

VA0002: Vyrnwy Aqueduct Preliminary Feasibility Assessment

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Vyrnwy Aqueduct: Preliminary Feasibility Assessment

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1. Executive summary

- We have delivered our Gate 1 programme on time and within budget
- We recommend that the Vyrnwy Aqueduct (VA) Strategic Resource Option (SRO) progresses to Gate 2
- We have selected 2 options for further investigation as part of the Gate 2 plan
- We believe the VA SRO can enable a range of transfer volumes up to a maximum of 180 Ml/d in conjunction with the UUS SRO
- We are on track for delivery of the Gate 2 concept and design activities

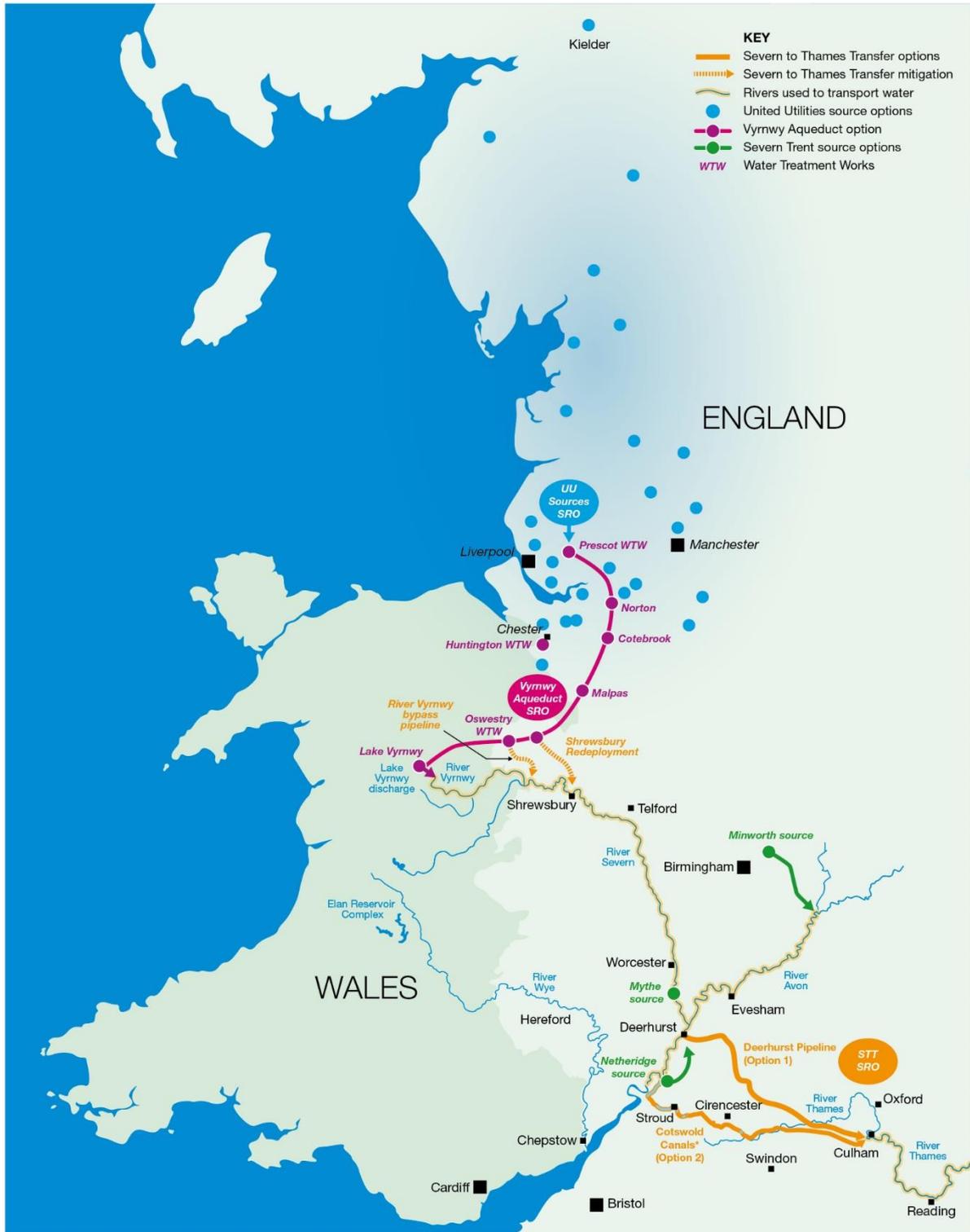
1.1.1. The VA SRO is one of 17 schemes promoted by Ofwat in the PR19 Final Determination (PR19 FD¹) to identify new strategic water resources to meet projected supply deficits as a consequence of population growth and climate change. This report contains a summary of the activities and associated outcomes for the period up to Gate 1. The content is also consistent with information previously shared with the Regulators' Alliance for Progressing Infrastructure Development (RAPID) through Quarterly Dashboard Reports.

1.1.2. We are delivering the VA SRO as one of three SROs we are participating in – the others being UU Sources (UUS) SRO and Severn to Thames Transfer (STT) SRO. We are delivering the STT SRO in partnership with Severn Trent Water and Thames Water. Although these schemes are separate SROs, they directly interface with each other to enable water to be transferred from North West England to the Midlands and South, as shown in **Figure 1**.

¹<https://www.ofwat.gov.uk/wp-content/uploads/2019/12/PR19-final-determinations-United-Utilities-Water-final-determination-.pdf>

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Figure 1 - Illustration of the interface between SROs



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- 1.1.3. The purpose of the VA SRO is to maintain supplies to customers supplied directly from the aqueduct if we were to stop or reduce our abstraction from Lake Vyrnwy to facilitate a transfer of raw water. Enabling works to the Vyrnwy system are only required for trading volumes greater than 50 MI/d and the VA SRO provides options for those enabling works. A detailed description of the scheme is in Section 2.
- 1.1.4. There are a number of potential implications of water transfers to United Utilities (UU) and the customers we serve, and therefore we have established the principles shown in **Table 1** below. Certain challenges such as impacts on customers' bills are industry wide and are being considered as part of the RAPID working groups.

Table 1 - Water Transfer Principles

Principle	Criteria
Drinking Water Quality	UU customers will receive drinking water that is fully compliant with all regulatory standards.
Customer Acceptability	Customers must continue to have confidence in their water supply and acceptance in terms of taste, odour, appearance (discolouration) and pressure.
Resilience	The transfer must not have a net detrimental impact – and should ideally improve – the resilience of the water resource and assets used to provide services to customers.
Environment	The projects must not have a significant adverse effect on the environment, must be approved through regulatory oversight and must support, or at least not have a detrimental impact on the company's overall environmental performance.
Customer Bills	The scheme should provide demonstrable value for money for customers in the North West, as reflected in customer bills and customers in the region must receive a fair proportion of the national benefits, which arise from the scheme.

Source: UU Water Trading Principles 2021

- 1.1.5. Key facts and conclusions are shown in **Table 2** below.

Table 2 - Key facts and conclusions

Description	Comments
Key assumptions	<ul style="list-style-type: none"> ▪ The VA SRO is required to support the STT SRO. ▪ The VA SRO and UUS SROs are interdependent and therefore would be delivered conjunctively to enable out of region transfers. ▪ The VA SRO will be selected in the Water Resources West (WRW) and Water Resources South East (WRSE) Regional Plans. ▪ Environmental and water quality impacts which emerge in Gate 2 can be mitigated. ▪ Stakeholder concerns can be addressed prior to planning being submitted.
Key risks	<ul style="list-style-type: none"> ▪ We have identified a number of risks and have actions to mitigate them, with nothing preventing further progression of the SRO to Gate 2. For details, please see Section 9.
Hierarchy of options	<ul style="list-style-type: none"> ▪ We are proposing two engineering solutions for further assessment prior to Gate 2; <ul style="list-style-type: none"> ○ Option A - Norton to Oswestry WTW ○ Option B - Huntington to Cotebrook
Key Conclusions and Recommendations	<ul style="list-style-type: none"> ▪ We recommend that the VA and UUS SROs are merged post Gate 1 to provide a single coherent transfer strategy. ▪ The submission has been externally assured and a supporting UUW Board Statement has been provided. ▪ The VA SRO is able to facilitate an out of region transfer of up to 180 MI/d (in conjunction with the UU Sources SRO) and we therefore recommend progression to Gate 2 for further detailed assessment. ▪ The conjunctive nature of the VA and UUS SROs mean they would only be viable if both were approved through the gated process.

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Description	Comments
	<ul style="list-style-type: none"> ▪ We can maintain supply to customers fed directly from the VA during a transfer of up to 180 MI/d. ▪ We have selected 2 options for further assessment prior to Gate 2. ▪ We are able to provide scalability of transfer volumes from 0 MI/d to 180 MI/d with costs ranging from £22m to £179m to accommodate projected increasing regional demand profiles. ▪ We have identified an opportunity to deliver efficiencies in scheme delivery through co-ordination with the Vyrnwy Cleaning & Lining project. ▪ The Town and Country Planning Act 1990 (TCPA) is the current recommended planning route. ▪ Our initial assessment is that the VA SRO does not meet the criteria for a Direct Procurement for Customers (DPC) approach. ▪ The earliest delivery date for the VA SRO ranges from 2030 for transfers from 50 MI/d up to 75 MI/d, to 2033 for the maximum transfers up to 180 MI/d (assuming a clear justification to support the planning applications is made in the WRMPs and Regional Plans).

Source: UUS SRO RAID Log (May 2021), Solutions Assessment Matrix (March 2021)

1.1.6. In summary, based on our Gate 1 preliminary feasibility study we believe that we can contribute to the national framework for improving resilience to extreme droughts by offering an option that is cost effective, flexible and resilient while minimising disruption for customers in the North West or adverse effects to the environment.

2. Solution description

- We believe the VA SRO meets the requirements of both the National Framework and relevant Regional Plans
- We have selected 2 options for progression to Gate 2 for further investigation
- We have developed the VA SRO to enable a range of transfer volumes up to 180 MI/d in conjunction with UUS SRO

2.1.1. VA SRO fully aligns with the ambitions of the Environment Agency’s (EA) publication ‘Meeting our Future Water Needs: a National Framework for Water Resources’ (March 2020). The purpose of VA SRO is to meet the national challenge of projected supply–demand deficits, primarily by increasing supply resilience in the South East of England through the transfer of up to 180 MI/d via STT SRO. We will do this while also ensuring 1-in-500 year drought resilience within the UU region as required by the Framework. We are also contributing to the water transfer section of UUs WRMP24 and aligning to the Water Resource Regional Plans.

2.1.2. Lake Vyrnwy provides a resilient, high quality and cost-effective supply to many customers every day, as part of a large conjunctive supply system. This is a significant benefit because if we release water for transfer we can replace it by using other existing sources. However, the additional pressure placed on other sources would mean that our risk of needing to impose customer restrictions, and damaging the environment, would increase. The offsetting of the transfer volume released from Lake Vyrnwy is addressed by the UUS SRO. For transfer volumes greater than 50 MI/d enabling works are required on the Vyrnwy Aqueduct in order to maintain supply to customers that can only be supplied with Lake Vyrnwy water, which forms the scope of the VA SRO.

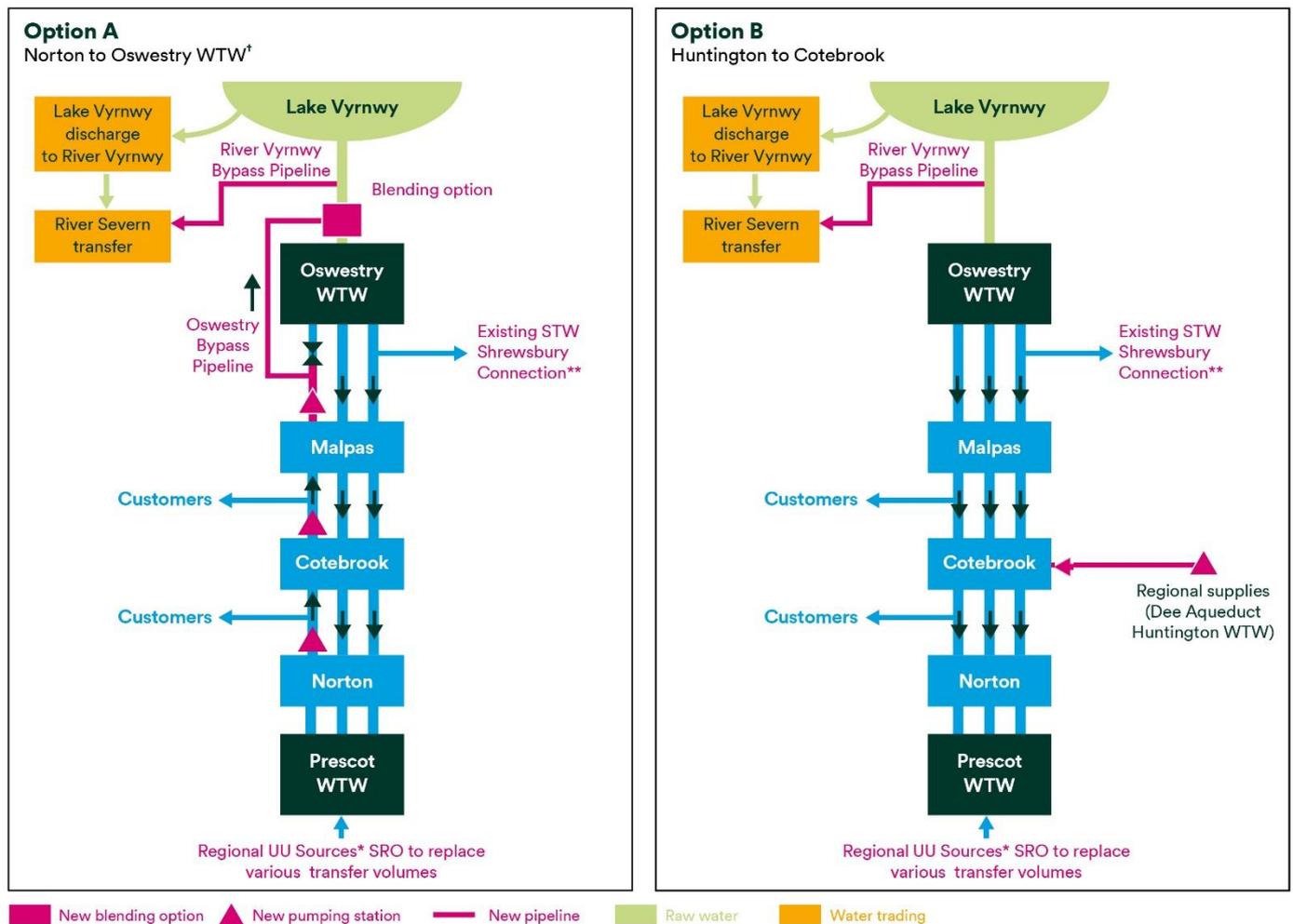
2.1.3. We have selected 2 options to progress to Gate 2 that will enable transfer volumes over 50 MI/d and up to 180 MI/d. (As shown in **Table 3**). These are:

- Option A - Norton to Oswestry WTW
- Option B - Huntington to Cotebrook

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2.1.4. Both options enable treated water from regional UU sources to be transferred by pumping into the Vyrnwy Aqueduct to maintain customer supplies (As shown in **Figure 2** below).

Figure 2 - Schematic showing the 2 selected options



† There are four sub options available for A1 to A4.

*UU Sources to be developed further at Gate 2 to confirm Deployable Output

**Potential opportunity to supply up to 25 MI/d towards water transfer – to be considered at Gate 2

Note all figures represent MI/d.

2.1.5. Option A requires pumping treated water up the Vyrnwy Aqueduct to Oswestry WTW (in reverse of normal flow direction), through a new bypass into a new blending option (that mixes both the treated water and raw water from Lake Vyrnwy) for treatment through Oswestry WTW, before gravitating back down the remaining lines of the aqueduct to supply customers.

2.1.6. Option A has four sub options for different water transfer volumes, as additional enabling works are progressively required to scale up in volume from 51 MI/d to 75 MI/d, 76 MI/d to 135 MI/d, 136 MI/d to 150 MI/d and finally up to 180 MI/d. (As shown **Figure 3**).

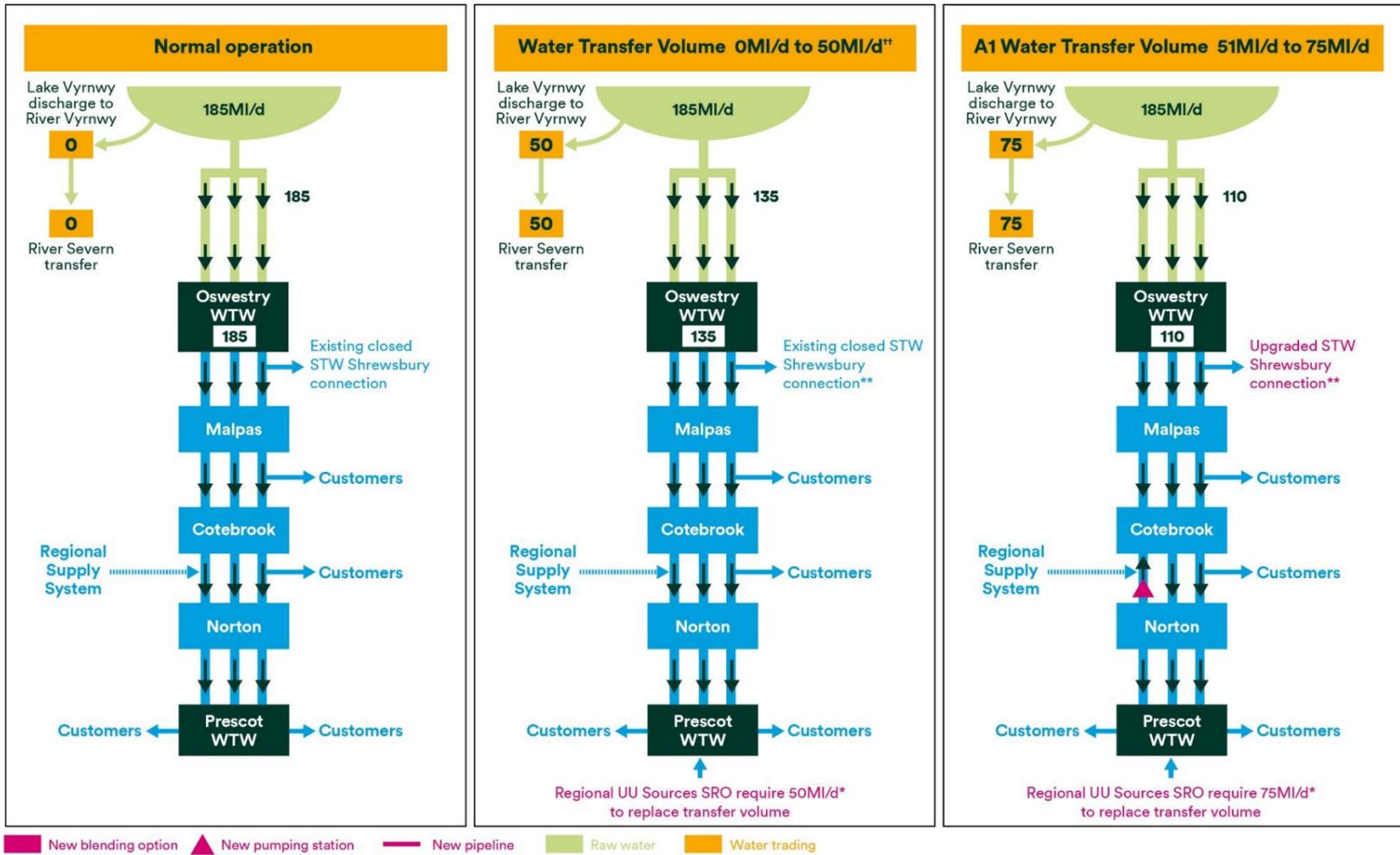
2.1.7. Option B consists of a new pumping station and pipeline from Huntington connecting into Cotebrook, which is part of the Vyrnwy Aqueduct. Water will then gravitate from Cotebrook to feed customers off the Vyrnwy Aqueduct. The maximum transfer allowed under gravity flow with this option is 75 MI/d, although it may be possible to increase to 180 MI/d through additional pumping to Oswestry WTW. We will confirm the full scope of this option in Gate 2. The options have been developed to maintain a minimum production flow at Oswestry WTW of 110 MI/d, to meet design specifications and to maintain water quality.

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- 2.1.8. **Figure 3** illustrates how the system configuration changes to facilitate the transfer volumes. It also shows a further sub option to supply Severn Trent Water (STW) with 25 MI/d into Shrewsbury, taken from an existing connection off the Vyrnwy Aqueduct on the outlet of Oswestry WTW. This option would mitigate the amount of direct release from Lake Vyrnwy into the River Vyrnwy and therefore affect the selection of Option A, its sub options, or Option B. The scoping of this Shrewsbury option is in the scope of the Severn Trent Water (STW) Sources SRO. We are working collaboratively with STW to develop a cost effective solution to support water transfer requirements.

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Figure 3 - Configuration of options



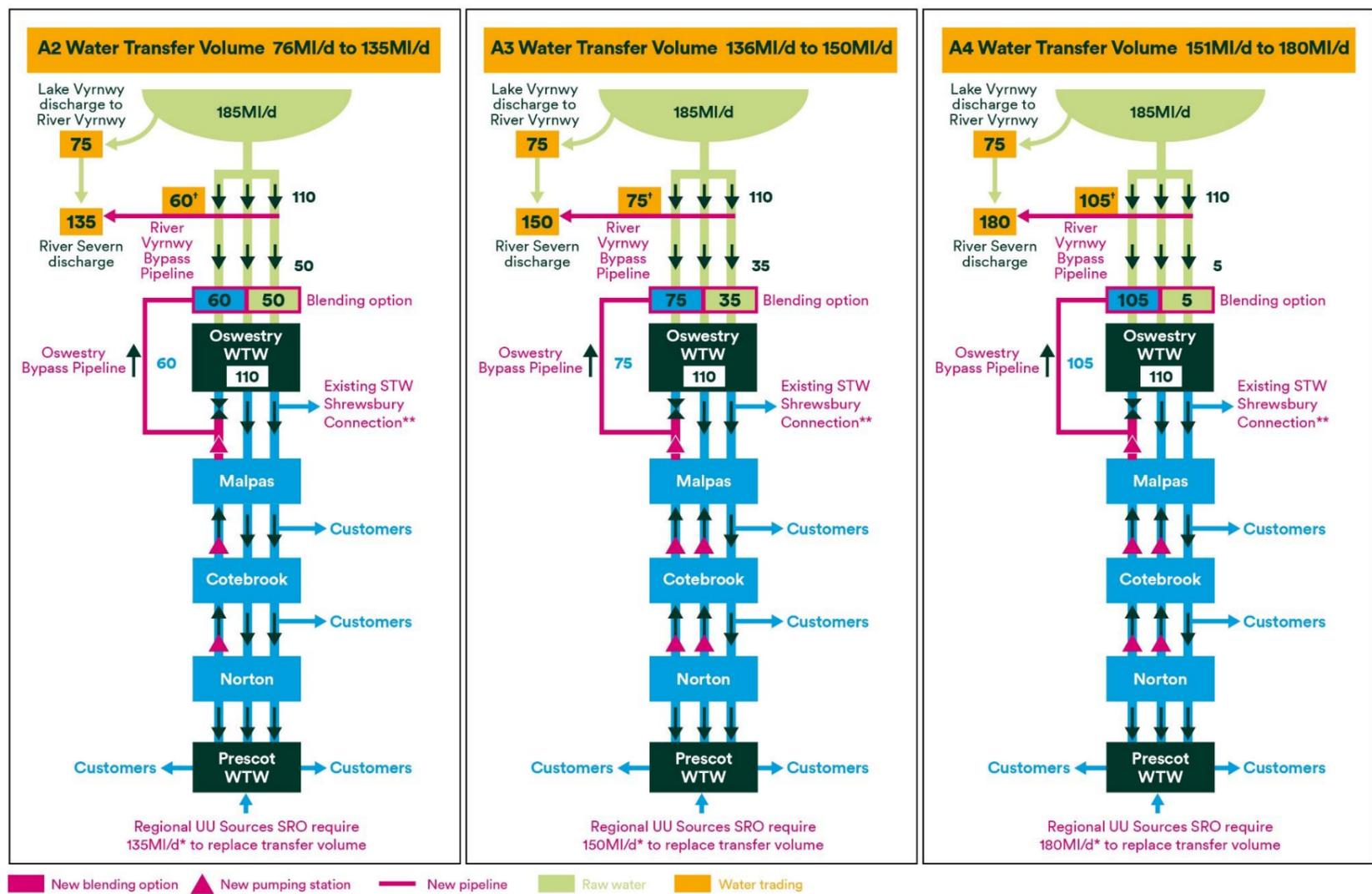
*UU Sources to be developed further at Gate 2 to confirm Deployable Output.

**Potential opportunity to supply up to 25 MI/d towards water transfer – to be considered at Gate 2.

††This option does not require any new enabling works to the Vyrnwy Aqueduct.

Note all figures represent MI/d.

[It is assumed that the maximum reliable yield of Lake Vyrnwy is 185 MI/d and that a minimum of 5 MI/d of raw water is required to maintain a blended solution, which supports a maximum transfer volume of 180 MI/d].



† The River Vyrnwy bypass pipeline could be sized up to a maximum of 180 MI/d. If the River Vyrnwy discharge is limited to 0 MI/d.

*UU Sources to be developed further at Gate 2 to confirm Deployable Output.

**Potential opportunity to supply up to 25 MI/d towards water transfer – to be considered at Gate 2.

Note all figures represent MI/d.

[It is assumed that the maximum reliable yield of Lake Vyrnwy is 185 MI/d and that a minimum of 5 MI/d of raw water is required to maintain a blended solution, which supports a maximum transfer volume of 180 MI/d].

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2.1.9. All VA SRO options and sub options Capex and Opex costs are shown in **Table 3** below.

Table 3 - Options of A - Water Transfer Volumes and Costs

VA Options	Sub Option	Water Transfer Volumes (MI/d)	Capex with Optimism Bias (£m)	Opex (£m/yr)	Average Incremental Cost (AIC) (p/m3)
Option A	A1	75	22.0	0.2	4
	A2	135	145.0	1.7	15
	A3	150	170.0	1.8	15
	A4	180	179.0	2.8	17
Option B	Huntington to Cotebrook	75*	134.0	0.7	18

*For Option B it may be possible to increase to 180 MI/d through additional pumping to Oswestry WTW. We will confirm the full scope of this option in Gate 2.

Source: Solutions Assessment Matrix (March 2021)

2.1.10. The costs to each future gateway for VA SRO are forecast to be in line with the PR19 FD values, as shown in **Table 4** below.

Table 4 – RAPID gated allocations

	Gate 1	Gate 2	Gate 3	Gate 4
Ofwat allowance for each gate	£1.47m (actual cost £1.092m)	£2.21m	£5.15m	£5.88m

2.1.11. VA SRO works in conjunction with the UUS SRO and the STT SRO to support water transfer (as shown in Section 1 **Figure 1**). The VA SRO provides benefits on several levels:

- It operates in tandem with the UUS SRO, to protect the resilience of customers’ supplies and the environment from the impacts of water transfer.
- It also operates conjunctively with the other STT SROs to maximise the overall benefit and reliability of the STT scheme.
- Our environmental assessments have indicated no additional flooding risk associated with the options we are proposing. Due to the nature of the proposed options, there are limited opportunities for flood alleviation, but these will be reviewed as part of Gate 2.

2.1.12. Each option has undergone environmental assessment following the principles of Strategic Environmental Assessment (SEA), Habitats Regulations Assessment (HRA) and Water Framework Directive (WFD) Assessment. In addition, we have completed a high-level Natural Capital Assessment (NCA), Biodiversity Net Gain (BNG) Assessment and Invasive Non-Native Species (INNS) Risk Assessment. These assessments have highlighted areas of environmental risks and provided environmental costings to support the Average Incremental Social Cost (AISC), and opportunities for wider environmental improvements, as shown in Section 5, **Table 7** and Section 10 **Table 14** respectively.

2.1.13. We recognise that some options may cause a change in customers’ water and we are working with customers to understand their preferences (as shown in Section 8). We will undertake the drinking

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water safety planning approach to the solutions as the design and modes of operation are developed prior to our Gate 2 submission, covering treatment and distribution to mitigate the impact on customers.

2.1.14. We are designing the VA SRO options in conjunction with another major capital project named Vyrnwy Cleaning and Lining to look for opportunities to work collaboratively and identify water transfer cost efficiencies providing the best overall value for customers in the long term. We are working to quantify the possible benefits of combining elements of these projects and identify any additional associated risks in the early stages of our Gate 2 activities.

3. Outline project plan

- We have delivered our Gate 1 programme on time and within budget
- We have developed a programme which outlines key activities and outputs for Gates 2-5
- We believe a 180 MI/d transfer solution can be delivered by 2033 with an opportunity to accelerate this to 2028 for transfer volumes at 50 MI/d or less

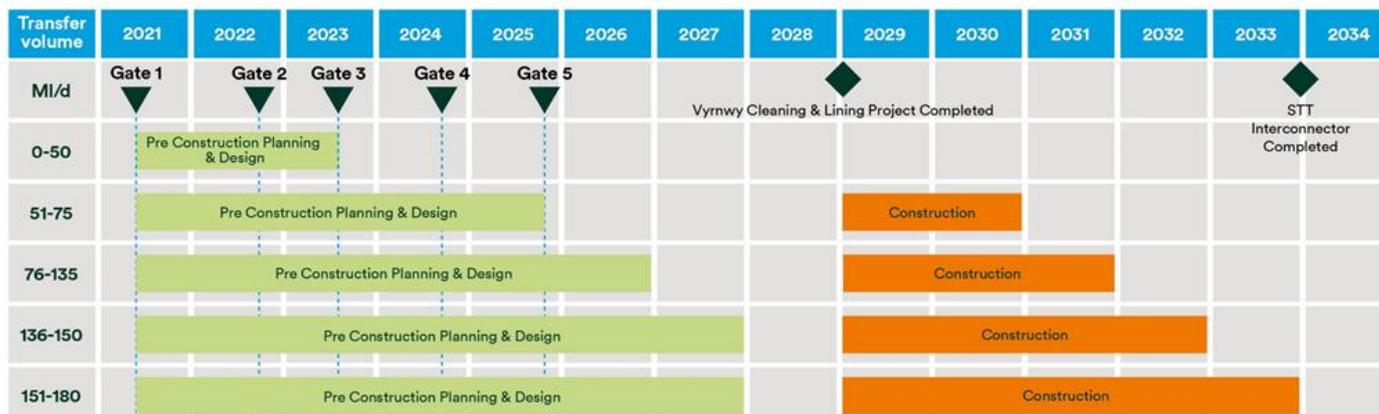
3.1.1. We have delivered our Gate 1 programme on time and within budget. Although the Covid-19 pandemic impacted our programme in a number of areas, we have introduced measures to mitigate many of these challenges. The key exception to this is face-to-face customer acceptability research.

3.1.2. Customer acceptability is a key consideration in the selection of source options as we wish to minimise the impact of potential changes in customers' water. We have undertaken an online customer research programme (as shown in Section 8) and had planned a series of 'Hall Tests' where customers would be invited to physically interact with different water samples - such as undertaking taste tests, boiling kettles, lathering soap – to understand their perception of changes in water (primarily hardness). Due to Covid-19 restrictions, we have deferred this activity in to Gate 2.

3.1.3. The timing of the solution will be determined through regional modelling and water resource management plans (WRMP). To support a supply deficit in the South East, the VA SRO is dependent upon the delivery of the STT SRO, currently scheduled for earliest completion in 2033. However, in conjunction with the UUS SRO we are able to release water (up to 150 MI/d) into the River Severn in advance of this date, providing an opportunity for abstractors in the River Severn catchment.

3.1.4. Due to the scalability of our source options up to 180 MI/d transfer volumes and the increasing complexity of the VA SRO enabling works at higher transfer volumes, it is possible that we could deliver lower transfer volumes by 2028. The delivery dates associated with each transfer volume are shown in **Figure 4** below.

Figure 4 – VA SRO High Level Programme for different ranges of transfer volumes

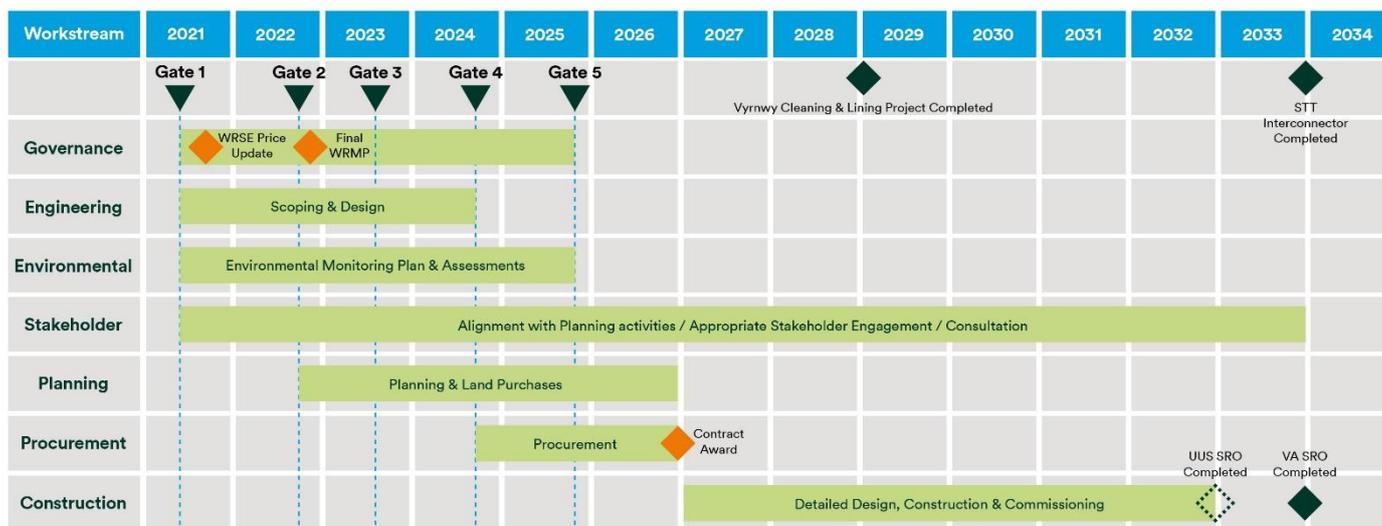


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Source :UUVA SRO Gate 2 Programme Plan

- 3.1.5. Our working assumption is that we will need to wait for the Vyrnwy Cleaning and Lining project to complete before we start construction of the VA SRO elements. We have identified an opportunity to collaborate across the two projects, which may allow delivery of the VA SRO to be brought forward and this opportunity will be explored further prior to Gate 2.
- 3.1.6. We have identified the key milestones and activities associated with delivery of the VA SRO programme post Gate 1 assessment through to Gate 5. This also encompasses the pre-construction activities required to be ‘construction ready’ in AMP8. The programme below assumes the full 180 MI/d is required, as shown in **Figure 5** below.

Figure 5 - Key Milestones and Activities to Completion



Source :UUVA SRO Gate 2 Programme Plan

- 3.1.7. We have developed this programme based on our current understanding of the requirements and timescales of the RAPID gated process and the wider regional planning process. However, we are conscious that this will be subject to change and therefore we have maintained a detailed assumptions and dependencies log. We have highlighted the key items shown in **Table 5** below.

Table 5 - Key Assumptions and Dependencies

Workstream	Assumption/Dependency
Stakeholder	It is assumed that the stakeholder management plan will address stakeholder concerns to enable timely and successful delivery of planning consents.
Procurement	It is assumed that construction contracts will be awarded through UU frameworks and not be subject to a DPC process (see Section 6 for outcome of DPC assessment)
Planning	It is assumed that the VA SRO options would be consented under the Town and Country Planning regime.
Programme	The VA and UUS SROs are interdependent and therefore delivered in tandem to enable out of region transfers.
	If the water is required in the South East, the VA & UUS SROs have a dependency on the STT SRO Interconnector.
	It is assumed that both VA & UUS SROs are selected in both WRW and WRSE Regional Plans.
	It is assumed that the VA SRO solution satisfies the requirements of the Water Transfer Principles agreed with the UU Executive.

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Workstream	Assumption/Dependency
Engineering	It is assumed that the Vyrnwy Cleaning and Lining project solution is a structural slip lined solution that aligns to the proposed VA SRO configurations.
	It is assumed that the maximum reliable yield of Lake Vyrnwy is 185 MI/d and that a minimum of 5 MI/d of raw water is required to maintain a blended solution, which supports a maximum transfer volume of 180 MI/d.
Environmental	It is assumed environmental and water quality impacts, which may emerge following detailed feasibility, can be mitigated to enable support from environmental regulators and achievement of planning consents.

Source : UUVA SRO RAID Log (May 2021)

4. Technical information

- We have engaged with regional groups and engineering experts to define the VA SRO enabling works options to facilitate a range of transfer volumes
- We have produced robust cost estimates in alignment with the relevant cost consistency methodology

4.1.1. The options considered are set out in Section 2, **Figure 2**. Two options have been selected to progress forward to Gate 2. These are:

- Option A - Norton to Oswestry WTW
- Option B - Huntington to Cotebrook

Option A: Norton to Oswestry WTW

4.1.2. This option includes pumping stations that deliver treated water through a single or dual line of the Vyrnwy Aqueduct (VA). The pumping stations will transfer water up the VA system. There are numerous customers fed off the VA from bulk supply points that will require modification works. There are also cross over valves and pipe connections needed to ensure they can withstand the pumping pressures and maintain levels of service. This scope of work relies on the completion of a structural liner installed as part of the Vyrnwy Cleaning and Lining project. The exact location for the proposed pumps needs to be assessed to minimise working pressures on the mains.

4.1.3. At Oswestry WTW a new bypass pipeline will take treated water from the single line of the VA into a new blending option. The blending option is required to mix treated water with raw water from Lake Vyrnwy to maintain the operations of Oswestry WTW. This blend of water will then gravitate to the works for treatment. Oswestry WTW needs to maintain a minimum production of 110 MI/d to maintain operational performance. As shown in Section 2, **Figure 3**.

Option A: Norton to Oswestry WTW Sub Options

4.1.4. There are four sub options (A1 to A4) shown in Section 2, **Figure 3**. All four sub options require a level of pumping up the VA. As the water transfer volume increases, so will the requirement to pump more treated water up the VA to Oswestry WTW, as shown in **Table 6**.

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Table 6 – Sub option configuration

VA Options	Sub Option	Water Transfer Volumes (Ml/d)	Number of Pumping Stations	Oswestry WTW Bypass Pipeline	Blending options
Option A	A1	75	1	No	No
	A2	135	3	Yes	Yes
	A3	150	5	Yes	Yes
	A4	180	5	Yes	Yes

Note: River Vyrnwy Bypass Pipeline may be required for options A2, A3 & A4 (STT SRO scope)

Source: UUVA Solutions Assessment Matrix (March 2021)

Option B: Huntington to Cotebrook

4.1.5. This option requires the installation of a new 18km pipeline from Huntington WTW to Cotebrook, alleviating the need to pump from Norton to Cotebrook and avoiding some associated modification works on this section of the VA as shown in Section 2, **Figure 2**. The maximum transfer under gravity flow with this option is 75 Ml/d, although it may be possible to increase to 180 Ml/d through additional pumping to Oswestry WTW. We will confirm the full scope of this option in Gate 2.

Operation and maintenance for all options

4.1.6. We will need to develop an operational change over plan on the VA system for both starting and stopping the transfer as part of future gateway activities. The VA is a complex set up with numerous cross connections, bulk supply points and valve houses. To ensure there is no water quality infringements it is imperative that the VA is changed over in a controlled manner. The monitoring and control infrastructure required to enact the operating plan needs to be defined in line with our systems thinking approach in Gate 2.

4.1.7. Options A2 to A4 will require new pumping stations with equipment. The equipment will be designed to UU Asset Standards and Design Life and in line with our systems thinking operational strategy. All pumping station layouts will cater for future operation and maintenance requirements.

Initial costs and benchmarking

4.1.8. A summary of Capex and Opex, Average Incremental Societal Cost (AISC) and a summary of the SAM is shown in Section 10, **Table 13**.

4.1.9. We have scoped and estimated each option (with Capex including optimism bias, Opex including maintenance requirements) in line with Mott MacDonald 'Cost Consistency Methodology Rev C'². We have developed estimates for the options using our estimating database developed from a range of previous projects, including projects with similar scope of work. We carried out market testing at PR19 to benchmark our costs for 14 sample projects against our framework partners, as well as Costain and Mott MacDonald. This exercise showed that our internal estimates were below average (34th percentile) and provides confidence that our costs are efficient. In addition we have participated in benchmarking of costs for the River Vyrnwy bypass pipeline element of the STT SRO which showed our estimating to be between 4% lower and 16% higher than the Jacobs benchmark. We will continue to refine our costs as we develop our designs through to Gate 2.

Initial water resources benefit

4.1.10. This VA SRO does not directly benefit a specific water resource body. The VA SRO is a key enabler, working conjunctively with UUS SRO. The transfer is likely to be made through a combination of direct release into the River Vyrnwy, a new Vyrnwy bypass pipeline connecting the VA to the River Severn

² Mott MacDonald, Cost Consistency Methodology (Rev C), Technical Note and Methodology, published August 2020

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and through a treated supply to Shrewsbury. The details of the transfer is being covered by the STT SRO. The working assumption is that VA SRO could benefit WRSE, however there is also potential to support other transfers to abstractors within the River Severn catchment.

Initial data provided to WRSE

- 4.1.11. We provided initial data to regional groups to support high-level assessment of regional water resource benefits, including provision of indicative pricing information to WRSE in March 2021.

5. Environmental and drinking water quality considerations

- We have completed SEA, HRA, WFD and INNS assessments for all options
- We have undertaken an initial NCA and BNG assessment to identify, at an early stage, opportunities to deliver environmental and social benefits that we will explore further prior to Gate 2
- We have committed to Water UK's Net Zero 2030 Routemap and are actively contributing to the All Company Working Group (ACWG) Carbon Task & Finish Group
- We have undertaken a source level assessment of risks to inform our Gate 2 water quality programme

Introduction

- 5.1.1. We are committed to ensuring that the VA SRO supports, or at least does not have a detrimental impact on, our overall environmental performance and that our customers continue to have confidence in their water supply and acceptance in terms of taste, odour, appearance (discolouration) and pressure
- 5.1.2. We have undertaken environmental assessment of the VA SRO options following the principles of SEA, HRA and WFD assessment. In addition, we have completed high-level NCA, BNG assessment and Invasive Non-Native Species (INNS) Risk assessment. Our assessments:
- are aligned with the approaches adopted for the assessment of WRMP19 (where applicable) and have taken into account relevant Welsh legislation including the Well-being of Future Generations (Wales) Act 2015 and the Environment (Wales) Act 2016
 - have been informed by extensive stakeholder engagement
 - evaluate the environmental effects of the preferred list of VA SRO options, facilitating the early identification of measures to mitigate adverse effects and deliver environmental benefits
 - have confirmed that significant negative environmental effects are likely to be avoidable, subject to further investigation and identification of appropriate mitigation measures during Gate 2
- 5.1.3. We have also considered the likely raw water, treatment and downstream risks (including customer acceptability). Each option has a very different risk profile and we will undertake the drinking water safety planning, and Regulation 15 new sources (where appropriate), approach to all options in the consolidated list as we progress to our Gate 2 submission.

Initial Option Level Environmental Assessments

Overview and Approach

- 5.1.4. Environmental considerations have been at the forefront of our option selection process. Our environmental assessments have been undertaken in accordance with the methodologies developed for WRMP19, an approach agreed with the National Assessment Unit (NAU) and Natural Resources Wales (NRW), and subject to engagement with regulators.
- 5.1.5. We have taken into account the findings of the assessments in our appraisal (see Section 10 for further information) and selected two options: Option A: Norton to Oswestry WTW; and Option B: Huntington to Cotebrook.

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- 5.1.6. Following primary screening, which included a high level consideration of environmental risks, we carried out SEA, HRA and WFD assessment of five feasible options for the UUVA SRO in order to:
- Evaluate the significant environmental effects of the options including where their implementation may cause deterioration in WFD water body status and/or adverse effects on the integrity of European designated nature conservation sites
 - Possible in-combination effects have been considered
 - Identify measures to mitigate adverse effects and opportunities to deliver environmental benefits
 - Inform our programme of post Gate 1 environmental investigations
- 5.1.7. The two options for the VA SRO have subsequently been subject to further environmental assessment including NCA, BNG and INNS Risk assessments.
- 5.1.8. We recognise that there will be a need to align the environmental assessments with work undertaken for WRMP24 and the WRW Regional Plan. We are therefore proactively working with WRW and its environmental assessment team to ensure consistency in terms of the breadth and scope of assessments and to avoid unnecessary duplication.

Assessment Findings

5.1.9. The findings of the SEA, HRA and WFD assessment of the selected options are shown in **Table 7** below.

Table 7 - Summary of Environmental Assessment Findings

	Biodiversity	Geology/Soil	Water	Flood Risks	Air Quality	Health	Population	Heritage	Landscape	Commentary
Option A: Norton to Oswestry WTW	Yellow	Green	Yellow	Green	Green	Green	Green	Green	Green	-There is the potential for effects on Midlands Meres and Mosses Phase 1 Ramsar site at Hatch Mere during the construction of the option which may require mitigation. -Further investigation is required to confirm required abstraction volumes and location. Water Industry National Environment Programme (WINEP) investigations are ongoing and NRW has confirmed that no additional water should be taken from the Dee. In consequence, effects on water are uncertain.
Option B: Huntington to Cotebrook	Green	Green	Yellow	Green	Green	Green	Green	Green	Green	-Further investigation is required to confirm required abstraction volumes and therefore effects on water are uncertain.
Key										
	<ul style="list-style-type: none"> • Significant negative environmental effects identified. Further investigation and detailed review of potential for mitigation required at Gate 2. • Adverse effects on European designated nature conservation sites likely (Biodiversity criterion only). Further investigation and detailed review of potential for mitigation required at Gate 2. • High level of impact on WFD water bodies (Water criterion only). Further investigation and detailed review of potential for mitigation required at Gate 2. 									
	<ul style="list-style-type: none"> • Significant negative environmental effects identified that can be reasonably mitigated and/or further investigation is required. • Adverse effects on European designated nature conservation sites possible and/or further investigation is required (Biodiversity criterion only). • Medium level of impact on WFD water bodies and/or further investigation is required (Water criterion only). 									
	<ul style="list-style-type: none"> • No or only minor negative environmental effects identified. • No risk of adverse effects on European designated nature conservation sites (Biodiversity criterion only). • No or minor level of impact on WFD water bodies (Water criterion only). 									

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- 5.1.10. Our HRA assessment has identified that there is the potential for Option A to have significant negative effects on European designated nature conservation sites during the construction phase; however, it is likely that these effects could be avoided or mitigated. Effects on WFD waterbodies have been assessed as uncertain for both options at this stage, reflecting the need for additional investigation to confirm the extent, if any, of additional abstraction. We will undertake these investigations prior to Gate 2 in accordance with our Environmental Monitoring Plan (EMP).
- 5.1.11. Overall, at this stage, we do not consider there to be potential environmental effects so significant that prevent the selected options from progressing to Gate 2.

Environmental, Social and Economic Valuations

Overview and Approach

- 5.1.12. We completed Environmental and Social (E&S) costings of the selected options for the VA SRO, based on the Benefits Assessment Guidance approach, to inform the AISC and selection of the list of options (see Section 10).
- 5.1.13. In accordance with the requirements of the NAU & Natural Resources Wales (NRW), ACWG guidance and Water Resources Planning Guideline, we have also carried out a high-level assessment of the potential natural capital benefits of the list of options and opportunities for delivering BNG to ensure that our proposals would not result in a net loss of biodiversity and deliver overall a positive impact.
- 5.1.14. Beyond Gate 1, we will quantify the ecosystem services and calculate a monetary valuation of the benefits/dis-benefits. The identification of a solution for the VA SRO will also permit more detailed consideration of opportunities for BNG.

Assessment Findings

- 5.1.15. The opportunities to increase natural capital and biodiversity that we have identified are associated with, for example, enhancements at river and hedgerow crossings, creation of pollinator strips in arable fields and enhancements through changes in management on soft landscaping at existing water treatment infrastructure. We will continue to explore these and other opportunities to deliver environmental net gain beyond Gate 1 in liaison with key stakeholders and as more detailed designs are developed. Any offsetting or mitigation schemes will be included in the design so that future stages of NCA can take account of any potential social and environmental benefits.
- 5.1.16. The SEA has also identified additional potential social benefits associated with the VA SRO options including investment in local supply chains and the creation of jobs.

Drinking Water Quality Considerations and Risk Assessments

- 5.1.17. Prior to Gate 1, our Water Quality and Public Health Manager has been engaged in the review of the solutions assessment. This expert has reviewed the options under consideration, and provided guidance on the likely risks (including acceptability). In each case highlighting any inherent risks, the degree of uncertainty around the risks and likelihood of unknowns. A “gap analysis” has been undertaken with respect to those progressing through Gate 1 – where we have reviewed existing drinking water safety plans for any risks that cannot be readily addressed by the proposed solution. We have undertaken workshops with representatives of RAPID and DWI to talk them through this approach and will further engage with them as we go through the next stages of the process.
- 5.1.18. The solutions under consideration are likely to have a similar risk profile, primarily around risk of discolouration and changes in the taste of the water (acceptability) due to changes in source. Both these risks can be adequately addressed and managed through the engineered design of the solution as well as the method of operation. With respect to discolouration, this will be primarily addressed

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through the planned relining of the aqueduct being undertaken under the DWI's Enforcement Order (UUT-2020-00002) in this and the next AMP. As for any variation in the taste, the alternative source being progressed has some different qualities to Vyrnwy water, however the hardness is only slightly greater, and will be addressed through blending. We will ensure that the taste of the water is acceptable to consumers at all times.

- 5.1.19. We will undertake the drinking water safety planning approach to the solutions as the design and modes of operation are developed prior to our Gate 2 submission. We have liaised with representatives of RAPID and the Drinking Water Inspectorate to outline this approach and will provide regular updates on the solution level assessments as they further develop.

Conclusions and Issues Arising

- 5.1.20. Overall, the VA SRO will provide water to our customers supplied directly from the VA when the transfer is operational. The VA SRO will therefore ensure supplies are maintained during times of transfer. Water resource and asset resilience are both criteria included in our option appraisal (see Section 10). Environmental resilience benefits have not been identified at this stage but will be investigated further prior to Gate 2.
- 5.1.21. Our environmental assessments and engagement with regulators have identified a need for further investigation in respect of the preferred options prior to Gate 2. We have developed an EMP in conjunction with the NAU and NRW which sets out a programme for this work. Through our environmental assessments, we have already started to identify potential opportunities to deliver environmental and social benefits. These will be explored further following the selection of the preferred solution for the VA SRO.
- 5.1.22. We have estimated construction and operational carbon emissions for all of the VA SRO options. This includes embodied carbon, emissions from vehicles and carbon associated with the power required during operation. We are working alongside the rest of the water industry to set out its plans to be carbon neutral by the end of this decade. We have committed to Water UK's Net Zero 2030 Routemap which is 20 years ahead of the UK Government's own legally binding target of 2050 and forms the world's first detailed plan to get an entire industry sector to net zero. We are also actively contributing to the ACWG Carbon Task & Finish Group which is aiming to develop a consistent carbon ambition across all SRO projects.
- 5.1.23. We have calculated the social and environmental costs of the options identified for the UUVA SRO in the AISC. We will consider these costs further prior to Gate 2, informed by ongoing environmental assessment including NCA and BNG Assessment. Our approach to assessing overall costs and benefits to determine best value for customers and the environment is set out in Section 10.

6. Initial outline of procurement and operation strategy

- We have assessed the VA SRO as being 'somewhat less suitable for DPC'
 - We have assessed 17 procurement strategies, with our current preference being 'Strategic Relationship'
- 6.1.1. In partnership with external consultants we have made an initial assessment of the scheme's suitability for Direct Procurement for Customers (DPC) and also outlined a preferred procurement strategy.
- 6.1.2. With respect to DPC we have assessed the scheme against the suitability criteria developed by KPMG on behalf of Ofwat³. Our initial assessment for DPC would indicate that the VA SRO is "somewhat less suitable for DPC". Although the scheme value is likely to be greater than £100m, the works involve

³ https://www.ofwat.gov.uk/wp-content/uploads/2017/12/DPC-A-technical-review-FINAL_08.12.17.pdf

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modification to existing UU assets and integration with the effective operation of the UU supply system. The outcome of our assessment against the KPMG criteria is shown in **Figure 6**.

Figure 6 - DPC Suitability Assessment for VA SRO

	Project somewhat suitable for DPC	Project Somewhat less suitable for DPC	Assessment Comments
Project Size	Very Large Schemes with CAPEX Values in excess of £100m	Small schemes with Totex values close to or below £100m	Present estimate of project cost is £224m, In line of the AMP7 Pipe lining project, might this fall below the £100m level? (Tbc)
Stakeholder interactions and statutory obligations	Limited or marginal impact on the appointees ability to meet item statutory obligations (e.g. Non portable or raw water sources)	Asset materially contributes towards appointee meeting statutory obligations	85% of the capacity will be for UU, while 15% will be subject of water trading. The proposed changes will involve portable water. With customers along the route, this is required for UU to maintain their statutory duties
Interaction with network	Assets where there are limited economies of scale and scope with the rest of the appointees network system OR where those economies of scale or scope could be maintained through contracts	Assets where there are material economies of scale and scope with the rest of the appointees network system or where economies of scale or scope cannot be maintained through contracts	Considered difficult to gain economics of scale since due to interaction with existing infrastructure and blending tank
	Simple or limited, well understood and manageable interactions with the appointee's network	Significant, complex and frequent interactions with the appointees' network	Significant and Frequent interactions between existing UU infrastructure assets and the proposed new Blending tank and Aqueduct around the Oswestry
	Separate non-contiguous networks or assets within the appointees area Assets where capacity is shared by multiple appointees More passive assets (e.g. network enhancement pipes) that are not actively managed as part of the overall system	Assets that are actively managed as part of the overall system operation of the network	When built this project is a critical part of the UU supply system
Contributions to supply capacity and ability to specify outputs	Assets where capacity is regularly needed and contracting requirements can be more easily defined and priced	Assets where capacity is rarely needed (e.g. Resilience schemes and contracting requirements difficulty to specify)	When STT Water Trading is underway it is anticipated that c15% will be required for Trading and this is a resilience scheme. Control of the Asset is required to effectively run the UU supply network; maintaining UU
	Schemes where outputs can be clearly defined and are not subject to substantial change from other factors or difficult to predict in the future (e.g. Around asset condition at handback)	Assets where capacity requirements are not well understood uncertain Schemes where outputs cannot be clearly defined	Assets required to be live and operational throughout the construction after. Critical part of UU supply structure to meet obligations
Asset and operational failures	Assets where operational failure risk is well understood and mitigations well established for similar assets	Assets where operation failure risk is not well understood with limited track record of effective mitigations	Operational risks of failure is well understood but mitigation would not be sufficient to supply the (see point 1 re UU statutory obligations)
	Well developed market or technical supply chains with strong experience of similar project delivery	Weak market or technical supplychains with limited experience of similar project delivery Assets where there are no alternative back up supplies	Market could provide construction solutions but not considered appropriate for ownership No back up supplies

6.1.3. In addition to DPC assessments we have also evaluated emerging procurement strategies. We have utilised our proprietary tool the Market Engagement Methodology (MEM) which takes 17 commercial approaches to create a funnel of possible contracting methods, providing primary and secondary options to be considered in the next stage of the project. Our Gate 1 assessment for the VA SRO has refined this list to three possible approaches with the optimal procurement solution to be that of a Strategic Relationship. Under our model this is defined as where we work with the supply chain to co-develop the outcome and where UU maintain ownership and operation of the assets. While Strategic Relationship is the primary option, there are two alternative options which we will continue to consider prior to Gate 2, namely Framework Providers and Joint Specification. Brief descriptions of these procurement approaches are shown in **Table 8** below. These will continue to be reviewed as we develop our preferred solution for Gate 2.

Table 8 – Proposed Procurement Strategies for Further Consideration

Procurement Strategy (Preferred)	Outline Description
Strategic Relationship	Focusing on relational contracting mechanisms at the business level, inclusive of Delivery Partners, Delivery Consortia, Strategic Partnering and Alliancing.
Procurement Strategy (Alternative options for consideration)	Outline Description
Framework Providers	Incorporating frameworks of various types, this focuses on the aggregation of focused services.
Joint Specification	UU engage the marketplace to help define and develop elements of the requirement.

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- 6.1.4. In terms of anticipated operational utilisation of the VA SRO this is dependent on the outcome of the regional planning process to model the likely frequency and duration of transfers. We expect clarity on this between Gates 1 and 2 to enable us to provide a detailed assessment of forecast utilisation of Lake Vyrnwy. If the water is only required to supply the South East, there may be a dependency on consent being granted for the STT SRO Interconnector before planning permissions can be sought for the VA SRO.
- 6.1.5. We anticipate the operation of transfers will be integrated within our production planning function due to the inherent impact they will have on UU's supply system. This is a 24/7 operation which monitors a range of inputs including projected demand, planned asset outages and weather forecasts to inform a weekly optimised production plan. The team continuously monitor performance against the plan and make necessary amendments to mitigate for changing forecasts or unplanned incidents.

7. Planning considerations

- We currently assess that the options under consideration would be consented under the Town and Country Planning Act
- We believe it is likely that there will be a combination of permitted development rights and express planning permissions⁴

Summary

- 7.1.1. We consider that the most efficient, optimal consenting strategy would be pursuing consent by a combination of permitted development and where necessary express planning permissions under the Town and Country Planning Act 1990.
- 7.1.2. This strategy is subject to review as the development of the VA SRO progresses. In particular, the consenting strategy will need to be revisited when the option to be taken forward has been selected and fully developed. It will also need to be considered alongside the wider strategy for the regional water resource plans.

Proposed consenting strategy

- 7.1.3. The VA SRO enabling works would not be classified as a Nationally Significant Infrastructure Project (NSIP) under the Planning Act 2008 and therefore would not be required to be consented by way of a Development Consent Order (DCO), as they would not meet the relevant criteria (e.g. they would not be transferring raw water). Given this, the only way that they could be consented by way of a DCO is if UU requests that the Secretary of State gives a direction under section 35 of the Planning Act 2008 that the VA SRO enabling works should be treated as a NSIP as a result of their national significance. However, at this stage, UU is of the preliminary view that the benefits offered by the DCO consenting route would only have limited application.
- 7.1.4. The preferred consenting route at this stage is to secure consent under the town and country planning regime. Depending on the precise nature of the works there would be scope to rely on planning permission automatically granted as a result of permitted development rights under the Town and Country Planning (General Permitted Development) (England) Order 2015 for certain elements. This is particularly the case for works that are largely below ground or comprise the construction of plant and machinery on our 'operational land'. Elements of the works such as any new buildings or plant and machinery over the permitted development limits, or any new or amended access to the highway etc. would require express planning permission.

⁴ The term 'express planning permissions' refers to the requirement for planning permission from the local planning authority. This is to differentiate it from planning permission granted by development orders

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7.1.5. However, elements of the VA SRO enabling works may be captured by the Environment Impact Assessment (EIA) regime. This would particularly apply to long distance pipelines. This effectively removes permitted development rights subject to a screening opinion from the local planning authority. Should a screening opinion confirm that the development is “EIA development” a planning application accompanied by an Environmental Statement would be required. Under these circumstances the relevant legal tests applicable to artificially 'slicing' up a project to avoid EIA would have to be carefully considered.

Benefits and risks

7.1.6. The primary benefits of the proposed strategy are as follows:

- Maximising the use of permitted development rights would offer a flexible approach in terms of delivery, particularly as additional conditions would not be imposed on the works
- Adopt a 'mix and match' approach, in terms of splitting the consenting of the works between permitted development and planning permissions (subject to EIA tests)
- Efficient and cost effective in terms of limited preparatory work and no additional consenting fees, etc.
- Even if an express planning permission was required, less preparatory work and lower consenting fees when compared to a DCO application
- The regime under the 1990 Act is a consenting mechanism that we are very familiar with, utilising our tried and tested processes for securing consents and managing stakeholders

7.1.7. However, the proposed consenting strategy is not without risks, although we consider these can be mitigated. An indication of some of the key risks and our proposed mitigations are shown in **Table 9** below.

Table 9 – Planning risks and mitigations

Key risk	Mitigation
Planning permissions from the local planning authorities would be needed – this carries the risk of delays, inconsistency of handling and the risk of refusal by the local planning authority or authorities and the need to consider and undertake the planning appeals process.	Engage with the local planning authorities during pre-application including entering into, for example, Planning Performance Agreements (PPAs) (to ensure suitable and adequate resource can be deployed to deal with the applications). Applications need to be supported by suitable pre-application consultation and engagement with the public and key statutory stakeholders.
The VA SRO enabling works will not have the benefit of the 'supplementary' powers and consents that a DCO can confer (e.g. in relation to land).	Identify early which 'supplementary' powers and consents (e.g. where third party land is required) are needed (if any) and devise a strategy for seeking alternative means to obtaining those powers – consider requirements of compulsory purchase orders, etc., as part of programming and plan for a worst case. Noting that Water Industry Act powers are available for pipe laying and access to existing infrastructure.
There would be multiple decision-makers	Engage with the local planning authorities and other regulators and ensure consistency of approach in submissions. This will help avoid any inconsistencies.
Onerous conditions attached to planning permission, which could limit development or impede implementation.	Engagement with the local planning authorities and ensure submissions have sufficient detail of proposed mitigation articulated to provide for adaptive approaches.

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Key risk	Mitigation
Works trigger EIA thresholds, meaning permitted development rights are not available for certain works and bringing legal risks around assessment approach.	Early consideration of EIA issues as part of scheme development, with early engagement with local planning authorities and statutory environmental bodies to conclude optimal strategy – obtaining legal advice at key stages to test robustness of approach and consideration and use of EIA screening as appropriate.
Legal challenges to consenting decisions.	Proactively obtain legal advice at all stages of the development, to ensure applications are robust.

Source: UUVA SRO RAID Log (May 2021)

Timescales

- 7.1.8. The timescales associated with consents under the 1990 Act are difficult to set out, as they are entirely dependent on the nature and scale of the development in question, as well as the particular local planning authority's capacity and performance.
- 7.1.9. As an example, the target for a local planning authority to determine an application for 'EIA development' is 16 weeks - however, this is not a 'statutory' timescale. There are ways to seek to reduce or gain more certainty on these timescales, e.g. through the use of Planning Performance Agreements. However, experience shows that a 16 week period is often extended.
- 7.1.10. Should a local planning authority refuse an application, an applicant can appeal to the Secretary of State through the Planning Inspectorate. Such an appeal can add another 12 months or more to the decision making process.

8. Stakeholder engagement

- We have delivered engagement in collaboration with other SRO's supporting the STT SRO, ensuring messages to stakeholders and customers are consistent
- We believe that stakeholders are broadly supportive. More detailed engagement will occur as the need and solutions are defined in Gate 2
- Customers have some concerns around water source changes and the perceived impact on water quality and want to be notified in advance of any changes

Our approach to stakeholder engagement

- 8.1.1. Collaboration has been key in our approach to stakeholder engagement across the water companies, Regulators, and regional planning groups - WRW and WRSE. Our principles for engagement are:
- To build on the engagement undertaken through WRMP19 and regional planning, taking account of the issues and concerns raised by stakeholders and local communities.
 - To ensure the entirety of the scheme is understood, this includes the sources of water, transfer via the River Severn and the conveyance into the Thames catchment.
 - To fit with the regulatory processes established under the guidance of RAPID.
 - To ensure consistency and coordination with regional and UU water resource planning.
- 8.1.2. A stakeholder steering group has been set up with representatives from a number of water companies, members of this group are also representatives on the corresponding regional planning groups (WRW & WRSE) so consistency was ensured. As a steering group we agreed, and adopted, a tiered approach to engagement as shown in **Figure 7**. The focus for Gate 1 has been on Tier 1 stakeholders.

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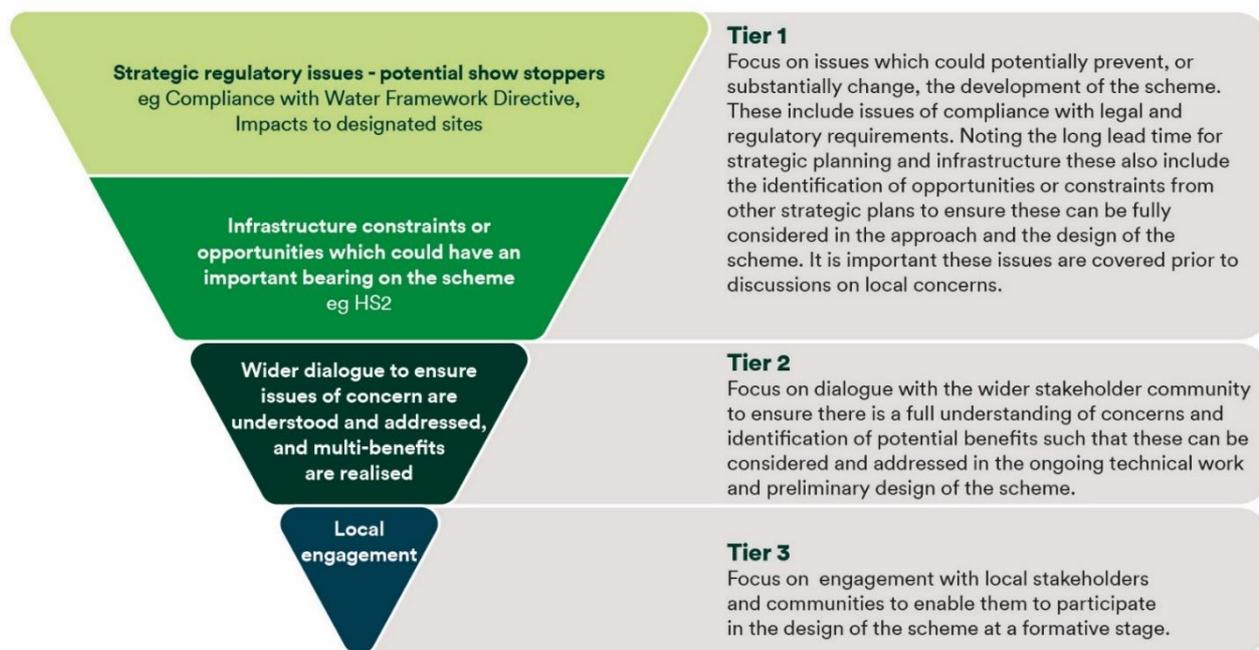
- 8.1.3. We are engaging with a broad range of stakeholders, at a Tier 1 level as we develop the UUS SRO. Most stakeholders are positive or neutral towards the current proposals for a transfer. Many are fully engaged with helping shape how the scheme progresses and are making key representations along the way. There is more to do before we could conclude we have support, while the feasibility studies are taking place the clarity that some stakeholders seek is not yet there. Because of this we have not been able to fully engage with some organisations, which will be addressed in Gate 2.
- 8.1.4. Ongoing engagement is key to ensuring we have a scheme that is both feasible and supported by stakeholders. We will update our plan regularly, following discussions with stakeholders. The plan is presented as two strands of activity; engagement via the water resources planning process and engagement on specific scheme issues.

Customers

- 8.1.5. We have engaged directly with customers to gain their views of the impacts of changes of water supply, which may be required to facilitate water transfers more strategically, as well as to understand their opinions of the specific SRO proposals under consideration.
- 8.1.6. The first, quantitative study looked at customers' acceptability of potential changes to water sources. This showed that customers think they have a good understanding of water quality in their area and were protective of any perceived deterioration. They were strongly supportive of proposals to help other regions with less water, but wanted to know the reasons for any proposed impact on their own supply in advance. Questions were raised about impact on health and wellbeing as well as on domestic appliances, which need to be considered. If potential high volumes of complaints are to be avoided, effective communications campaigns supported by regulators and industry bodies, will be needed in the event of changes in supply.
- 8.1.7. The second, qualitative study looked at customers attitudes more broadly in respect of the proposed water source options and water transfer in particular. Again, although customers were supportive of helping other regions with less water, they thought that their own water quality should not suffer. Customers thought the proposals for water transfer appear sensible, but there were initial concerns about the impact on the environment. There were also concerns that the water company should do all it could to avoid impact on the consumer, and should look to innovate and use technology where possible to provide customer protection. Mitigating messaging campaigns may also be required when transfers are operated to address customer concerns.

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Figure 7 - Tiered Approach to Stakeholder Engagement



Overview of stakeholder activity to date

- 8.1.8. For Gate 1 our focus for engagement has been on the wider STT SRO including topics on regulatory, policy and strategic issues, which could potentially prevent, or substantially change, the development of the STT SRO and its associated SROs. Alongside the scheme specific discussions, we have also engaged via WRW and WRSE to ensure stakeholders understand how the UUS SRO and other SROs, fit within the strategic planning framework.
- 8.1.9. We have set out our engagement plan, which provides an overview of the engagement undertaken and key points of discussion. A summary of some of the key topics discussed as shown in **Table 10** below.

Table 10 – Key Topics of Stakeholder Engagement

Topic	Stakeholder
The regulatory mechanism, of a put and take arrangement, has been agreed in principle	EA, NRW
A comprehensive “gap analysis” has been completed, this served as the foundation for the agreed environmental investigations and monitoring plan for Gate 2, This collaboration has culminated in the provision of an NAU Gate 1 SRO Feedback form, which is part of the Gate 1 submission.	EA, NE, NRW
The Vyrnwy source water and specifically to the need to ensure protection of the environment and mitigation required.	NRW
Focus on ensuring regulatory compliance, alignment with DWSPs including the monitoring and assessment programme. Need to ensure customer acceptability of potential changes to water quality	DWI, CCG’s
Collaborative activity to complete flow trials and understand losses in the Rivers Severn and Avon	EA, NRW
Need for planned, timely and well managed engagement with local communities and compliance with Wellbeing requirements	Welsh Government, NRW, Wales Water Management Forum
Early engagement with identified local stakeholders classed as Tier 1	Windermere Liaison Group, Vyrnwy Liaison Group

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Next steps- planned stakeholder engagement for Gate 2

- 8.1.10. For Gate 2 our focus will broaden to include the Tier 2 stakeholders and include the following activities:
- continued engagement with wider stakeholder population regarding the development of the regional plans, the selection and prioritisation of solutions and the interregional reconciliation of plans.
 - continued engagement with the NAU & NRW on the technical studies underway and more detailed engagement as scheme specifics become more established.
 - continued engagement with Consumer Council for Water (CCW) and Customer Challenge Groups (CCG) to share ongoing customer engagement work.
 - ongoing engagement with other Tier 1 stakeholders.
 - as the design of the scheme is developed, introductory discussions with the Local Authorities and key local stakeholders will focus on the planning process.

Customer Research

Study 1- Water quality – acceptability of changes in water supply sources – summary of findings

- 8.1.11. Over December 2020, DJS Research Ltd (DJS) conducted an online survey with domestic household customers across the region. The key objective of the research was to measure customer attitudes on current water quality and to gain insight on acceptability should there need to be a change in supply. In total, 1,057 surveys were completed.
- 8.1.12. Customers are open to a change in supply but want to be notified (75%), and most crucially informed on the reasons behind it. Even if notified, there are still concerns over the impact on water quality; customers' initial impression is that there would be a reduction in quality. Questions are raised over what impact a reduction in quality would have on household appliances, health and wellbeing and the types of soaps/detergent used. Ensuring appropriate information is provided to customers around these questions will be crucial.
- 8.1.13. The reaction to any change in supply will be governed by two things: the duration of change, and the reason behind the change. A change of up to 1 week is generally acceptable (77% stated low to moderate level of concern). However if the change was to last 3 months, 51% stated a high to very high level of concern.
- 8.1.14. When prompted, there was a high level of acceptability for a change in supply across a number of events/circumstances; however, these were not set to any specific duration or timeline and therefore this level of acceptability might vary if a duration is applied. Eighty five percent of customers would find a change in supply acceptable if it was due to having to transfer water outside of the North West to areas in need. However, customers in Cumbria are significantly less likely to find this acceptable (64%). Note that customers were not provided with information on what areas the water would be supplied to.
- 8.1.15. This data provides strong contextualised evidence on the perceptions of water quality and the impact a change in supply would have. However, further face-to-face research is required in order to test acceptability of specific water samples, which will be essential to understanding views on water quality and the potential impact of the water transfer scheme on customer satisfaction.

Study 2 - Customer Preference research to inform long-term water resources planning

- 8.1.16. Focus group-based deliberative research was conducted with customers of UuW during September 2020, as part of a wider project to capture views from customers of all the water companies making up WRSE, along with potential 'donor' companies including UU and STW. In total, 84 customers were consulted, over two sessions of 1 ½ hours for each group of between 8 – 10 customers. The aim of the research was to understand views on:

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- water resources and the risk of emergency drought restrictions;
- resilience planning;
- Supply and demand options; and sharing resources and strategic options.

- 8.1.17. For UU, the research took place over September 2020. The groups were implemented online, featuring two sessions with participants, with a mix of discussion topics and exercises. The group also completed pre-read and between sessions 'home-work' exercises. The research explored a range of issues within these topic areas to test customers' broad priorities and help establish a view on what the level of customer support will be for various outcomes. The group also covered the proposals for new sources and transfers out of the region. Accordingly, the insight that has been highlighted has been generated as a result of direct engagement with UU customers, and it reflects what they expressed as their opinions, in relation to the key SRO concepts discussed.
- 8.1.18. The summary of customer views covers: (i) understanding of strategic planning needs for water resources; (ii) preferences for water sharing and transfers in general; and (iii) reactions to the UU SRO proposals. The findings are meant to be viewed alongside the quantitative results generated by the DJS project in this context, rather than as an isolated set of insight on its own;
- 8.1.19. At the initial explanation of the redirection of water sources, customers were supportive and said that the option 'makes sense', however when considering the SRO in more depth there was more negative sentiment. Participants in the group felt they would find the plan more acceptable if it had the full support of the EA, and if they were informed that all the water outputs would reach safe standards.
- 8.1.20. Participants were also asked how they would feel about a difference in taste, or the hardness of their water, if they were moving to alternative sources. While some were accepting of change, a number would resist any deterioration in perceived quality. Overall, there was mixed sentiment in the group. Participants were drawn between wanting to support the South during drought conditions, but were concerned about water quality in the North and felt there should be alternative options or technologies considered.
- In conclusion, the range of customer views heard in the UU deliberative group is consistent with the understanding formed from previous research. The initial response from customers has been positive, particularly in terms of the rationale for sharing water. However, more detailed context and information is required for customers to determine whether an SRO is the best choice for them.

In summary:

- 8.1.21. Customers want to understand the options in terms of the alternative combinations of source(s) and transfer(s) that could be taken forward, and how each compares in terms of potential impacts on service levels, the environment, local communities and customer bills.
- 8.1.22. Customers also want wider information on how SROs fit into the long-term plan for water resources alongside demand measures and local supply options that are not large enough to meet SRO criteria and how the options fit into the long-term plan for the region. The discussion also shows that the acceptability of the SRO proposals to all affected customers is not a given. Some adverse reactions were observed on the possibility of changes in taste and water hardness as a result of a switch to alternative sources to provide the capacity to support transfers.
- 8.1.23. While the relatively small customer sample is not necessarily a representative finding for all UU customers, it does illustrate (at least) that supplier customers can place significant weight on maintaining current service levels. As such, there could be a fine balance between the potential for a deteriorated level of service and the willingness to support the source options, which would allow water transfer through the STT SRO.
- The focus group is not intended to be a definitive, quantitative, regionally representative study of uninformed customer opinions, but rather a qualitative 'bellwether' reading, which together with the

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attitudes and opinions expressed by the remaining 76 respondents, gives a realistic viewpoint of UU customer reactions (both uninformed & by the later session, informed) to the water service and quality aspects presented by the challenge of water transfers.

Next steps – planned customer engagement for Gate 2

- 8.1.24. This initial customer research has provided the evidence to demonstrate the level of customer understanding of the need for water transfers and the level of support for the principles of water transfers. Further customer preference research to Gate 2 is planned to address the issues and concerns raised by customers. It will include the following topics:
- Water quality- It is evident from this research that water quality is something that many customers hold strong views on. We will be carrying out further research in order to test acceptability of specific water samples, which will be essential to understanding views on water quality and the potential impact of the water transfer scheme on customer satisfaction.
 - Communication –Customers from this current and previous research are broadly supportive of the rationale for sharing water. More research will be required providing detailed context and information so customers are more able to determine whether a water transfer is the best choice for them and how it fits with the long term water resources plan for the region.
 - Service levels - supplier customers can place significant weight on maintaining current service levels. As such, there could be a fine balance between the potential for a deteriorated level of service and the willingness to support the source options that would allow water sharing. We need to further explore and communicate that water transfers would not come at the expense of service levels.
 - As the schemes develop, customers and communities will want to know more and help shape how the scheme will be constructed, its operation and what that means for them and their environment.

9. Key risks and mitigation measures

- We have not identified any risks which would prevent VA SRO progressing to Gate 2
 - The identified risks are consistent with those presented to RAPID in Quarterly Reports
 - We have identified mitigating measures to ensure that all risks are reduced to an acceptable level
- 9.1.1. We have developed and maintained a RAID (Risks, Actions, Issues, Decisions) log from the inception of this project. The log is monitored, updated, reviewed and reported on a monthly basis and governed through a VA SRO Project Management Board.
- 9.1.2. The risks and mitigating measures contained within this submission are consistent with those reported in the quarterly dashboards issued to RAPID up to Gate 1 as they are based on the same source data from our RAID log.
- 9.1.3. We have detailed the key risks and associated mitigating measures, which have been assessed using our corporate risk assessment tool. The VA SRO key risks and mitigations, as shown in **Table 11**.

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Table 11 – VA SRO Key Risks and Mitigations

RAPID Ref	Project Area	Key Risk	Impact	Mitigation	Risk Score Pre Mitigation	Risk Score Post Mitigation
RSK006	Programme	There is a risk that the future need for the volumes of water to be transferred to the South East and when they will be required is not clear.	This may result in the UU programme of work and potentially lead to inefficiencies in developing options.	Ongoing engagement with WRSE and support for modelling activity.	12	8
RSK002	Stakeholder & Planning	There is a risk that customers currently directly supplied from the Vyrnwy Aqueduct will reject the change in water provided to them during times of Severn Thames Transfer operation (taste/odour).	This may result in customers rejecting the water, increase in customer complaints which would impact CMEX. Potential regulatory involvement and prosecution. Reputational impact. Loss of trust from customers.	Detailed impact analysis is planned over and above work done to date which will inform mitigation actions.	12	8
RSK003	Stakeholder & Planning	There is a risk that UU's stakeholders may not be supportive of transferring water to other regions.	This may result in opposition to scheme leading to both reputational damage and impact on the planning process [Town and Country planning]	Stakeholder engagement plan is being delivered to mitigate this.	12	6
RSK001	Engineering	There is a risk that bi directional flows in the Vyrnwy Aqueduct during times of Severn Thames Transfer operation could generate discolouration and associated water quality issues.	This may result in failure to meet water quality compliance.	Agreed operational maintenance regime and change over plan for both pumped and gravity scenarios [covering events from bursts to a deep hole]	12	4
RSK007	Engineering	There is a risk that by deploying a recirculation process as part of the solution, the Chlorates target levels may be exceeded.	This may result in a partially reduced flow from Oswestry, and may require additional treatment/process modification at Oswestry inlet works, which will impact costs.	Further investigations and pilot trials are to be undertaken in Gate 2.	9	3
RSK008	Engineering	There is a risk that there will be a lack of contingency during outage [Vyrnwy Lining Project]	This may result in UU unable to meet resilience requirements.	Operationally signed off contingency plans to cover associated works with both Vyrnwy Lining and Water Trading.	9	6
RSK010	Engineering	There is a risk that the Vyrnwy Cleaning and Lining project solution (structural liner) does not align with the VA SRO configuration. Collaborative working across the two projects will help to mitigate this risk.	This may result in significant increase in costs and extension of delivery timescales.	Collaborative working between two projects	8	6
RSK005	Environmental	There is a risk that the solution(s) identified to supply customers fed directly from the Vyrnwy Aqueduct during periods of water transfer may not be acceptable due to adverse impact on the environment. Additional environmental studies will be required as the scheme develops.	This may result in adverse impact on the environment.	Additional environmental studies will be required as the scheme develops.	8	4
RSK004	Engineering	There is a risk that UU cannot supply some customers fed from UU sources into the network.	This may result in UU not unable to meet / limit agreed trading volumes.	Water Resource and Network Modelling underway to ensure sources and resilience are in place to maintain supply.	6	4
RSK009	Engineering	There is a risk that that we may experience engineering difficulties at river crossings that may increase the cost of the solution.	This may result in a significant increase in costs and an extension of delivery timescales.	Further investigation (e.g. site surveys) will be completed to Gate 2.	6	4

Source: UUVA SRO Programme RAID Log (May 2021)

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10. Option cost/benefits comparison

- We propose 2 options for progression to Gate 2 for further investigation
- We have applied the Cost Consistency Methodology (Rev C)
- We have aligned our option selection process with HM Treasury’s Green Book guidance

10.1.1. The VA SRO options have been evaluated against an extensive range of criteria to determine the best value options for customers and the environment to take forward to Gate 2. **Table 12** below summarises the criteria used in the assessment process. For each of the criteria we have applied established best practice methodologies to undertake the analysis of the source options. We have developed a bespoke business decision tool called the SAM, which provides a summary of the evaluation of the options and the determination of next steps. The SAM enables us to ensure that the options considered satisfy the Water Transfer Principles as shown in Section 1, **Table 1** of the Executive Summary.

Table 12 - Assessment criteria for VA SRO options

Assessment Criteria	Summary of Assessment
Cost	Opex, Capex and Carbon.
Water Resources Modelling	Using WRMP19 models to determine deployable output/benefit.
Network Modelling	Water hardness customer impact analysis.
Environmental Assessments	Primary screening, SEA, HRA, WFD, AISC assessments. Secondary screening. Abstraction and water availability review. Assessments based on WRMP and Regional Plan methodology.
Customer Water Acceptance	Network modelling and sample data reviews for water hardness analysis on customers.
Drinking Water Quality	DWSP including sample data review.
Planning and Consenting	Review of planning and consenting requirements and process.
Engineering Design	Process block diagrams, design and treatment requirements.
Operability	Asset operability and alignment with existing asset base.

Source: Water Transfer Principles

10.1.2. In order to promote and endorse the selected list of source options, a governance process was embedded that included assessment and approval from subject matter experts across the business with the formation of a Technical Assurance Group (TAG). The TAG provided technical governance for all the criteria of the SAM and its purpose was to promote options that were both viable and cost effective (measured by AIC). The options were then taken forward to a second stage of the process for endorsement by a Solutions Assessment Group (SAG) which provided a wider, strategic assessment of options, for example stakeholder and customer implications.

10.1.3. The nature of the VA SRO project means that only a small number of practical solutions are able to provide alternative supplies to customers as we are utilising an existing asset. The 2 options were chosen to provide the best value as they both ensure the resilience of connectivity with the regional supply system while minimising the amount of additional infrastructure required. **Table 14** provides a summary of the options and the outcome of the assessment process. It should be noted that the ratings contained within the SAM are subject to review and refinement as more feasibility work is undertaken prior to Gate 2. Technical detail regarding the options can be viewed in Sections 2 and 4.

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Table 13 - Option costs benefit in accordance with ACWG Cost Consistency Methodology (Rev C)

Option name	Units	VA Option A1	VA Option A2	VA Option A3	Option A4	Option B
Option benefit	MI/d	75	135	150	180	75
Total option benefit (NPV)	MI	699,066	1,213,875	1,348,750	1,616,500	674,375
Maximum Flow						
Total planning period indicative capital cost of option (CAPEX NPV)	£m	20,864,580	129,095,687	149,481,834	159,706,512	108,267,616
Total planning period indicative operating cost of option (OPEX NPV)	£m	4,240,982	51,411,468	57,342,785	111,364,924	11,697,086
Total planning period indicative option cost (NPV)	£m	25,105,562	180,507,155	206,824,618	271,071,436	119,964,702
Average Incremental Cost (AIC)	p/m ³	3.6	14.9	15.3	16.7	17.8
Carbon						
Embodied Carbon	(tCO ₂ e)	26,679	77,400	84,141	109,842	43,319
Operational Carbon	(tCO ₂ e)	2,056	8,706	10,852	14,660	3,463

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Table 14 Summary Dashboard of Solution Selection (Solutions Assessment Matrix)⁵

Name:	PBD Capacity Source: PBD STT	Engineering (Capex £M) with Optimism Bias	Engineering (Opex £M/yr.) Source: PBD WRMP 24	AISC (p/m3)	Drinking Water Quality	Environmental	Customer Water Acceptance	Operational Impact	Stakeholder	Planning	Asset Resilience	Engineering
Option A1 Norton to Oswestry WTW	75	22	0.2	5.0	H	M	H	M	H	M	L	L
Option A2 Norton to Oswestry WTW	135	145	1.7	19.3	H	M	H	M	H	M	M	M
Option A3 Norton to Oswestry WTW	150	170	1.8	20.0	H	M	H	M	H	M	M	M
Option A4 Norton to Oswestry WTW	180	179	2.8	20.9	H	M	H	M	H	M	M	M
Option B Huntington to Cotebrook	75	134	0.7	59.9	H	M	H	M	H	M	L	M

Source: UUVA SRO Solutions Assessment Matrix (March 20)

⁵ As there is no ACWG consistency methodology for calculating AISC, we have used a UU methodology

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- 10.1.4. Due to the scalability of our source options up to 180 MI/d transfer volumes and the increasing complexity of the VA SRO enabling works at higher transfer volumes, it is possible that we could deliver lower transfer volumes by 2028. The delivery dates associated with each transfer volume are shown in **Figure 4**. Our working assumption is that we will need to wait for the Vyrnwy Cleaning and Lining project to complete before we start construction of the VA SRO elements. We have identified an opportunity to collaborate across the two projects, which may allow delivery of the VA SRO to be brought forward and this opportunity will be explored further prior to Gate 2.
- 10.1.5. With respect to calculation of cost data at Gate 1 we have actively contributed to the development of the Cost Consistency Methodology (Rev C)⁶ delivered by Mott MacDonald on behalf of the ACWG. This methodology has been shared and agreed with RAPID and we have adhered to the guidance therein in development of our solution costs, as shown in **Table 13**. This has also formed part of our external assurance process, more details of which are shown in Section 12.
- 10.1.6. Our Gate 1 cost estimates for the VA SRO enabling works are approximately 20% higher than previously estimated in PR19. This is a result of the following factors:
- More detailed engineering work at Gate 1 has revealed additional scope including additional pipe replacements and a blending option at Oswestry WTW
 - An increase of 4.7% due to inflation
 - Our estimates have had a number of changes to their cost structure. For example, construction risk (Tender to Outturn Adjustment) has increased from 1.5% to 4%
- 10.1.7. We have also aligned our option selection with Green Book guidance. We believe that Gate 1 has parallels with elements of the Strategic Outline Case (SOC) phase and accordingly we have delivered a number of activities which map against the SOC guidance;
- **Critical Success Factors** – Adopted UU Water Transfer Principles that outline the criteria that must be met for water transfers to take place. These are aligned to a holistic option assessment process that evaluates all options for a range of criteria and is represented in our SAM.
 - **The Economic Case** – A long list of options have been rationalised to a selected list that represent best value for customers.
 - **The Commercial Case** – We have outlined a preferred procurement strategy for delivery of the project.
 - **The Financial Case** – Selected source options have been costed and an optimism bias applied using the Cost Consistency Methodology (Rev C). Possible funding routes have also been explored as part of our procurement strategy.
 - **The Management Case** – We have applied appropriate programme management and governance processes to manage risks and applied both internal and external assurance reviews. We have also established our forward plan for Gate 2.
- 10.1.8. These SOC cases will be further developed as part of the Gate 2 programme.

⁶ Mott MacDonald, Cost Consistency Methodology (Rev C), Technical Note and Methodology, published August 2020

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11. Impacts on current plan

- There are no impacts on our current plan. The proposed options are in alignment with our WRMP19 submission

11.1.1. The VA SRO does not affect the regional supply-demand balance as it is a distribution system and does not impact water resources. Additionally, the engineering solutions we have reviewed are in alignment with the options considered as part of our WRMP19 submission⁷. Our initial timeline for the VA SRO is dependent on the completion of the Vyrnwy Cleaning and Lining project. Short outages on the VA may be required to facilitate the construction work and this will be factored into our updated water resources plans.

11.1.2. In our WRMP19 submission we outlined a 'Water Trading Adaptive Pathway' developed in consultation with customers, stakeholders and environmental regulators. As part of this process a number of options were identified to support a transfer of up to 180 Ml/d, subject to further detailed assessment. This has been the basis for the creation of the UUS SRO which is managing the impact on the region's supply-demand balance through identification of source options to offset the water volumes transferred out of region. As outlined in the UUS SRO Gate 1 submission, although the constituent source options to support a transfer have changed, the WRMP19 assumption of a transfer volume of up to 180 Ml/d is still valid and therefore does not alter the supply-demand balance modelling.

11.1.3. Finally, we have actively engaged with our water resources colleagues throughout our Gate 1 activity and we continue to align with the project team developing our WRMP24 submission.

12. Assurance

- We have successfully assured that we have delivered the RAPID Gate 1 requirements
- The U UW Board have provided a supporting Assurance Statement

Introduction

12.1.1. We have prepared our submission in accordance with the stated assessment criteria outlined in the "Strategic regional water resource solutions: guidance for 2021" document, published February 2021. This document highlights the following three key assessment criteria:

1. *Robustness* – throughout the programme we have adopted an approach to optioneering and feasibility that demonstrates appropriate and proportionate evidence in support of assertions. Where evidence is less compelling we have identified this alongside any plans to address it.

2. *Consistency* – we have ensured consistency throughout the VA SRO submission and aligned to the UUS and STT SRO submissions. Our methodologies and approach align with both internal U UW and national policies and guidance. Our approach to assurance is in line with our published assurance framework. This has included external assurance as identified by our risk assessment, and both first and second line assurance undertaken internally. This assures the both the integrity and consistency of the information provided

3. *Uncertainty* – an active RAID log has been in place during the programme and all options considered for the Gate 1 submission have assessed risks and mitigations as part of their criteria.

Assurance framework and findings

12.1.2. Our published assurance framework has evolved over time adopting an industry recognised risk based approach. We have utilised this structured assurance framework and tailored it accordingly to ensure

⁷ https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/wrmp-2019---2045/final-water-resources-management-plan-2019.pdf

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that the assurance that we have applied to each area of the plan is both proportionate and comprehensive. In line with our PR19 and Annual Performance Reporting (APR) assurance framework, it is comprised of five linked processes summarised below. In addition to this, where possible we have aligned the assurance framework with the STT SRO, delivered jointly with Thames Water and Severn Trent Water, in order to ensure a consistency of approach. This approach was mandated by both the STT and VA SRO Programme Board during the initial set up phase of the programme.

- 1) **Requirements**— All requirements set out by RAPID have been cross referenced to a set of deliverables within each identified workstream, enabling us to ensure relevant success criteria were being met. These requirements have remained under review and when changed, deliverables have been reassessed to reflect the nature of this changing environment.
- 2) **Accountability** — A “RACI” matrix was developed and each owner was responsible for the management, risk assessment and assurance of their deliverables.
- 3) **Programme management** — An experienced programme management team was formed, managing the programme through a central plan reporting to the VA SRO Programme Board.
- 4) **Risk assessment** — Each deliverable went through a risk assessment, with this process being used to determine both the level of governance that was to be applied to the deliverable and the level of assurance required. This is in line with our published assurance framework.
- 5) **Robust assurance processes** — A structured and risk-based three lines of assurance process was applied to the deliverables within the programme. This included the use of an assurance partner (Deloitte LLP), internal corporate audit reviews and a range of subject matter expert (SME) reviews and challenges.

Confidence and assurance in our programme

12.1.3. Utilising this existing approach provides confidence to the UUW Board that we are addressing all RAPID’s requirements. The coverage of each line is summarised below:

- 1) First line assurance: Developing and maintaining sound processes, systems and controls.

Accountability for first line assurance of each area of the programme was assigned to the workstream leads that owned and managed that area of the plan. Fundamental to this concept is that those responsible for delivery are ultimately responsible for assurance of that deliverable.

- 2) Second line assurance: Providing the enabling framework and governance for the development of the plan.

Second line assurance and approval of the programme was provided by subject matter experts who oversee or specialise in risk management. Second line assurance was delivered independently of the deliverable owner, but was coordinated with the owner. The second line also monitored and provided assurance on the quality and robustness of the submission through peer review and challenge. All second line assurance was recorded when carried out, centrally collated with an auditable trail.

- 3) Third line assurance: Providing independent review and assurance of the plan.

We undertook a detailed and wide-ranging independent review of our programme. The main purpose of the independent assurance was to provide external review and feedback to the deliverable owner and sponsors; with this being used to provide the Executive and UUW Board with independent assurance and confidence in the quality of the submission prior to sign off. Since accepting the PR19 FD in January 2020, our approach to assurance was presented to the UUW Board in October 2020 with a further interim update in February 2021, prior to the final sign off which took place in June 2021.

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- 12.1.4. At the start of the programme we appointed a central assurance provider, Deloitte LLP who provided early assurance on the programme and its governance, with further scheduled reviews at key stages.
- 12.1.5. The scope of the initial review was based around the set up and the structure of the programme, the scope of the assurance activity and targeted reviews of deliverables during the development of the plan. The second review, was a more detailed review in to deliverables and project cost allocations as well as confirming the assurance was completed in line with the plan. Deloitte reported no significant issues requiring senior management intervention. All actions raised as a result of these reviews have been addressed and closed off as complete. The Deloitte report concluded *“Following the completion of our work as above, UU has confirmed to us that the programme teams have completed the recommendation actions raised in respect of our findings, and these have been assured through the programmes’ internal governance mechanisms. Based on completion of these actions as advised by UU, on the basis of the work we performed, we are not aware of any matters that would affect UU’s decision to progress to Gate 2”*.
- 12.1.6. The UUW Board have provided a supporting Assurance Statement confirming they are satisfied that the data and approaches used to develop the concept design and decision making information meet the requirements of the Gate 1 submission.

13. Solution or partner changes

- We recommend that the VA and UUS SROs are merged post Gate 1 to provide a single coherent transfer strategy
 - There have been no changes in solution partner or solution substitutions at Gate 1
- 13.1.1. Our feasibility work at Gate 1 has illustrated the mutually inclusive nature of the VA and UUS SROs as they deliver a single output – a transfer volume released into the River Vyrnwy. Each SRO can only be progressed through a gate in conjunction with the other and therefore we are proposing that they are merged into a single SRO post Gate 1. This would provide a single coherent strategy (and future delivery programme) encompassing the ‘end to end’ system.
- 13.1.2. The options proposed in this submission interface directly with our existing assets and do not require engagement with other water companies. We therefore anticipate working independently in delivering these solutions should they be approved through the RAPID gated process.
- 13.1.3. We note that the STT SRO project is considering new raw and treated water connections into the VA as possible mitigation measures for environmental risks on the River Vyrnwy. The associated modelling and feasibility scope is being managed through STT SRO and we are being kept informed of progress. At present we do not believe the proposed connections will impact our proposed solution for this project.

14. Efficient spend of gate allowance

- We confirm that our Gate 1 outturn is forecast to be below the PR19 FD allocation
 - We believe our expenditure to Gate 1 has been efficient, as we have adhered to the criteria provided by RAPID for efficient expenditure, namely that activities should be relevant, timely, complete and of high quality
 - We forecast to deliver Gate 2 activities within the PR19 FD allocation
- 14.1.1. The PR19 FD allowance for VA SRO was £14.7m, with a 10% allocation to Gate 1 equating to £1.470m. We confirm that our total Gate 1 outturn forecast is £1.092m (74.28% of allocation) based on actual costs incurred to March 2021 combined with forecast expenditure to the end of Gate 1. We understand that this underspend of £0.378m (25.72%) may be available for future activity and customer share, should this scheme progress to Gate 3.

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14.1.2. An overview of the Gate 1 expenditure is shown in **Table 15** below. An element of the underspend was due to the deferment of customer acceptability Hall Tests, now scheduled for Gate 2.

Table 15 - Cost overview to Gate 1 - 4

Description	Cost £m	Comments
Gate 1 Allowance @ 17/18 prices	£1.470m	10% of total allowance
Gate 1 costs	£1.032m	Based on actuals to March 2021 and forecast to Gate 1 in 17/18 price base
Third Party costs	£0.060m	Funding for EA, NE, NRW (NAU)
Total Gate 1 costs	£1.092m	A breakdown of these costs is shown in Table 16
Variance (underspend)	£0.378m	Forecast expenditure is 25.72% less than the FD allocation
Forecast Gate 2 costs @ 17/18 prices	£1.903m	Based on current forecast
Gate 3 & 4 allowances @ 17/18 prices	£11.030m	Remaining total of allowance

The VA SRO forecast outturn is based on actual cost through to end March 2021 and forecast to 5th July 2021 with deflation using CPI-H indexes

Table 16 - Breakdown of costs against activities undertaken to Gate 1

VA SRO Workstreams	Proportion of spend (%)	Value of spend (£)	Description
Programme Direction & Governance	10.94%	£119,398	Activities including day-to-day liaison, reviews, decision making and oversight; Programme and Steering boards; managing in-company assurance, reporting and governance; ACWG, Regional Co-ordination Group, RAPID 'Task & Finish' and cross-SRO interfaces and support.
Programme Management & Delivery	6.56%	£71,636	Senior programme resources, plus PMO, scheduling and PM workstream support.
Assurance & Submission Production	6.25%	£68,268	Assurance activities including third line assurance and the management of the submission through the internal review and approval processes.
Commercial	3.61%	£39,382	Assessment and development of initial Gate 1 procurement strategy for the SRO.
Engineering	41.21%	£449,917	Identification and assessment of Vyrnwy enabling options, completing feasibility, technical and cost estimating assessments to support the development a number of selected options available for this SRO.
Network Modelling	11.21%	£122,385	Identification and assessment of Vyrnwy Aqueduct system modelling and source options including water quality blending assessments feasibility studies.
Environmental	18.48%	£201,737	We have undertaken environmental assessments of the SRO options following the principles of SEA, HRA and WFD assessment. In addition, we have completed a high-level NCA, BNG assessment and INNS risk assessment. It also includes NAU third party charges to support these SRO activities.
Stakeholder & Planning	1.75%	£19,142	Stakeholder engagement planning and activities. Carried out customer research via two studies. An element of the underspend was due to the deferment of customer acceptability Hall Tests, now scheduled for Gate 2. (See Section 3). Development of initial Gate 1 planning consents strategy.

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Total Costs	100%	£1,091,864
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Note: (i) All figures have been deflated to 17/18 cost base.

- 14.1.1. In delivering the submission we have adhered to the criteria provided by RAPID for efficient expenditure, namely that activities should be relevant, timely, complete and of high quality, and that this should be backed by benchmarking and assurance activity.
- 14.1.2. Expenditure to Gate 1 has been efficient as evidenced by, packages of work that have only been promoted if they support delivery of the Gate 1 requirements outlined in the PR19 FD. This has been validated through a mapping exercise of project deliverables against PR19 FD requirements.
- 14.1.3. Where possible we have utilised UU Framework Agreements to award packages of work. These frameworks have been competitively tendered and externally benchmarked to ensure value for money for customers. Utilisation of these frameworks has also expedited delivery of work as contractual terms have been agreed in advance.
- 14.1.4. Where possible we have sought to maximise internal resources before engaging external contractors as this tends to deliver greater value. We have driven efficiencies by using a small core programme team, supported by technical experts.
- 14.1.5. We have continuously monitored budgets and reported on a monthly basis to the UUS SRO Programme Board to ensure costs are in line with forecasts and any negative variances have been rectified by the delivery of recovery plans.
- 14.1.6. We have also actively engaged with the ACWG, contributing funding to consistency projects (e.g. WRSE customer research).
- 14.1.7. Expenditure is only for relevant work in AMP7 and to the VA SRO. There is no carryover of AMP6 spend. There is no expenditure claimed against 'business as usual' WRMP or other non-SRO related activities.

Forecast spend to Gate 2.

- 14.1.8. The PR19 FD allowance to Gate 2 is £2.205m based on a 15% allocation of £14.7m total funding. The forecast spend for Gate 2 is £1.903m, leaving a contingency value of £0.302m (13.68%).
- 14.1.9. We have developed a bottom-up Gate 2 budget through engagement with workstream leads and external stakeholders including the NAU, NRW and the Drinking Water Inspectorate. We have referenced the Gate 2 requirements published in the PR19 FD, and mapped activities and deliverables to achieve those outcomes. A detailed programme for Gate 2 is available in our response to Section 15.
 - 14.1.1. It should be noted that this is a forecast and is based upon a number of assumptions, dependencies and risks.
 - 14.1.2. We can confirm that our Gate 1 expenditure has been assured by Deloitte LLP.

15. Proposed Gate 2 activities and outcomes

- We have developed a detailed programme to deliver Gate 2 requirements as outlined in the PR19 FD
- We propose that the delivery incentive methodology applied at Gate 1 is equally applicable to Gate 2 and will ensure consistent appraisal of submissions

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15.1.1. To develop our activities and outcomes to Gate 2 we have undertaken a workstream level gap analysis to understand the work packages required to meet the requirements for Gate 2 as stated in the PR19 FD. A summary of this is shown in **Table 17** below.

Table 17 - Gate 2 Activities and Outcomes

PR19 FD Gate 2 Requirements	Activities	Deliverable
Detailed feasibility and data collection detailed design report	<ul style="list-style-type: none"> Water resource modelling Pilot trials for Oswestry WTW Network/hydraulic modelling EA wastewater modelling Selected site audits and route selection Asset integrity review and surveys Jar Testing and pilot trials Detailed drinking water quality assessments Environmental Monitoring Plan as agreed with the NAU 	<ul style="list-style-type: none"> Network profiles Testing schedule and required output Completed site surveys Completed / updated Asset register Water quality assessment report Updated Environmental assessments Updated Gate 2 Conceptual Design Report
Procurement strategy including assessment for potential direct procurement for customers' delivery.	<ul style="list-style-type: none"> Undertake an updated DPC assessment of proposed solution. Conduct an updated assessment of contracting options for risk, delivery, cost and market appetite. 	<ul style="list-style-type: none"> An updated DPC assessment An assessment of the optimum contracting options/ commercial models for delivery of Gate 3 activities
Pre-planning application activity plan (land referencing, field surveys, environmental permitting plans)	<ul style="list-style-type: none"> Initiating land surveys over Winter 2021/2022 Initiating land access for surveys Spring/ Summer 2022 Engagement with relevant stakeholders/planning authorities 	<ul style="list-style-type: none"> Completed land surveys Updated Stakeholder engagement plan and outcomes
Assessment of key risks to identify potential regulatory barriers, guidance or changes required for the solution to progress	<ul style="list-style-type: none"> Continued collation of assumptions and risks and issues including identification and delivery of mitigating actions where applicable. 	<ul style="list-style-type: none"> Updated RAID log Continued participation in regulatory Task & Finish Groups
Identification of mutually exclusive solutions	<ul style="list-style-type: none"> Identification of mutually exclusive options 	<ul style="list-style-type: none"> Updated Gate 2 Conceptual Design Report
Full comparison of solutions' costs and benefits as tested in regional modelling	<ul style="list-style-type: none"> Review /assess AIC & AISC & DO and include benefits Further water resource and network modelling 	<ul style="list-style-type: none"> Updated AIC & AISC calculations Updated DO calculations
Updated regional stakeholder engagement including customer preference studies	<ul style="list-style-type: none"> Customer Acceptability Research (Hall Tests carried over from Gate 1) Public Consultations (where required) Alignment with WRMP and regional planning stakeholder engagement. 	<ul style="list-style-type: none"> Full regional based stakeholder plan for UUS SRO Further customer research
Identification of any changes in solution partner (other water company) or solution substitutions	<ul style="list-style-type: none"> Continued monitoring of potential changes in solution partner or solution substitutions 	<ul style="list-style-type: none"> Updated position outlined in Gate 2 submission

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PR19 FD Gate 2 Requirements	Activities	Deliverable
Assurance of data and approaches	<ul style="list-style-type: none"> ▪ Continued proactive engagement with the UUW Board ▪ Complete/action assurance activity required ▪ Engagement with external assurance and internal Corporate Audit, as required 	<ul style="list-style-type: none"> ▪ Development of the Assurance Approach ▪ UUW Board Assurance Statement ▪ Completed risk assessment
Proposals for Gate 3 activity and outcomes, and penalty assessment criteria and contributions	<ul style="list-style-type: none"> ▪ Development of Gate 3 Programme detailing activities, timescales and deliverables 	<ul style="list-style-type: none"> ▪ Gate 3 Programme ▪ Delivery Incentive Proposal

Source: UUVA SRO Gate 2 Programme Plan

- 15.1.1. Sections 3 and 9 set out the key dependencies, assumptions and risks. While there are a number of key technical and commercial aspects to be addressed as the scheme develops, at this stage we do not anticipate any solution delay impacts for the delivery of Gate 2.
- 15.1.2. With respect to delivery incentives we propose that the criteria and methodology applied at Gate 1 should also be applied at Gate 2. We believe that the requirements for Gate 2 will require SROs to undertake similar activities and schemes should have reached a comparable level of maturity to enable comparisons to be made regarding the viability of solutions, and therefore the schemes should also be assessed against a common set of delivery incentives.
- 15.1.3. This approach aligns with the rationale stated in the PR19 FD for the introduction of customer cost-sharing at Gate 2 stage 'After Gate 2 the certainty of costs is also reduced as primarily desk-based activities move to predominantly site investigations and interactions with external bodies as part of planning activities'. We agree that after Gate 2 it is likely that SRO activities and timescales will begin to diverge due to the differing nature of the projects in terms of scale and complexity as they transition towards delivery stage – for example SROs may adopt different planning and procurement routes - and therefore we propose that bespoke delivery incentives are applied from Gate 3 onwards.

Vyrnwy Aqueduct: Preliminary Feasibility Assessment

16. Conclusions and recommendations

- We have delivered our Gate 1 programme on time and within budget
- We recommend that the VA SRO progresses to Gate 2
- We have selected 2 options for further detailed assessment
- We believe the VA SRO is able to facilitate a range of transfer volumes up to a maximum of 180 MI/d in conjunction with the UUS SRO
- We are on track to deliver the Gate 2 requirements

16.1.1. The key conclusions from our preliminary feasibility assessment are as follows;

- We recommend that the VA and UUS SROs are merged post Gate 1.
- The VA SRO is able to facilitate an out of region transfer of up to 180 MI/d (in conjunction with the UUS SRO and STT SRO River Vyrnwy Bypass pipeline) and we therefore recommend progression to Gate 2 for further detailed assessment.
- We can maintain supply to customers fed directly from the VA during a transfer of up to 180 MI/d.
- We have selected 2 options for further detailed assessment prior to Gate 2.
- We are able to offer scalability of transfer volumes up to 180 MI/d.
- We have identified an opportunity to deliver efficiencies in VA SRO delivery through collaboration with the Vyrnwy Cleaning and Lining project.
- The Town and Country Planning Act 1990 (TCPA) is the current recommended planning route.
- Our initial assessment is that the VA SRO does not meet the criteria for a DPC procurement approach.
- Customers have concerns around potential water source changes to facilitate transfers and we will need to address these concerns as part of our Gate 2 investigations.
- The earliest delivery date for the VA SRO ranges from 2030 (for transfers up to 75 MI/d), to 2033 for the maximum transfer of 180 MI/d (assuming a clear justification to support the planning applications is evidenced in the WRMPs and Regional Plans.)

16.1.2. We have a good understanding of the key risks involved with delivering our scheme and have plans in place to mitigate those risks. We do not foresee any risk or barrier, which would prevent this SRO proceeding to Gate 2.

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Water for the North West