRSE. Subject to specific alternative pathway with WRW.	2037	2040	271 MI/d (conjunctive use benefit varies depending on other schemes selected)		Typically SESRO 150 is selected, though not exclusively across all of the branches.
17	Thames Water	Thames water London (WLJ, KGV)	London Reuse - Mogden	In region option for WRSE	Effluent Re-use	Strategic Resource Option under development through the RAPID gated process.	London-Reuse Mogden option is selected across a number of the more challenging situations in the regional plan. These schemes were also selected in the stress tests.	Included in the reconciled plan to meet the needs of WRSE.	2031	2065	100 MI/d		Not explored through reconciliation
18	Thames Water	Thames water London (WLJ, KGV)	Direct river abstraction - Teddington	In region option for WRSE	DRA	Strategic Resource Option under development through the RAPID gated process.	Teddington DRA option is selected in the most challenging situation in the regional plan. These schemes were also selected in the stress tests.	Included in the reconciled plan to meet the needs of WRSE.	2034	2045	50 MI/d		Not explored through reconciliation
19	Thames Water	Thames water London (WLJ, KGV)	London Reuse - Beckton	In region option for WRSE	Effluent Re-use	Strategic Resource Option under development through the RAPID gated process.	The core London-Reuse Beckton is selected across all situations. The Enhanced Beckton 50MI/d options are also used in all options. The Enhanced Beckton 100MI/d options is only selected in the most challenging situation. These schemes were also selected in the stress tests.	Included in the reconciled plan to meet the needs of WRSE.	2031 Beckton 2034 Beckton Enhanced 100MI/d 2034 Beckton Enhanced 50MI/d	2031 Beckton 2046 Beckton Enhanced 50MI/d 2051 Beckton Enhanced 100MI/d	Beckton 95MI/d Beckton Enhanced + 50MI/d Beckton Enhanced + 100MI/d		Model selection was sensitive between Beckton reuse and STT
20	Thames Water	Thames Water London	Desalination - Beckton	In region option for WRSE	Desalination	WRMP option	The Beckton desalination option is an alternative option to Beckton re-use and some other strategic resource options	This scheme isn't consistently selected across all plans but it is selected in some plans and in some situations.	2040. the option has several modular option ranging up to 150 MI/d.	2044 for operation in 2050	150 MI/d		
21	Thames Water	Thames water London	London reuse - Deephams	In region option for WRSE	Effluent re-use	Strategic resource option under development through the Rapid gated process	London reuse scheme – Deephams reuse is sometimes selected across some	Scheme selected in some of the exclusion runs and in the more challenging branches.	Selected in the 2060's but is available much earlier than that	2060	42.3		Deephams is another / alternative source of water in London area.

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22	Portsmouth Water	Southern Water	SWS Havant Thicket Raw Water Transfer	In region option for WRSE	Raw water transfer	Strategic Resource Option under development through the RAPID gated process.	Not included in stress testing as the reservoir now has planning permission so is more likely to be constructed.	Not included in reconciled plan	2027	n/a	Multiple options ranging from 90-190MI/d		Not explored through reconciliation
23	Southern water	Portsmouth Water	SWS Water Recycling	In region option for WRSE	Reclaimed water, water re-use, effluent re-use	Strategic Resource Option under development through the RAPID gated process.	This option is consistently selected across all WRSE situations. This scheme is also selected in stress test model runs.	Included in the reconciled plan to meet the needs of WRSE.	2027	2031	90MI/d		Not explored through reconciliation
24	Southern water	Southern Water	SWS Water Desalination at Fawley	In region option for WRSE	Desalination	Strategic Resource Option under development through the RAPID gated process.	Not included in stress testing following the announcement that the Fawley desalination plant is no longer a feasible option following the gate 1 review. Other smaller WRMP type desalination options are included	Not included in reconciled plan	2026	n/a	Multiple options ranging from 40-200MI/d		Rejected on grounds on operability, resilience, adaptability, customer preference
25	Thames water	Affinity Water	T2AT	In region option for WRSE	Raw water transfer	Strategic Resource Option under development through the RAPID gated process.	Not included in stress testing exercise for the regional reconciliation process but will be completed for the within region stress testing	Included in reconciled plan	2034	n/a	Multiple options ranging from 50-100MI/d		Not explored through reconciliation
26	Thames water	Southern Water	T2ST	In region option for WRSE	Raw water transfer	Strategic Resource Option under development through the RAPID gated process.	Not included in stress testing exercise for the regional reconciliation process but will be completed for the within region stress testing	Included in reconciled plan	2030	n/a	Multiple options ranging from 24-200MI/d		Not explored through reconciliation
27	Northumbrian Water	WRW	Kielder transfer	Inter-region option from WReN to WRW Also features as in-region option to YW Grid	Raw water transfer	Associated with North West Transfer (NWT) Strategic Resource Option (SRO). One of 27 potential options carried forward for more detailed assessment for Gate 2 linked to the overall SRO.	Included in options BVP test. Option not selected primarily on basis of cost and carbon metrics from WRW perspective. Could impact on carbon, natural capital and SEA related BVP areas for WReN driven by increased lake drawdowns and lost hydropower generation (but scale TBC).	Not included in reconciled plan, option flex test only.	2034	n/a	100 MI/d capacity explored (but further detailed modelling work ongoing to explore levels of availability linked to NWT SRO)	Indicatively 78.97 - Inclusive of abstraction charges	-