rdWRMP24

Appendix D: Water Framework Directive Assessment

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Tables

Table of Acronyms

ACWG	All Company Working Group
AMP	Asset Management Plan
AR	Aquifer recharge
ASR	Aquifer storage and recovery
AWB	Artificial water body
BESP	Best Environmental and Societal Plan
BVP	Best Value Plan
CRT	Canal and River Trust
DCO	Development consent order
Dia	Diameter
DO	Deployable Output
DP	Drought Plan
DRA	Direct river abstraction
DWSP	Drinking Water Safety Plan
EA	Environment Agency
EFI	Environmental Flow Indicator
EQS	Environmental Quality Standards
GEP	Good ecological potential
GES	Good ecological status
GWDTE	Groundwater dependent terrestrial ecosystem
HDD	Horizontal directional drilling
HMWB	Heavily modified water body
HOF	Hands off flow
HRA	Habitats Regulation Assessment
HS2	High Speed 2
INNS	Invasive Non-Native Species
KGV	King George V reservoir
kW	Kilowatts
LCP	Least Cost Plan
Ml/d	Megalitres per day
Mm^3	Million cubic metres
PBDE	polybrominated diphenyl ethers
PFOS	Perfluorooctane sulfonate
PoM	Programme of Measures
PS	Pumping station
PWS	Public Water Supply
RAPID	Regulators' Alliance for Progressing Infrastructure Development
RA	Recent Actual
RBMP	River Basin Management Plan
rdWRMP	revised draft Water Resources Management Plan
RNAG	Reasons for Not Achieving Good
RO	Reverse osmosis

SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SES	Sutton and East Surrey Water
SESRO	South East Strategic Reservoir option
SPA	Special Protection Area
SPZ	Source Protection Zone
SR	Service reservoir
SRO	Strategic resource option
SSSI	Site of Special Scientific Interest
STT	Severn to Thames Transfer
STW	Sewage Treatment Works
SWA	Slough, Wycombe and Aylesbury Water Resource Zone
SWOX	Swindon and Oxfordshire water resource zone
SWQRA	Strategic Water Quality Risk Assessment
T2ST	Thames to Southern Transfer
TLT	Thames Lee Tunnel
TWRM	Thames Water ring main
UF	Ultrafiltration
UV	Ultra violet
VSD	Variable speed drive
WFD	Water Framework Directive
WINEP	Water Industry National Environment Programme
WRMP	Water Resources Management Plan
WRPG	Water Resources Planning Guideline
WRSE	Water Resources South East
WRZ	Water resource zone
WTW	Water treatment works

Executive summary

Introduction

As a water company, Thames Water has a statutory obligation to produce a Water Resources Management Plan (WRMP) every five years. The WRMP sets out how a sustainable and secure supply of clean drinking water will be provided to its customers over a minimum 25-year planning period, whilst showing how its long-term vision for the environment will be achieved. Wider societal benefits, such as tourism, are also considered and balanced against the plan being affordable. This creates a 'best value' plan (BVP). The Thames Water revised draft WRMP 2024 (rdWRMP24) renews the previous WRMP published in 2019.

In developing the rdWRMP24, Thames Water has undertaken a Water Framework Directive (WFD) assessment of the potential effects of alternative options and plans on WFD objectives. The UK WFD regulations are set out in The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (known as the WFD Regulations).

The WFD assessment

This report presents the findings of the WFD assessment work undertaken as part of the development of the Thames Water rdWRMP24. The report is part of a suite of environmental assessment documents that support the rdWRMP24. The WFD assessment results fed into both the plan-making process and the Strategic Environmental Assessment (SEA) to ensure that an integrated approach to environmental assessment has been followed.

The WRMP process has considered numerous feasible supply-side options that could be included in the final Plan. Option-level environmental assessment is essential for producing a constrained list and facilitating decision making. This report also sets out the potential WFD impacts from the rdWRMP24 as a whole. Environmental and social considerations have influenced the development of the rdWRMP24.

The requirement for the supply options is driven, at least in part, from the requirement to reduce abstraction to protect the environment. WFD screening assessments have been completed for 85 options and detailed assessments for 35 options. The majority of options that provide new sources of water lead to some level of potential risk of WFD deterioration (on a precautionary basis) before application of mitigation. Taking into account the requirement for additional water supply, policy decisions and the Water Industry National Environment Programme (WINEP), there was limited potential for a rdWRMP24 which did not lead to any potential risks under WFD, at this plan level. However, further investigations will be undertaken to allow these risks to be reduced, through better understanding of the implications of the options and application of appropriate mitigation.

The approach to WFD assessment

The key WFD objective is for all water bodies to attain good status, which includes achieving the required standard for water quantity (e.g., flow) and water quality criteria. The WFD regulations set out requirements to prevent deterioration of the status of designated water bodies, and to ensure no impediment is introduced which could prevent the attainment of future water body objectives. These objectives are set out in Regulation 13 of the WFD.

Any new water resources development, in addition to existing operations, must not compromise the WFD objectives (for surface water or groundwater bodies). WFD objectives have been

reviewed for the rdWRMP24 to assess individual options and the whole Plan. These are for 'natural' and heavily modified/artificial water bodies.

Exemptions are defined within the WFD Regulations 16 to 19, outlining the conditions under which the achievement of good status or potential may be phased or may not be achieved, or under which deterioration may be allowed. Regulations 16 to 19 describe these distinct conditions. In particular, Regulation 19 allows for deterioration of status or non-achievement of good status or potential under certain conditions. If any options lead to a risk of water body status deterioration and cannot be mitigated, then a Regulation 19 derogation application would be needed.

For the rdWRMP24, WFD assessments have been undertaken using a sequential process (making allowance or exceptions) as follows:

- Option assessment of WFD compliance – basic screening of options and where necessary detailed assessment
- Production of a WFD compliance statement for a preferred programme
- Undertaking an in-combination WFD assessment of the preferred programme

Two levels of WFD options assessment have been undertaken: a simple screening using an automated spreadsheet tool (Level 1) and a more detailed assessment (Level 2) which includes professional judgement.

There are nine different pathways that have been modelled for the BVP, each representing different future scenarios for supply and demand requirements. The rdWRMP24 BVP Situation 4 is the preferred pathway for the rdWRMP24. This preferred pathway contains 71 options. The WFD process requires specific geographic locations to base the assessment upon; as these are not available for the non-supply options such as demand management, they have not been included here. Options using existing infrastructure have also been excluded from this list as they have been assessed as appropriate as part of business as usual activities. The remaining 26 supply options were assessed using the All Company Working Group (ACWG) Level 1 methodology. Of these, six options form part of Strategic Resource Option (SRO) projects and four are considered under drought plans (DPs). Summaries of these are provided in this report.

WFD assessment of rdWRMP24 BVP preferred pathway (Situation 4)

The preferred pathway is influenced by a number of aspects, which dictate the expected future demand within the region. These include a 'High' Environmental Destination (a decision to deliver long-term sustainability and environmental resilience). The Environmental Destination within the rdWRMP24 BVP preferred pathway (Situation 4) is the 'Enhanced' scenario. This scenario sets out to achieve the Environmental Flow Indicator (EFI) at specific assessment points across the Thames Water region. The Environmental Destination scenario delivers 422Ml/d of water to the environment through reductions to deployable output (DO). This will not lead to any increased risk to WFD but will potentially lead to significant improvements for WFD in a large number of water bodies, supporting attainment of water body objectives.

The Level 1 WFD assessments indicated that eight of the 26 options are anticipated to have very low risks of being non-compliant with WFD objectives and do not require further assessment.

WFD Level 2 assessments have been completed for the remaining 18 options that make up the preferred pathway. Six of these options form part of an SRO project and were carried out under the relevant SRO projects. The findings are summarised in this report. Following further investigation, design and mitigation development, it is anticipated that the WFD compliance risk will be reduced to minor (impact score 1) and, therefore all the options in this plan would be expected to be WFD compliant.

The majority of the options assessed as part of the BVP preferred pathway have only been subject to high level design and, if they are taken forward, would require additional design and assessment as they progress to the next stage of optioneering. Due to this, the confidence in the option design has been rated as low throughout all of the Level 2 assessments undertaken. For the SROs, WFD assessments have been undertaken using the Gate 2 designs and therefore design is assessed as medium confidence.

The findings indicate that there are precautionary WFD compliance risks associated primarily with the operation of additional/new abstractions. The potential hydrological effects of these activities, among several other varying impacts, could conflict with achieving WFD status objectives. This is particularly the case where hydrology/river flow is an existing limiting factor, recorded in WFD baseline data as a 'reason for not achieving good'. The potential biological effects, particularly on fish, and physico-chemical changes (for example, reduced dilution as a result of a new or increased abstraction) would benefit from further assessment to improve certainty of the scale of effects.

For groundwater bodies, deterioration risks were primarily associated with changes to quantitative surface water dependent status elements or water balance, as a result of new or increased groundwater abstractions, or construction of below ground works.

The cumulative effects assessment for the rdWRMP24 (based on the BVP preferred pathway (Situation 4)has identified 17 water bodies which are impacted by more than one preferred pathway option. Of these water bodies, only one water body was assessed to have the potential for an increased risk of WFD deterioration due to the multiple options including Groundwater Development - Woods Farm Existing Source Increase DO (increasing abstraction by 2.4Ml/d by 2074), Groundwater Development - Moulsford Groundwater Source (new abstraction of 3.5Ml/d peak by 2033) and T2ST (potential construction dewatering 2038 to 2050). This is water body GB40601G600900: Berkshire Downs Chalk. This water body already has a poor status for quantitative dependent surface water body status so the increased abstraction could further exacerbate the issue. The environmental destination scenarios include closure of Bradfield and licence reduction at Pangbourne (reducing abstraction by 1.64Ml/d by 2030 and 5Ml/d by 2035 respectively) in this waterbody. These environmental destination reductions will help to reduce the cumulative impact of these options, and it is anticipated that with appropriate mitigation there would be no increased risk of deterioration. Further investigation is needed (such as scenario modelling, hydroecology assessment etc) to confirm this.

In-combination effects assessment

It is recognised that there is the potential for in-combination effects to water bodies due to the implementation of the rdWRMP24 BVP preferred pathway) alongside planning projects (including planning allocations, planning applications, Nationally Significant Infrastructure Projects (NSIPs)) and other water company dWRMP24s. An in-combination effects assessment has therefore been undertaken.

The in-combination effects assessment identified 13 water bodies where one or more BVP preferred pathway option and one or more planning project and/or other water company rdWRMP24 option are present. The in-combination effects assessment indicated that only one of these water bodies (GB40601G604100: Chiltern Chalk Scarp) is at risk of further WFD deterioration due to the combination of options and planning projects. Further information on the implications of HS2 Phase 1 on this water body are required to quantify the in-combination effects on this water body.

These assessments are based on the limited data available on planning applications, and on the published information within the other water company dWRMP24s. Other water companies and WRSE have been preparing their rdWRMP24s in parallel, so the latest published

information from other water companies remains the dWRMP24. It is acknowledged that the dWRMP24 assessments will be superseded, however, these assessments represent a snapshot in time during the development of WRMP24s and remain the most recent published datasets available at the time of writing. However, the rdWRMP24 options in-combination assessment for other water companies will be included in the imminent publication of the WRSE regional plan. Therefore, further information is required to fully understand the WFD risk. This may require further details of planning applications, further details of other water companies' options or further investigations into the Thames Water BVP rdWRMP24 options.

Other BVP pathways and alternative plans

Other BVP pathways

As part of the rdWRMP24, a WFD assessment was carried out on two other BVP scenarios, Situation 1 and Situation 8). BVP Situation 1 represents the maximum need within the plan, as it includes maximum growth and high climate change and environmental destination scenarios. BVP Situation 8 is the core Ofwat pathway to be used as a guide for minimum future investment.

In comparison to the BVP preferred pathway (Situation 4), the BVP (Situation 1) contains 11 different options, excludes three options, and includes options that could lead to increased potential cumulative effects on eight additional water bodies. The cumulative effects assessment has not identified any additional water bodies at increased risk of WFD deterioration, over those already reported for the BVP preferred pathway.

In comparison to the BVP preferred pathway, the BVP core pathway (Situation 8) contains no additional options and excludes 16 options. The cumulative effects assessment for the BVP core pathway does not require assessment of 11 water bodies identified in the BVP preferred pathway and has not identified any additional water bodies at increased risk of WFD deterioration. In the BVP core pathway, the cumulative effect on the Berkshire Downs Chalk reported for the preferred pathway is not applicable.

Alternative plans

In comparison to the BVP preferred pathway (Situation 4), the LCP includes four additional options, excludes two options, and includes options that could lead to additional potential cumulative effects on two additional water bodies and changes to cumulative effects in one water body. The cumulative effects assessment has not identified any additional water bodies at increased risk of WFD deterioration, over those already reported for the BVP preferred pathway.

In comparison to the BVP preferred pathway the BESP includes seven additional options, excludes seven options, and includes options that could lead to additional potential cumulative effects on three additional water bodies and changes to cumulative effects in two water bodies. However, the cumulative effects assessment has not identified any additional water bodies at increased risk of WFD deterioration, over those already reported for the BVP preferred pathway.

Next steps

Following further investigation, design and mitigation development, it is anticipated that the WFD compliance risk can be reduced to minor (impact score 1) and, therefore all the options in this plan would be expected to be WFD compliant, including consideration of cumulative effects of the whole rdWRMP24, other planning applications and other water company dWRMP24s.

Further investigation will be undertaken to understand the potential risk to WFD compliance and identify mitigation as appropriate. Recommendations for further investigations are provided for each option.

1 Introduction

1.1 Overview

Water companies in England and Wales are required to produce a Water Resources Management Plan (WRMP) every five years. The WRMP sets out how a company intends to maintain the balance between supply and demand for water over a minimum of 25 years. In the development of a WRMP, water companies must follow the Environment Agency (EA) Water Resources Planning Guideline (WRPG)[1] and consider broader government policy objectives, ensuring the plan sets out how the company intends to maintain the balance between supply and demand for water over the long-term planning horizon and how to increase security of supply in each of the water resource zones making up its supply area.

The Thames Water supply area is situated within the Water Resources South-East (WRSE) regional planning area. Therefore, all the water resource options considered as part of the Thames Water Resources Management Plan 2024 (WRMP24) have fed down from the selected options as part of the regional plan. For the Thames Water WRMP24 the Water Framework Directive (WFD) assessments will focus on the local scale, drawing on the higher-level work previously completed for the regional plans where applicable.

As part of the environmental assessment process to support the development of the WRSE Regional Plans and Thames Water WRMP24, WFD Level 1 and, where needed, Level 2 assessments have been completed. Assessment of the water resource options has been undertaken to identify potential option impacts on the water environment while also considering potential mitigation measures.

The WFD process was undertaken alongside the development of the Thames WRMP24 to inform the decision-making process and integrate environmental considerations. The WFD assessment for the draft WRMP24 (dWRMP24) was presented in a WFD Report which was issued for consultation from November 2022 to March 2023. Comments received from the consultation process were reviewed and have been addressed where appropriate within this WFD Report. The dWRMP24 has been updated to the revised draft WRMP24 (rdWRMP24), reflecting additional modelling work undertaken to optimise the plan as well as consultation feedback. This report is the WFD Report for the Thames rdWRMP24 and forms part of the Thames rdWRMP24 documentation.

1.2 Thames Water rdWRMP24

The Water Industry National Environment Programme (WINEP) provides a mechanism for ensuring that abstraction licence reductions are considered. However, this programme only covers a five-year period, so does not include consideration of longer-term licence reductions. Therefore, to deliver long-term sustainability and environmental resilience, Thames Water have identified an Environmental Destination scenario within the rdWRMP24. This process is explained in Section 2 and 5 of the rdWRMP24. Some of the difficulty in assessing the future licence reductions that may be necessary is that without conducting detailed investigations we do not know to what extent abstractions are influencing river flows, or whether any influences that abstractions are having could cause any ecological detriment. In addition, future government policy which could cause further tightening of environmental legislation cannot be

[1] Environment Agency (Apr 2023), Water Resources planning guideline. Available online at: https://www.gov.uk/government/publications/water-resources-planning-guideline/water-resources-planning-guideline.

predicted. Due to these factors, various scenarios of potential future licence reduction have been considered to cover a wide range.

In the rdWRMP24, the long term aspiration is to cease all abstraction that adversely affects sensitive streams. The Environmental Destination within the rdWRMP24 BVP preferred pathway is the 'High' scenario, based on the 'Enhanced' scenario set out by the Environment Agency. This scenario sets out to achieve the Environmental Flow Indicator (EFI) at specific assessment points across the Thames Water region, with all abstraction reductions delivered by 2050 at the latest. The destination will deliver water to the environment through reductions to deployable output (DO). This will lead to improvements under WFD regulations in a large number of water bodies. The outcome of these decisions will result in limits on abstractions, reducing DO and thus affects which supply options are selected in the rdWRMP24, as well as their size (DO) and timing. The requirement for the supply options is driven, at least in part, from the requirement to reduce abstraction to protect the environment, as set out above.

Following the development of the main long term abstraction reduction scenarios, additional requirements for licence capping to avoid potential for deterioration under WFD were set out by the Environment Agency in April 2022. These licence capping reductions are required by 2030. The impact of this on DO has been assessed and is presented in Section 5 of the rdWRMP24. The requirement for the licence capping has been incorporated into the Environmental Destination scenario included in the rdWRMP24.

As part of the regional plan and WRMP processes, a Best Value Plan (BVP), which forms the WRMP, and two alternative plans (a Least Cost Plan (LCP) and Best Environment and Societal Plan (BESP)) were developed in line with the WRPG. The rdWRMP24 is an adaptive plan to deal with uncertainties and future scenarios that will mean further investment is required (e.g. further future sustainability reductions). An adaptive planning approach uses branches to cover these uncertainties. Section 4 in the rdWRMP24 provides further detail on the adaptive planning process. WRSE and Thames Water selected a total of nine branches (hereafter referred to as 'situations') to cover these uncertainties, which were derived based on forecast change (high, medium and low) combinations of the three key drivers:

- Population and housing growth
- Climate change impacts on DO for existing systems
- Levels of abstraction reduction associated with delivering Environmental Destination ambitions

Nine 'situations' were made up of a representative combination of these driver specific forecasts within each plan. Further information on this process is set out in the Strategic Environmental Assessment (SEA) report which forms Appendix B of the rdWRMP24. Within this report the following situations are considered:

- Situation 1: High Growth, high climate change and high environmental destination
- Situation 4: Medium growth, high climate change and high environmental destination
- Situation 8: Low Growth, medium climate change and medium environmental destination

WFD Level 1 assessments have been undertaken for all Thames Water feasible options, including transfers, reservoirs, water recycling, desalination, groundwater sources and aquifer storage and recharge. Options such as demand management were scoped out of the assessment. Where options were selected for the rdWRMP24 or the two alternative plans, Level 2 WFD assessments were undertaken where required (see Section 1.4 below). Further information on the BVP Framework and the selection of the BVP and the two alternative plans is presented in Section 10 and 11 of the rdWRMP24.

Table 1.1 summarises the 85 feasible options scoped in for WFD Level 1 screening, providing a general overview of the activities associated with each of them.

Table 1.1: Thames Water Feasible Options List

Option ID	Option name	Description overview
TWU_LON_HI-LRE_WT1_ALL_copperwtwmecana200/480/680	Coppermills WTW - filtration pre-treatment 680Ml/d	A 200, 480, or 680Ml/d Mecana filtration system for primary filtration of surface water at the Coppermills Water Treatment Works (WTW), including three new shaft connections, inlet pipework diversions, inlet pumping station (PS) and pipe bridge for return pipework.
TWU_LON_HI-DES_ALL_CNO_beckton desal 50/100/150	Beckton Desalination	Abstraction of raw water for production of 150Ml/d, 100Ml/d or 50Ml/d desalinated water (conveyance within option below). DO 142Ml/d for 150Ml/d capacity.
TWU_LON_HI-TFR_LON_CNO_beckton-coppermills	Beckton to Coppermills tunnel (treated) - Construction	Treated desalination water is to be conveyed via tunnel from Beckton desalination works to Coppermillls WTW for blending. (Part of the Beckton Desalination Scheme with the option above.)
TWU_LON_HI-TFR_SES_ALL_woodwtw-epsomdowns	Transfer - Woodmansterne to Epsom - Resource Element	Proposed new trunk mains to transfer potable water from Woodmansterne (SES) to Epsom including a new PS at Woodmansterne WTW.
TWU_SWX_HI-GRW_ALL_ALL_ashton keynes	Groundwater Development - Ashton Keynes borehole pumps - Removal of Constraints to DO	Installation of larger pumps and/or lowering of the pumps in some or all of five existing boreholes, abstracting from the confined Great Oolite aquifer. Change in operational philosophy to improve peak source output.
TWU_LON_HI-TFR_LON_ALL_nrv-groundimprov	New River Head - Ground improvements	Rehabilitation and recommissioning of disused groundwater source. This option comprises: - ground stabilisation around the New River Head borehole, comprising the grouting of the potential voids created by sand migration; - installation of four near surface ground anchors placed at convenient locations around the borehole; - installation of a turbidity meter; and - recommissioning of the licensed but currently disused groundwater source.
TWU_LON_HI-ROC_NET_CNO_hampton-battersea	TWRM extension - Hampton to Battersea - Construction	New ring main tunnel from Hampton to Battersea.
TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox2.3	Kennet Valley to SWOX Transfer - 2.3 Ml/d	The works proposed include: treated water pipeline from Pangbourne WTW to Cleeve WTW 9.4km (250dia), a pumping station at Pangbourne WTW (60kW), balance tank at Cleeve WTW (2 x the pipe volume), 800m (700dia) of replacement pipeline at the end of the Fobney WTW to Tilehurst Service Reservoir (SR) main, to increase flow, increased pump capacity at Fobney WTW treated water pump station from 18Ml/d to 23.88Ml/d.
TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox6.7	Kennet Valley to SWOX Transfer - 6.7 Ml/d	The works proposed include: treated water pipeline from Pangbourne WTW to Cleeve WTW 9.4km (350dia), a pumping station at Pangbourne WTW (150kW), balance tank at Cleeve WTW (2 x the pipe volume), 800m (700dia) of replacement pipeline at the end of the Fobney WTW to Tilehurst SR main to increase flow. Increased pump capacity at Fobney WTW treated water pump station from 18Ml/d to 28.34Ml/d.
TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox	Oxford Canal - Duke's Cut (SWOX) - Construction	Upgrades to the canal network to transfer 15Ml/d surplus from the Wolverhampton Levels to upstream of Duke's Cut.
TWU_UTC_HI-IMP_UTC_CNO_oxcanal-cropredy	Oxford Canal - Cropredy - Construction	15Ml/d resource option for Oxford Canal to the River Thames transfer. Option includes transfer of water to canal at Cropredy for discharge to River Cherwell and subsequent discharge into the River Thames.

Option ID	Option name	Description overview
TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor	Oxford Canal - Transfer from Duke's Cut to Farmoor	15Ml/d conveyance option from the Oxford Canal to Farmoor Reservoir, with abstraction from a point approximately 800m north of Duke's Cut on the Oxford Canal, discharging into the River Thames for subsequent re-abstraction at the existing Farmoor Reservoir intake. It has been assumed that, as the transfer will only be used in periods of low flow, no works will be required to upgrade the existing intake structure or treatment facilities at Farmoor Reservoir.
TWU_LON_HI-TFR_LON_ALL_lockwood ps-kgv res	Thames-Lee Tunnel extension from Lockwood PS to King George V Reservoir intake	New connection from Lockwood PS to the intake of KGV reservoir.
TWU_SWX_HI-TFR_HEN_ALL_henley-swox2.4	Henley to SWOX Transfer – 2.4 Ml/d	The option is for a new 2.4Ml/d capacity main from New Farm service reservoir (Henley) to Nettlebed Service reservoir (SWOX). This will require a new 5.9km (250dia) main from New Farm to Nettlebed and a new pumping station at New Farm.
TWU_SWX_HI-TFR_HEN_ALL_henley-swox5	Henley to SWOX Transfer – 5 Ml/d	The option is for one new 5Ml/d capacity main from New Farm SR (Henley) to Nettlebed SR (SWOX). This will require a new 5.9km, 350mm diameter main from New Farm to Nettlebed and a new pumping station at New Farm.
TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby	Managed Aquifer Recharge - Horton Kirby ASR	Construction of pipelines between two existing ASR boreholes in the Lower Greensand aquifer to an existing WTW at Horton Kirby in Kent. The Thames Water Bean abstraction abstracts water from existing Chalk aquifer boreholes (via the mains supply), which will be recharged into the two ASR boreholes during periods of water surplus and abstracted when needed and treated at the WTW.
TWU_SWA_HI-GRW_ALL_ALL_datchet do	Groundwater Development - Datchet Existing Source DO Increase	Increase capacity of Datchet site.
TWU_HEN_HI-TFR_KVZ_ALL_tw(kv)to(hen) con	Transfer - Kennet Valley to Henley - Conveyance Element	Existing Potable Water Transfer - Thames Water (Kennet Valley) to Thames Water (Henley) Conveyance.
TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	Groundwater Development - Southfleet & Greenhithe	Southfleet-Greenhithe licence disaggregation and new headworks and pumping station at borehole sites and new 3km main from Greenhithe to new WTW. DO benefit is 8Ml/d average, 9Ml/d peak.
TWU_LON_HI-GRW_ALL_ALL_addington gw	Groundwater Development - Addington	New abstraction borehole and upgrade to WTW. DO benefit 1Ml/d average, 1.5Ml/d peak.
TWU_SWX_HI-GRW_ALL_ALL_woods farm do	Groundwater Development - Woods Farm Existing Source Increase DO	New borehole to be constructed on site to bring DO up to licence (this is an additional 2.4Ml/d to average licence of 4.99Ml/d or an additional 2.91Ml/d to peak licence of 5.5Ml/d). The option includes a new borehole and a 1.4km raw water pipeline from the new satellite borehole to Woods Farm WTW.
TWU_GUI_HI-TFR_RZ5_ALL_sewtogui	Transfer - SEW to Guildford - Conveyance Element	10Ml/d transfer from South East Water (Hogsback) to Mount SR Guildford.
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw100/150/300	New WTW at Kempton - 100Ml/d - Construction	100/150/300Ml/d new capacity at WTW at Kempton treating raw reservoir water in west London. Purpose is to accommodate additional future demand.
TWU_SWX_HI-GRW_ALL_ALL_moulsford gw	Groundwater Development - Moulsford Groundwater Source	Construction of an abstraction borehole in the unconfined Chalk north of Streatley on the west bank of the River Thames. Water abstracted from the borehole will be treated at the existing Cleeve WTW located on the eastern side of the River Thames. DO benefit is 3.5Ml/d peak and 2Ml/d average.
TWU_SWA_HI-TFR_SWX_ALL_swoxswa48/72	Transfer from WTW in Abingdon to SWA - 48Ml/d	Abingdon WTW to Long Crendon to supply SWA.

Option ID	Option name	Description overview
	Transfer from WTW in Abingdon to SWA - 72Ml/d	
TWU_SWX_HI-TFR_SWA_ALL_tw(swa)to(swx)con	SWA to SWOX Transfer - Conveyance Element	Existing Potable Water Transfer from SWA WRZ to SWOX WRZ.
TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney	River Thames to Fobney Transfer	40Ml/d raw water transfer option from River Thames to Fobney WTW to supply Kennet Valley WRZ.
TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe	Abingdon Reservoir to Farmoor Reservoir pipeline	Construction of a transfer pipeline to convey 24Ml/d of raw water between a proposed reservoir at Abingdon and the existing Farmoor reservoir, in the SWOX WRZ. (Note: Abingdon reservoir creation is not part of this option.) The engineering scope includes the provision of a booster pump station at the proposed Abingdon reservoir site to facilitate the transfer. Treatment would be provided at the existing WTW.
TWU_GUI_HI-GRW_ALL_ALL_dapdune lic disagg	Groundwater Development - Dapdune Licence Disaggregation	Licence disaggregation. DO benefit 0Ml/d average, 2.2Ml/d peak
TWU_KVZ_HI-GRW_ALL_ALL_mortimer recomm	Groundwater Development - Recommission Mortimer Disused Source	Refurbishment of two disused abstraction boreholes located on-site at the existing, but disused Mortimer WTW. Water abstracted from the boreholes will be sourced from the underlying deep confined Chalk and treated at the disused WTW which will be upgraded for ammonia and iron removal and recommissioned. DO benefit 4.5Ml/d average and peak.
TWU_LON_HI-TFR_LON_ALL_crossness to beckton	Crossness to Beckton tunnel (treated) - Construction	Transfer of 190Ml/d desalinated water to Beckton site via pipeline inside tunnel beneath the Thames.
TWU_LON_HI-TFR_LON_CNO_beckton-crossness	Beckton to Crossness tunnel (raw) - Construction	The estuarine water from the Beckton site is to be conveyed under the River Thames via a tunnel to the Crossness desalination treatment site.
TWU_LON_HI-GRW_ALL_ALL_merton recommission	Groundwater Development - Merton Recommissioning	The option comprises the recommissioning and upgrade of the Merton Abbey WTW in order to treat the maximum peak DO of 8Ml/d from the Merton Abbey Well. DO benefit 7.86Ml/d peak, 2Ml/d average
TWU_LON_HI-REU_RE1_ALL_deephams reuse 46.5	Deephams Reuse – 46.5 Ml/d, direct to KGV - Construction	Transfer of Deephams sewage treatment works (STW) final effluent to the new water reuse works with the following technology: pre-screens, ultrafiltration (UF), reverse osmosis (RO), ultraviolet (UV) treatment, inter-process pumping, buildings and disinfection, pH adjustment chemicals. Includes conveyance to KGV.
TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b	Deephams Reuse – 46.5 Ml/d, to TLT - Construction	Transfer of Deephams STW final effluent to the new water reuse works with the following technology: pre-screens, UF, RO, UV treatment, inter-process pumping, buildings and disinfection, pH adjustment chemicals. Includes conveyance to TLT extension.
TWU_LON_HI-GRW_ALL_ALL_london conchalk	Groundwater Development - Confined Chalk North London	New abstraction borehole. DO benefit 2Ml/d average and peak.
TWU_GUI_HI-TFR_SES_ALL_reigatetoguildford5/20	Transfer - Reigate (SES) to Guildford 20Ml/d	Either a 5Ml/d or 20Ml/d transfer from Reigate (SES) to Guildford.
TWU_HON_HI-ROC_NET_CNO_cop'mills-honoroak	TWRM extension - Coppermills to Honor Oak - Construction	New ring main tunnel from Coppermills to Honor Oak.
TWU_KVZ_HI-GRW_ALL_ALL_east woodhay roc	Groundwater Development - East Woodhay borehole pumps Removal of Constraints to DO	Upgrade of pumps and pump control to increase DO. DO benefit 2.1Ml/d peak, 0 average.
TWU_LON_HI-DES_ALL_ALL_crossnessdesal50/100	Crossness Desalination	Development of a 50Ml/d or 100Ml/d desalination plant located south of Crossness, using brackish estuarine

Option ID	Option name	Description overview
		feedwater from the River Thames. Transfer of treated water to Coppermills WTW for blending.
TWU_LON_HI-GRW_ALL_ALL_addington asr	Managed Aquifer Recharge - Addington	Two new ASR boreholes near Addington PS, and one borehole refurbishment, 300m length of sewer for conditioning discharges, booster recharge pumps due to artesian head pressures in aquifer. DO benefit 3Ml/d average, 5Ml/d peak.
TWU_LON_HI-GRW_ALL_ALL_honor oak gw	Groundwater Development - Honor Oak	Two new abstraction boreholes, connections to existing WTW, DO benefit 1Ml/d average, 2.82Ml/d peak.
TWU_LON_HI-GRW_ALL_ALL_streatham ar	Managed Aquifer Recharge - Streatham (SLARS2)	One new AR borehole at Streatham PS, and one borehole refurbishment, new 17Ml/d WTW. DO benefit is 4Ml/d average, 4.5Ml/d peak.
TWU_LON_HI-GRW_ALL_ALL_thames valley asr	Managed Aquifer Recharge - Thames Valley, South London	Two new ASR boreholes at Ashford WTW, 1km length of sewer for conditioning discharges, booster injection pumps due to artesian head pressures in aquifer. DO benefit 3Ml/d average, 5Ml/d peak.
TWU_LON_HI-GRW_ALL_CNO_kidbrooke slars	Managed Aquifer Recharge - Kidbrooke (SLARS1) Construction	The scheme comprises the upgrade of the existing borehole at the Rochester Way site, another at the Bromley Reservoir site and the construction of a new AR borehole on private land in Eltham Green. Six observation boreholes will be constructed for groundwater level monitoring, four at the Eltham Green site and two off-site the Eltham Green location. Benefit is 8.1Ml/d peak and 7Ml/d average. The scheme also includes: construction of a new 10Ml/d WTW located on the existing Kidbrooke borehole site to serve the Rochester Way, Bromley Reservoir and a new AR borehole, a 5.7km (300mm) raw water transfer main between Bromley Reservoir and new AR borehole, a 6.4km (400mm) bi-directional raw water transfer main between Rochester Way AR borehole and a new AR borehole via Kidbrooke WTW (3.5km between Rochester Way and Kidbrooke WTW, 2.6km between new borehole and Kidbrooke WTW), a 1.8km (450mm) treated water main between Kidbrooke WTW and Bermondsey (Well Hall Pumping Station).
TWU_LON_HI-GRW_ALL_CNO_merton ar	Managed Aquifer Recharge - Merton (SLARS3) Construction	The scheme comprises the upgrade of the existing well and adit system at the Merton Abbey WTW for recharge/abstraction purposes and the construction of a new AR borehole at the nearby Byegrove Road site. DO benefit is 5Ml/d average and 6Ml/d peak. The scheme also includes the construction of a new 4.5Ml/d WTW located at the existing Merton Abbey WTW site to serve the Byegrove Road AR borehole, and the installation of a 1.1km raw water main from the Byegrove Road AR borehole to the new Merton Abbey WTW.
TWU_LON_HI-ROC_NET_ALL_barrowhillpump	Replace pump infrastructure at Barrow Hill - TWRM	Pump 6 at Barrow Hill is to be replaced.
TWU_LON_HI-ROC_WT1_CNO_eastlondon wtw100/150/200/300	New East London WTW	184Ml/d treatment works for reservoir water in London. Purpose is to accommodate additional future demand. Water discharged for treatment could result from various option types including wastewater reuse and water transfers. The capex calculations represent a 184Ml/d plant. The opex is calculated to represent a 184Ml/d opex less the saving associated with discontinuing the treatment of 84Ml/d through the slow sand filters, resulting in an opex that corresponds to 100Ml/d. There are also 150Ml/d, 200Ml/d and 300Ml/d versions of the option.
TWU_LON_HI-TFR_LON_ALL_ch'ford s intake	Intake Capacity Increase - Chingford South	Increase capacity of Chingford South intake.
TWU_LON_HI-TFR_LON_ALL_datchet int-qm	Intake Capacity Increase - Datchet	Increase capacity of Datchet PS site.

Option ID	Option name	Description overview
TWU_LON_HI-TFR_LON_ALL_littleton int-qm	Intake Capacity Increase - Queen Mary	Increase capacity of Littleton intake PS site by 300Ml/d capacity.
TWU_LON_HI-TFR_LON_ALL_newriverhead pump 4	Replace New River Head Pump - TWRM	Pump 4 at New River Head is to be replaced.
TWU_LON_HI-TFR_LON_CNO_second spine tunnel	Raw Water System Upgrade - Tunnel from Walthamstow 5 to Coppermills - Construction	Second Spine Tunnel from break tank to reservoir five upstream of Coppermills WTW.
TWU_LON_HI-TFR_LON_CNO_surbiton int-walton	Surbiton intake capacity increase with transfer to Walton inlet channel - Construction	Increase capacity of Surbiton intake.
TWU_LON_HI-TFR_LON_CNO_tlt upgrade – roc	Raw Water System Upgrade - TLT Removal of Constraints - Construction	TLT reinforcement for a section of the tunnel, a new shaft 6m diameter at a depth of 30m and a new air valve.
TWU_STR_HI-RSR_RE1_CNO_res_marsh gibbon	New Reservoir - Marsh Gibbon 30Mm3 - Construction	New non-impounding bunded reservoir situated within Oxfordshire, 2km south of Marsh Gibbon with a volume of 30Mm³/50Mm³/70Mm³.
TWU_SWA_HI-GRW_ALL_ALL_dorney do	Groundwater Development - Dorney Existing Source DO Increase	Drilling of one new borehole and provision of two new submersible pumps (two per borehole) to increase the overall site capacity up to the source DO. DO benefit 4.3Ml/d (peak). 300m pipeline to connect to existing raw feed pipeline which runs to WTW and 100m run-to-waste pipeline.
TWU_SWA_HI-GRW_ALL_ALL_taplowincreasedo	Groundwater Development - Taplow Existing Source DO Increase	Aims to increase DO up to licensed quantities. This is expected to bring peak DO from 44Ml/d to 50Ml/d. The scope is as follows: increase Taplow to peak licence (50Ml/d) by drilling a new chalk abstraction borehole at the Dorney WTW site but added to the Taplow abstraction licence. Adding two pumps, duty/stand-by fitted with variable speed drives (VSDs). 300m rising main and 300m run to waste.
TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw	New Medmenham Surface Water WTW	24Ml/d treatment works for river water near Medmenham (SWA). Purpose is to accommodate additional future demand. Includes a treated water pumping station, treated water transfer pipeline and new storage reservoir at Widdenton.
TWU_SWA_HI-TFR_HEN_ALL_henley-swa2.4	Henley to SWA Transfer - 2.4 Ml/d	The option is for one new main from Sheeplands WTW (Henley) to Hambleden WTW (SWA). This will require a new 9.94km main from Sheeplands WTW and a new pumping station at Sheeplands.
TWU_SWA_HI-TFR_HEN_ALL_henley-swa5	Henley to SWA Transfer – 5 Ml/d	The option is for one new main from Sheeplands WTW (Henley) to Hambleden WTW (SWA). This will require a new 9.94km main from Sheeplands WTW and a new pumping station at Sheeplands.
TWU_SWA_HI-TFR_UTC_ALL_medmenham intake 53/80	New Medmenham Surface Water Intake - 53 Ml/d	The Medmenham intake element includes the construction of an intake structure on the River Thames located approximately 1.75km west of the village of Medmenham, close to the village of Mill End. In addition to the intake structure, a pumping station will be constructed. The intake structure, pumping station and raw water transfer main would supply water from the River Thames to a new water treatment works at Medmenham. The intake and all associated infrastructure will be constructed with an abstraction capacity of either 53Ml/d or 80Ml/d.
TWU_SWX_HI-ROC_WT1_ALL_radcotwtw	New WTW - Radcot	24Ml/d treatment works for reservoir water in Radcot (SWOX). Purpose is to accommodate additional future demand.
TWU_WLJ_HI-ROC_NET_CNO_twrm shaft kempton	New shaft on the TWRM at Kempton - Construction	This option includes a new shaft on the TWRM to accommodate 800Ml/d of treated water flow from the expanded Kempton WTW.

Option ID	Option name	Description overview
TWU_WLJ_HI-TFR_WLJ_CNO_qm res-kempton wtw	Additional conveyance from Queen Mary Reservoir to Kempton WTW - Construction	New conveyance of raw water from Queen Mary Reservoir to Kempton WTW.
TWU_UTC_HI-RSR_RE1_CNO_res_chinnor_2	New Reservoir - Chinnor 30Mm3 - Construction	New non-impounding bunded reservoir situated within Oxfordshire, 5km southwest of Chinnor with a volume of 30Mm³.
TWU_LON_HI-TFR_SES_ALL_cheam-merton	Transfer from SES WTW to Merton TWRM shaft	Bidirectional main from London ring main at Merton shaft to Cheam.
TWU_STT_HI-TFR_STT_ALL_stt-sesro	STT to SESRO Link	Potential increase in DO by integrating the Severn to Thames Transfer (STT) pipeline and the Abingdon Reservoir Strategic Resource Options (SROs).
TWU_LON_HI-GRW_ALL_ALL_honoroak do	Groundwater Development - Increase DO of Existing Honor Oak Source	Restore Honor Oak well and WTW back into service by refurbishing the treatment works and replacing the pump. This option would utilise the existing license.
TWU_GUI_HI-GRW_ALL_ALL_dapdune roc	Groundwater Development - Removal of Constraints to Dapdune DO	Removal of current constraints on the DO at the Dapdune source. Increase of pump capacity at the Dapdune boreholes and rapid gravity filters will be used to treat the water at Ladymead WTW.

In addition to the options set out above, several Strategic Resource Options (SROs) were also considered. These are strategically important water resource options that could provide a large volume of water for more than one water company to use. SROs are being developed in parallel through the RAPID (Regulators' Alliance for Progressing Infrastructure Development) Gate process. The SROs have been assessed under the individual SRO projects, but a summary of these from the published RAPID Gate Two reports is provided in this report for completeness. The SROs are set out in Table 1.2 below.

Table 1.2: Thames Water SRO based options

Strategic Resource Option	Description
Abingdon Reservoir (South East Strategic Reservoir Option – SESRO)	This is a new water storage reservoir in the Upper Thames catchment, south-west of Abingdon. Water would be abstracted from the River Thames during periods of high flow and pumped into the reservoir. When flow in the river is low and water is required in London, or the wider South East, water would be released back to the Thames for re-abstraction downstream. There are a range of sizes of reservoirs being considered including: 75Mm³, 100Mm³, 125Mm³, 150Mm³.
Severn to Thames Transfer (STT)	This is a water transfer from the North West and Midlands to the South East to support the South East of England during drought events. The water would be provided from the River Severn itself, with additional sources of water provided by Severn Trent Water and United Utilities. The water would be moved from the River Severn to the River Thames by a new pipeline.
Thames to Southern Transfer (T2ST)	A transfer of water from Thames Water to Southern Water's Hampshire area helping to improve resilience through better connectivity. The transfer is dependent on the prior development of new water resource sources, namely the STT or SESRO. The T2ST SRO involves two options for the transfer of potable water from a new WTW at the intake location to the west of A34 near Drayton, Oxfordshire, to the existing Yew Hill Water Supply Reservoir (WSR) near Winchester, Hampshire. The following water transfer route options were under review at Gate 2: • Option B: Pipeline from the new WTW at the intake location to the west of A34 near Drayton, then continuing to the west of the A34 to Yew Hill WSR. Connects along the route to three existing assets – Beacon Hill WSR, Micheldever WSR and Crabwood WSR. • Option C: Pipeline from the new WTW at the intake location to the west of A34 near Drayton, running to the east of the A34 between Newbury and Whitchurch, then continuing to west of A34 to Yew Hill WSR. Connects along the route to three existing assets – Beacon Hill WSR, Micheldever WSR and Crabwood WSR.
Thames to Affinity Transfer (T2AT)	A transfer of raw water from Thames Water to Affinity Water. It would rely on new sources of water from one of the strategic resources options (STT, SESRO or London water recycling) contributing to a resilient water supply for Affinity Water.

	• Lower Thames Reservoir Option – The Lower Thames Reservoir Option involves the abstraction of raw water from Thames Water's Wraysbury and Queen Mother reservoirs via a proposed connection into Affinity Water's existing tunnel at the existing Iver WTW. This raw water would then be diverted to a new WTW and drinking water would be subsequently conveyed to an existing SR in the vicinity of Harefield. • Beckton Reuse Indirect Option – The Beckton Reuse Indirect Option involves the abstraction of raw water from the River Lee flood relief channel and transfer to a new WTW, followed by conveyance of the drinking water produced to an existing SR in the vicinity of Brookmans Park and directly into the existing drinking water transfer network. A proportion of the water would then be able to flow under gravity to the existing booster PS in the vicinity of North Mymms. Whilst a proportion of the raw water may arise naturally in the River Lee catchment, in terms of water resources the scheme would depend on the indirect transfer of recycled water from the Beckton Water Recycling option of the London Water Recycling SRO. The proposed abstraction point would be located on the River Lee flood relief channel, downstream of the outfall from the Beckton Water Recycling option.
London Water Recycling	The solution aims to use treated wastewater to provide a reliable, sustainable supply of water to support the flow in the River Thames. It does this by treating wastewater effluent to a high standard and discharging it to the River Thames or to the River Lee where it can then be abstracted and used as a raw water resource. The water would be treated at a WTW to meet high quality drinking water standards. There are four potential schemes being looked at: • Beckton Water Recycling – Transfer of recycled water from Beckton to the new water reuse works with the following technology: pre-screens, UF, RO, UV treatment, inter-process pumping, buildings and chemical additions. DO 89Ml/d for 100Ml/d Capacity. DO 130Ml/d for 150Ml/d capacity. Conveyance of treated water from Beckton to Lockwood PS. • Mogden Water Recycling – A portion of final effluent from Mogden STW would be conveyed to a new Advanced Water Recycling Plant (AWRP). The recycled water would be discharged into the River Thames upstream of the existing Thames Water Walton WTW Intake. The waste streams would be conveyed back to Mogden STW. • Mogden South Sewer – A portion of untreated sewage would be abstracted from the South Sewer, which runs close to Kempton Park WTW and would be pumped to a new AWRP located at a site near Kempton WTW (AWRP site). The recycled water would then be pumped and discharged into the River Thames upstream of the existing Thames Water Walton WTW intake. Waste stream from RO concentrate would be transferred to the existing Mogden STW outfall through a new pipeline, while the other waste stream could be returned to the South Sewer which discharges into Mogden STW inlet works. There is an opportunity that all waste stream could be returned to the South Sewer, if capacity of Mogden STW allows. This option was not progressed through Gate 2 and therefore, is not included further within this report. • Teddington Direct River Abstraction (DRA) – A portion of the final effluent from Mogden STW would be subject to tertiary treatment and transferred in a tunnel for discharge into the River Thames upstream of Teddington weir. An equal volume of water would be abstracted from the Thames upstream of the new outfall. Abstracted water would be pumped into the nearby Thames Lee Tunnel for transfer to Lockwood Reservoir, part of the Lee Valley reservoirs in East London. The Gate 2 assessment considered a 75Ml/d option and a 100Ml/d option. Progression of further studies and modelling by Thames Water has shown marginal increased environmental risks associated with the 100Ml/d option compared to the 75Ml/d option. Overall, these have been shown to be minimal in the work undertaken to date. The Environment Agency requires that any option minimises the level of detriment to the river Thames at this location. It has indicated that scheme sizes greater than 75Ml/d would not be environmental promotable. Taking account of these points, as well as representations received expressing concerns around the environment, health and recreation in relation to the scheme, the maximum size of Teddington DRA to be included in the rdWRMP and progressed to Gate 3 is 75Ml/d.

DP options were also included in the feasible options list, but these have been assessed through the DP process. These options are set out in Table 1.3 below.

Table 1.3: Thames Water drought plan options

Option ID	Option name	Drought plan option description
TWU_SWX_RE-DRP_ALL_ALL_dp-gatehampton-swox	Gatehampton Drought Permit	The Gatehampton licence includes a flow constraint which means abstraction must be reduced from the licence quantity of 105Ml/d to at or below 101.5Ml/d when flow in the River Thames at Reading Gauging Station falls below 400Ml/d for five days. The Gatehampton SWOX DP option is to change the Gatehampton licence to allow abstraction to remain at 105Ml/d even when the flow constraint is in place during drought periods.
TWU_KVZ_RE-DRP_ALL_ALL_dp-playhatch-kv	Playhatch Drought Permit	The Playhatch licence has an annual average abstraction of 7.27Ml/d and a peak abstraction of 8.2Ml/d. The Playhatch Kennet Valley DP option is to increase the peak licence to 12.3Ml/d during drought periods.
TWU_GUI_RE-DRP_ALL_ALL_dp-shalford-guild	Shalford Drought Permit	The Shalford licence allows abstraction of 30Ml/d from the River Wye and is aggregated with the Tillingbourne licence. This option is to allow an increase in the abstraction to 35Ml/d and removal of the licence aggregation.
TWU_HEN_RE-DRP_ALL_ALL_dp-sheep/harp-hen	Sheeplands/Harpsden Drought Permit	When nitrate levels are low (below 10.3mg/l) Thames can abstract up to 18.18Ml/d from Sheeplands and 6.5Ml/d from Harpsden with an aggregate of 22.33Ml/d. When nitrate levels are high Thames Water may abstract up to 18Ml/d from Harpsden (but the aggregate remains the same. DO at these sources are 11.4Ml/d at Sheeplands and 16.5Ml/d at Harpsden. This option would remove the licence aggregate condition to allow increased abstraction up to the DO.

The WFD assessments for these DP options have been carried out using the methodology set out in the Thames Water Drought Plan 2022 Environmental Assessment Methodology[2] and the assessments are presented in the Drought Plan Environmental Assessment Reports. A summary of the outcomes of these assessments is included in this report.

1.3 The Water Framework Directive Regulations

The Water Framework Directive (WFD) was introduced into UK law in 2003. The latest regulations are set out in The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017[3] (known as the WFD Regulations). These regulations require all water bodies (both surface and groundwater) to achieve 'good status'. For surface water bodies good status is a function of good ecological status (biological, physico-chemical and hydromorphological elements and specific pollutants) and good chemical status (Priority Substances and Priority Hazardous Substances). For groundwater good status is a function of quantitative (surface water, groundwater dependent terrestrial ecosystems (GWDTE), saline intrusion and water balance) and chemical status (dependent surface water body, drinking water protected areas, GWDTE, saline intrusion and general chemical).

The WFD Regulations require that the water bodies experience no deterioration in status and no impediment is introduced which could prevent the achievement of future water body objectives and good status. The WFD Regulations promotes long-term sustainable water management,

[2] Ricardo, October 2020. Thames Water Drought Plan 2022. Environmental Assessment Methodology.

[3] The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. Available online at: https://www.legislation.gov.uk/uksi/2017/407/contents/made

with the key objectives of providing a high level of protection to the aquatic environment, including:

1. aquatic ecology
2. unique and valuable habitats
3. drinking water resources
4. bathing water

All the key objectives are integrated for each river basin with objectives 2, 3 and 4 above reflecting specific bodies of water that are designated for drinking water abstraction, supporting special wetlands, or bathing areas.

The WFD Regulations, regulation 13, sets out the “environmental objectives” for natural surface and groundwater bodies, and artificial water bodies (AWB) and heavily modified water bodies (HMWBs). Natural surface water bodies must, by 2015, adhere to good ecological and chemical status and groundwater bodies to good quantitative and chemical status. Artificial and HMWBs (A/HMWB) must achieve good ecological potential and good chemical status. Regulation 13 also sets out the principle of no deterioration, providing protection from the deterioration of water status/potential. The WFD Regulation, regulation 15, sets out the criteria for the designation of artificial or heavily modified water bodies.

Regulations 8 to 10 set out the protection of specific areas for the protection of areas used for drinking water, shellfish water and protected areas respectively.

Exemptions are defined within the WFD Regulations, with regulations 16 to 19 outlining the conditions under which the achievement of good status or potential may be phased or not be achieved, or under which deterioration may be allowed. Regulations 16 to 19 describe these distinct conditions. In summary:

- Regulation 16 allows an extension of the time limit so that good status or potential is, under certain conditions, achieved only after 2015.
- Regulation 17 allows the achievement of less stringent objectives under certain conditions.
- Regulation 18 allows the temporary deterioration of status in case of natural causes or "force majeure".
- Regulation 19 allows for deterioration of status or non-achievement of good status or potential under certain distinct conditions. If any options are identified as leading to a risk of water body scale deterioration that cannot be mitigated, then a regulation 19 derogation application would be needed. Where a regulation 19 exemption application is needed, various tests must be passed including:
  - The benefits of the option cannot be achieved by a significantly better environmental option.
  - All practicable steps have been taken to mitigate the adverse effects on the water body.
  - The reasons for the modifications or alterations are explicitly set out in the River Basin Management Plan (RBMP).
  - There is an overriding public interest in the proposed development and/or its benefits outweigh the benefits of delivering the WFD objectives.

The objectives of the WFD assessment are:

- To ensure there is no deterioration between WFD status class of any element in the water body as set out in WFD Regulation 13.
- To ensure no new impediments to attaining ‘Good’ WFD status or potential for the water body, or any assessed element, as set out in Regulation 13. In some water bodies it is accepted that it is currently technically infeasible or disproportionately costly to achieve Good

status or potential. If this is the case, the test is applied to current agreed objectives for the water body.

- To ensure that the planned programme of measures in the current cycle of RBMPs, to help attain the WFD objectives from the water body, are not compromised.

As well as these legally binding WFD objectives, other objectives set out in the RBMP should be reviewed to see if the options can assist in meeting the WFD objectives:

- Does the option assist in attaining the WFD objectives for the water body?
- Does the option assist in attaining the objectives associated with WFD protected areas?
- Does the option reduce treatment needed in the production of drinking water and look to work in partnership with others, promoting the requirements of Regulation 8?

1.4 Methodology

1.4.1 Methodology overview

The All Company Working Group (ACWG) has developed a consistent framework for undertaking WFD Regulations assessments[4] to ensure that the WRMP supports the achievement of environmental objectives for water resources in the RBMPs by preventing deterioration and supporting achievement of protected area and water body status objectives, as well as not preventing a water body from reaching 'good' or 'good potential' status in the future. The assessment considers mitigation that would need to be put in place to protect water body status and WFD future objectives.

Two stages of assessment are completed under the ACWG WFD approach, an initial Level 1 basic screening (Section 1.4.2) and a Level 2 detailed impact screening (Section 1.4.3). These are completed using a spreadsheet assessment tool. Level 1 outcomes are automated based on option information and Level 2 outcomes are based on expert judgment. Further information on WFD classification and the approach adopted can be found in the ACWG WFD framework[4].

This framework was developed to ensure consistency in environmental assessment across water companies for SRO development across England and Wales. To ensure consistent comparison between WRMP options, the same framework has been used for the assessment of all WRMP options.

1.4.2 WFD ACWG Level 1 – basic screening

The first stage of WFD assessment was completed for all options. The Level 1 assessment followed the ACWG methodology set out in the framework and shown below:

- The affected water bodies are identified.
- The option is reviewed for activities taking place in each water body.
- Possible impacts of the option are identified. Predetermined scores for each activity (as set out in the ACWG framework) in a water body are applied, using a 6-point scale from -2 to 3 (shown in Table 1.4).
- Embedded mitigation measures (those already included in the scheme design) are applied. Where this embedded mitigation would remove the potential impact from an activity, the impact score is adjusted using professional judgement and justification provided.
- A maximum screening score for the water body is then calculated. Where this maximum screening score identifies water bodies with a maximum score of -2 to 1, these are 'screened out' and do not proceed to further assessment. If the maximum impact score is greater than

[4] All Company Working Group (Nov 2020), WFD: Consistent framework for undertaking no deterioration assessments.

1 then the water body is 'screened in' and assessed at level 2. This is known as detailed impact screening (please refer to section 1.4.3).

The scoring system used is set out below in Table 1.4.

Table 1.4: Impact scoring system used for WFD assessments

Impact	Score	Description
Very beneficial	-2	Impacts that, taken on their own, have the potential to lead to the improvement in the ecological status or potential of a WFD quality element for the entire water body.
Beneficial	-1	Impacts that, when taken on their own, have the potential to lead to a minor localised or temporary improvement that does not affect the overall WFD status of the water body or any quality elements.
No/minimal	0	No measurable change in the quality of the water environment or the ability for target WFD objectives to be achieved.
Minor	1	Impacts that, when taken on their own, have the potential to lead to a minor localised, short-term and fully reversible effect on one or more of the quality elements but would not result in the lowering of WFD status. Impacts would be very unlikely to prevent any target WFD objectives from being achieved.
Moderate adverse	2	Impacts that, when taken on their own, have the potential to lead to a widespread or prolonged effect on the quality of the water environment that may result in the temporary reduction in WFD status. Impacts have the potential to prevent target WFD objectives from being achieved.
Major adverse	3	Impacts when taken on their own have the potential to lead to a significant effect and permanent deterioration of WFD status. Potential for high impact on preventing target WFD objectives from being achieved.

The outcomes for the Thames Water rdWRMP24 feasible options are summarised in Section 2 and Annex A. Where water bodies and option impacts were 'screened in' for further assessment, a Level 2 assessment has been undertaken.

1.4.3 WFD ACWG Level 2 – detailed impact screening

The second stage of WFD assessment is more detailed. These Level 2 assessments have been completed for the options that were screened in at Level 1. The Level 2 assessment includes the following steps:

- For each water body where a risk of deterioration has been identified in Level 1, a detailed assessment is undertaken on the potential for impacts on each WFD quality element, from each activity proposed as part of the option. Each activity is assessed against each WFD status element and a score (using the same criteria set out in Table 1.4) is assigned using professional judgement.
- An assessment of confidence in the assessment is given (low, medium or high), for the WFD baseline data and around the design certainty. These confidence levels are assigned for each assessment, based on the quality and availability of physical data and on the amount of design information for the option at the time of assessment *(note, confidence/certainty expected to be low during this initial WRMP assessment and to increase over time).* The criteria for these confidence levels is set out in the ACWG framework and provided in Table 1.5 below. For options, where the confidence levels are medium or low, the requirements for further data collection or design detail are set out in order to raise this confidence level in the future will be listed.
- Further mitigation is also identified.
- A post mitigation impact scope is also assigned based professional judgement of the impact once the proposed further mitigation, or suitable alternative, has been included in the design.
- Where the assessment certainty is medium or low, further investigations are identified which would improve the certainty of the assessment outcomes.

Table 1.5: Confidence levels used in the level 2 assessment

Confidence level	Description
Low	Limited data and evidence available, based mainly or completely on expert judgement with many assumptions. Preliminary design information only, detailed information on location/routes, construction methods etc not yet available.
Medium	Some data and evidence available, based partially on professional judgment with some assumptions.t with some assumptions. Design progressed but some assumptions made on construction methods etc.
High	Lots of appropriate data and evidence available, minimal assumptions needed Design advanced minimal assumptions needed

The WFD Level 2 assessment outcomes for the selected options are summarised in Section 3 and the full assessments are presented in Annex B.

Where water bodies and option impacts have been identified, recommendations have been made for increasing the confidence in the assessment. This is expected to be achieved by increasing the level of detail available during option development and the pre-application design process when development consent is sought.

1.4.4 WFD assessment of rdWRMP24

The ACWG WFD assessment process, described in Section 1.4.3, is designed to identify where an individual option contained within rdWRMP24 would lead to a direct risk of deterioration to a specific water body (i.e. option compliance). There is also the need to consider the potential risk of deterioration posed by the rdWRMP24 as a whole, to identify whether more than one option included in the rdWRMP24 could lead to an increase in deterioration risk to one, or more, water bodies. As such, an additional assessment was undertaken to identify whether any water bodies are considered to be potentially at risk from multiple options included within the rdWRMP.

The water bodies that were listed as potentially impacted under more than one option were identified. The proposed activities associated with all options within each water body were reviewed to determine if there is an increased risk of WFD deterioration and a new impact score assigned to the water body. The assessment is based on the WFD Level 1 and 2 assessment outcomes at this stage. As further investigations are conducted and design information becomes available for future updates to the plan, the individual Level 2 WFD assessments will require updates. Following these adjustments, updates to these assessments will be required.

The cumulative effects assessment for the rdWRMP24 has been carried out on the following Plans:

- BVP preferred pathway – Situation 4
- BVP core pathway – Situation 8
- BVP - Situation 1
- Best Environment and Societal Plan – Situation 4
- Least Cost Plan – Situation 4

Section 4.1 sets out the assessment for the BVP preferred pathway (Situation 4), while Section 5 reports the differences between the preferred pathway and the other situations and plans.

1.4.5 In-combination effects assessment

The in-combination effects assessment is undertaken to determine the combined impact of BVP preferred pathway option activities along with any relevant planning projects and/or other water company options identified on impacted water bodies.

All planning allocations, large existing or emerging planning applications (500 or more dwellings or large commercial/industrial developments) and major projects, such as Development Consent Orders (DCOs) or Hybrid Bills, have been identified within the Thames Water operating area. Hereafter these will be collectively referred to as 'planning projects'. For each planning project, an assessment is made on whether the project could lead to impacts on WFD water bodies. For larger DCOs this review makes use of any existing WFD assessments which have been carried out for the planning application. For other planning allocations or applications where no WFD assessment has been carried out, professional judgement is used to identify the potential for impacts on WFD. Any planning projects where no risk of deterioration is identified are screened out of the assessment, and the remaining planning projects are passed into the next stage of the assessment.

The in-combination effects assessment also includes consideration of the BVP options with neighbouring water company WRMPs and DPs. The results from the published draft WRMP BVP have been used in this report to consider the cumulative effects of the other water companies.

For any water body where effects from one or more BVP options and one or more relevant planning projects occur, the corresponding option assessments and planning project information is reviewed to determine if the cumulative impact of the proposed activities could lead to an increased risk of WFD deterioration. Where a water body is identified to be at an increased risk, a new cumulative WFD assessment is completed where all option activities and planning project activities are assessed together, and a new impact score assigned.

1.5 Limitations and assumptions

The impact scoring system used in this assessment is derived from the ACWG document and focusses on screening at a project level. The limitations of this scoring system to assess WFD compliance at the plan/strategic level therefore need to be acknowledged. However, this system has been used to guide this WFD assessment in the manner explained below.

As the options set out in the rdWRMP24 are in the early stages of design development, a precautionary approach has been exercised in the derivation of WFD compliance risk scoring, following the Level 2 assessment approach. If insufficient evidence was available at the time of assessment to rule out a potential risk of deterioration and/or meeting WFD objectives, that has been reflected in the tables provided with this assessment in the maximum impact score column, which reflects the impact scoring system which contains a category of potential deterioration risk.

The assessment also includes consideration of potential available mitigation, and these measures are taken into account in a further column which reflects the scoring of 'post-mitigation' impact. This scoring approach has considered where a potential deterioration risk is identified whether an adjustment should be made to the impact score taking into account the mitigation measures. Given that this assessment is at a strategic plan level the scoring has been undertaken based on reasonable professional judgment at this stage. The mitigation identified at this stage is generic or best practice in nature, so is understood to have a reasonable level of confidence that it can be applied at a project level.

Clearly more detailed WFD assessments will need to be undertaken at the project-level design development stage.

The WFD assessment has the following limitations and assumptions:

- The assessment has used WFD 2019 baseline classification data, which is the current officially reported baseline in the Cycle 3 River Basin Management Plan (RBMP).

- All assessments will be based on a precautionary approach where limited data or design certainty is identified.
- All pipelines are assumed to be constructed underground.
- Assessment assumes that pipelines will be directionally drilled or pipe-jacked beneath any larger watercourses, roads or railways and bypass and trenched under small roads and watercourses. Therefore, they will not be installed over watercourses above ground or cause direct impacts.
- The WFD assessment initially considers the water bodies where changes to abstraction and discharges will take place. There is potential for some effects to continue downstream of the abstraction point. It is assumed these effects would decrease downstream until they are far enough removed from option activity to be considered at a ‘negligible’ risk. Where downstream impacts are possible, these water bodies have been included in the relevant assessments. This assumption will need to be reviewed as additional hydrological studies are undertaken.
- In-combination effects assessments are based on the publicly available information from planning applications, DCOs and planning allocations available at the time of writing.

2 Water Framework Directive findings (WFD ACWG Level 1)

2.1 Summary of rdWRMP24 WFD Level 1 outputs

This section of the report presents the WFD Level 1 screening assessments for all options assessed during the rdWRMP24 process. The full assessments are presented in Annex A.

Of the 85 supply options assessed, 41 pass the screening assessment and do not require further assessment at this stage. The remaining 44 supply options require further assessment and have been passed through to Level 2. All the drought options were screened out at the Level 1 assessment and do not require further assessment. All of the SROs require further assessment and have passed through to Level 2.

2.1.1 Coppermills WTW - filtration pre-treatment 680Ml/d

The Level 1 WFD assessment covered two water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why one water body has been screened out of further assessment. The outcomes indicated that further assessment would be necessary for one water body: GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks) due to construction of a below ground structure located within 500m of a sensitive groundwater feature.

Table 2.1: WFD Level 1 assessment outcomes for Coppermills WTW - filtration pre-treatment 680Ml/d Option

Option ID	TWU_LON_HI-LRE_WT1_ALL_copperwtwmecana200/480/680
Option description	200/480/680Ml/d Mecana filtration system for primary filtration of surface water at the Coppermills WTW, including three new shaft connections, inlet pipework diversions, inlet PS and pipe bridge for return pipework.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB106038027950: Lea Navigation Enfield Lock to Tottenham Locks
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks)
Description of potential effects/reason for further assessment	Construction of a below ground structure located within 500m of a sensitive groundwater feature. Risk of groundwater flooding, and potential adverse risks to watercourses, wetland habitats and abstractions.

2.1.2 Beckton Desalination

The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why one water body has been screened out of further assessment. The outcomes indicated that further assessment would be necessary for two water bodies: GB530603911402 Thames Middle, and GB40602G602500: Greenwich Tertiaries and Chalk due to the discharge of saline water in both water bodies, and a new abstraction license is required for the GB530603911402 Thames Middle.

Table 2.2: WFD Level 1 assessment outcomes for Beckton Desalination Option

Option ID	TWU_LON_HI-DES_RE1_CNO_beckton desal 50/100/150
Option description	Abstraction of 187Ml/d raw water for production of 150Ml/d desalinated water (conveyance within option below). DO 142Ml/d for 150Ml/d capacity. The 50 and 100 options involve raw water abstraction for production of 50Ml/d and 100Ml/d desalinated water.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB106037028171: Mayes Brook
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further WFD assessment	GB530603911402: Thames Middle; GB40602G602500: Greenwich Tertiaries and Chalk (GW)
Description of potential effects/reason for further assessment	New discharge of highly saline water to both water bodies. New abstraction license required for the GB530603911402: Thames Middle.

2.1.3 Beckton to Coppermills tunnel (treated) - Construction

The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why two water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for one water body: GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks) due to construction of a below ground structure located within 500m of a sensitive groundwater feature.

Table 2.3: WFD Level 1 assessment outcomes for Beckton to Coppermills tunnel (treated) - Construction Option

Option ID	TWU_LON_HI-TFR_LON_ALL_beckton-coppermills
Option description	Treated desalination water is to be conveyed via tunnel from Beckton desalination works to Coppermillls WTW for blending (part of the Beckton Desalination Scheme with the option above).
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB530603911402: Thames Middle GB106037028181: Lower Roding (Loughton to Thames)
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks)
Description of potential effects/reason for further assessment	Construction of a below ground structure located within 500m of a sensitive groundwater feature. Risk of groundwater flooding, and potential adverse risks to watercourses, wetland habitats and abstractions.

2.1.4 Transfer - Woodmansterne to Epsom - Resource Element

The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why two water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for one groundwater body: GB40601G602200: Epsom North Downs Chalk due to construction of a below ground structure located within 500m of a sensitive groundwater feature. There is a risk

of groundwater flooding, and potential adverse risks are posed to watercourses, wetland habitats and existing abstractions.

Table 2.4: WFD Level 1 assessment outcomes for Transfer – Woodmansterne to Epsom – Resource Element Option

Option ID	TWU_LON_HI-TFR_SES_ALL_woodwtw-epsomdowns
Option description	Proposed new trunk mains to transfer potable water from Woodmansterne (SES) to Epsom including a new PS at Woodmansterne WTW.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106039023460: Wandle (Croydon to Wandsworth) and the Graveney; GB106039017440: Hogsmill
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB40601G602200: Epsom North Downs Chalk
Description of potential effects/reason for further assessment	Construction of a below ground structure located within 500m of a sensitive groundwater feature. Risk of groundwater flooding, and potential adverse risks to watercourses, wetland habitats and abstractions.

2.1.5 Groundwater Development – Ashton Keynes borehole pumps – Removal of Constraints to DO

The Level 1 WFD assessment covered four water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why three water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for one water body: GB40602G600500: Kemble Forest Marble due to the use of an existing surface water and groundwater abstraction licence, within existing licence conditions but outside of the recent actual rates, which could reduce groundwater levels, and poses a risk to surface watercourses, wetland habitats and existing abstractions.

Table 2.5: WFD Level 1 assessment outcomes for Groundwater Development - Ashton Keynes borehole pumps - Removal of Constraints to DO Option

Option ID	TWU_SWX_HI-GRW_ALL_ALL_ashton keynes roc
Option description	Installation of larger pumps and/or lowering of the pumps in some or all of five existing boreholes, abstracting from the confined Great Oolite aquifer. Change in operational philosophy to improve peak source output.
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB106039023700: Swill Brook (source to Ashton Keynes); GB106039023760: Thames (Kemble to Waterhay Bridge); GB40603G000200: Upper Thames Gravels
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB40602G600500: Kemble Forest Marble
Description of potential effects/reason for further assessment	Use of existing groundwater abstraction licence, within existing licence conditions but outside of the recent actual rates, which could reduce groundwater levels in the Kemble Forest Marble groundwater body.

2.1.6 New River Head - Ground improvements

–The Level 1 WFD assessment covered two groundwater bodies for this option: GB530603911402: Thames Middle and GB40602G602500: Greenwich Tertiaries and Chalk. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why all the water bodies have been screened out of further assessment.

Table 2.6: WFD Level 1 assessment outcomes for New River Head – Ground improvements Option

Option ID	TWU_LON_HI-TFR_LON_ALL_nrv-groundimprov
Option description	Rehabilitation and recommissioning of disused groundwater source. This option comprises: - ground stabilisation around the New River Head borehole, comprising the grouting of the potential voids created by sand migration; - installation of four near surface ground anchors placed at convenient locations around the borehole; - installation of a turbidity meter; and - recommissioning of the licensed but currently disused groundwater source.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB530603911402: Thames Middle GB40602G602500: Greenwich Tertiaries and Chalk (GW)
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	NA
Description of potential effects/reason for further assessment	N/A

2.1.7 TWRM extension – Hampton to Battersea - Construction

The Level 1 WFD assessment covered six water bodies for this option: GB106039023232: Thames (Egham to Teddington), GB530603911403: THAMES UPPER, GB106039023460: Wandle (Croydon to Wandsworth) and the Graveney, GB530603911402: THAMES MIDDLE, GB40603G000300: Lower Thames Gravels and GB106039022850: Beverley Brook (Motspur Park to Thames) and Pyl Brook at West Barnes. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why all the water bodies have been screened out of further assessment.

Table 2.7: WFD Level 1 assessment outcomes for TWRM extension - Hampton to Battersea - Construction –Option

Option ID	TWU_LON_HI-ROC_NET_CNO_hampton-battersea
Option description	New ring main tunnel from Hampton to Battersea.
Number of water bodies passing WFD assessment	5
Water bodies passing WFD assessment	GB106039023232: Thames (Egham to Teddington); GB530603911403: THAMES UPPER; GB106039023460: Wandle (Croydon to Wandsworth) and the Graveney; GB530603911402: THAMES MIDDLE; GB40603G000300: Lower Thames Gravels
Number of water bodies requiring further WFD assessment	1

Water bodies requiring further WFD assessment	GB106039022850: Beverley Brook (Motspur Park to Thames) and Pyl Brook at West Barnes
Description of potential effects/reason for further assessment	Due to the GWDTE status of Wimbledon Common SSSI, the shaft at Hampton near River Thames will need to be constructed using diaphragm walls and other mitigation to ensure no adverse effect. This assessment assumes this mitigation is in place and therefore impact will be minor/temporary and so will not require a Level 2.

2.1.8 Kennet Valley to SWOX Transfer – 2.3 Ml/d and 6.7Ml/d

The Level 1 WFD assessment covered five water bodies for these options. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why two water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for three water bodies: GB106039023300: Pang; GB40601G600900: Berkshire Downs Chalk and GB40601G604100: Chiltern Chalk Scarp due to construction of a below ground feature located within 500m of a sensitive groundwater feature.

Table 2.8: WFD Level 1 assessment outcomes for Kennet Valley to SWOX Transfer – 2.3 Ml/d and 6.7Ml/d Options

Option ID	TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox2.3 TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox6.7
Option description	The Works proposed include: treated water pipeline from Pangbourne WTW to Cleeve WTW 9.4km, a pumping station at Pangbourne WTW (150kW), balance tank at Cleeve WTW (2 x the pipe volume), 800m (700dia) of replacement pipeline at the end of the Fobney WTW to Tilehurst SR main, to increase flow, increased pump capacity at Fobney WTW treated water pump station from 18Ml/d to 23.88Ml/d (2.3Ml/d option) or from 18Ml/d to 28.34Ml/d (6.7Ml/d option).
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106039030331: Thames Wallingford to Caversham; GB106039023141: Holy Brook
Number of water bodies requiring further WFD assessment	3
Water bodies requiring further WFD assessment	GB106039023300: Pang; GB40601G600900: Berkshire Downs Chalk (GW) GB40601G604100: Chiltern Chalk Scarp (GW)
Description of potential effects/reason for further assessment	Construction of a below ground feature located within 500m of a sensitive groundwater feature. Risk of groundwater flooding, and potential adverse risks to watercourses, wetland habitats and abstractions.

2.1.9 Oxford Canal - Duke's Cut (SWOX) – Construction

The Level 1 WFD assessment covered 54 water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body. The outcomes indicated that further assessment would be necessary for all 54 water bodies due to transfer of water via a river, canal or aqueduct, a new or increased surface water abstraction, and a low volume discharge of water with a quality element of a lower WFD status than the receiving water body.

Table 2.9: WFD Level 1 assessment outcomes for Oxford Canal - Duke's Cut (SWOX) – Construction Option

Option ID	TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox
Option description	Oxford Canal to River Thames - transfer of water to canal at Cropredy for discharge to River Cherwell and subsequent discharge to River Thames. A supported conveyance pipeline option from Duke's Cut on the Oxford Canal to the River Thames upstream of the existing Farmoor intake with a 15Ml/d capacity.
Number of water bodies assessed	54
Water bodies passing WFD assessment	0
Number of water bodies requiring further WFD assessment	54
Water bodies requiring further WFD assessment	GB30436523: Chasewater; GB109054044070: Itchen - source to confluence with River Stowe; GB106039037370: Clayton and Wormleighton Brook, Source to Highfurlong Brook; GB106039042660: Highfurlong Brook (to Cherwell); GB106039037350: Cherwell (Ashby Brook to Cropredy); GB106039037280: Chacombe Brook (Source to Cherwell); GB106039037340: Hanwell Brook; GB106039037310: Cherwell (Cropredy to Nell Bridge); GB106039037290: Farthinghoe Stream (Source to Cherwell) and tributaries; GB106039037260: Sor Brook (Broughton to Cherwell); GB106039037230: Ockley Brook and Croughton Brook (Source to Cherwell); GB106039037431: Cherwell (Nell Bridge to Bletchingdon); GB106039037190: Deddington Brook (Source to Cherwell); GB106039037220: Swere (Wigginton to Cherwell); GB106039037190: Deddington Brook (Source to Cherwell); GB105033038210: Padbury Brook; GB106039030130: Gallos Brook; GB106039037380: Dorn (Source to Glyme); GB106039029940: Glyme (Dorn confluence to Evenlode); GB106039 030080: Bletchingdon Stream; GB106039030334: Thames (Evenlode to Thame); GB106039037432: Cherwell (Bletchingdon to Ray); GB106039029800: Cherwell (Ray to Thames) and Woodeaton Brook; GB70410541: Wyreley and Essington, Daw End and Rushall Canals; GB70410516: Birmingham to Wolverhampton Canal, Wolverhampton Level; GB70410512: Birmingham to Wolverhampton Canal, Birmingham Level; GB70410515: Birminglam and Fazeley Canal upper section; GB70410514: Tame Valley Canal; GB70410212: Coventry and Ashby Canals; GB70910513: North Oxford Canal; GB70910511: Grand Union Canal, Braunston to Leamington Spa; GB70910196: Oxford Canal, summit pound; GB70610197: Oxford Canal, summit to Aynho; GB70610542: Oxford Canal, Thrupp to Thames; GB104028046990: Ford Brook from Source to River

	Tame; GB104028046950: Sneyd Brook from Source to Tame (W/hampton Arm); GB104028042601: Tame (Oldbury Arm) - source to confluence River Tame (W/hampton Arm); GB104028046842: Tame - confluence two arms to River Rea; GB104028046860: Plants Brook Catchment (tributary of Tame); GB104028046901: Langley Brook - source to confluence River Tame; GB104028046440: Tame from River Blythe to River Anker; GB104028047000: Black-Bourne Brook from source (confluence) to River Tame; GB104028046460: Anker from River Sence to River Tame; GB104028042430: Wem Brook from source to River Anker; GB109054044640: Withy Brook - source to confluence River Sowe; GB109054044630: Smite Brook - source to confluence River Sowe; GB109054043920: Avon – Claycoton-Yelvertoft Brook to confluence River Sowe; GB109054043940: Swift source to confluence River Avon; GB109054043920: River Avon – Claycoton Yelvertoft Brook to confluence River Sowe; GB109054043900: Clifton Brook – source to confluence River Avon; GB109054044150: Rains Brook - source to confluence River Leam; GB109054044120: River Leam - source to confluence Rains Brook; GB109054044130: River Leam - confluence Rains Brook to confluence River Itchen; GB109054044090: Stowe - source to confluence River Itchen
Description of potential effects/reason for further assessment	• Transfer of water via a river, canal or aqueduct.at GB70410541: Wyreley and Essington, Daw End and Rushall Canals; GB70410516: Birmingham to Wolverhampton Canal, Wolverhampton Level; GB70410512: Birmingham to Wolverhampton Canal, Birmingham Level; GB70410515: Birminglam and Fazeley Canal upper section; GB70410514: Tame Valley Canal; GB70410212: Coventry and Ashby Canals; GB70910513: North Oxford Canal; GB70910511: Grand Union Canal, Braunston to Leamington Spa; GB70910196: Oxford Canal, summit pound; GB70610197: Oxford Canal, summit to Aynho; GB70610542: Oxford Canal, Thrupp to Thames; • New or increased surface water abstraction at GB30436523: Chasewater; • Low volume discharge of water with a quality element of a lower WFD status than the receiving water body at the remaining water bodies.

2.1.10 Oxford Canal to Cropredy - Construction

The Level 1 WFD assessment covered 33 water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water

body. The outcomes indicated that further assessment would be necessary for all 33 water bodies. This is due to the transfer of water via a river, canal or aqueduct.

Table 2.10: WFD Level 1 assessment outcomes for Oxford Canal to Cropredy – Construction Option

Option ID	TWU_UTC_HI-IMP_UTC_CNO_oxcanal-cropredy
Option description	15Ml/d resource option for Oxford Canal to the River Thames transfer. Option includes transfer of water to canal at Cropredy for discharge to River Cherwell and subsequent discharge into the River Thames.
Number of water bodies passing WFD assessment	0
Water bodies passing WFD assessment	N/A
Number of water bodies requiring further WFD assessment	33
Water bodies requiring further WFD assessment	GB109054044070: Itchen – source to conf with R Stowe; GB106039037370: Clayton and Wormleighton Brook, Source to Highfurlong Brook; GB106039042660: Highfurlong Brook (to Cherwell); GB106039037350: Cherwell (Ashby Brook to Cropredy); GB106039037280: Chacombe Brook (Source to Cherwell); GB106039037340: Hanwell Brook; GB106039037310: Cherwell (Cropredy to Nell Bridge); GB106039037290: Farthinghoe Stream (Source to Cherwell) and tributaries; GB106039037260: Sor Brook (Broughton to Cherwell); GB106039037230: Ockley Brook and Croughton Brook (Source to Cherwell); GB106039037431: Cherwell (Nell Bridge to Bletchingdon); GB106039037190: Deddington Brook (Source to Cherwell); GB106039037220: Swere (Wigginton to Cherwell); GB106039037190: Deddington Brook (Source to Cherwell); GB105033038210: Padbury Brook; GB106039030130: Gallos Brook; GB106039037380: Dorn (Source to Glyme); GB106039029940: Glyme (Dorn confluence to Evenlode); GB106039030080: Bletchingdon Stream; GB106039030334: Thames (Evenlode to Thame); GB106039037432: Cherwell (Bletchingdon to Ray); GB106039029800: Cherwell (Ray to Thames) and Woodeaton Brook; GB70410541: Wyreley and Essington, Daw End and Rushall Canals; GB70410516: Birmingham to Wolverhampton Canal, Wolverhampton Level; GB70410512: Birmingham to Wolverhampton Canal, Birmingham Level; GB70410515: Birmingham and Fazeley Canal upper section; GB70410514: Tame Valley Canal; GB70410212: Coventry and Ashby Canals; GB70910513: North Oxford Canal; GB70910511: Grand Union Canal, Braunston to Leamington Spa;

	GB70910196: Oxford Canal, summit pound; GB70610197: Oxford Canal, summit to Aynho; GB70610542: Oxford Canal, Thrupp to Thames;
Description of potential effects/reason for further assessment	All of the water bodies assessed for this option have been screened in for Level 2 assessment due to the transfer of water via a river, canal or aqueduct.

2.1.11 Oxford Canal – Transfer from Duke's Cut to Farmoor

The Level 1 WFD assessment covered five water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why three water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for two water bodies: GB106039030333: Thames (Leach to Evenlode) and GB70610542: Oxford Canal, Thrupp to Thames due to a low volume discharge of water with a quality element of a lower WFD status than the receiving water body and a new or increased surface water abstraction.

Table 2.11: WFD Level 1 assessment outcomes for Oxford Canal - Transfer from Duke's Cut to Farmoor Option

Option ID	TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor
Option description	15Ml/d conveyance option from the Oxford Canal to Farmoor Reservoir, with abstraction from a point approximately 800m north of Duke's Cut on the Oxford Canal, discharging into the River Thames for subsequent re-abstraction at the existing Farmoor Reservoir intake. It has been assumed that, as the transfer will only be used in periods of low flow, no works will be required to upgrade the existing intake structure or treatment facilities at Farmoor Reservoir.
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB106039030334: Thames (Evenlode to Thame); GB106039030310: Chil and Limb Brooks (source to B4044); GB106039029880: Evenlode (Glyme to Thames)
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further WFD assessment	GB106039030333: Thames (Leach to Evenlode); GB70610542: Oxford Canal, Thrupp to Thames
Description of potential effects/reason for further assessment	Thames (Leach to Evenlode) water body has been screened in for Level 2 assessment due to low volume discharge of water with a quality element of a lower WFD status than the receiving water body. Oxford Canal, Thrupp to Thames water body has been screened in for Level 2 assessment due to new or increased surface water abstraction.

2.1.12 Thames-Lee Tunnel extension from Lockwood PS to King George V Reservoir intake

The Level 1 WFD assessment covered eight water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why all water bodies have been screened out of further assessment.

Table 2.12: WFD Level 1 assessment outcomes for Thames-Lee Tunnel extension from Lockwood PS to King George V Reservoir intake option

Option ID	TWU_LON_HI-TFR_LON_ALL_lockwood ps-kgv res

Option description	New connection from Lockwood PS to the intake of KGV reservoir.
Number of water bodies passing WFD assessment	8
Water bodies passing WFD assessment	GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks) GB106038027950: Lea Navigation Enfield Lock to Tottenham Locks GB106038027910: Pymmes and Salmon Brooks - Deephams STW to Tottenham Locks GB106038027940: Pymmes Brook upstream Salmon Brook confluence GB106038027960: Salmon Brook upstream Deephams STW GB106038033200: Small River Lee (and tributaries) GB106038077851: Lea Navigation (Fieldes Weir to Enfield Lock) GB106038027920: Moselle Brook
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

2.1.13 Henley to SWOX Transfer– 2.4Ml/d and 5Ml/d

The Level 1 WFD assessment covered two water bodies for these options. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why both water bodies have been screened out of further assessment.

Table 2.13: WFD Level 1 assessment outcomes for Henley to SWOX Transfer – 2.4Ml/d and 5Ml/d options

Option ID	**TWU_SWX_HI-TFR_HEN_ALL_henley-swox2.4** **TWU_SWX_HI-TFR_HEN_ALL_henley-swox5**
Option description	The option is for one new main from New Farm SR (Henley) to Nettlebed SR (SWOX). This will require a new 5.9km main from New Farm to Nettlebed and a new PS at New Farm. 2.4Ml/d capacity or 5Ml/d capacity.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106039023233: Thames (Reading to Cookham) GB40601G601100: South-West Chilterns Chalk;
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

2.1.14 Managed Aquifer Recharge - Horton Kirby ASR

The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why two of the water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for one water body: GB40601G604100: West Kent Darent and Cray Chalk groundwater body due to the use

of an existing groundwater abstraction licence, within existing licence conditions but outside of the recent actual rates, which could reduce groundwater levels in this groundwater body.

Table 2.14: WFD Level 1 assessment outcomes for Managed Aquifer Recharge – Horton Kirby ASR option

Option ID	TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby
Option description	Construction of pipelines between two existing ASR boreholes in the Lower Greensand aquifer to an existing WTW at Horton Kirby in Kent. The Thames Water Bean abstraction abstracts water from existing Chalk aquifer boreholes (via the mains supply) will be recharged into the two ASR boreholes during periods of water surplus and abstracted when needed and treated at the WTW.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106040024222: Middle and Lower Darent GB106040024190: Ebbsfleet
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB40601G501800: West Kent Darent and Cray Chalk
Description of potential effects/reason for further assessment	Use of existing groundwater abstraction licences, within existing licence conditions but outside of the recent actual rates, which could reduce groundwater levels. It is assumed recharge water from the chalk aquifer will be from an existing licence and within licence quantities. Ebbsfleet is included due to potential risk of increased groundwater abstraction leading to reduced surface water contribution to support Ebbsfleet water body.

2.1.15 Groundwater Development – Datchet Existing Source DO Increase

The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why two of the water bodies have been screened out of further assessment. The outcome indicates that further assessment would be necessary for one water body: GB40601G602600: Maidenhead Chalk groundwater body due to the use of an existing groundwater abstraction licence, within existing licence conditions but outside of the recent actual rates, which could reduce groundwater levels.

Table 2.15: WFD Level 1 assessment outcomes for Groundwater Development - Datchet Existing Source DO Increase in DO option

Option ID	TWU_SWA_HI-GRW_ALL_ALL_datchet do
Option description	Increase DO at Datchet site
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106039023231: Thames (Cookham to Egham) GB40603G000300: Lower Thames Gravels
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB40601G602600: Maidenhead Chalk
Description of potential effects/reason for further assessment	Use of existing groundwater abstraction licence, within existing licence conditions but outside of the recent actual rates, which could reduce groundwater levels.

2.1.16 Transfer - Kennet Valley to Henley - Conveyance Element

This option makes use of existing assets and continues a current option. Therefore, no WFD assessment is required.

2.1.17 Groundwater Development – Southfleet & Greenhithe

The Level 1 WFD assessment covered four water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why two of the water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for two water bodies: GB40601G500300: North Kent Medway Chalk and GB40601G501800: West Kent Darent and Cray Chalk groundwater bodies due to the use of an existing groundwater abstraction licence, within existing licence conditions but outside of the recent actual rates, which could reduce groundwater levels.

Table 2.16: WFD Level 1 assessment outcomes for Groundwater Development - Southfleet & Greenhithe option

Option ID	TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg
Option description	Southfleet-Greenhithe licence disaggregation and new headworks and pumping station at borehole sites and new 3km main from Greenhithe to new WTW. DO benefit is 8Ml/d average, 9Ml/d peak.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106040024222: Middle and Lower Darent GB106040024190: Ebbsfleet
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further WFD assessment	GB40601G500300: North Kent Medway Chalk GB40601G501800: West Kent Darent and Cray Chalk
Description of potential effects/reason for further assessment	Use of existing groundwater abstraction licence, within existing licence conditions but outside of the recent actual rates, which could reduce groundwater levels.

2.1.18 Groundwater Development - Addington

The Level 1 WFD assessment covered two water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why one water body has been screened out of further assessment. The outcomes indicated that further assessment would be necessary for one water body: GB40601G602200: Epsom North Downs Chalk groundwater body due to a new borehole that shall be constructed in the Epsom North Downs Chalk to accommodate a new abstraction from this groundwater body.

Table 2.17: WFD Level 1 assessment outcomes for Groundwater Development – Addington option

Option ID	TWU_LON_HI-GRW_ALL_ALL_addington gw
Option description	New abstraction borehole and upgrade to WTW. DO benefit 1Ml/d average, 1.5Ml/d peak.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB106039023250: Pool River
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB40601G602200: Epsom North Downs Chalk

Description of potential effects/reason for further assessment	A new borehole is to be constructed in the Epsom North Downs Chalk to accommodate a new abstraction from this groundwater body.

2.1.19 Groundwater Development – Woods Farm Existing Source Increase DO

The Level 1 WFD assessment covered two water bodies for this option. The assessment is set out in Annex A, which provides details of the activities in each water body. The outcomes indicated that further assessment would be necessary for both water bodies: GB106039030331: Thames Wallingford to Caversham and GB40601G600900: Berkshire Downs Chalk groundwater body due to an increase in abstraction from the current Deployable Output (DO) up to the annual average or peak licence is required for each water body.

Table 2.18: WFD Level 1 assessment outcomes for Groundwater Development - Woods Farm Existing Source Increase DO option

Option ID	TWU_SWX_HI-GRW_ALL_ALL_woods farm do
Option description	New borehole to be constructed on site to bring DO up to licence (this is an additional 2.4Ml/d to average licence of 4.99Ml/d or an additional 2.91Ml/d to peak licence of 5.5Ml/d). Currently the site is only able to produce up to 2.59Ml/d constrained by turbidity. Woods Farm WRMP24 option comprises of retaining the current abstraction licence with construction of a new abstraction borehole in the unconfined Chalk, 1.4km east of the existing Woods Farm boreholes. The option also includes a new 1.4km raw water pipeline from the new satellite borehole to Woods Farm WTW.
Number of water bodies passing WFD assessment	0
Water bodies passing WFD assessment	0
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further WFD assessment	GB106039030331: Thames Wallingford to Caversham GB40601G600900: Berkshire Downs Chalk
Description of potential effects/reason for further assessment	An increase in abstraction from the current DO up to the annual average/peak licence is required for each water body.

Transfer - SEW to Guildford - Conveyance Element The Level 1 WFD assessment covered ten water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why seven of the water bodies have been screened out of further assessment. The outcomes indicated further assessment would be necessary for three water bodies: GB40602G601300: Farnborough Bagshot Beds groundwater body, GB40602G601400: Chobham Bagshot Beds groundwater body and GB70610019: Basingstoke Canal water body due to the construction of a below ground structure located within 500m of a sensitive groundwater feature, which could pose a risk to groundwater flooding, and adverse impacts to surface watercourses, wetland habitats or abstractions.

Table 2.19: WFD Level 1 assessment outcomes for Transfer - SEW to Guildford - Conveyance Element Option

Option ID	TWU_GUI_HI-TFR_RZ5_ALL_sewtogui
Option description	10Ml/d transfer from South East Water (Hogsback) to Mount SR Guildford.
Number of water bodies passing WFD assessment	7
Water bodies passing WFD assessment	GB106039017290: Blackwater (Hawley to Whitewater confluence at Bramshill)

	GB106039017930: Hale/Mill Bourne (Bagshot to Addlestone Bourne confluence near Chobham) GB106039017180: Blackwater (Aldershot to Cove Brook confluence at Hawley) GB106039017850: Clasford Brook and Wood Street Brook GB106039017820: Wey (Tilford to Shalford) GB106039017630: Wey (Shalford to River Thames confluence at Weybridge) GB40602G601800: Effingham Tertiaries (GW)
Number of water bodies requiring further WFD assessment	3
Water bodies requiring further WFD assessment	GB40602G601300: Farnborough Bagshot Beds (GW) GB40602G601400: Chobham Bagshot Beds (GW) GB70610019: Basingstoke Canal
Description of potential effects/reason for further assessment	Construction of a below ground structure located within 500m of a sensitive groundwater feature. Risk of groundwater flooding and risk of adverse impacts to watercourses, wetland habitats or abstractions.

2.1.20 New WTW at Kempton - 100Ml/d - Construction

The Level 1 WFD assessment covered two water bodies for these options. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why both of the water bodies have been screened out of further assessment.

Table 2.20: WFD Level 1 assessment outcomes for New WTW at Kempton – 100Ml/d – Construction Options

Option ID	TWU_LON_HI-ROC_WT1_CNO_kemptonwtw100 TWU_LON_HI-ROC_WT1_CNO_kemptonwtw150 TWU_LON_HI-ROC_WT1_CNO_kemptonwtw300
Option description	100/150/300Ml/d new capacity at WTW at Kempton treating raw reservoir water in west London. Purpose is to accommodate additional future demand.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106039023451: Portlane Brook GB40603G000300: Lower Thames Gravels
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Groundwater Development – Moulsford Groundwater Source The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why one water body has been screened out of further assessment. The outcomes indicated further assessment would be necessary for two water bodies: GB106039030331: Thames Wallingford to Caversham River water body and GB40601G600900: Berkshire Downs Chalk groundwater body due to the construction of a below ground structure located within 500m of a sensitive groundwater feature, which could pose a risk to groundwater flooding, and adverse impacts to surface watercourses, wetland habitats or abstractions.

Table 2.21: WFD Level 1 assessment outcomes for Groundwater Development – Moulsford Groundwater Source Option

Option ID	TWU_SWX_HI-GRW_ALL_ALL_moulsford gw
Option description	Construction of an abstraction borehole in the unconfined Chalk north of Streatley on the west bank of the River Thames. Water abstracted from the borehole will be treated at the existing Cleeve WTW located on the eastern side of the River Thames.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB40601G601400: Chilterns Chalk Scarp
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further WFD assessment	GB106039030331: Thames Wallingford to Caversham GB40601G600900: Berkshire Downs Chalk
Description of potential effects/reason for further assessment	New/increased ground water abstraction with potential implications on surface water contribution.

Transfer from WTW in Abingdon to SWA – 48Ml/d and 72Ml/d The Level 1 WFD assessment covered 18 water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why 13 of the water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for five water bodies: GB106039030210: Filchhampstead Brook at Farmoor, GB106039029780: Bayswater Brook, GB106039030180: Northfield Brook (Source to Thames) at Sandford, GB106039030240: Thame (Scotsgrove Brook to Thames) and GB40602G600700: Headington Corallian river water bodies due to construction of pipeline structures, pumping stations, and service reservoir structures which are located within 500m of Brasenose Wood & Shotover Hill (SSSI), Sidlings Copse & College Pond (SSSI), Cassington Meadows (SSSI), Wytham Woods (SSSI), Cothill Fen (SSSI) and Frilford Heath, Ponds & Fens (SSSI). Construction of below ground structures may adversely impact these habitats.

Table 2.22: WFD Level 1 assessment outcomes for SWOX to SWA (Abingdon WTW to Long Crendon to supply SWA) 48Ml/d and 72Ml/d Option

Option ID	TWU_SWA_HI-TFR_SWX_ALL_swoxswa48 TWU_SWA_HI-TFR_SWX_ALL_swoxswa72
Option description	Abingdon WTW to Long Crendon to supply SWA
Number of water bodies passing WFD assessment	13
Water bodies passing WFD assessment	GB106039023360: Cow Common Brook and Portobello Ditch GB106039023430: Ock and tributaries (Land Brook confluence to Thames) GB106039023410: Sandford Brook (source to Ock) GB106039023420: Frilford and Marcham Brook GB106039030333: Thames (Leach to Evenlode) GB106039030334: Thames (Evenlode to Thame) GB106039029880: Evenlode (Glyme to Thames) GB106039029800: Cherwell (Ray to Thames) and Woodeaton Brook GB106039030360: Holton Brook and tributaries GB106039030340: Worminghall Brook and tributaries GB106039030290: Peppershill and Shabbington Brooks GB106039030400: Dorton, Chearsley and Waddesdon Brooks GB40602G600600; Shrivenham Corallian

Number of water bodies requiring further WFD assessment	5
Water bodies requiring further WFD assessment	GB106039030210: Filchhampstead Brook at Farmoor GB106039029780: Bayswater Brook GB106039030180: Northfield Brook (Source to Thames) at Sandford GB106039030240: Thame (Scotsgrove Brook to Thames) GB40602G600700: Headington Corallian
Description of potential effects/reason for further assessment	Pipeline structures, pumping stations, and service reservoir structures are located within 500m of Brasenose Wood & Shotover Hill (SSSI), Sidlings Copse & College Pond (SSSI), Cassington Meadows (SSSI), Wytham Woods (SSSI), Cothill Fen (SSSI) and Frilford Heath, Ponds & Fens (SSSI). Construction of below ground structures may adversely impact these habitats.

2.1.21 SWA to SWOX Transfer - Conveyance Element

This option makes use of existing assets and continues a current transfer. Therefore, no WFD assessment is required.

River Thames to Fobney Transfer The Level 1 WFD assessment covered four water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why two of the water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for two water bodies: GB106039030331: Thames Wallingford to Caversham River water body and GB40601G600900: Berkshire Downs Chalk groundwater body due to the construction of below ground structures located within 500m of a sensitive groundwater feature. There is a risk of groundwater flooding, and potential to cause adverse impacts to surface watercourses, wetland habitats and abstractions. For the Thames Wallingford to Caversham water body, a new abstraction is required which could reduce flow volume and velocity and has the potential to adversely impact water quality in this watercourse.

Table 2.23: WFD Level 1 assessment outcomes for River Thames to Fobney Transfer Option

Option ID	TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney
Option description	40Ml/d raw water transfer option from River Thames to Fobney WTW to supply Kennet Valley WRZ.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106039023141: Holy Brook GB106039023140: Kennet and Holy Brook
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further WFD assessment	GB106039030331: Thames Wallingford to Caversham GB40601G600900: Berkshire Downs Chalk (GW)
Description of potential effects/reason for further assessment	For the Berkshire Downs Chalk groundwater body, construction of below ground structures shall be located within 500m of a sensitive groundwater feature. There is a risk of groundwater flooding, and potential to cause adverse impacts to surface watercourses, wetland habitats and abstractions. For the Thames Wallingford to Caversham, a new abstraction is required which could reduce flow volume and velocity and has the potential to adversely impact water quality in this watercourse.

Abingdon Reservoir to Farmoor Reservoir pipeline The Level 1 WFD assessment covered nine water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why eight of the water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for one water body: GB106039030334: Thames (Evenlode to Thame) river water body due to a new surface water abstraction planned in the Thames (Evenlode to Thame) water body, which could reduce surface water flow and velocity, and could produce adverse impacts on water quality in this watercourse.

Table 2.24: WFD Level 1 assessment outcomes for Abingdon Reservoir to Farmoor Reservoir pipeline Option

Option ID	TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe
Option description	Construction of a transfer pipeline to convey 24Ml/d of raw water between a proposed reservoir at Abingdon and the existing Farmoor reservoir, in the SWOX WRZ. (Note: Abingdon reservoir creation is not part of this option). The engineering scope includes the provision of a booster pump station at the proposed Abingdon Reservoir site to facilitate the transfer. Treatment would be provided at the existing WTW.
Number of water bodies passing WFD assessment	8
Water bodies passing WFD assessment	GB106039023430: Ock and tributaries (Land Brook confluence to Thames) GB106039023360: Cow Common Brook and Portobello Ditch GB106039023410: Sandford Brook (source to Ock) GB106039023420: Frilford and Marcham Brook GB106039030333: Thames (Leach to Evenlode) GB106039030210: Filchhampstead Brook at Farmoor GB30641011: Farmoor Reservoir GB40602G600600: Shrivenham Corallian
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB106039030334: Thames (Evenlode to Thame)
Description of potential effects/reason for further assessment	A new surface water abstraction is planned in the Thames (Evenlode to Thame) water body, which could reduce surface water flow and velocity, and could produce adverse impacts on water quality in this watercourse.

Groundwater Development - Dapdune Licence Disaggregation The Level 1 WFD assessment covered two water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why all of the water bodies have been screened out of further assessment.

Table 2.25: WFD Level 1 assessment outcomes for Groundwater Development - Dapdune Licence Disaggregation Option

Option ID	TWU_GUI_HI-GRW_ALL_ALL_dapdune lic disagg
Option description	Licence disaggregation. DO benefit 0Ml/d average, 2.2Ml/d peak
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106039017630: Wey (Shalford to River Thames confluence at Weybridge) GB40601G604300: Guildford Chalk
Number of water bodies requiring further WFD assessment	0

Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Groundwater Development - Recommission Mortimer Disused Source The Level 1 WFD assessment covered two water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why both of the water bodies have been screened out of further assessment. The groundwater abstracted for this option comes from the deep confined Chalk aquifer, which is separated from shallow groundwater by a layer of clay. Therefore, there is no hydraulic connection between the Chalk aquifer and the overlying surface water bodies or GWDTEs and no pathway for impact.

Table 2.26: WFD Level 1 assessment outcomes for Groundwater Development - Recommission Mortimer Disused Source Option

Option ID	TWU_KVZ_HI-GRW_ALL_ALL_mortimer recomm
Option description	Refurbishment of two disused abstraction boreholes located on-site at the existing, but disused Mortimer WTW. Water abstracted from the boreholes will be sourced from the deep confined chalk and treated at the disused WTW which will be upgraded for ammonia and iron removal and recommissioned. DO benefit 4.5Ml/d average and peak.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106039017380: Foudry Brook (West End Brook to M4) GB40601G600900: Berkshire Downs Chalk
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Crossness to Beckton tunnel (treated) - Construction The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why all three of the water bodies have been screened out of further assessment.

Table 2.27: WFD Level 1 assessment outcomes for Crossness to Beckton tunnel (treated) - Construction Option

Option ID	TWU_LON_HI-TFR_LON_ALL_crossness to beckton
Option description	Transfer of 190Ml/d desalinated water to Beckton site via pipeline inside tunnel beneath the Thames.
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB530603911402: Thames Middle GB106039023500: Marsh Dykes (Woolwich) GB40601G401100: South Essex Thurrock Chalk (GW)
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Beckton to Crossness tunnel (raw) - Construction The Level 1 WFD assessment covered two water bodies for this option. The full assessment is set out in Annex A. This assessment sets

out the activities which would take place in each water body, and therefore shows why both of these water bodies have been screened out of further assessment.

Table 2.28: WFD Level 1 assessment outcomes for Beckton to Crossness tunnel (raw) - Construction Option

Option ID	TWU_LON_HI-TFR_LON_CNO_beckton-crossness
Option description	The estuarine water from the Beckton site is to be conveyed under the River Thames via a tunnel to the Crossness desalination treatment site.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB530603911402: Thames Middle GB106039023500: Marsh Dykes (Woolwich)
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Groundwater Development - Merton Recommissioning The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body. The outcomes indicated that further assessment would be necessary for one water body: GB106039023460: Wandle (Croydon to Wandsworth) and the Graveney due to a new abstraction required. The design documents show that this borehole is abstracting from the underlying confined Chalk aquifer. Therefore, assessment is required for the Chalk water body at its outcrop is 5km away to the south.

Table 2.29: WFD Level 1 assessment outcomes for Groundwater Development - Merton Recommissioning Option

Option ID	TWU_LON_HI-GRW_ALL_ALL_merton recommission
Option description	The option comprises the recommissioning and upgrade of the Merton Abbey WTW in order to treat the maximum peak DO of 8Ml/d from the Merton Abbey Well.
Number of water bodies passing WFD assessment	0
Water bodies passing WFD assessment	N/A
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB106039023460: Wandle (Croydon to Wandsworth) and the Graveney;
Description of potential effects/reason for further assessment	The design documents show that this borehole is abstracting from the underlying confined Chalk aquifer. Therefore, assessment is required for the Chalk water body at its outcrop is 5km away to the south.

Deephams Reuse – 46.5 Ml/d, direct to KGV - Construction The Level 1 WFD assessment covered two water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why both of these water bodies have been screened out of further assessment.

Table 2.30: WFD Level 1 assessment outcomes for Deephams Reuse – 46.5 Ml/d, direct to KGV - Construction Option

Option ID	TWU_LON_HI-REU_RE1_ALL_deephams reuse 46.5
Option description	Transfer of Deephams STW final effluent to the new water reuse works with the following technology: pre-screens, UF, RO, UV treatment, inter-process pumping,

	buildings and disinfection, pH adjustment chemicals. Includes conveyance to KGV.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106038027910: Pymmes and Salmon Brooks - Deephams STW to Tottenham Locks GB106038027960: Salmon Brook upstream Deephams STW
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Deephams Reuse – 46.5 Ml/d, to TLT - Construction The Level 1 WFD assessment covered two water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why both of these water bodies have been screened out of further assessment.

Table 2.31: WFD Level 1 assessment outcomes for Deephams Reuse – 46.5 Ml/d, to TLT - Construction Option

Option ID	TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b
Option description	Transfer of Deephams STW final effluent to the new water reuse works with the following technology: pre-screens, UF, RO, UV treatment, inter-process pumping, buildings and disinfection, pH adjustment chemicals. Includes conveyance to TLT extension.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106038027910: Pymmes and Salmon Brooks - Deephams STW to Tottenham Locks; GB106038027960: Salmon Brook upstream Deephams STW
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Groundwater Development - Confined Chalk North London The Level 1 WFD assessment covered two water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body. The outcomes indicated that further assessment would be necessary for both waterbodies: GB106039023590: Lower Brent due to a new groundwater abstraction which may reduce flow velocity and flow volume and could produce adverse impacts on water quality in this water body and GB40601G601200: Mid-Chilterns Chalk due to the new groundwater abstraction from the deep confined chalk which could impact water balance at the outcrop.

Table 2.32: WFD Level 1 assessment outcomes for Groundwater Development - Confined Chalk North London Option

Option ID	TWU_LON_HI-GRW_ALL_ALL_london conchalk
Option description	New abstraction borehole. DO benefit 2Ml/d average and peak.
Number of water bodies passing WFD assessment	0
Water bodies passing WFD assessment	N/A

Number of water bodies requiring further WFD assessment	2
Water bodies requiring further WFD assessment	GB106039023590: Lower Brent GB40601G601200: Mid-Chilterns Chalk
Description of potential effects/reason for further assessment	New groundwater abstraction from deep confined chalk, which may reduce flow velocity and flow volume in the Lower Brent, and could produce adverse impacts on water quality in this water body. Potential impact on Mid-Chilterns Chalk water balance.

2.1.22 Transfer - Reigate (SES) to Guildford 20Ml/d and 5Ml/d

The Level 1 WFD assessment covered nine water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why eight of these water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for one water body: GB40601G601900: Godalming Lower Greensand due to the construction of below ground structures (shaft/retaining wall) with associated dewatering, located within 500m of a sensitive groundwater feature and the presence of new underground structure (tunnel/shaft/retaining wall) located within 500m of a sensitive groundwater feature.

Table 2.33: WFD Level 1 assessment outcomes for Transfer - Reigate (SES) to Guildford 20Ml/d and 5Ml/d Options

Option ID	**TWU_GUI_HI-TFR_SES_ALL_reigatetoguildford5** **TWU_GUI_HI-TFR_SES_ALL_reigatetoguildford20**
Option description	Either a 5Ml/d or 20Ml/d transfer from Reigate (SES) to Guildford.
Number of water bodies passing WFD assessment	8
Water bodies passing WFD assessment	GB106039017570: Tanners Brook (Holmewood to River Mole confluence at Brockham); GB106039017580: Pipp Brook; GB106039017623: Mole - Leatherhead to Hersham; GB106039017624: Mole - Dorking to Leatherhead; GB106039017625: Mole - Horley to Dorking; GB106039017840: Tillingbourne; GB106039017630: Wey (Shalford to River Thames confluence at Weybridge); GB40601G602000: Reigate Lower Greensand
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB40601G601900: Godalming Lower Greensand
Description of potential effects/reason for further assessment	GB40601G601900: Godalming Lower Greensand has been screened for Level 2 assessment due to the construction of below ground structures (shaft/retaining wall) with associated dewatering, located within 500m of a sensitive groundwater feature and the presence of new underground structure (tunnel/shaft/retaining wall) located within 500m of a sensitive groundwater feature.

As this option has not been selected as part of any Thames WRMP24 plan or situation, further assessment at Level 2 has not been undertaken. If this option is progressed in future, a Level 2 assessment will be required.

TWRM extension - Coppermills to Honor Oak - Construction The Level 1 WFD assessment covered four water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why three of these water bodies have been screened out of further assessment. The

outcomes indicated that further assessment would be necessary for one water body: GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks) due to below ground construction activity with 500m of a GWDTE.

Table 2.34: WFD Level 1 assessment outcomes for TWRM extension - Coppermills to Honor Oak - Construction Option

Option ID	TWU_HON_HI-ROC_NET_CNO_cop'mills-honoroak
Option description	New ring main tunnel from Coppermills to Honor Oak
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB530603911402: THAMES MIDDLE; GB70610510: Regents Canal, lower section; GB40602G602500: Greenwich Tertiaries and Chalk
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks)
Description of potential effects/reason for further assessment	Below ground structures within 500m of a GWDTE (Walthamstow Marshes SSSI).

Groundwater Development - East Woodhay borehole pumps Removal of Constraints to DO The Level 1 WFD assessment covered two water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body, and therefore shows why this water body has been screened out of further assessment.

Table 2.35: WFD Level 1 assessment outcomes for Groundwater Development - East Woodhay borehole pumps Removal of Constraints to DO Option

Option ID	TWU_KVZ_HI-GRW_ALL_ALL_east woodhay roc
Option description	Upgrade of pumps and pump control to increase DO. DO benefit 2.1Ml/d peak, 0 average.
Number of water bodies passing WFD assessment	2
Water bodies passing WFD assessment	GB106039017280: Enborne (Source to downstream A34) GB40601G600900: Berkshire Downs Chalk
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

2.1.23 Crossness Desalination

The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body. The outcomes indicated that further assessment would be necessary for the water body GB530603911402: Thames Middle due to a new discharge of highly saline water to a coastal or transitional water body and a new coastal or transitional water body abstraction licence.

Table 2.36: WFD Level 1 assessment outcomes for Crossness Desalination Options

Option ID	TWU_LON_HI-DES_ALL_ALL_crossnessdesal50 TWU_LON_HI-DES_ALL_ALL_crossnessdesal100
Option description	Development of a 50Ml/d or 100Ml/d desalination plant located south of Crossness, using brackish estuarine

	feedwater from the River Thames. Transfer of treated water to Coppermills WTW for blending.
Number of water bodies passing WFD assessment	0
Water bodies passing WFD assessment	N/A
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB530603911402: Thames Middle
Description of potential effects/reason for further assessment	The water body was screened for Level 2 assessment due to a new discharge of highly saline water to a coastal or transitional water body and a new coastal or transitional water body abstraction licence.

2.1.24 Managed Aquifer Recharge - Addington

The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why one of the water bodies has been screened out of further assessment. The outcomes indicated that further assessment would be necessary for two water bodies: GB40601G602200: Epsom North Downs Chalk and GB40601G500500: Kent Greensand Western groundwater bodies due to new or increased groundwater abstraction.

Table 2.37: WFD Level 1 assessment outcomes for Managed Aquifer Recharge - Addington Option

Option ID	TWU_LON_HI-GRW_ALL_ALL_addington asr
Option description	Two new ASR boreholes near Addington PS, and one borehole refurbishment, 300m length of sewer for conditioning discharges, booster recharge pumps due to artesian head pressures in aquifer. DO benefit 3Ml/d average, 5Ml/d peak.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB106039023250: Pool River
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further WFD assessment	GB40601G602200: Epsom North Downs Chalk GB40601G500500: Kent Greensand Western
Description of potential effects/reason for further assessment	Both ground water bodies have been screened for Level 2 assessment due to new or increased groundwater abstraction.

2.1.25 Groundwater Development – Honor Oak

The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body. The outcomes indicated that further assessment would be necessary for the one water body: GB106039023270: Ravensbourne (Catford to Deptford) due to the use of existing surface water and groundwater abstraction licences, within existing licence conditions but outside of the recent actual rates.

Table 2.38: WFD Level 1 assessment outcomes for Groundwater Development – Honor Oak Option

Option ID	TWU_LON_HI-GRW_ALL_ALL_honor oak gw
Option description	Two new abstraction boreholes, Connections to existing WTW, DO benefit 1Ml/d average, 2.82Ml/d peak.
Number of water bodies passing WFD assessment	0

Water bodies passing WFD assessment	N/A
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB106039023270: Ravensbourne (Catford to Deptford)
Description of potential effects/reason for further assessment	GB106039023270: Ravensbourne (Catford to Deptford) has been screened for Level 2 assessment due to the use of existing groundwater abstraction licences, within existing licence conditions but outside of the recent actual rates and subsequent implications on surface water.

Managed Aquifer Recharge - Streatham (SLARS2) The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body, and therefore shows why it has been screened out of further assessment.

Table 2.39: WFD Level 1 assessment outcomes for Managed Aquifer Recharge - Streatham (SLARS2) Option

Option ID	TWU_LON_HI-GRW_ALL_ALL_streatham ar
Option description	One new AR borehole at Streatham PS, and one borehole refurbishment. New 17Ml/d WTW works. DO benefit is 4Ml/d average, 4.5Ml/d peak.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB106039023460: Wandle (Croydon to Wandsworth) and the Graveney
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Managed Aquifer Recharge - Thames Valley, South London The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body, and therefore shows why it has been screened out of further assessment.

Table 2.40: WFD Level 1 assessment outcomes for Managed Aquifer Recharge - Thames Valley, South London Option

Option ID	TWU_LON_HI-GRW_ALL_ALL_thames valley asr
Option description	Two new ASR boreholes at Ashford WTW, 1km length of sewer for conditioning discharges, booster injection pumps due to artesian head pressures in aquifer. DO benefit 3Ml/d average, 5Ml/d peak.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB106039023451: Portlane Brook
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Managed Aquifer Recharge - Kidbrooke (SLARS1) Construction The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This

assessment sets out the activities which would take place in each water body, and therefore shows why all three water bodies have been screened out of further assessment.

Table 2.41: WFD Level 1 assessment outcomes for Managed Aquifer Recharge - Kidbrooke (SLARS1) Construction Option

Option ID	TWU_LON_HI-GRW_ALL_CNO_kidbrooke slars
Option description	The scheme comprises the upgrade of the existing borehole at the Rochester Way site, another at the Bromley Reservoir site and the construction of a new AR borehole on private land in Eltham Green. Six observation boreholes will be constructed for groundwater level monitoring, four at the Eltham Green site and two off-site the Eltham Green location. Benefit is 8.1Ml/d peak and 7Ml/d average. The scheme also includes construction of a new 10Ml/d WTW located on the existing Kidbrooke borehole site to serve the Rochester Way, Bromley Reservoir and a new AR borehole, a 5.7km (300mm) raw water transfer main between Bromley Reservoir and a new AR borehole, a 6.4km (400mm) bi-directional raw water transfer main between Rochester Way AR borehole and a new AR borehole via Kidbrooke WTW (3.5km between Rochester Way and Kidbrooke WTW, 2.6km between new borehole and Kidbrooke WTW), a 1.8km (450mm) treated water main between Kidbrooke WTW and Bermondsey (Well Hall PS).
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB106039023500: Marsh Dykes (Woolwich); GB106039023290: Quaggy GB40602G602500: Greenwich Tertiaries and Chalk
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Managed Aquifer Recharge - Merton (SLARS3) Construction The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body. The outcomes indicated that further assessment would be necessary for the water GB106039023232: Thames (Egham to Teddington) water body due to a new or increased groundwater abstraction.

Table 2.42: WFD Level 1 assessment outcomes for Managed Aquifer Recharge - Merton (SLARS3) Construction Option

Option ID	TWU_LON_HI-GRW_ALL_CNO_merton ar
Option description	The scheme comprises the upgrade of the existing well and adit system at the Merton Abbey WTW for recharge/abstraction purposes and the construction of a new AR borehole at the nearby Byegrove Road site. DO benefit is 5Ml/d average and 6Ml/d peak. The scheme also includes the construction of a new 4.5Ml/d WTW located at the existing Merton Abbey WTW site to serve the Byegrove Road AR borehole, and the installation of a 1.1km raw water main from the Byegrove Road AR borehole to the new Merton Abbey WTW.
Number of water bodies passing WFD assessment	0
Water bodies passing WFD assessment	N/A

Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB106039023232: Thames (Egham to Teddington)
Description of potential effects/reason for further assessment	GB106039023232: Thames (Egham to Teddington) water body has been screened for Level 2 assessment due to a new or increased groundwater abstraction.

2.1.26 Replace pump infrastructure at Barrow Hill - TWRM

The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body, and therefore shows why it has been screened out of further assessment.

Table 2.43: WFD Level 1 assessment outcomes for Replace pump infrastructure at Barrow Hill Option - TWRM

Option ID	TWU_LON_HI-ROC_NET_ALL_barrowhillpump
Option description	Pump 6 at Barrow Hill is to be replaced.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB530603911402: Thames Middle
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

2.1.27 New East London WTW

The Level 1 WFD assessment covered one water body for these options. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body. The outcomes indicated that further assessment would be necessary for one water body: GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks) due to construction and presence of underground structures close to sensitive groundwater dependent features.

Table 2.44: WFD Level 1 assessment outcomes for New East London WTW Options

Option ID	TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw100 TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw150 TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw200 TWU_LON_HI-ROC_WT1_CNO_eastlondonwtw300
Option description	184Ml/d treatment works for reservoir water in London. Purpose is to accommodate additional future demand. Water discharged for treatment could result from various option types including wastewater reuse and water transfers. The CAPEX calculations represent a 184Ml/d plant. The OPEX is calculated to represent a 184Ml/d OPEX less the saving associated with discontinuing the treatment of 84Ml/d through the slow sand filters, resulting in an OPEX that corresponds to 100Ml/d. There are also 150Ml/d, 200Ml/d and 300Ml/d versions of the option.
Number of water bodies passing WFD assessment	0
Water bodies passing WFD assessment	N/A
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks)

Description of potential effects/reason for further assessment	Construction of below ground structures (shaft/retaining wall) with associated dewatering, within 500m of a sensitive groundwater feature. Presence of new underground structure (tunnel/shaft/retaining wall) within 500m of a sensitive groundwater feature.

As this option has not been selected as part of any Thames WRMP24 plan or situation, further assessment at Level 2 has not been undertaken. If this option is progressed in future, a Level 2 assessment will be required.

Intake Capacity Increase - Chingford South The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body. The outcomes indicated that further assessment would be necessary for one water body: GB106038027950: Lea Navigation Enfield Lock to Tottenham Locks due to the use of existing surface water and groundwater abstraction licences, within existing licence conditions but outside of the recent actual rates, which could reduce groundwater levels.

Table 2.45: WFD Level 1 assessment outcomes for Intake Capacity Increase - Chingford South Option

Option ID	TWU_LON_HI-TFR_LON_ALL_ch'ford s intake
Option description	Increase capacity of Chingford South intake.
Number of water bodies passing WFD assessment	0
Water bodies passing WFD assessment	N/A
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB106038027950: Lea Navigation Enfield Lock to Tottenham Locks
Description of potential effects/reason for further assessment	GB106038027950:Lea Navigation Enfield Lock to Tottenham Locks has been screened for Level 2 assessment due to the use of existing surface water and groundwater abstraction licences, within existing licence conditions but outside of the recent actual rates, which could reduce groundwater levels.

As this option has not been selected as part of any Thames WRMP24 plan or situation, further assessment at Level 2 has not been undertaken. If this option is progressed in future, a Level 2 assessment will be required.

Intake Capacity Increase - Datchet The Level 1 WFD assessment covered four water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why all four of the water bodies have been screened out of further assessment.

Table 2.46: WFD Level 1 assessment outcomes for Intake Capacity Increase - Datchet Option

Option ID	TWU_LON_HI-TFR_LON_ALL_datchet int-qm
Option description	Increase capacity of Datchet PS site.
Number of water bodies passing WFD assessment	4
Water bodies passing WFD assessment	GB106039023231: Thames (Cookham to Egham); GB106039023520: Datchet Common Brook; GB106039023040: Horton Brook; GB106039023010: Colne Brook
Number of water bodies requiring further WFD assessment	0

Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Intake Capacity Increase - Queen Mary The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body, and therefore shows why it has been screened out of further assessment.

Table 2.47: WFD Level 1 assessment outcomes for Intake Capacity Increase - Queen Mary Option

Option ID	TWU_LON_HI-TFR_LON_ALL_littleton int-qm
Option description	Increase capacity of Littleton intake PS site by 300Ml/d capacity.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB106039023480: Surrey Ash
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

2.1.28 Replace New River Head Pump - TWRM

The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body, and therefore shows why it has been screened out of further assessment.

Table 2.48: WFD Level 1 assessment outcomes for Replace New River Head Pump - TWRM Option

Option ID	TWU_LON_HI-TFR_LON_ALL_newriverhead pump 4
Option description	Pump 4 at New River Head is to be replaced.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB530603911402: Thames Middle
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Raw Water System Upgrade - Tunnel from Walthamstow 5 to Coppermills - Construction The Level 1 WFD assessment covered two water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body, and therefore shows why both of the water bodies have been screened out of further assessment.

Table 2.49: WFD Level 1 assessment outcomes for Raw Water System Upgrade - Tunnel from Walthamstow 5 to Coppermills - Construction Option

Option ID	TWU_LON_HI-TFR_LON_CNO_second spine tunnel
Option description	Second Spine Tunnel from break tank to Reservoir 5 upstream of Coppermills WTW.
Number of water bodies passing WFD assessment	2

Water bodies passing WFD assessment	GB106038027950: Lea Navigation Enfield Lock to Tottenham Locks; GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks)
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Surbiton intake capacity increase with transfer to Walton inlet channel - Construction The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why all three water bodies have been screened out of further assessment.

Table 2.50: WFD Level 1 assessment outcomes for Surbiton intake capacity increase with transfer to Walton inlet channel - Construction Option

Option ID	TWU_LON_HI-TFR_LON_CNO_surbiton int-walton
Option description	Increase capacity of Surbiton intake.
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB106039023232: Thames (Egham to Teddington); GB106039017622: Mole (Hersham to R. Thames conf at East Molesey); GB106039017650: Rythe
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Raw Water System Upgrade - TLT Removal of Constraints - Construction The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body, and therefore shows why it has been screened out of further assessment.

Table 2.51: WFD Level 1 assessment outcomes for Raw Water System Upgrade - TLT Removal of Constraints - Construction Option

Option ID	TWU_LON_HI-TFR_LON_CNO_tlt upgrade – roc
Option description	TLT reinforcement for a section of the tunnel, a new shaft 6m diameter at a depth of 30m and a new air valve.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks)
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

New Reservoir - Marsh Gibbon 30Mm3 - Construction The Level 1 WFD assessment covered nine water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why five of the water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for four water bodies: GB106039030334: Thames

(Evenlode to Thame), GB106039030120: Summerstown Ditch and Launton and Cutters Brook, GB106039030100: Ray and tributaries North East of Grendon Underwood and GB106039030110: Gubbinshole and Broadmoor ditch to Ray (Oxon) due to a new abstraction in the Thames (Evenlode to Thame) river water body, and the construction of a storage reservoir within 500m of the remaining water bodies which require further assessment.

Table 2.52: WFD Level 1 assessment outcomes for New Reservoir - Marsh Gibbon 30Mm3 - Construction Options

Option ID	TWU_STR_HI-RSR_RE1_CNO_res_marsh gibbon30 TWU_STR_HI-RSR_RE1_CNO_res_marsh gibbon50 TWU_STR_HI-RSR_RE1_CNO_res_marsh gibbon70
Option description	New non-impounding bunded reservoir situated within Oxfordshire, 2km south of Marsh Gibbon with a volume of 30Mm³/50Mm³/70Mm³.
Number of water bodies passing WFD assessment	5
Water bodies passing WFD assessment	GB106039030180: Northfield Brook (Source to Thames) at Sandford GB106039023820: Baldon Brook (South of Oxford) GB106039030240: Thame (Scotsgrove Brook to Thames) GB106039030360: Holton Brook and tributaries; GB106039030090: Oxon Ray (upstream A41 to Cherwell) including Otmoor
Number of water bodies requiring further WFD assessment	4
Water bodies requiring further WFD assessment	GB106039030334: Thames (Evenlode to Thame) GB106039030120: Summerstown Ditch and Launton and Cutters Brook GB106039030100: Ray and tributaries North East of Grendon Underwood GB106039030110: Gubbinshole and Broadmoor ditch to Ray (Oxon)
Description of potential effects/reason for further assessment	For the Thames (Evenlode to Thame), a new abstraction is required which may reduce flow volume and velocity and produce adverse impacts on water quality in this watercourse. For the remaining water bodies, the construction of a new storage reservoir is required, which increases the risk of flooding, silt deposition and the mobilisation of existing pollutants in these watercourses.

As this option has not been selected as part of any Thames WRMP24 plan or situation, further assessment at Level 2 has not been undertaken. If this option is progressed in future, a Level 2 assessment will be required.

Groundwater Development - Dorney Existing Source DO Increase The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why all three of the water bodies have been screened out of further assessment.

Table 2.53: WFD Level 1 assessment outcomes for Groundwater Development - Dorney Existing Source DO Increase Option

Option ID	TWU_SWA_HI-GRW_ALL_ALL_dorney do
Option description	Drilling of one new borehole and provision of two new submersible pumps (one per borehole) to increase the overall site capacity up to the source DO. DO benefit 4.3Ml/d (peak). 300m pipeline to connect to existing raw

	feed pipeline which runs to WTW and 100m run-to-waste pipeline.
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB106039023231: Thames (Cookham to Egham) GB106039023540: Roundmoor Ditch and Boveney Ditch GB40602G602700: Twyford Tertiaries
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

Groundwater Development - Taplow Existing Source DO Increase The Level 1 WFD assessment covered two water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why one of the water bodies has been screened out of further assessment. The outcomes indicated that further assessment would be necessary for one water body: GB40601G602600: Maidenhead Chalk due to the use of an existing surface water and groundwater abstraction licences, within existing licence conditions but outside of the recent actual rates.

Table 2.54: WFD Level 1 assessment outcomes for Groundwater Development - Taplow Existing Source DO Increase Option

Option ID	TWU_SWA_HI-GRW_ALL_ALL_taplowincreasedo
Option description	Aims to increase SDO up to licensed quantities. This is expected to bring peak SDO from 44Ml/d to 50Ml/d. The scope is as follows: increase Taplow to peak licence (50Ml/d) by drilling a new chalk abstraction borehole at the Dorney WTW site but added to the Taplow abstraction licence, add two pumps, duty/stand-by fitted with VSDs, 300m rising main and 300m run to waste.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB106039023540: Roundmoor Ditch and Boveney Ditch
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB40601G602600: Maidenhead Chalk
Description of potential effects/reason for further assessment	The use of an existing surface water and groundwater abstraction licences, within existing licence conditions but outside of the recent actual rates is required for the Maidenhead Chalk groundwater body. This may reduce groundwater levels in this water body.

As this option has not been selected as part of any Thames WRMP24 plan or situation, further assessment at Level 2 has not been undertaken. If this option is progressed in future, a Level 2 assessment will be required.

New Medmenham Surface Water WTW The Level 1 WFD assessment covered four water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why three of the water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for one water body: GB40601G601100: South-West Chilterns Chalk due to the construction of a below ground structure located within 500m of a sensitive groundwater feature.

Table 2.55: WFD Level 1 assessment outcomes for New Medmenham Surface Water WTW Option

Option ID	TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw ph1 TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw ph2
Option description	24Ml/d treatment works for river water near Medmenham (SWA). Purpose is to accommodate additional future demand. Includes a treated water PS, treated water transfer pipeline and new storage reservoir at Widdenton.
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB106039023233: Thames (Reading to Cookham); GB106039023720: Hamble Brook GB106039023890: Wye (Source to High Wycombe fire station)
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB40601G601100: South-West Chilterns Chalk
Description of potential effects/reason for further assessment	Construction of a below ground structure located within 500m of a sensitive groundwater feature. Risk of groundwater flooding, and potential for adverse impacts on watercourses, wetland habitats or abstractions.

2.1.29 Henley to SWA Transfer - 2.4Ml/d and 5Ml/d

The Level 1 WFD assessment covered five water bodies for these options. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why two of the water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for two water bodies, GB40601G602600: Maidenhead Chalk and GB40601G601100: South-West Chilterns Chalk, due to construction of a below ground structure located within 500m of a sensitive groundwater feature

Table 2.56: WFD Level 1 assessment outcomes for Henley to SWA Transfer – 2.4Ml/d and 5Ml/d Options

Option ID	TWU_SWA_HI-TFR_HEN_ALL_henley-swa2.4 TWU_SWA_HI-TFR_HEN_ALL_henley-swa5
Option description	The option is for one new main from Sheeplands WTW (Henley) to Hambleden WTW (SWA). This will require a new 9.94km main from Sheeplands WTW and a new PS at Sheeplands.
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB106039023720: Hamble Brook; GB106039023160: Loddon (Swallowfield to River Thames confluence) GB106039023233: Thames (Reading to Cookham)
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further WFD assessment	GB40601G602600: Maidenhead Chalk GB40601G601100: South-West Chilterns Chalk
Description of potential effects/reason for further assessment	Construction of a below ground structure located within 500m of a sensitive groundwater feature. Risk of groundwater flooding, and potential for adverse impacts on watercourses, wetland habitats or abstractions.

New Medmenham Surface Water Intake - 53 Ml/d The Level 1 WFD assessment covered one water body for these options. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body. The outcomes indicated that

further assessment would be necessary for one water body: GB106039023233: Thames (Reading to Cookham) due to a new abstraction from this watercourse.

Table 2.57: WFD Level 1 assessment outcomes for New Medmenham Surface Water Intake - 53 Ml/d Options

Option ID	TWU_SWA_HI-TFR_UTC_ALL_medmenham intake 53
Option description	The Medmenham intake element includes the construction of an intake structure on the River Thames located approximately 1.75km west of the village of Medmenham, close to the village of Mill End. In addition to the intake structure, a PS will be constructed. The intake structure, PS and raw water transfer main would supply water from the River Thames to a new WTW at Medmenham. The intake and all associated infrastructure will be constructed with an abstraction capacity of either 53Ml/d or 80Ml/d.
Number of water bodies passing WFD assessment	0
Water bodies passing WFD assessment	N/A
Number of water bodies requiring further WFD assessment	1
Water bodies requiring further WFD assessment	GB106039023233: Thames (Reading to Cookham)
Description of potential effects/reason for further assessment	A new surface water abstraction will be required from the Thames (Reading to Cookham) watercourse, which could reduce flow volume and velocity, and produce adverse impacts on water quality in this watercourse.

New WTW - Radcot The Level 1 WFD assessment covered eight water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why all of the water bodies have been screened out of further assessment.

Table 2.58: WFD Level 1 assessment outcomes for New Radcot - WTW Option

Option ID	TWU_SWX_HI-ROC_WT1_ALL_radcotwtw
Option description	24Ml/d treatment works for reservoir water in Radcot (SWOX). Purpose is to accommodate additional future demand.
Number of water bodies passing WFD assessment	8
Water bodies passing WFD assessment	GB106039022990: Thames (Churn to Coln); GB106039023710: Bydemill Brook (Source to Thames); GB106039023680: Share ditch; GB106039023711: Westrop Brook; GB106039023730: Cole (Bower Bridge to Thames) including Coleshill; GB106039029992: Coln (from Coln Rogers) and Thames (Coln to Leach); GB106039030040: Leach (Source to Thames); GB106039030231: Radcot Cut;
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

New shaft on the TWRM at Kempton - Construction The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out

the activities which would take place in this water body, and therefore shows why it has been screened out of further assessment.

Table 2.59: WFD Level 1 assessment outcomes for new shaft on the New shaft on the TWRM at Kempton - Construction Option

Option ID	TWU_WLJ_HI-ROC_NET_CNO_twrm shaft kempton
Option description	This option includes a new shaft on the TWRM to accommodate 800Ml/d of treated water flow from the expanded Kempton WTW.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB106039023451: Portlane Brook
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

2.1.30 Additional conveyance from Queen Mary Reservoir to Kempton WTW

The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why all three of the water bodies have been screened out of further assessment.

Table 2.60: WFD Level 1 assessment outcomes for Additional conveyance from Queen Mary Reservoir to Kempton WTW Option

Option ID	TWU_WLJ_HI-TFR_WLJ_CNO_qm res-kempton wtw
Option description	New conveyance of raw water from Queen Mary Reservoir to Kempton WTW.
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB106039023480: Surrey Ash; GB106039023451: Portlane Brook; GB106039023232: Thames (Egham to Teddington);
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

New Reservoir - Chinnor 30Mm3 - Construction The Level 1 WFD assessment covered nine water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why seven of the water bodies have been screened out of further assessment. The outcomes indicated that further assessment would be necessary for two water bodies: GB106039030331: Thames Wallingford to Caversham and GB106039030200: Kingsey Cuttle Brook and tributaries at Thame due to a new abstraction and the construction of a new storage reservoir within 500m of the water body, respectively for each water body.

Table 2.61: WFD Level 1 assessment outcomes for New Reservoir - Chinnor 30Mm3 - Construction Option

Option ID	TWU_UTC_HI-RSR_RE1_CNO_res_chinnor_2
Option description	New non-impounding bunded reservoir situated within Oxfordshire, 5km southwest of Chinnor with a volume of 30Mm³.
Number of water bodies passing WFD assessment	7
Water bodies passing WFD assessment	GB106039023670: Berrick Stream and Lady Brook; GB106039023740: Chalgrove Brook; GB106039023750: Lewknor Brook; GB106039023780: Haseley Brook; GB106039023840: Cuttle Brook; GB106039023850: Chinor Brook and Sydenham Brook; GB106039030240: Thame (Scotsgrove Brook to Thames);
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further WFD assessment	GB106039030331: Thames Wallingford to Caversham; GB106039030200: Kingsey Cuttle Brook and tributaries at Thame
Description of potential effects/reason for further assessment	For the Thames Wallingford to Caversham, a new surface water abstraction may reduce flow volume and velocity in the watercourse and may create adverse impacts on water quality in this watercourse. For the Kingsey Cuttle Brook and tributaries at Thame, the construction of a new storage reservoir within 500m of the watercourse may increase risk of flooding, silt deposition and the release of other forms of pollution into the watercourse.

As this option has not been selected as part of any Thames WRMP24 plan or situation, further assessment at Level 2 has not been undertaken. If this option is progressed in future, a Level 2 assessment will be required.

Transfer from SES WTW to Merton TWRM shaft The Level 1 WFD assessment covered three water bodies for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why all three of the water bodies have been screened out of further assessment.

Table 2.62: WFD Level 1 assessment outcomes for Transfer from SES WTW to Merton TWRM shaft Option

Option ID	TWU_LON_HI-TFR_SES_ALL_cheam-merton
Option description	Bidirectional route from London ring main at Merton shaft to Cheam.
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB106039023460:Wandle (Croydon to Wandsworth) and the Graveney; GB106039022850:Beverley Brook (Motspur Park to Thames) and Pyl Brook at West Barnes; GB40602G602300:West Kent and Bromley Tertiaries;
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

2.1.31 STT to SESRO Link

The Level 1 WFD assessment covered one water body for this option. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in this water body, and therefore shows why it has been screened out of further assessment.

Table 2.63: WFD Level 1 assessment outcomes for STT to SESRO Link Option

Option ID	TWU_STT_HI-TFR_STT_ALL_stt-sesro
Option description	Potential increase in DO by integrating the Severn to Thames Transfer pipeline and the Abingdon Reservoir SROs.
Number of water bodies passing WFD assessment	1
Water bodies passing WFD assessment	GB106039023360: Cow Common Brook and Portobello Ditch
Number of water bodies requiring further WFD assessment	0
Water bodies requiring further WFD assessment	N/A
Description of potential effects/reason for further assessment	N/A

2.2 Summary of SRO option WFD ACWG Level 1 outputs

All the SROs have had a WFD assessment completed as part of the individual SRO projects. A summary of the WFD Level 1 assessment for each SRO is provided in this section of the report. WFD Level 2 summaries are provided in Section 3.2.

2.2.1 Thames to Southern Transfer (T2ST SRO)

The T2ST SRO has been assessed under the individual SRO project[5], and a summary of the WFD assessment for this SRO project is provided in this report. Two options for the route of the T2ST are still under consideration and therefore summaries of both are provided here. The section of this SRO project which is included in the rdWRMP24 is the Kennet Valley to Speen section. The water bodies associated with this section of the scheme remain the same for both options and are GB106039030334: Thames (Evenlode to Thame); GB106039023360: Cow Common Brook and Portobello Ditch; GB106039023660: Ginge Brook and Mill Brook; GB106039023600: Mill Brook and Bradfords Brook system, Wallingford; GB106039023300: Pang; GB106039023210: Winterbourne; GB106039023220: Lambourn (Source to Newbury); GB106039023174: Middle Kennet (Hungerford to Newbury); GB40601G601000: Vale of White Horse Chalk and GB40601G600900: Berkshire Downs Chalk.

2.2.1.1 T2ST Option B

The T2ST SRO Option B WFD ACWG Level 1 assessment covered 24 water bodies[6]. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why 16 of the water bodies have been screened out of further assessment. The outcomes indicated further assessment would be necessary for eight water bodies: GB106039030334: Thames (Evenlode to Thame), GB106039023220: Lambourn (Source to Newbury), GB106039023174: Middle Kennet (Hungerford to Newbury), GB107042022710: Test (Upper), GB107042022700: Test - Bourne Rivulet to conf Dever, GB107042022770: Dever, GB40601G600900: Berkshire Downs Chalk, GB40602G601600 (Thatcham Tertiaries, groundwater) and GB40701G501200: River Test Chalk.

[5] Mott MacDonald (2022) Thames to Southern Transfer Water Framework Directive Regulations Compliance Assessment Report
[6] Mott MacDonald (2022) Thames to Southern Transfer Water Framework Directive Regulations Compliance Assessment Report

These water bodies require assessment at Level 2 due to the following:

- An abstraction from the Thames (Evenlode to Thame) could alter water body flow volume and velocity in this water body, potentially affecting biology and water quality.
- A main transfer pipeline is expected to be constructed across the remaining affected river water bodies, which are within 500m of a sensitive groundwater feature and SSSIs including the Lambourn and Kennet Floodplain SSSI and the River Test SSSI.
- There is potential for dewatering during construction to impact the Berkshire Downs Chalk, River Test Chalk groundwater bodies.
- Thatcham Tertiaries groundwater body was identified as being potentially impacted due to potential impacts on drinking water protected areas.

Table 2.64: WFD ACWG Level 1 assessment outcomes for T2ST

Option description	T2ST: Transfer from the River Thames to the South option B
Number of water bodies passing WFD assessment	16
Water bodies passing WFD assessment	GB106039023360: Cow Common Brook and Portobello Ditch GB106039023660: Ginge Brook and Mill Brook GB106039023600: Mill Brook and Bradfords Brook system, Wallingford GB107042022710: Test (Upper) GB106039023300: Pang GB106039023210: Winterbourne GB106039017210: Penwood Stream GB106039017280 (Enborne, Source to downstream A34) GB107042022720: Bourne Rivulet GB107042022810: Anton – Upper GB107042022740: Sombourne Stream GB107042022730: Nun's Walk Stream GB107042016310: Monks Brook GB107042022580: Itchen GB40601G601000: Vale of White Horse Chalk GB40701G505000: River Itchen Chalk
Number of water bodies requiring further WFD assessment	8
Water bodies requiring further WFD assessment	GB106039030334: Thames (Evenlode to Thame) GB106039023220: Lambourn (Source to Newbury) GB106039023174: Middle Kennet (Hungerford to Newbury) GB107042022700: Test - Bourne Rivulet to conf Dever GB107042022770: Dever GB40601G600900: Berkshire Downs Chalk GB40602G601600: Thatcham Tertiaries GB40701G501200: River Test Chalk
Description of potential effects/Reason for further assessment	Abstraction from the Thames (Evenlode to Thame) could alter water body flow volume and velocity, potentially impacting biology and water quality in this water body. A main transfer pipeline is expected to be constructed across the remaining water bodies, which are within 500m of a sensitive groundwater feature and SSSIs including the Lambourn and Kennet Floodplain SSSI and the River Test SSSI. There is potential for dewatering during construction to impact the Berkshire Downs Chalk, River Test Chalk groundwater bodies. Thatcham Tertiaries groundwater body was identified due to potential impacts on drinking water protected areas.

2.2.1.2 Thames to Southern Transfer (T2ST) SRO - Option C

The T2ST SRO Option C WFD ACWG Level 1 assessment covered 25 water bodies[7]. The full assessment is set out in Annex A. This assessment sets out the activities which would take place in each water body, and therefore shows why 17 of the water bodies have been screened out of further assessment. The outcomes indicated further assessment would be necessary for eight water bodies GB106039030334: Thames (Evenlode to Thame), GB106039023220: Lambourn (Source to Newbury), GB106039023174: Middle Kennet (Hungerford to Newbury), GB107042022710: (Test, Upper), GB107042022700: (Test – Bourne Rivulet to conf Dever), GB107042022770: (Dever), GB40601G600900: (Berkshire Downs Chalk), GB40701G501200: (River Test Chalk)

These water bodies require assessment at Level 2 due to the following:

- An abstraction from the Thames (Evenlode to Thame) could alter water body flow volume and velocity in this water body, with potential impacts to biology and water quality.
- A main transfer pipeline is expected to be constructed across the remaining affected river water bodies, which are within 500m of a sensitive groundwater feature and SSSIs including the Lambourn and Kennet Floodplain SSSI and the River Test SSSI.
- There is potential for dewatering during construction to impact the Berkshire Downs Chalk, River Test Chalk groundwater bodies.

Table 2.65: WFD ACWG Level 1 assessment outcomes for T2ST

Option description	T2ST: Transfer from the River Thames to the South option C
Number of water bodies passing WFD assessment	17
Water bodies passing WFD assessment	GB106039023360: Cow Common Brook and Portobello Ditch GB106039023660: Ginge Brook and Mill Brook GB106039023600: Mill Brook and Bradfords Brook system, Wallingford GB107042022710: Test (Upper) GB106039023300: Pang GB106039023210: Winterbourne GB106039017210: Penwood Stream GB106039017280: Enborne, Source to downstream A34 GB106039017310: Enborne, downstream A34 to Burghclere Brook GB106039017230: Earlstone Stream and Burghclere Brook, source to Enborne GB107042022740: Sombourne Stream GB107042022730: Nun's Walk Stream GB107042016310: Monk's Brook GB107042022580: Itchen GB40601G601000: Vale of White Horse Chalk GB40602G601600: Thatcham Tertiaries GB40701G505000: River Itchen Chalk
Number of water bodies requiring further WFD assessment	8
Water bodies requiring further WFD assessment	GB106039030334: Thames (Evenlode to Thame) GB106039023220: Lambourn (Source to Newbury) GB106039023174: Middle Kennet (Hungerford to Newbury) GB107042022710: Test, Upper GB107042022700: Test – Bourne Rivulet to conf Dever

[7] Mott MacDonald (2022) Thames to Southern Transfer Water Framework Directive Regulations Compliance Assessment Report

	GB107042022770: Dever GB40601G600900: Berkshire Downs Chalk GB40701G501200: River Test Chalk
Description of potential effects/Reason for further assessment	An abstraction from the Thames, Evenlode to Thame which could alter water body flow volume and velocity, potentially impacting biology and water quality in this water body. A main transfer pipeline is expected to be constructed across the remaining water bodies, which are within 500m of a sensitive groundwater feature and SSSIs including the Lambourn and Kennet Floodplain SSSI and the River Test and East Aston Common SSSI. There is potential for dewatering during construction to impact the Berkshire Downs Chalk and River Test Chalk groundwater bodies.

2.2.2 South East Strategic Reservoir Option (SESRO) SRO

The SESRO WFD ACWG Level 1 assessment covered 12 water bodies[8]. The outcomes indicated further assessment would be necessary for five water bodies: GB106039023430: Ock and tributaries (Land Brook confluence to Thames); GB106039023360: Cow Common Brook and Portobello Ditch, GB106039023380: Childrey Brook and Norbrook at Common Barn, GB106039023410: Sandford Brook (source to Ock) and GB106039030334: Thames (Evenlode to Thame) river water bodies.

Based on initial assessments, these water bodies require assessment at Level 2 due to the following:

- Reductions in flow and water quality are expected at Childrey Brook. Norbrook at Common Barn and Ock and tributaries (Land Brook confluence to Thames). Further hydrodynamic and water quality modelling is proposed for the River Ock in subsequent stages of the SESRO project to explore this further.
- The Sandford Brook requires further assessment due to a new crossing over channels in the catchment, which could impact flow volume and velocity in this water body.
- Hydrodynamic modelling undertaken in the River Thames (Evenlode to Thame) suggest that the releases triggered by the SESRO may lead to depth and/or velocity changes in this WFD water body. This modelling suggests that this effect dissipates further downstream and thus the downstream WFD water bodies were not assessed at Level 2, but will continue to be included in future assessments.

The following WFD water bodies were screened out of the WFD ACWG Level 2 assessment, however, until further assessments into the hydrological impacts on the River Thames are completed, they cannot be fully discounted and so will be assessed again at Gate 3[8]:

- Thames Wallingford to Caversham - GB106039030331
- Thames (Reading to Cookham) - GB106039023233
- Thames (Cookham to Egham) - GB106039023231
- Thames (Egham to Teddington) - GB106039023232

Groundwater bodies were reviewed as part of the screening assessment. Two groundwater bodies exist close to the site, namely:

- Shrivenham Corallian (GB40602G60060) which is located north of the footprint (boundary around Marcham and Shippon)

[8] Atkins (2022) South East Strategic Reservoir Option Water Framework Directive Regulations Compliance Assessment report

- Vale of White Horse Chalk (GB40601G601000) which is located south of the footprint (boundary south of the railway line which goes east to west from Didcot Parkway to Swindon)

However, no groundwater body is located within the indicative location of SESRO and hence groundwater bodies have been screened out from further assessment.

For any indicative locations of SESRO extensions, further assessments would be required to ensure that all potential environmental impacts are fully considered.

Table 2.66: WFD ACWG Level 1 assessment outcomes for SESRO

Option description	SESRO: South east strategic reservoir option. New storage reservoir in the south east of England.
Number of water bodies passing WFD assessment	7
Water bodies passing WFD assessment	GB106039030331: Thames (Wallingford to Caversham) GB106039023233: Thames (Reading to Cookham) GB106039023231: Thames (Cookham to Egham) GB106039023232: Thames (Egham to Teddington) GB106039023660: Ginge Brook and Mill Brook GB40602G60060: Shrivenham Corallian GB40601G601000: Vale of White House Chalk.
Number of water bodies requiring further WFD assessment	5
Water bodies requiring further WFD assessment	GB106039023430: Ock and tributaries (Land Brook confluence to Thames) GB106039023360: Cow Common Brook and Portobello Ditch GB106039023380: Childrey Brook and Norbrook at Common Barn GB106039023410: Sandford Brook (source to Ock) GB106039030334: Thames (Evenlode to Thame)
Description of potential effects/Reason for further assessment	Some reductions in flow and water quality are expected Childrey Brook and Ock and tributaries (Land Brook confluence to Thames). Further hydrodynamic and water quality modelling is proposed in subsequent project stages for the River Ock to explore this further. The Sandford Brook requires further assessment due to a new culvert crossing over channels in the catchment, which could impact flow volume and velocity in this water body. Cow Common Brook and Portobello Ditch water body has been screened in as a result of a loss of habitat resulting from the SESRO scheme and requires further assessment. Hydrodynamic modelling in the River Thames (Evenlode to Thame) suggest that the releases triggered by the SESRO may lead to depth and/or velocity changes in this water body.

2.2.3 River Severn to River Thames Transfer (STT) SRO

The STT SRO WFD ACWG Level 1 assessment covered 22 WFD water bodies[9]. The outcomes indicated that all water bodies would require further assessment (Level 2) mainly due to the transfer of water via a river, canal or aqueduct, a high-volume discharge of water with a water quality element the same or lower than that of the receiving water body, which has the potential to adversely impact water quality characteristics in receiving water bodies, and maintenance and use of river outfall or intake. Pipeline construction, intake and outfall headwork construction

[9] United Utilities on behalf of the STT group (2022) Severn Thames Transfer Solution Water Framework Directive Regulations Compliance Assessment Report

activities were all screened as compliant at Level 1 and therefore do not form reasons for the Level 2 assessment.

Where the associated evidence and assessment reports have identified an impact to a WFD status element with no published targets in the draft RBMP3, this impact has still been considered within the Level 2 assessment[10]. This is to ensure a holistic understanding of the potential impacts of the option is maintained throughout the assessment. When this is the case, a note stating 'No Classification in RBMP3' within the water body-specific tabs has been provided.

Table 2.67: WFD ACWG Level 1 assessment outcomes for STT

Option description	STT: Transfer from River Severn (support by additional discharges from Vyrnwy reservoir) to River Thames.
Number of water bodies passing Level 1 WFD assessment	0
Water bodies passing WFD assessment	-
Number of water bodies requiring further WFD assessment	22
Water bodies requiring further WFD assessment	GB109054049880: Vrynwy - Lake Vrynwy to conf Afon Cownwy GB109054049720: Afon Vyrnwy - conf Afon Cownwy to conf Afon Banwy GB109054049852: Afon Vyrnwy DS of Banwy confluence GB109054049800: Afon Vyrnwy - conf Afon Tanat to conf R Severn GB109054049142: Severn - conf Bele Bk to conf Sundorne Bk GB109054049141: Severn - Sundorne Bk to conf M Wenlock-Farley Bk GB109054049143: Severn conf M Wenlock-Farley Bk to conf R Worfe GB109054049145: Severn - conf R Worfe to conf R Stour GB109054049144: Severn - conf R Stour to conf River Teme GB109054039760: Severn - conf R Teme to conf R Avon GB109054044404: Severn - conf R Avon to conf Upper Parting GB109054043840: Avon (Warks) - conf R Sowe to conf R Leam GB109054044402: Avon (Wark) conf R Leam to Tramway Br, Stratford GB109054044401: Avon- Tramway Br Stratford to Workman Br Evesham GB109054044403: Avon conf Workman Br, Evesham to conf R Severn GB106039030334: Thames (Evenlode to Thame) GB106039030331: Thames Wallingford to Caversham GB106039023233: Thames (Reading to Cookham) GB106039023231: Thames (Cookham to Egham) GB106039023232: Thames (Egham to Teddington)

[10] United Utilities on behalf of the STT group (2022) Severn Thames Transfer Solution Water Framework Directive Regulations Compliance Assessment Report

	GB109054032750: Severn (E Channel) - Horsebere Bk to Severn Est GB530905415403: Severn Upper
Description of potential effects/Reason for further assessment	• The transfer of water via a river, canal or aqueduct, potentially impacting all water bodies. • A high-volume discharge of water with a quality element of a *lower* WFD status than the receiving water body at Avon (Warks) - conf R Sowe to conf R Leam and Severn - conf R Avon to conf Upper Parting, which could create adverse impacts for water quality and sedimentation processes in the receiving water bodies. • A high-volume discharge of water with a quality element of *the same* WFD status as the receiving water body is expected at the following water bodies: Vrynwy - Lake Vrynwy to conf Afon Cownwy, Severn - conf Bele Bk to conf Sundorne Bk, Severn - conf R Avon to conf Upper Parting, Thames (Evenlode to Thame), which could create adverse impacts for water quality and sedimentation processes in the receiving water bodies. • Pipeline construction, intake and outfall headwork construction activities were screened as compliant as per the agreed methodology.

2.2.4 London Reuse SRO: Teddington DRA scheme (75Ml/d)

The London Reuse SRO: Teddington DRA scheme (75Ml/d) WFD ACWG Level 1 assessment covered five water bodies[11]. The outcomes indicated further assessment would be necessary for two of these water bodies: GB106039023232: Thames (Egham to Teddington) river water body and GB530603911403: Thames Upper transitional water body due to the diversion of an existing discharge from the Thames Upper water body, and a new abstraction and the discharge of a high volume of effluent in the Thames (Egham to Teddington).

Table 2.68: WFD Level 1 assessment outcomes for Teddington DRA

Option description	London Reuse: Teddington DRA
Number of water bodies passing WFD assessment	3
Water bodies passing WFD assessment	GB106039023030: Crane GB806100095: Lower Duke of Northumberland's River GB30641865: Lockwood Reservoir
Number of water bodies requiring further WFD assessment	2
Water bodies requiring further WFD assessment	GB106039023232: Thames (Egham to Teddington) GB530603911403: Thames Upper
Description of potential effects/Reason for further assessment	A new surface water abstraction and a high-volume discharge of effluent is expected in the Thames (Egham to Teddington) water body, which could create adverse impacts for water quality, and the cessation of an existing discharge in the Thames Upper water body is expected, which may adversely impact flow volume and velocity and water quality characteristics.

[11] Ricardo (2022), London Effluent Refuse SRO Gate 2 Water Framework Directive Regulations Report

2.3 Summary of Drought Plan WFD assessments

2.3.1 Gatehampton Drought Permit

The WFD assessment for the Gatehampton Drought Permit[12] option identified two waterbodies which could potentially be affected by this drought option. These are the Thames Wallingford to Caversham (GB106039030331) river water body and the Chiltern Chalk Scarp (GB40601G604100) groundwater body.

The existing Gatehampton licence permits abstraction from the Chalk aquifer at a daily peak of 105Ml/d (with an annual maximum of 34,770Ml/year). A licence condition applies that if flow conditions in the River Thames at Reading Gauging Station fall to below 400Ml/d for five days then abstraction must be maintained at or below 101.5Ml/d. This option is to remove this licence restriction and allow the 105Ml/d peak to be maintained even when flow in the River Thames falls below 400Ml/d.

The WFD screening assessment on the surface water body as part of the DP found that no further assessment of the WFD river water body is required due to a negligible impact on hydrology and the watercourse biology being classed as not sensitive to any potential minor changes. The groundwater body is also screened out as all groundwater bodies are considered to be extremely unlikely to be sensitive to the changes caused by DP options, due to their short-term nature.

2.3.2 Playhatch Drought Permit

The WFD assessment for the Playhatch DP[13] option identified three water bodies which could potentially be affected by this DP option: Thames (Reading to Cookham) (GB106039023233) and Thames Wallingford to Caversham (GB106039030331) river water bodies and the South West Chilterns Chalk (GB40601G601100) groundwater body.

The existing Playhatch licence allows abstraction from the Chalk at an annual average of 7.27Ml/d, with a maximum peak of 8.2Ml/d. This option is to increase the peak licence to 12.3Ml/d.

The WFD screening assessment carried out as part of the DP found that no further assessment of either WFD surface water bodies status is required due to negligible impact on hydrology and the watercourse biology being classed as not sensitive to any potential minor changes. The groundwater body is also screened out as all groundwater bodies are considered to be extremely unlikely to be sensitive to the changes caused by DP options, due to their short-term nature.

2.3.3 Shalford – Guildford

The WFD assessment for the Shalford - Guildford DP[14] option identified two water bodies which could potentially be affected by this DP option: Wey (Shalford to River Thames confluence at Weybridge) (GB106039017630) and the Godalming Lower Greensand groundwater body (GB40601G601900).

The existing Shalford licence allows abstraction from the River Wey at 30Ml/d. This licence is aggregated with the Tillingbourne licence. This option is to increase the existing surface water abstraction from the River Wey to 35Ml/d and remove the licence aggregation with Tillingbourne.

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[12] Ricardo (2022) Environmental Assessment Report: Swindon Oxford Water Resource Zone Drought Options

[13] Ricardo (2022) Environmental Assessment Report: Kennet Valley Water Resource Zone Drought Options

[14] Ricardo (2022) Environmental Assessment Report: Henley, Slough/Wycombe/Aylesbury (SWA) and Guildford Water Resource Zone Drought Options

The WFD screening assessment carried out as part of the DP found that no further assessment of either WFD surface water bodies status is required due to negligible impact on hydrology and the watercourse biology being classed as not sensitive to any potential minor changes. The groundwater body is also screened out as all groundwater bodies are considered to be extremely unlikely to be sensitive to the changes caused by DP options, due to their short-term nature.

2.3.4 Sheeplands/Harpsden Drought Permit

The WFD assessment for the Sheeplands/Harpsden Drought Permit [15] option identified two water bodies which could potentially be affected by this DP option: Thames Reading to Cookham (GB106039023233) and South-West Chilterns Chalk groundwater body (GB40601G601100).

When nitrate levels are low (less than 10.3mg/l) at Sheeplands, Thames Water may abstract 18.18Ml/d from Sheeplands and 6.5Ml/d from Harpsden with an aggregate of 22.33Ml/d. When nitrate levels are high (above 10.3mg/l) then abstraction from Harpsden can increase to a peak of 18Ml/d (annual average 13Ml/d) but the aggregate remains at 22.33Ml/d. This option is to remove the aggregate on these licences and allow abstraction up to DO for both sources, which is 11.4Ml/d from Sheeplands and 16.5Ml/d from Harpsden (total 27.9Ml/d).

The WFD screening assessment carried out as part of the DP found that no further assessment of the WFD surface water body status is required due negligible impact on hydrology and the watercourse biology being classed as not sensitive to any potential minor changes. The groundwater body is also screened out as all groundwater bodies are considered to be extremely unlikely to be sensitive to the changes caused by DP options, due to their short-term nature.

[15] Ricardo (2022) Environmental Assessment Report: Henley, Slough/Wycombe/Aylesbury (SWA) and Guildford Water Resource Zone Drought Options

3 Water Framework Directive findings (WFD ACWG Level 2)

The second stage of WFD assessment has been completed for rdWRMP24 options that were screened in at Level 1. Further information on WFD classification and the approach adopted can be found in *ACWG, WFD: Consistent framework for undertaking no deterioration assessments, Nov 2020*.

This Section 3.1 provides an overview of the findings of the Level 2 WFD assessments carried out for the rdWRMP24, while Section 3.2 provides a summary of the assessment outcomes from the RAPID Gate 2 SRO assessments, carried out under the individual SRO projects.

3.1 Summary of WFD ACWG Level 2 outcomes

3.1.1 Coppermills WTW - filtration pre-treatment 680Ml/d

For this option one water body was identified as requiring further assessment: GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks) river water body. A summary of the Level 2 WFD assessment is included in Table 3.1 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified minor localised effects (impact score 1) on biology (fish, invertebrates and macrophytes and phytobenthos combined) and water quality (ammonia, biochemical oxygen demand, dissolved oxygen, pH, phosphate and temperature). This is largely due to potential changes to water quality from construction activities and potential changes in groundwater level and water quality from construction dewatering. These minor changes in water quality could have minor implications on biology. Mitigation is proposed in the form of discharging dewatering into nearby lakes and small feeder streams to help maintain flow during dewatering, and good construction practice.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to confirm this assessment including understanding the potential for groundwater level changes due to construction dewatering. This investigation will also help identification of further mitigation measures required, such as consideration of requirements to return water to the ground (through recharge trenches) to help minimise the impact of construction.

Following these additional investigations, design development and implementation of any resultant targeted mitigation, this assessment concludes no WFD deterioration risk.

The ‘reasons for not achieving good’ (RNAG) status for the Lee (Tottenham Locks to Bow Locks/Three Mills Locks) river body relate to:

- Dissolved oxygen, fish, invertebrates and macrophytes and phytobenthos combined, mitigation measures assessment due to ‘physical modifications’
- Invertebrates, macrophytes and phytobenthos combined, fish, phosphate and ammonia (phys-chem) and dissolved oxygen due to ‘pollution from wastewater’
- Fluoranthene, fish, dissolved oxygen, phosphate, fish, invertebrates, tributyltin compounds, ammonia (phys-chem) due to ‘pollution from towns, cities and transport’
- Hydrological regime, fish and invertebrates due to ‘changes to the natural flow levels of the water’

- Macrophytes and phytobenthos combined due to ‘non-native invasive species’

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Overall, this assessment concludes that, following further investigations, design development and implementation of any resultant targeted mitigation, this option does not lead to a WFD deterioration or an impediment to reaching future objectives and is therefore compliant under WFD.

Table 3.1: Coppermills WTW - filtration pre-treatment 680Ml/d Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB10603 8077852	Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	Low/Low	1	No	No	No	Groundwater monitoring to understand groundwater levels and how they interact with the scheme. Further information about option.	Further investigation into impact on groundwater levels of dewatering for construction and consideration of requirement to return water to the ground (through recharge trenches) to help minimise the impact of construction, if required.	1	None

3.1.2 Beckton Desalination

For this option, one transitional water body and one groundwater body were identified as requiring further assessment: Thames Middle transitional water body, Greenwich Tertiaries and Chalk groundwater body.

A summary of the Level 2 WFD assessment is included in Table 3.2 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment for the Thames Middle transitional water body identified precautionary deterioration risks (impact score 2) to biology (angiosperms, fish, invertebrates, macroalgae and phytoplankton) and water quality (dissolved inorganic nitrogen and dissolved oxygen). This is due to the:

- discharge of the saline waste stream to this water body, which could adversely impact on water quality and therefore biology, along with associated local designated marine protected areas under WFD. However, the brackish tidal environment of the receiving water body means that the saline discharge may not lead to significant biological impacts.
- changes in flow volume and velocity from new structures in the estuary, leading to negative impacts on biology and sedimentation processes.

The HRA considers the implications of the works on the marine protected areas and has concluded that the WRMP24 contains measures that would ensure compliance with the policies of the marine plan. Further details can be found in Appendix C Habitats Regulation Assessment of this rdWRMP24.

The RNAG for the Thames Middle transitional water body relate to:

- Water quality (benzo(b)fluoranthene, dissolved inorganic nitrogen, benzo(g-h-i)perylene, zinc and perfluorooctane sulfonate (PFOS)) the cause of which is under investigation
- Mitigation Measures Assessment and angiosperms due to ‘physical modifications’
- Tributyltin compounds due to ‘pollution from wastewater’ and ‘pollution from towns, cities and transport’
- Mercury and its compounds as well as polybrominated diphenyl ethers (PBDE), which are assessed as no sector responsible (measures delivered to address reason, awaiting recovery)

This assessment has highlighted the potential for this option to increase pressure on this river water body and therefore the potential to impede gaining good status and future objectives for water quality, namely dissolved inorganic nitrogen. Further investigation will be carried out to understand the implication of this scheme on dissolved inorganic nitrogen.

Further investigations will be undertaken at an appropriate time, in accordance with the date the option is required for the plan. These investigations are required to confirm this assessment including:

- Review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme.
- Hydroecological investigations into the impact of the new abstraction on flows and ecology.
- Specialist environmental modelling should be carried out to ensure better understanding of impacts resulting from the new discharge due to changes in salinity, tidal level and sedimentation
- Investigation of impact saline discharge on water quality and potentially other physico-chemical parameters.
- Further information about how the option will be operated.

This investigation can also help identify further mitigation measures through hydroecological and other studies including specialist environmental modelling of salinity, tidal level and sedimentation. Following further investigations, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk can be reduced to minor localised (impact score 1) and therefore, for this waterbody, this option would be WFD compliant..

The Level 2 WFD assessment for the Greenwich Tertiaries and Chalk groundwater body identified potential deterioration risks (impact score 2) to chemical status elements (chemical saline intrusion and general chemical test). While this option will not increase saline intrusion, there is the potential for increased salinity as a result of option activities. This could potentially lead to an increased risk of deterioration in the chemical status of this water body.

Further investigations are required to understand the potential risks to this water body and may include hydrogeological assessment of the impacts of the discharge on groundwater chemistry and scenario modelling.

The RNAG for the Greenwich Tertiaries and Chalk groundwater body relate to:

- Chemical and quantitative saline intrusion due to ‘changes to the natural flow and levels of water’
- Quantitative dependent surface water body status with the ‘sector under investigation’

This assessment has highlighted the potential for this option to increase pressure on this groundwater body and therefore potential to impede gaining good status and future objectives for chemical saline intrusion. Further investigation is required to understand the implication of this scheme on chemical saline intrusion.

This investigation will be undertaken at an appropriate time, in line with the date the option is required for the plan. This investigation will also help identify further mitigation measures through hydroecological and other studies. Following further investigations, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk can be reduced to minor localised (impact score 1) and therefore, for this waterbody, this option would be WFD compliant.

Following these additional investigations and implementation of any resultant targeted mitigation, this assessment concludes no WFD deterioration risk.

Table 3.2: Beckton Desalination Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB530603911402	THAMES MIDDLE	Low/Low	2	Possible	Possible	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Further investigation into quality of water discharged into surface water body to establish extent of impact (anticipated concentrations of pollutants). Further hydroecological investigations into the impact of the new abstraction and discharge on flows and ecology. Further information about how the option will be operated.	Fish and eel screening on new intake. Design of desalination process and outfall structure in line with best practice to meet acceptable environmental requirements.	1	None
GB40602G602500	Greenwich Tertiaries and Chalk	Low/Low	2	Possible	Possible	No	Hydrogeological assessment of the impacts of new discharge on water quality in groundwater body. Further information about option.	-	1	None

3.1.3 Beckton to Coppermills tunnel (treated) - Construction

For this option one river water body was identified as requiring further assessment: Lee (Tottenham Locks to Bow Locks/Three Mills Locks). A summary of the Level 2 WFD assessment is included in Table 3.3 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified minor localised effects (impact score 1) on biology (fish, invertebrates and macrophytes and phytobenthos combined) and water quality (ammonia, biochemical oxygen demand, dissolved oxygen, pH, phosphate and temperature). This is due to potential temporary changes to water quality from construction activities and in groundwater level and water quality from temporary construction dewatering. The temporary changes in water quality could have minor implications on biology. Mitigation is proposed in the form of discharging dewatering into nearby lakes and small feeder streams to help maintain flow during dewatering, and good construction practice.

Further investigation will be undertaken at an appropriate time, in line with the date the option is required for the plan. This investigation is required to identify the potential for groundwater level changes due to construction dewatering. This investigation can also help to identify further mitigation measures, such as consideration of requirements to return water to the ground (through recharge trenches) to help minimise the impact of construction.

Following these additional investigations, design development and implementation of any resultant targeted mitigation, this assessment concludes no WFD deterioration risk.

The RNAG for the Lee (Tottenham Locks to Bow Locks/Three Mills Locks) water body relate to:

- Dissolved oxygen, fish, invertebrates, and macrophytes and phytobenthos combined, mitigation measures assessment due to ‘physical modifications’
- Invertebrates, macrophytes and phytobenthos combined, fish, phosphate and ammonia (phys-chem) and dissolved oxygen due to ‘pollution from wastewater’
- Fluoranthene, fish, dissolved oxygen, phosphate, fish, invertebrates, tributyltin compounds, ammonia (phys-chem) due to ‘pollution from towns, cities and transport’
- Hydrological regime, fish and invertebrates due to ‘changes to the natural flow levels of the water’
- Macrophytes and phytobenthos combined due to ‘non-native invasive species’

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Overall, this assessment concludes that, following further investigations, design development and implementation of any resultant targeted mitigation, this option does not lead to a WFD deterioration or an impediment to reaching future objectives and is therefore compliant under WFD.

Table 3.3: Beckton to Coppermills tunnel (treated) - Construction Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB106038077852	Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	Low/Low	1	No	No	No	Detailed review of all additional baseline ecological WFD data. Further investigation into impact on groundwater levels of dewatering for construction Further information about how the option will be constructed.	Return construction dewatering water to the ground (through recharge trenches) to help minimise the impact of construction, if required.	1	None

3.1.4 Transfer - Woodmansterne to Epsom - Resource Element

For this option one groundwater body was identified as requiring further assessment: Epsom North Downs Chalk. A summary of the Level 2 WFD assessment is included in Table 3.4 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified minor localised effects (impact score 1) on quantitative status elements (quantitative dependent surface water body status, quantitative GWDTE test and quantitative water balance) and chemical status elements (chemical dependent surface water body status, chemical GWDTE test and general chemical test). This is due to potential temporary changes in water quality from construction activities and groundwater level and water quality from construction dewatering. These temporary changes in water quality could have minor implications on biology. Mitigation is proposed in the form of discharging dewatering into nearby lakes and small feeder streams to help maintain flow during dewatering, and good construction practices.

The RNAG for the Epsom North Downs Chalk groundwater body relate to:

- Chemical drinking water protected areas and trend assessment due to ‘pollution from towns, cities and transport’ and ‘pollution from rural areas’
- Water balance due to ‘natural conditions’

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to confirm this assessment to confirm the extent of groundwater level changes due to construction dewatering and review the degree of groundwater dependency of the identified GWDTE. This investigation can also help to identify further mitigation measures, such as consideration of requirements to return water to the ground (through recharge trenches) to help minimise the impact of construction. Following these additional investigations, design development and implementation of any resultant targeted mitigation this assessment concludes no WFD deterioration risk.

Overall, this assessment concludes that this option does not lead to a WFD deterioration or an impediment to reaching future objectives and is therefore compliant under WFD.

Table 3.4: Transfer - Woodmansterne to Epsom - Resource Element Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB40601 G602200	Epsom North Downs Chalk	Low/Low	1	No	No	No	Review of the degree of groundwater dependency at Chipstead Downs (SSSI) Further investigation into impact on groundwater levels of dewatering for construction, may require additional groundwater monitoring to understand groundwater levels and how they interact with the scheme. Further information about option.	Use of clay bunds in pipeline route where groundwater potentially encountered to ensure pipeline does not become a preferential groundwater flow pathway. Return construction dewatering water to the ground (through recharge trenches) to help minimise the impact of construction, if required.	1	Chipstead Downs (SSSI) is classified as a GWDTE but the reason for this is unclear. There is no mention of groundwater in SSSI citation.

3.1.5 Groundwater Development - Ashton Keynes borehole pumps - Removal of Constraints to DO

For this option two groundwater bodies were identified as requiring further assessment: Upper Thames Gravels and Kemble Forest Marble groundwater bodies. For this option this abstraction is from the semi-confined Kemble Forest Marble, with the outcrop located approximately 100m to the northwest.

A summary of the Level 2 WFD assessment is included in Table 3.5 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment for Upper Thames Gravels groundwater body identified minor localised effects (impact score 1) on quantitative status elements (quantitative dependent surface water body status) and chemical status elements (chemical dependent surface water body status, chemical GWDTE test and general chemical test). This is due to potential temporary changes in water quality from construction activities and groundwater levels from construction dewatering. Mitigation is proposed in the form of discharging dewatering into watercourses to help maintain flow during dewatering, and good construction practices.

The RNAG for the Upper Thames Gravels groundwater body relate to:

- Chemical drinking water protected areas, general chemical test and trend assessment due to ‘pollution from rural areas’
- General chemical test due to ‘pollution from towns, cities and transport’

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to confirm this assessment and may include:

- Identification of any potential existing contaminated groundwater.
- Hydroecological assessment to consider the location of discharge of dewatering to help maintain flow (if water quality is not a concern).
- hydrogeological assessment to determine any connection between the underlying aquifer and the Upper Thames Gravels aquifer in this area. This investigation can also help to identify further mitigation measures, such as consideration of requirements to return water to the ground (through recharge trenches) to help minimise the impact of construction.

Following further investigations, design development and implementation of resultant targeted mitigation, it is anticipated that the WFD non-compliance risk can be reduced to minor localised (impact score 1). Therefore, for this waterbody, this option does not lead to a WFD deterioration or an impediment to reaching future objectives and is therefore compliant under WFD.

The Level 2 WFD assessment for Kemble Forest Marble identified a potential WFD deterioration risk (impact score 2) to the Kemble Forest Marble groundwater body for quantitative status elements (quantitative water balance). This is due to the increase in groundwater abstraction (in the confined aquifer) which may adversely impact the water balance at the aquifer outcrop (approximately 5km from abstraction location). Potential mitigation is proposed in the form of restricting abstraction to upstream use, scenario modelling and, if appropriate, licence capping through HOF restrictions.

The RNAG for the Kemble Forest Marble groundwater body relate to the trend assessment due to ‘pollution from rural areas’. This option will not affect this reason for not achieving good status

and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to better understand the risks to water body status and these assessments could include:

- hydrogeological assessment into the extent of impact on groundwater levels and therefore on water balance at the outcrop.
- Hydrogeological investigation to confirm that there is no connection between this confined aquifer and the Upper Thames Gravels aquifer in this area.

It should be noted that the Ashton Keynes abstraction is currently under a WINEP no deterioration assessment. Therefore, pending on the outcome of this investigation, a risk to the sustainability of this option remains. Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk will be removed. If further investigation does not confirm this then alternative sources of supply within our adaptive plan will be pursued.

Table 3.5: Groundwater Development - Ashton Keynes borehole pumps - Removal of Constraints to DO Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB40603 G000200	Upper Thames Gravels	Low/Low	1	No	No	No	Assessment of scale of water balance impacts. Further information about option.	Dewatering to be discharged to local watercourse to help maintain flow (if water quality not of concern).	1	Assumed no hydraulic connection with abstraction aquifer and only construction impacts will affect this groundwater body.
GB40602 G600500	Kemble Forest Marble	Low/Low	2	Possible	No	No	This source is currently under a WINEP WFD no deterioration assessment. Assessment of scale of water balance impacts. Hydrogeological assessment of deep confined aquifer to prove connection to the upper aquifer. Further information about option.	Potential to restrict abstraction to upstream use. If deemed appropriate, licence capping through HOF restrictions.	1	Assumes target aquifer for abstraction is deep and confined and that there is no connection with the surface water or upper aquifer.

3.1.6 TWRM extension – Hampton to Battersea - Construction

One river water body was identified as requiring further assessment: Beverley Brook (Motspur Park to Thames) and Pyl Brook at West Barnes. A summary of the Level 2 WFD assessment is included in Table 3.6 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified potential deterioration risks (impact score 2) on biology (fish, invertebrates and macrophytes and phytobenthos combined) and minor and localised effects on water quality (ammonia, dissolved oxygen, pH, phosphate and temperature). This is due to potential temporary reductions in surface water flow and water quality from below ground construction activity and dewatering, with potential implications on Wimbledon Common SSSI GWDTE, as the shaft is proposed within the site. Mitigation measures include use of diaphragm walls during construction and ensuring dewatering activity can be designed to return water to either the SSSI, river, or ground to minimise the impacts on the site, as well as good construction practices. The assessment also identified temporary impact to hydromorphological supporting elements and physico-chemical quality elements as a result of construction dewatering. Mitigation measures include best construction practices.

The RNAG for the Beverley Brook (Motspur Park to Thames) and Pyl Brook at West Barnes relate to:

- Fish and mitigation measures assessment due to ‘physical modifications’
- Fish, invertebrates, phosphate and macrophytes and phytobenthos due to ‘pollution from towns, cities and transport’ and ‘pollution from waste water’
- Fish, invertebrates, PBDE, cypermethrin and PFOS due to ‘no sector responsible/sector under investigation’

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to confirm this assessment and could include a hydrogeological investigation into the extent of groundwater level changes due to construction dewatering for the shaft on shallow groundwater, which could support Wimbledon Common SSSI GWDTE. Mitigation measures may include ensuring dewatering discharge is returned to either the ground (within the SSSI) or the river to minimise the impacts of groundwater level changes.

Following the further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that WFD non-compliance risk can be reduced to minor localised (impact score 1) and therefore this option would be WFD compliant.

Table 3.6: TWRM extension – Hampton to Battersea – Construction Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB106039022850	Beverley Brook (Motspur Park to Thames) and Pyl Brook at West Barnes	Low/Low	2	Possible	Possible	No	Hydrogeological assessment of the impacts of temporary construction dewatering on the GWDTE and the watercourses, and consideration of mitigation measures. Review of all baseline ecological WFD data to further understand the potential for impact on biology. Further information about construction of this option.	Use of diaphragm walls in shaft construction to minimise groundwater level changes. Return of construction dewatering to ground or surface watercourses to minimise impacts	1	Assumes source of water for extended ring main covered in resource option WFD assessment.

3.1.7 Kennet Valley to SWOX – 2.3Ml/d and 6.7Ml/d

For this water body, one river water body, Pang, and two groundwater bodies, Berkshire Downs Chalk and Chiltern Chalk Scarp, were identified as requiring further assessment. A summary of the Level 2 WFD assessment is included in Table 3.7 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment for the Pang river water body identified minor localised effects (impact score 1) on biology (fish and invertebrates) and hydromorphology (hydrological regime). These are due to temporary changes in flow regime and potential changes in groundwater level and water quality from construction dewatering. These minor temporary changes in water quality could have minor implications on biology. Mitigation is proposed in the form of discharging dewatering into Pang river to help maintain flow during dewatering, and good construction practice for river crossing.

The RNAGs for the Pang water body relate to:

- Hydrological regime due to ‘changes to the natural flow and levels of water’
- Dissolved oxygen due to ‘pollution from wastewater’
- Mercury and its compounds and PBDE with ‘no sector responsible’ (measures delivered to address reason, awaiting recovery)

Although this option will lead to possible temporary changes in hydrological regime, they are temporary short term impacts and are not anticipated to affect any of these reasons for not achieving good status. Therefore, this option will not impede reaching GEP or compromise water body objectives.

Further investigation will be undertaken at an appropriate time, in line with the date the option is required for the plan. This investigation is required to confirm this assessment and investigations could include hydrogeological assessment of the extent of groundwater level changes due to temporary construction dewatering. This investigation can also help identification of further mitigation measures, such as consideration of requirements to return water to the ground (through recharge trenches) to help minimise the impact of construction.

Following these additional investigations, design development and implementation of any resultant targeted mitigation, this assessment concludes no WFD deterioration risk in this water body.

The Level 2 WFD assessment for the two groundwater bodies, Berkshire Downs Chalk and Chiltern Chalk Scarp, identified minor localised effects (impact score 1) on quantitative status elements (quantitative dependent surface water body status, quantitative GWDTE test, and quantitative water balance). This is due to temporary changes to groundwater flow from construction dewatering. These temporary changes in flow could have minor implications on biology in overlying surface water bodies. Mitigation is proposed in the form of discharging dewatering into watercourses to help maintain flow during dewatering, and good construction practice.

The RNAG for the Berkshire Downs Chalk groundwater body relate to:

- Quantitative dependent surface water body status and quantitative water balance due to ‘changes in the natural flow and levels of water’
- General chemical test, chemical drinking water protected area and trend assessment due to ‘pollution from rural areas’
- Trend assessment due to ‘pollution from towns, cities and transport’

The RNAG for the Chiltern Chalk Scarp groundwater body relate to:

- Chemical dependent surface water body status and trend assessment due to ‘pollution from towns, cities and transport’
- Trend assessment and chemical drinking water protected area due to ‘pollution from rural areas’

This option will not affect any of these reasons for not achieving good status for either of these two groundwater bodies. Therefore, this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to confirm this assessment and investigations could include:

- hydrogeological assessment of the extent of groundwater level changes due to temporary construction dewatering.
- Identification of any potential existing contaminated groundwater and inclusion of appropriate temporary treatment of water prior to discharge, if required.
- Consideration to location of discharge of dewatering to help maintain groundwater levels and flow in watercourses (such as returning water to the ground through recharge trenches to help minimise the impact of construction).

Overall, this assessment concludes that, following further investigations, design development and implementation of any resultant targeted mitigation, this option does not lead to a WFD deterioration or an impediment to reaching future objectives and is therefore compliant under WFD.

Table 3.7: Kennet Valley to SWOX – 2.3Ml/d and 6.7Ml/d Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB106039023300	Pang	Low/Low	1	No	No	No	Further information about option.	Industry best practice for pollution prevention.	1	No
GB40601G600900	Berkshire Downs Chalk	Low/Low	1	No	No	No	Further information about option.	Industry best practice for pollution prevention.	1	Assume that watercourse crossing will not have any in-channel modifications and will be completed via directional drilling.
GB40601G604100	Chiltern Chalk Scarp	Low/Low	1	No	No	No	Further information about option.	Industry best practice for pollution prevention.	1	No

3.1.8 Oxford Canal to Duke's Cut (SWOX) - Construction

The WRSE screening assessment carried out for this option concluded that 50 additional water bodies should be scoped in for further assessment as a result of potential changes in water quality. These water bodies consist of the canal water bodies used in the transfer as well as river water bodies which have been included on a precautionary basis as they may be connected to the canal water bodies. It should be noted that the option will not lead to the introduction of additional connections but could potentially lead to changes in water quality in these water bodies that are already connected.

As part of WRMP24, further option investigation and assessment has been undertaken, establishing which of the 50 water bodies are at the most risk of deterioration following the implementation of this option. Due to a lack of water quality data and design information, a full Level 2 assessment has not been carried out for this option. However, a review of the potential for risk has been carried out to try and identify potential deterioration risks.

The source of water for this option is from existing Canal and River Trust (CRT) assets which already feed into the canals around Birmingham. Where the canal elevation decreases, it can be reasonably assumed that the water from these assets already enters these canals and therefore this option will not lead to any change in water quality in these canals. However, a high-level review of elevation changes along the option route identified that there is a topographic low point around Tamworth (east of Birmingham). Therefore, for the canal water bodies (and any connections to surface water bodies) after this point, this option will be pumping water against current flow (and therefore introducing new source of water to these waterbodies).

From the existing CRT assets downstream to Tamworth seven canal water bodies and one lake water body have been identified and are set out in Table 3.8 below. It is concluded that any changes in water quality in these water bodies as a result of this option would be minimal and no risk of WFD deterioration is anticipated. Associated with these eight water bodies, there are 12 surface water bodies which could potentially be connected to the canals, and these are also assessed to be at low risk of deterioration.

Table 3.8: WFD status of water bodies surrounding Tamworth low point

Water body ID	Water body name	Water body category	Overall status	Ecological status	Chemical status
GB30436523	Chasewater Reservoir	Lake	Moderate	Moderate	Fail
GB70410171	Birmingham to Wolverhampton Canal, Bradley Arm	Canal	Moderate	Good	Fail
GB70410212	Coventry and Ashby Canals	Canal	Moderate	Good	Fail
GB70410512	Birmingham to Wolverhampton Canal, Birmingham Level	Canal	Moderate	Good	Fail
GB70410514	Tame Valley Canal	Canal	Moderate	Good	Fail
GB70410515	Birmingham and Fazeley Canal upper section	Canal	Moderate	Good	Fail
GB70410516	Birmingham to Wolverhampton Canal, Wolverhampton Level	Canal	Moderate	Moderate	Fail
GB70410541	Wyreley and Essington, Daw End and Rushall Canals	Canal	Moderate	Good	Fail

To the south and east of Tamworth, this option will be introducing a new source of water to the canals and any surface water bodies connected to them. Water introduced to the Coventry & Ashby Canal, North Oxford Canal and Oxford Canal could have an impact on the status of the

encountered water bodies and any connected river water bodies. A review of these canal water bodies, and their WFD status has been carried out (see Table 3.9 below).

Table 3.9: WFD status of canal water bodies down-scheme

Water body ID	Water body name	Water body category	Overall status	Ecological status	Chemical status
GB70410212	Coventry & Ashby Canal	Canal	Moderate	Good	Fail
GB70910513	North Oxford Canal	Canal	Moderate	Good	Fail
GB70910511	Grand Union Canal, Braunston to Leamington Spa	Canal	Moderate	Good	Fail
GB70910196	Oxford Canal, summit pound	Canal	Moderate	Good	Fail
GB70610197	Oxford Canal, summit to Aynho	Canal	Moderate	Good	Fail
GB70610198	Oxford Canal, Aynho to Thrupp	Canal	Moderate	Good	Fail
GB70610542	Oxford Canal, Thrupp to Thames	Canal	Moderate	Moderate	Fail

An overview of the WFD data suggests that the water quality in these sections of the canal route is comparable in status to that of the water bodies assessed in Table 3.8. Although there is limited water quality data, more is being collected as part of this project, as appropriate to the timing of option selection within the plan. It is therefore currently considered that there is a low risk of deterioration of the water quality in the canal water bodies, although this is subject to the provision of further option information and a more in-depth water quality review. In addition, river water bodies were also assessed. Based on the above, it is assumed that any connected river water bodies would also be at low risk of deterioration in status following the implementation of this option, although this is subject to further analysis.

Proposed further studies will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations may include:

- water quality monitoring
- water quality analysis
- hydrological studies
- hydroecology investigations

On a precautionary basis, this assessment concludes that this option has potential to lead to a WFD deterioration and a potential impediment to reaching future objectives. Following further investigations, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk can be reduced to minor localised (impact score 1) and therefore this option would be WFD compliant.

3.1.9 Oxford Canal - Cropredy - Construction

Assessment was undertaken for this option at WRMP19. This assessment scoped in seven water bodies: two groundwater bodies and five river water bodies. Since then, a WRSE screening assessment concluded that 38 additional water bodies should be scoped in for further assessment as a result of potential changes in water quality. These water bodies consist of the canal water bodies used in the transfer as well as river water bodies which have been included on a precautionary basis, as they may be connected to the canal water bodies. It should be noted that the option will not lead to the introduction of additional connections but could potentially lead to changes in water quality in these water bodies that are already connected.

As part of WRMP24, further option investigation and assessment has been undertaken, establishing which of the additional scoped in 38 water bodies are at the most risk of deterioration following the implementation of this option. Due to a lack of water quality data and design information, a full Level 2 assessment has not been carried out for this option. However, a review of the potential for risk has been carried out to try and identify potential deterioration risks.

This option aims to transfer surplus from the Wolverhampton Level (Chasewater Reservoir and surrounding groundwater source) via the Coventry & Ashby and Oxford Canals to the River Cherwell. Where the canal elevation is falling, it can be reasonably assumed that the water from these assets is already entering these canals and therefore this option will not lead to any change in water quality in these canals. However, a high-level review of elevation changes along the option route identified that there is a topographic low point around Tamworth (east of Birmingham). Therefore, for the canal water bodies (and any connections to surface water bodies) after this point this option will be pumping water against current flow (and therefore introducing new source of water to these waterbodies).

From the Wolverhampton Level assets downstream to Tamworth, seven canal water bodies have been identified and are set out in Table 3.10 below. It is concluded that any changes in water quality in these water bodies as a result of this option would be minimal and no risk of WFD deterioration is anticipated. Associated with these eight water bodies, there are 12 surface water bodies which could potentially be connected to the canals, and these are also assessed to be at low risk of deterioration.

Table 3.10: WFD status of water bodies surrounding Tamworth low point

Water body ID	Water body name	Water body category	Overall status	Ecological status	Chemical status
GB70410171	Birmingham to Wolverhampton Canal, Bradley Arm	Canal	Moderate	Good	Fail
GB70410212	Coventry and Ashby Canals	Canal	Moderate	Good	Fail
GB70410512	Birmingham to Wolverhampton Canal, Birmingham Level	Canal	Moderate	Good	Fail
GB70410514	Tame Valley Canal	Canal	Moderate	Good	Fail
GB70410515	Birmingham and Fazeley Canal upper section	Canal	Moderate	Good	Fail
GB70410516	Birmingham to Wolverhampton Canal, Wolverhampton Level	Canal	Moderate	Moderate	Fail
GB70410541	Wyreley and Essington, Daw End and Rushall Canals	Canal	Moderate	Good	Fail

To the south and east of Tamworth, this option will be introducing a new source of water to the canals and any surface water bodies connected to them. Water introduced to the Coventry & Ashby Canal, North Oxford Canal and Oxford Canal could have an impact on the status of the encountered water bodies and any connected river water bodies. A review of these canal water bodies and their WFD status has been carried out (set out in Table 3.11 below).

Table 3.11: WFD status of canal water bodies down-scheme

Water body ID	Water body name	Water body category	Overall status	Ecological status	Chemical status
GB70410212	Coventry & Ashby Canal	Canal	Moderate	Good	Fail
GB70910513	North Oxford Canal	Canal	Moderate	Good	Fail

Water body ID	Water body name	Water body category	Overall status	Ecological status	Chemical status
GB70910511	Grand Union Canal, Braunston to Leamington Spa	Canal	Moderate	Good	Fail
GB70910196	Oxford Canal, summit pound	Canal	Moderate	Good	Fail
GB70610197	Oxford Canal, summit to Aynho	Canal	Moderate	Good	Fail

An overview of the WFD data suggests that the water quality in these sections of the canal route is comparable in status to that of the sections assessed in Table 3.10. Although there is limited water quality data, more is being collected as part of this project, as appropriate to option selection within the plan. It is therefore currently considered that there is a low risk of deterioration of the water quality in the canal water bodies, although this is subject to the provision of further option information and a more in-depth water quality review. In addition, river water bodies were also assessed. Based on the above, it is assumed that any connected river water bodies would also be at low risk of deterioration in status following the implementation of this option, although this is subject to further analysis.

Proposed further studies will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations may include:

- water quality monitoring
- water quality analysis
- hydrological studies
- hydroecology investigations

On a precautionary basis, this assessment concludes that this option has potential to lead to a WFD deterioration and a potential impediment to reaching future objectives. Following further investigations, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk can be reduced to minor localised (impact score 1) and therefore option would be WFD compliant.

3.1.10 Oxford Canal - Transfer from Duke's Cut to Farmoor

Two water bodies were identified as requiring further assessment: Thames (Leach to Evenlode) river water body and Oxford Canal, Thrupp to Thames canal water body. A summary of the Level 2 WFD assessment is included in Table 3.12 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment for Thames (Leach to Evenlode) water body identified potential deterioration (impact score 2) for water quality (ammonia, dissolved oxygen, pH, phosphate and temperature) and minor and localised effects (impact score 1) on biology (fish and invertebrates). These are due to changes in river flow and water quality resulting from the new discharge into the water body. A potential benefit to the hydrological regime due to an increase in flow downstream of the outfall has also been identified. Mitigation is proposed in the form of adjustment to the discharge conditions to minimise impact.

The RNAG for the Thames (Leach to Evenlode) river water body relate to:

- Fish due to ‘physical modifications’ and ‘non-native invasive species’
- Hydrological regime due to ‘changes to the natural flow and levels of water’
- Mitigation measures assessment due to ‘physical modifications’
- Phosphate due to ‘pollution from wastewater’ and ‘pollution from rural areas’
- PFOS with ‘sector under investigation’ and PBDE with ‘no sector responsible’

This assessment has highlighted the potential for this option to increase pressure on this river water body and therefore potential to impede gaining good status and future objectives for water quality, namely phosphate. The option may assist attainment of the water body objective for hydrological regime as the increase in flow velocity and volume could help to improve flow towards a more natural flow and level, but no other benefits have been identified.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to better understand the risks to water body status and these assessments could include:

- Water quality review. This could potentially lead to requirement for additional water quality monitoring to understand water quality baseline and how the option could affect it. This will allow appropriate mitigation to be included where possible.
- Review of baseline ecological WFD data. This could potentially to requirement for additional ecology monitoring to understand ecology baseline and how it could be affected by the option. This will allow appropriate mitigation to be included where possible.
- Further information on the construction and operation of the option.

Following further investigations, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk to this water body can be reduced to minor localised (impact score 1) and therefore, for this waterbody, this option would be WFD compliant.

The Level 2 WFD assessment for the Oxford Canal, Thrupp to Thames water body identified potential risk of deterioration (impact score 2) on mitigation measures assessment and minor localised impacts (impact score 1) on water quality (ammonia, pH and temperature). This is due to the proposed new abstraction from the canal water body which could significantly affect water levels and have potential implications on water quality. Mitigation is proposed in the form of adjustment to the abstraction conditions and fish and eel screening around intake structure.

The RNAG for this canal water body relate to:

- Mitigation measures assessment due to ‘physical modifications’
- PBDE with ‘sector under investigation’

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to better understand the risks to water body status and could include:

- Hydroecology study to understand changes in water level from new abstraction, including impacts on biology and water quality. This investigation could also help identification of further mitigation measures.
- Further information about how the option will be operated.

Following further investigations, design development and implementation of any targeted mitigation, it is anticipated that the WFD non-compliance risk to this water body can be reduced to minor localised (impact score 1) and therefore, for this waterbody, this option would be WFD compliant.

Table 3.12:Oxford Canal - Transfer from Duke's Cut to Farmoor Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB106039030333	Thames (Leach to Evenlode)	Low/Low	2	Possible	Possible	No	Water quality review to understand water quality changes from the discharge. Additional water quality monitoring may also be required. Review of baseline ecological WFD data to assess impacts on biology, particularly from changes in water quality. Additional ecology monitoring may also be required. Further information about how the option will be operated.	Adjustment of discharge conditions to minimise impact on biology, hydromorphology and water quality.	1	No
GB70610542	Oxford Canal, Thrupp to Thames	Low/Low	2	Possible	Possible	No	Hydroecology study to understand changes in water level from new abstraction, including impacts on biology and water quality. Further information about how the option will be operated.	Adjustment of abstraction conditions to minimise impact on biology and water quality. Fish/eel screens on intake structure	1	No

3.1.11 Managed Aquifer Recharge - Horton Kirby ASR

For this option one water body was identified as requiring further assessment: West Kent Darent and Cray Chalk groundwater body. A summary of the Level 2 WFD assessment is included in Table 3.13 detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified potential risk of WFD deterioration (impact score 2) to the quantitative water balance test status. This is a result of the requirement to increase abstraction during wetter periods, to supply water to be injected into the ASR borehole. At this stage it is anticipated that the water would come from the Bean Chalk groundwater source. This could lead to an effect on the water balance in the groundwater body (already at Poor status). Recommended next steps include scenario modelling. Mitigation may require restrictions or licence capping through use of HOF on the groundwater source, if deemed appropriate after further investigation.

It should be noted that currently a quarry is operational in this groundwater body. As a part of the quarrying activity, dewatering is underway which will cease when the quarrying activity ceases in the next few years. This dewatering abstraction is expected to exceed that of the abstraction licence requirement for this option. As the option will only be implemented once the quarry works cease, the additional abstraction of the option will likely be more than compensated for by the cessation of the quarry work abstraction. In addition, the environmental destination will include reductions in abstraction within this water body which will provide mitigation for this option by the time it is brought forward.

The RNAG for this chalk groundwater body relate to:

- Chemical drinking water protected area test status, general chemical test status and trend assessment due to ‘pollution from towns, cities and transport’ and ‘pollution from rural areas’
- Quantitative dependent surface water body status and quantitative water balance due to ‘changes in natural flow and levels of water’
- Chemical saline intrusion, quantitative saline intrusion and quantitative water balance with ‘no sector responsible’ (natural conditions and unknown reasons under investigation)

This option includes for additional abstraction from the existing Chalk borehole (during non-drought periods). The additional abstraction could lead to further ‘changes in natural flow and levels of water’ and to a reduction in improvements which could be made.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to better understand the risks to water body status taking into account the quarry activities and environmental destination changes. These investigations may include a hydrogeological study to establish if this option will negatively impact groundwater flow and levels, as well as associated surface water flow. This investigation can also help identification of further mitigation measures, such as licence restrictions on abstraction.

Following further investigations, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk to this water body can be reduced to minor localised (impact score 1) and therefore, for this waterbody, this option would be WFD compliant.

Table 3.13: Managed Aquifer Recharge - Horton Kirby ASR Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB40601 G501800	West Kent Darent and Cray Chalk	Low/Low	2	Possible	Possible	No	Hydrogeological assessment of the impacts of increased groundwater abstraction on water balance and flows to surface water courses. Review of all baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Further information about option, including details on abstraction conditions.	Suggested mitigation include restricting upstream use, augmentation/ compensation flow in surface watercourses and licence capping through use of HOF restrictions for abstraction from Chalk to recharge ASR, if deemed appropriate after further investigation.	1	No

3.1.12 Groundwater Development - Datchet Existing Source DO Increase

For this option one water body was identified as requiring further assessment: Maidenhead Chalk groundwater body. A summary of the Level 2 WFD assessment is included in Table 3.14; detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified a potential risk of WFD deterioration (impact score 2) to the quantitative status elements (quantitative dependent surface water and water balance status). This is due to the increased abstraction within licence conditions but outside recent actuals, lowering groundwater levels and potentially reducing baseflow to the local surface watercourses.

The RNAG for the Maidenhead Chalk groundwater body relate to trend assessment due to ‘pollution from wastewater’, ‘pollution from rural areas’ and ‘pollution from towns, cities and transport’. This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GES or compromise water body objectives.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to better understand the risks to water body status. This option includes for installation of observation boreholes and the requirement for a low flow study to understand the implications of the abstraction. Further information on how the option will be operated (abstraction conditions) will also be required. These investigations would help in the identification of further mitigation measures, if required.

Following further investigations, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk to this water body can be reduced to minor localised (impact score 1) and therefore, for this waterbody, this option would be WFD compliant.

Table 3.14: Groundwater Development - Datchet Existing Source DO Increase Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB40601 G602600	Maidenhead Chalk	Low/Low	2	Possible	Possible	No	Option includes the installation of observation boreholes and a low flow investigation to understand the implications of the abstraction. Further information about option, including details on abstraction conditions.	Mitigation could include restricting to upstream use, augmentation/ compensation flow in surface watercourses and licence capping through use of HOF restrictions, if deemed appropriate after further investigation.	1	If necessary, consider alternate ways to maintain surface water flow/improve river water quality (river restoration etc.), if deemed necessary.

3.1.13 Groundwater Development - Southfleet & Greenhithe

For this option two water bodies were identified as requiring further assessment: North Kent Medway Chalk and West Kent Darent and Cray Chalk groundwater bodies.

A summary of the Level 2 WFD assessment is included in Table 3.15; detailed outputs are presented in Annex B.

The Level 2 WFD assessment for both groundwater bodies identified potential risks of WFD deterioration (impact score 2) on quantitative status elements (quantitative dependent surface water and quantitative water balance status). These are due to the increased abstraction from the two sources lowering groundwater levels and potentially reducing baseflow in the local surface watercourse (Ebbsfleet).

It should be noted that currently a quarry is operational in proximity to the proposed option. As a part of the quarrying activity, dewatering is underway which will cease when the quarrying activity ceases in the next few years. This dewatering abstraction is expected to exceed that of the disaggregated abstraction licence. As the option will only be implemented once the quarry works cease, the additional abstraction of the option will likely be more than compensated for by the cessation of the quarry work abstraction. It is therefore considered unlikely to be detrimental to the nearby water body (Ebbsfleet). In addition, the environmental destination will include reductions in abstraction within this water body which may provide mitigation for this option by the time it is brought forward.

The RNAG for both the North Kent Medway Chalk and the West Kent Darent and Cray Chalk groundwater body relate to:

- Chemical drinking water protected area test status, general chemical test status and trend assessment due to ‘pollution from towns, cities and transport’
- Chemical drinking water protected area test status, general chemical test status and trend assessment due to ‘pollution from rural areas’
- Quantitative dependent surface water body status and quantitative water balance due to ‘changes in natural flow and levels of water’ and ‘natural conditions’

This option includes an increase in groundwater abstraction which will affect groundwater levels in both water bodies. The additional abstraction could lead to further ‘changes in natural flow and levels of water’, potentially impeding future attainment of good status and objectives.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to confirm this assessment and could include:

- Hydrogeological assessment of the impacts of increased groundwater abstraction on water balance and flows to surface water courses, taking into account the likely changes in abstraction at the quarry and any abstraction reductions in these waterbodies due to the environmental destination.
- Further details on the option, including details on scheme operation

Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk will be reduced to minor (impact score 1) and, therefore, this option would be WFD compliant. If further investigation does not confirm this then alternative sources of supply within the adaptive plan will be pursued.

Table 3.15: Groundwater Development - Southfleet & Greenhithe Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ Confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB40601 G500300	North Kent Medway Chalk	Low/Low	2	Possible	Possible	No	Hydrogeological assessment of the impacts of increased groundwater abstraction on water balance and flows to surface water courses, making use of existing pumping test data and historical abstraction records, where appropriate. Further information about option, including details on abstraction conditions.	Mitigation measures include scenario modelling, restricting upstream use, augmentation/ compensation flow in surface watercourses and licence capping through use of HOF restrictions, if deemed appropriate after further investigation.	1	Seek alternative ways to maintain flow/ improve river water quality (river restoration etc.) of surface water bodies, if deemed necessary.
GB40601 G501800	West Kent Darent and Cray Chalk	Low/Low	2	Possible	Possible	No	Hydrogeological assessment of the impacts of increased groundwater abstraction on water balance and flows to surface water courses, making use of existing pumping test data and historical abstraction records, where appropriate. Further information about option, including details on abstraction conditions.	Recommended next steps and mitigation measures include scenario modelling, restricting upstream use, augmentation/ compensation flow in surface watercourses and licence capping through use of HOF restrictions, if deemed appropriate after further investigation.	1	Seek alternate ways to maintain flow/ improve river water quality (river restoration etc.) of surface water bodies, if deemed necessary.

3.1.14 Groundwater Development - Addington

For this option one water body was identified as requiring further assessment: Epsom North Downs Chalk groundwater body. A summary of the Level 2 WFD assessment is included in Table 3.16; detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified potential risks of WFD deterioration (impact score 2) on the water balance status. This is due to the increased abstraction lowering groundwater levels and reducing flow within the aquifer.

The RNAG for the Epsom North Downs Chalk groundwater body relate to:

- Trend assessment and chemical drinking water protected area status due to ‘pollution from towns, cities and transport’ and ‘pollution from rural areas’
- Quantitative water balance with ‘no sector responsible’ (natural conditions)

This option includes an increase in groundwater abstraction which will affect groundwater levels. The additional abstraction could lead to further changes in ‘natural conditions’ and impede future attainment of good status and objectives of the quantitative water balance test. At present the water body is at poor water balance status due to natural conditions; investigations would be required to prove that this minor increase in abstraction does not further deteriorate the water body water balance.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to better understand the risk for this water body and may include:

- Hydrogeological assessment of the impacts of increased groundwater abstraction on water balance and flows to surface water courses, taking into account the abstraction reductions in this waterbody due to the environmental destination.
- Monitoring requirements needed at the pre- application stage to address potential water quality concerns.
- Further information about option, including details on abstraction conditions.

Part of the Environmental Destination will include reductions in abstraction within this water body, but these will not be in place by the time this option is brought forward in the plan. This is a risk to the sustainability of this option.

Following further investigation, design development and implementation of an resultant targeted mitigation, it is anticipated that the WFD non-compliance risk will be reduced to minor (impact score 1) and, therefore, this option would be WFD compliant. If further investigation does not confirm this then alternative options within the adaptive plan will be pursued.

Table 3.16: Groundwater Development - Addington Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB40601 G602200	Epsom North Downs Chalk	Low/Low	2	Possible	Possible	No	Hydrogeological assessment of the potential implications on groundwater balance and flow in Epsom North Downs Chalk as a result of increased groundwater abstraction. Monitoring requirements needed at the pre-application stage to address potential water quality concerns. Further information about option, including details on abstraction conditions.	-	1	None

3.1.15 Groundwater Development - Woods Farm Existing Source Increase DO

For this option two water bodies were identified as requiring further assessment: Berkshire Downs Chalk groundwater body and Thames Wallingford to Caversham river water body. A summary of the Level 2 WFD assessment is included in Table 3.17; detailed outputs are presented in Annex B.

The Level 2 WFD assessment for Berkshire Downs Chalk has identified a potential risk of WFD deterioration (impact score 2) to quantitative dependent surface water body status. This is due to the increase in abstraction lowering groundwater levels and therefore potentially reducing baseflow to the local surface watercourses.

The RNAG for the Berkshire Downs Chalk groundwater body relate to:

- Trend assessment due to 'pollution from towns, cities and transport'
- Chemical drinking water protected area, general chemical test and trend assessment due to 'pollution from rural areas'
- Quantitative dependent surface water body status due to 'changes in natural flow and levels of water'

As discussed above this option includes an increase in groundwater abstraction (within licence but outside of recent actual) which will affect groundwater levels. The additional abstraction could lead to further 'changes in natural flow and levels of water' and impede future attainment of good status and objectives of the quantitative dependent surface water body test.

The Level 2 WFD assessment for Thames Wallingford to Caversham water body identified minor localised risks to biological and hydromorphological supporting elements. This is due to potential surface water implications of increased groundwater abstraction in the underlying groundwater body.

The RNAG for the Thames Wallingford to Caversham river water body relate to:

- Mitigation measures assessment due to physical modifications
- PFOS, benzo(b)fluoranthene and benzo(g-h-i)perylene where the reason is under investigation
- PBDE and mercury and its compounds, with 'no sector responsible' (measures delivered to address reason, awaiting recovery)
- Phosphate due to pollution from wastewater and pollution from rural areas

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to better understand the risks of this option and could include:

- a hydrogeological assessment to understand the implications of increased groundwater abstraction on river flow for both water bodies, taking into account any abstraction reductions from the Environmental Destination. It should also be noted that this option has been included in AMP8 of the WINEP, where it will likely be further developed through subsequent feasibility investigations.
- The potential for upstream use will be investigated to ensure its sustainability. If upstream use is confirmed as feasible, this restriction would be added to the licence. Since this water would then be returned into this watercourse (from the upstream STW), there would be no net reduction in flow, removing the potential for deterioration of the surface water body. For

the Berkshire Downs Chalk groundwater body, a review of the network to document the upstream use of the water as part of the AMP8 WINEP investigation is proposed.

Further option assessment is being carried out as part of the AMP8 WINEP investigation, which is expected to identify whether this option is sustainable. Following further investigations, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk can be reduced to minor localised (impact score 1) and therefore this option would be WFD compliant.

Table 3.17: Groundwater Development - Woods Farm Existing Source Increase DO Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score
GB10603 9030331	Thames Wallingford to Caversham	Low/Low	1	Possible	Uncertain	No	Hydrogeological assessment to understand the implications of increased abstraction on river flow. Review the network to document the upstream water use as part of the AMP8 WINEP investigation.	Add licence condition for upstream use.	1
GB40601 G60090	Berkshire Downs Chalk	Low/Low	2	No	Possible	No	Hydrogeological assessment to understand the implications of increased abstraction on river flow. Review the network to document the upstream water use as part of the AMP8 WINEP investigation. Further information about option, including details on abstraction conditions.	Add licence condition for upstream use. Alternative mitigation measures could include augmentation/ compensation flow in surface watercourses and licence capping through use of HOF restrictions, if deemed appropriate after further investigation.	1

3.1.16 Transfer - SEW to Guildford - Conveyance Element

For this option three water bodies were identified as requiring further assessment: Farnborough Bagshot Beds groundwater body, Chobham Bagshot Beds groundwater body and Basingstoke Canal water body. A summary of the Level 2 WFD assessment is included in Table 3.18; detailed outputs are presented in Annex B.

The Level 2 WFD assessment for the Basingstoke Canal identified potential deterioration (impact score 2) in water quality (ammonia, dissolved oxygen, pH, phosphate and temperature) due to potential temporary construction impacts from below ground works on the canal, which is also an SSSI and GWDTE. Mitigation measures include potential temporary treatment of water before discharge to the canal to maintain water levels.

The RNAG for the Basingstoke Canal water body relate to:

- Mitigation measures assessment due to ‘physical modifications’
- PBDE due to ‘no sector responsible’

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigation will be undertaken at an appropriate time, in line with the date the option is required for the plan. This investigation is required to understand the risk of potential water quality changes due to the impact of below ground works on this water body. This investigation can also help identification of further mitigation measures through hydroecological and other studies.

Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk will be reduced to minor (impact score 1) and, therefore for this waterbody, this option would be expected to be WFD compliant.

The Level 2 WFD assessment for the groundwater bodies (Farnborough Bagshot Beds, Chobham Bagshot Beds) identified minor localised impacts from below ground construction activities. Mitigation measures include using dewatering from construction to support water level in the canal. To reduce pressure on the groundwater bodies, it is recommended that clay stanks are used in the pipeline route where groundwater could potentially be encountered (these are small bunds inside the pipeline excavation to help prevent groundwater flowing along the excavation). It is also recommended that any shafts or significant below ground excavations are sealed preventing significant groundwater egress after construction.

Farnborough Bagshot Beds is currently at good status and therefore has no RNAG, whereas Chobham Bagshot Beds has one RNAG on the trend assessment element due to pollution from rural areas. This option is not anticipated to impact on the potential to achieve no trend status, as it does not directly contribute any additional pollution to this water body. This option will not affect this reason for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigation will be undertaken at an appropriate time, in line with the date the option is required for the plan. This investigation is required to confirm this assessment and may include a water quality assessment to investigate the potential water quality changes due to the impact of below ground works on this water body. This investigation can also help identification of further mitigation measures through hydrogeological and other studies.

Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk will be minor (impact score 1) and, therefore for these waterbodies, this option is considered WFD compliant.

Table 3.18: Transfer - SEW to Guildford - Conveyance Element Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromise of water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score
GB70610 019	Basingstoke Canal	Low/Low	2	Possible	Possible	No	Detailed review of all additional baseline ecological WFD data and consider requirement for additional data collection. Further information about how the option will be operated.	Dewatering for the construction to be discharged into the canal to help maintain flow/water level. Treatment of water before discharge to canal if required	1
GB40602 G601300	Farnborough Bagshot Beds	Low/Low	1	No	No	No	Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme. Hydrological assessment of the impacts of temporary abstraction on flow in the watercourses and GWDTE. Further information about option.	Use of clay stanks in pipeline route where groundwater potentially encountered Dewatering discharge to groundwater or surface water to help maintain flows. Shafts to be sealed to ensure minimal groundwater egress after construction.	1
GB40602 G601400	Chobham Bagshot Beds	Low/Low	1	No	No	No	Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme. Hydrological assessment of the impacts of temporary abstraction on flow in the watercourses and GWDTE. Further information about option.	Use of clay stanks in pipeline route where groundwater potentially encountered Dewatering discharge to groundwater or surface water to help maintain flows. Shafts to be sealed to ensure minimal	1

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromise of water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score
								groundwater egress after construction.	

3.1.17 Transfer - SEW to Guildford - Conveyance Element

For this option two water bodies were identified as requiring further assessment: Thames Wallingford to Caversham river water body and Berkshire Downs Chalk groundwater body. A summary of the Level 2 WFD assessment is included in Table 3.19; detailed outputs are presented in Annex B.

The Level 2 WFD assessment for Thames Wallingford to Caversham identified minor localised effects (impact score 1) on biology (invertebrates), hydromorphology (hydrological regime) and water quality (ammonia, dissolved oxygen, pH, phosphate and temperature). This is due to potential reductions in surface water flow from the increased groundwater abstraction in the underlying groundwater body.

The RNAG for the Thames Wallingford to Caversham river water body relate to:

- Mitigation measures assessment due to ‘physical modifications’
- Phosphate due to ‘pollution from wastewater’ and ‘pollution from rural areas’
- Mercury and its compounds, PBDE, PFOS, benzo(b)fluoranthene and benzo(g-h-i)perylene due to ‘no sector responsible/sector under investigation’

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives for the Thames Wallingford to Caversham river water body.

The Level 2 WFD assessment for Berkshire Downs Chalk groundwater body identified a risk of deterioration (impact score 2) to the quantitative surface water body status element. This is due to potential reductions in surface water flow caused by increased groundwater abstraction.

The RNAG for the Berkshire Downs Chalk groundwater body relate to:

- Trend assessment due to ‘pollution from towns, cities and transport’
- Chemical drinking water protected area, general chemical test and trend assessment due to ‘pollution from rural areas’
- Quantitative dependent surface water body status and quantitative water balance status due to ‘changes in natural flow and levels of water’

This assessment has highlighted the potential for this option to increase pressures on the quantitative dependent surface water body status and quantitative water balance status due to the increased abstraction and associated changes in flow in the nearby River Thames. Therefore, this option it has the potential to impede gaining good status and future objectives for these two elements.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to better understand the risks to the status of both water bodies and will include hydroecology investigation into the impact of changes in abstraction on surface water flows. It is noted that the environmental destination scenarios include closure of Bradfield and licence reduction at Pangbourne (reducing abstraction by 1.64Ml/d by 2030 and a further 5Ml/d by 2035 respectively) in this water body and this will be taken into account in these investigations.

The potential for upstream use will also be investigated to ensure the sustainability of this option. If upstream use is confirmed as feasible, this restriction would be added to the licence. Since this water would then be returned into this watercourse (from upstream STW), there would be no net reduction in flow, removing the potential for deterioration of the surface water body. Provided this mitigation is in place, the option is assessed to be compliant under WFD.

Table 3.19: Transfer - SEW to Guildford - Conveyance Element Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB106039030331	Thames Wallingford to Caversham	Low/Low	1	Possible	Uncertain	No	Review the network to document the upstream water use and further understand return of water upstream via STWs.	Industry best practice for pollution prevention. Add licence condition for upstream use.	1	No
GB40601G600900	Berkshire Downs Chalk	Low/Low	2	Possible	Possible	No	Further investigation into impact of abstraction on water balance of aquifer and flow in River Thames. Review the network to document the upstream water use and further understand return of water upstream via STWs. Further information about option, including details on abstraction conditions.	Industry best practice for pollution prevention.	1	Assume that watercourse crossing will not have any in-channel modifications and will be completed via directional drilling.

3.1.18 Transfer from WTW in Abingdon to SWA - 48Ml/d and 72Ml/d

For these options five water bodies have been identified as requiring further assessment: Filchhampstead Brook at Farmoor, Bayswater Brook, Northfield Brook (Source to Thames) at Sandford and Thame (Scotsgrove Brook to Thames) river water bodies, and Headington Corallian groundwater body. A summary of the Level 2 WFD assessment is included in Table 3.21; detailed outputs are presented in Annex B.

The Level 2 WFD assessments for the four river water bodies identified minor and localised effects (impact score 1) on the biological quality elements, hydrological supporting elements and physico-chemical quality elements. This is primarily due to potential temporary dewatering during construction of below ground structures. Minor localised effects (impact score 1) were also identified for groundwater body quantitative surface water dependent status elements and quantitative GWDTE status elements due to temporary construction impacts.

The RNAG for these water bodies are summarised below. Due to the nature of the works, this option is not anticipated to impede achieving good status or compromise water body objectives for any of these RNAG (Table 3.20).

Table 3.20: RNAG for the five water bodies under investigation

Water body	Filchhampstead Brook at Farmoor	Bayswater Brook	Northfield Brook (Source to Thames) at Sandford	Thame (Scotsgrove Brook to Thames)	Headington Corallian
Phosphate	Pollution from rural areas Pollution from towns, cities and transport	-	Pollution from wastewater	Pollution from wastewater Pollution from rural areas Suspect data	-
Macrophytes and Phytobenthos combined	Physical modifications Pollution from rural areas Pollution from towns, cities and transport	Physical modifications	Pollution from wastewater	-	-
Fish	Physical modifications	-	-	-	-
Invertebrates	Physical modifications		Physical modifications Pollution from wastewater Invasive non-native species Natural drought	-	-
Dissolved oxygen	Natural drought	-	Pollution from wastewater	-	-
PFOS	Unknown (pending investigation)		-	-	-
PBDE	Measures delivered to address reason, awaiting recovery		-	-	-
Mercury and its compounds	-	Measures delivered to address reason, awaiting recovery	-	-	-
Ammonia (Phys-chem)	-	-	Pollution from wastewater	-	-

Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk will be minor (impact score 1) and, therefore this option would be WFD compliant.

Table 3.21: Transfer from WTW in Abingdon to SWA - 48Ml/d and 72Ml/d Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ Confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB10603 9030210	Filchhampstead Brook at Farmoor	Low/Low	1	No	No	No	On-going refinement of the design. Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA.	Any dewatering needed for the construction will be discharged to the river to help maintain flow, if necessary. Construction methods to minimise need for dewatering in the shallow aquifer (such as diaphragm walls or secant piling).	1	No
GB10603 9029780	Bayswater Brook	Low/Low	1	No	No	No	On-going refinement of the design. Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA.	Any dewatering needed for the construction will be discharged to the river to help maintain flow if necessary. Construction methods to minimise need for dewatering in the shallow aquifer (such as diaphragm walls or secant piling).	1	No

Water body ID	Water body name	Confidence in WFD data/ Confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB10603 9030180	Northfield Brook (Source to Thames) at Sandford	Low/Low	1	No	No	No	On-going refinement of the design. Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA.	Any dewatering needed for the construction will be discharged to the river to help maintain flow if necessary. Construction methods to minimise need for dewatering in the shallow aquifer (such as diaphragm walls or secant piling).	1	No
GB10603 9030240	Thame (Scotsgrove Brook to Thames)	Low/Low	1	No	No	No	On-going refinement of the design. Request for further specific details of mitigation measures assessment and RBMP measures (including A/HWMB measures where relevant) from EA.	Any dewatering needed for the construction will be discharged to the river to help maintain flow if necessary. Construction methods to minimise need for dewatering in the shallow aquifer (such as diaphragm walls or secant piling).	1	No
GB40602 G600700	Headington Corallian	Low/Low	1	No	No	No	On-going refinement of the design. Request for further specific details of mitigation measures assessment and RBMP measures	Any dewatering needed for the construction will be discharged to the river to help maintain flow if necessary.	1	No

Water body ID	Water body name	Confidence in WFD data/ Confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
							(including A/HWMB measures where relevant) from EA.	Construction methods to minimise need for dewatering in the shallow aquifer (such as diaphragm walls or secant piling).		

3.1.19 River Thames to Fobney transfer

For this option two water bodies were identified as requiring further assessment: Thames Wallingford to Caversham river water body and Berkshire Downs Chalk groundwater body. A summary of the Level 2 WFD assessment is included in Table 3.22 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment for Thames Wallingford to Caversham water body identified potential risk of deterioration (impact score 2) for biology (invertebrates) and hydromorphology (hydrological regime and mitigation measures assessment). This is due to the increased surface water abstraction. Mitigation measures include fish and eel screening at intake on the River Thames and setting abstraction conditions in order to minimise changes to hydrological regime. In addition to this, provision for de-chlorination of pipeline water when draining down the pipeline before discharge to the watercourse could also be considered.

The RNAG for the Thames Wallingford to Caversham river water body relate to:

- Mitigation measures assessment due to ‘physical modifications’
- Phosphate due to ‘pollution from wastewater’ and ‘pollution from rural areas’
- Mercury and its compounds, PBDE, PFOS, benzo(b)fluoranthene and benzo(g-h-i)perylene due to ‘no sector responsible’ (sector under investigation, measures delivered to address reason, awaiting recovery)

This assessment has highlighted the potential for this option to increase pressures mitigation measures due to the new modifications (new intake structure) and reduce improvements which could be made. Therefore, this option it has the potential to impede gaining good status and future objectives for this status element.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to better understand the impacts of this option and could include modelling the impact of flow changes on habitats, sedimentation, water balance and water quality as a result of new abstraction. These investigations can also help identification of further mitigation measures.

Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk will be reduced to minor (impact score 1) and, therefore for this waterbody, this option would be expected to be WFD compliant.

The Level 2 WFD assessment for Berkshire Downs Chalk groundwater body identified minor temporary effects (impact score 1) on quantitative status elements (quantitative surface water dependent status and quantitative water balance) and chemical status elements (chemical dependent surface water body status, chemical drinking water protected area, chemical GWDTE test and general chemical test) due to construction of below ground works. Mitigation is proposed in the form of discharging dewatering into nearby watercourses to help maintain flow during dewatering, and good construction practice.

The RNAG for the Berkshire Downs Chalk groundwater body relate to:

- Trend assessment due to ‘pollution from towns, cities and transport’
- Chemical drinking water protected area, general chemical test and trend assessment due to ‘pollution from rural areas’
- Quantitative dependent surface water body status and quantitative water balance status due to ‘changes in natural flow and levels of water’

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives in the Berkshire Downs Chalk groundwater body.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to confirm this assessment and may include:

- investigation into the potential for groundwater level changes due to construction dewatering
- additional groundwater monitoring to understand groundwater levels and how they interact with the scheme as a result of new below ground structures. This investigation can also help identification of further mitigation measures, such as consideration of requirements to return water to the ground (through recharge trenches) to help minimise the impact of construction.

Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk will remain as minor (impact score 1) and, therefore for this waterbody, this option is assessed to be WFD compliant.

Table 3.22: River Thames to Fobney Transfer Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score
GB106039 030331	Thames Wallingford to Caversham	Low/Low	2	Possible	Possible	No	Detailed hydrological assessment of the impacts of 40Ml/d abstraction from watercourse on flow, hydromorphology and water quality/ concentration of key physico-chemical parameters. Detailed review of all baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Further information about option, including details on abstraction conditions (HOF etc.).	Fish and eel screening applied at intake from River Thames. Abstraction conditions to be set in order to minimise changes to hydrological regime. Any dewatering needed for the construction will be discharged to the river to help maintain flow. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	1
GB40601 G600900	Berkshire Downs Chalk	Low/Low	1	No	Possible	No	Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme. Further information about option.	Use of clay stanks in pipeline route where groundwater potentially encountered. Shafts to be sealed to ensure minimal groundwater egress after construction. Dewatering to be discharged to local watercourse to help maintain flow – after assessment of impact on watercourse flow and water quality.	1

3.1.20 Abingdon Reservoir to Farmoor reservoir pipeline

For this option one river water body was identified as requiring further assessment: Thames (Evenlode to Thame) water body. A summary of the Level 2 WFD assessment is included in Table 3.23 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified a potential risk of deterioration (impact score 2) on biology (fish and invertebrates) and hydromorphology (hydrological regime and morphology). This is due to the increased surface water abstraction, intake structure and new discharge from the WTW.

The RNAG for this Thames (Evenlode to Thame) body relate to:

- Tributyltin compounds and phosphate for ‘pollution from wastewater’
- Phosphate due to ‘pollution from rural areas’
- Invertebrates, mercury and its compounds, PBDE) and PFOS due to ‘no sector responsible
- Invertebrates due to non-native invasive species

A minor risk of a reduction in improvements which could be made is highlighted for invertebrates due to option activities potentially worsening existing issues, but this is not anticipated to be significant at a waterbody scale. Therefore, this option is not anticipated to impede reaching GES or compromise water body objectives.

This option will be used in conjunction with the SESRO option, and the additional abstraction is likely to only occur during wetter periods or when river flow support is provided by the SESRO (see Section 3.2.3 for SESRO WFD assessment). Mitigation measures will also include fish and eel screening at new intake.

Further investigation will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations will be undertaken to confirm this assessment and could include modelling of the impact of flow changes on habitats, sedimentation and biology as a result of new abstraction when considered in combination with SESRO. This investigation can also help identification of further mitigation measures through hydrological and other studies.

Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk will be reduced to minor (impact score 1) when considered in tandem with SESRO and, therefore this option would be WFD compliant.

Table 3.23: Abingdon Reservoir to Farmoor Reservoir Pipeline Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation scoring
GB106039 030334	Thames (Evenlode to Thame)	Low/Low	2	Possible	Possible	No	Detailed hydrological assessment of the impacts of abstractions on water quality/ concentration of key physicochemical parameters in combination with the appropriate SRO (SESRO). Assumption that the impacts of transfers from SESRO (such as water quality and INNS) will be covered under the corresponding WFD assessments. Further information about option.	Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse. Fish and eel screening at new intake. This option will be used in conjunction with other SRO (SESRO) and additional abstraction is likely to only occur during wetter periods or when river flow support is provided by the SESRO SRO	1

3.1.21 Groundwater Development - Merton Recommissioning

One groundwater body was identified as requiring further assessment: Epsom North Downs Chalk. For this option this abstraction is from the confined Chalk and the water body identified here is the outcrop located approximately 5.5km to the south. A summary of the Level 2 WFD assessment is included in Table 3.24 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified a potential risk of deterioration (impact score 2) to quantitative status elements (quantitative water balance) due to the potential for the recommencement of abstraction at the Merton source (within licence but above recent actual abstraction) to impact on water balance and levels at the waterbody outcrop, as well as use of below ground construction activity. Mitigation measures include licence capping, if deemed appropriate, as well as sealing shafts associated with below ground construction.

The RNAG for the Epsom North Downs Chalk relate to:

- Chemical drinking water protected area and trend assessment due to ‘agriculture and rural land management’, ‘industry’ and ‘water industry’ point and diffuse sources
- Quantitative water balance due to ‘natural conditions’

Although the quantitative water balance is currently at poor status due to natural conditions, this assessment has highlighted the potential for this option to increase pressure on the water balance if an impact does extend to the outcrop and therefore potential to impede gaining good status for the water body.

Further investigation will be undertaken at an appropriate time, in line with the date the option is required for the plan. This investigation is required to better understand the risks to the status of the water body and could include hydrogeological assessment of the impact of the abstraction on groundwater levels and flow at the waterbody outcrop. This investigation can also help identification of further mitigation measures.

Overall, the Level 2 assessment concludes that this option has potential to lead to a WFD deterioration and a potential impediment to reaching future objectives. Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk will be reduced to minor (impact score 1) and, therefore this option would be expected to be WFD compliant.

Table 3.24: Groundwater Development - Merton Recommissioning Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB40601 G602200	Epsom North Downs Chalk	Low/Low	2	Possible	No	No	Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme. Further investigation into impact on groundwater levels of dewatering for construction and consideration of requirement to return water to the ground (through recharge trenches) to help minimise the impact of construction, if required. Further information about option.	Shafts to be sealed to ensure minimal groundwater egress after construction.	1	None

3.1.22 Groundwater Development - Confined Chalk North London

One river water body and one groundwater body was identified as requiring further assessment: Lower Brent and Mid-Chilterns Chalk. A summary of the Level 2 WFD assessment is included in Table 3.25 and detailed outputs are presented in Annex B. The scheme involves an abstraction from confined chalk which is not in connection with any of the surface water bodies or GWDTE. As such, impact to the Lower Brent river water body is limited to impacts during construction. No impacts are identified as a result of groundwater abstraction from the confined aquifer.

The Level 2 WFD assessment identified minor and localised effects (impact score 1) on hydromorphology (hydrological regime). This is due to potential reductions in surface water flow due to temporary construction dewatering activity associated with new below ground structures. Mitigation is proposed in the form of discharging construction dewatering into nearby watercourses to help maintain flow during dewatering, and good construction practice.

The RNAG for the Lower Brent relate to:

- Ammonia (phys-chem), macrophytes and phytobenthos, phosphate and dissolved oxygen due to ‘pollution from waste water’
- Ammonia (phys-chem), macrophytes and phytobenthos, phosphate, dissolved oxygen, invertebrates and tributyltin compounds due to ‘pollution from towns, cities and transport’
- Mitigation measures assessment, fish and invertebrates due to ‘physical modifications’
- PBDE and benzo(g-h-i)perylene due to ‘no sector responsible/sector under investigation’

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigation will be undertaken at an appropriate time, in line with the date the option is required for the plan. This investigation is required to confirm this assessment, including assessment of the impact of dewatering on groundwater levels and therefore surface water flows. This investigation can also help identification of further mitigation measures, if deemed necessary.

Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD non-compliance risk will remain as minor temporary (impact score 1) and, therefore this option is WFD compliant.

Table 3.25:Groundwater Development - Confined Chalk North London Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB106039023590	Lower Brent	Low/Low	1	No	No	No	Further calculations into dewatering requirements for shaft construction for crossing.	Discharging dewatering into nearby lakes and small feeder streams to help maintain flow.	1	No

3.1.23 TWRM extension - Coppermills to Honor Oak - Construction

One river water body was identified as requiring further assessment: Lee (Tottenham Locks to Bow Locks/Three Mills Locks). A summary of the Level 2 WFD assessment is included in Table 3.26 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified a potential risk of deterioration (impact score 2) to biology. This is due to potential reductions in surface water flow and water quality which support a nearby GWDTE in Walthamstow Marshes SSSI. Mitigation measures include returning dewatering discharge to the SSSI, river or ground to minimise the impacts on the site.

The RNAG for the Lee (Tottenham Locks to Bow Locks/Three Mills Locks) water body relate to:

- Ammonia (phys-chem), dissolved oxygen, fish, invertebrates, macrophytes and phytobenthos and phosphate due to ‘pollution from wastewater’
- Ammonia (phys-chem), dissolved oxygen, fish, invertebrates, macrophytes and phytobenthos, phosphate, fluoranthene and tributyltin compounds due to ‘pollution from towns, cities and transport’
- Dissolved oxygen, fish, invertebrates, macrophytes and phytobenthos and mitigation measures assessment due to ‘physical modifications’
- Macrophytes and phytobenthos due to ‘non-native invasive species’
- Fish, hydrological regime and invertebrates due to ‘changes to the natural flow and levels of water’
- PFOS, fluoranthene, tributyltin compounds and PBDE with ‘no sector responsible/sector under investigation’ (measures delivered to address reason, awaiting recovery)

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigation will be undertaken at an appropriate time, in line with the date the option is required for the plan. This investigation is required to confirm this assessment and will include assessment of the impact of construction dewatering for the shaft at Coppermills on shallow groundwater which could support Walthamstow Marshes GWDTE. This investigation can also help identification of further mitigation measures, such as consideration of requirements to return water to the ground (through recharge trenches) to help minimise the impact of construction.

Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD compliance risk will remain as minor temporary (impact score 1) and, therefore this option is WFD compliant.

Table 3.26: TWRM extension - Coppermills to Honor Oak - Construction Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB10603 8077852	Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	Low/Medium	2	Possible	Possible	No	Hydrogeological assessment of the impacts of construction dewatering on groundwater levels at the GWDTE and local watercourse.	Return construction dewatering to ground, SSSI site or river	1	Assumes source of water for extended ring main covered in resource option WFD assessment.

3.1.24 Crossness Desalination

This option was assessed at WRMP19 and this assessment has been reviewed for rdWRMP24. For this option one water body was assessed: Thames Middle transitional water body. The WRMP19 assessment identified minor impacts associated with the scheme which were considered unlikely to lead to changes in the status of any WFD elements.

As part of WRMP24, further option investigation and assessment has been undertaken, establishing any changes in the risk of deterioration following the implementation of this option. This review assessed whether any changes in the option or the changes of baseline between RBMP Cycle 2 and RBMP Cycle 3 data affect the outcome of the assessment.

This review concluded that there is potential for option activities to lead to changes in water quality, which could in turn present a risk of deterioration for the Thames Estuary and Marshes Special Protection Area (SPA) (and Ramsar). The Habitat Regulations Assessment (HRA) considers the implications of the works on the marine protected areas and has concluded that this option will not have likely significant effects on this protected site. Further details can be found in HRA of this rdWRMP24.

Following further investigation, design development and implementation of targeted mitigation, it is anticipated that the WFD compliance risk will reduce to minor localised (impact score 1) and, therefore this option is anticipated to be WFD compliant.

3.1.25 Managed Aquifer Recharge - Addington

This option was assessed at WRMP19 and this assessment has been reviewed for rdWRMP24. For this option two groundwater bodies were assessed: Epsom North Downs Chalk and Kent Greensand Western. The WRMP19 assessment identified minor impacts associated with the scheme, which were considered unlikely to lead to changes in the status of any WFD elements.

As part of WRMP24, further option investigation and assessment has been undertaken, establishing any changes in the risk of deterioration following the implementation of this option. This review assessed whether any changes in the option or the changes of baseline between RBMP Cycle 2 and RBMP Cycle 3 data affect the outcome of the assessment.

This review determined that no change to the conclusions of the WRMP19 is necessary. The impacts on the Epsom North Downs Chalk and Kent Greensand Western groundwater bodies due to this option remain minor and localised. No further assessment is required. Overall, the Level 2 assessment concludes that this option does not lead to a WFD deterioration or an impediment to reaching future objectives and is therefore compliant under WFD.

3.1.26 Groundwater Development - Honor Oak

This option was assessed at WRMP19 and this assessment has been reviewed for rdWRMP24. For this option one river water body was assessed: Ravensbourne (Catford to Deptford). The WRMP19 assessment identified minor impacts associated with the scheme, which were considered unlikely to lead to changes in the status of any WFD elements, provided further investigation was undertaken.

As part of WRMP24, further option investigation and assessment has been undertaken, establishing any changes in the risk of deterioration following the implementation of this option. This review assessed whether any changes in the option or the changes of baseline between RBMP Cycle 2 and RBMP Cycle 3 data affect the outcome of the assessment.

This review determined that no change to the conclusions of the WRMP19 is necessary. The small increase in abstraction associated with this option is unlikely to have adverse impacts on flows in the Ravensbourne River, assuming that there is only limited connectivity between the

confined chalk (where water will be abstracted) and the Greenwich Tertiaries water body. The connectivity between these aquifers will be confirmed by further investigation. Following further investigation, design development and implementation of targeted mitigation, it is anticipated that the WFD compliance risk will remain as minor temporary (impact score 1) and, therefore this option is WFD compliant.

3.1.27 Managed Aquifer Recharge - Merton (SLARS3) Construction

This option was assessed at WRMP19 and this assessment has been reviewed for rdWRMP24. For this option one river water body was assessed: Thames (Egham to Teddington). The WRMP19 assessment identified minor impacts associated with the scheme which were considered unlikely to lead to changes in the status of any WFD elements.

As part of WRMP24, further option investigation and assessment has been undertaken, establishing any changes in the risk of deterioration following the implementation of this option. This review assessed whether any changes in the option or the changes of baseline between RBMP Cycle 2 and RBMP Cycle 3 data affect the outcome of the assessment.

This review determined that no change to the conclusions of the WRMP19 is necessary. The impact on the Thames (Egham to Teddington) water body due to this option is minor and localised. No further assessment is required. Following design development and implementation of targeted mitigation, it is anticipated that the WFD compliance risk will remain as minor temporary (impact score 1) and, therefore this option is WFD compliant.

3.1.28 New Medmenham Surface Water WTW

For this option one groundwater body was identified as requiring further assessment: South-West Chilterns Chalk. A summary of the Level 2 WFD assessment is included in Table 3.27 and detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified minor localised effects (impact score 1) to quantitative status elements (quantitative dependent surface water body status, quantitative GWDTE test and quantitative water balance) and chemical status elements (chemical dependent surface water body status, chemical drinking water protected area, chemical GWDTE test, general chemical test). This is due to the installation of a pipeline crossing and other below ground works within 500m of a GWDTE. Mitigation includes any dewatering discharge to be used to support surface water flow or to be put back to ground in order to minimise impact of dewatering during construction.

The RNAG for both water bodies relate to:

- Quantitative dependent surface water body status due to ‘physical modifications
- Quantitative dependent surface water body status and quantitative water balance due to ‘changes to the natural flow and levels of water’.

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigation will be undertaken at an appropriate time, in line with the date the option is required for the plan. This investigation will be carried out to confirm this assessment, including assessment of the groundwater level changes due to construction dewatering and potential implications on the GWDTE and on local watercourses. This investigation can also help identification of further mitigation measures, such as consideration of requirements to return water to the ground (through recharge trenches) to help minimise the impact of construction.

Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD compliance risk will remain as minor temporary (impact score 1) and, therefore this option is WFD compliant.

Table 3.27: New Medmenham Surface Water WTW Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB40601 G601100	South-West Chilterns Chalk	Low/Low	1	No	No	No	Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme. Further investigation into impact on groundwater levels of dewatering for construction and consideration of requirement to return water to the ground (through recharge trenches) to help minimise the impact of construction, if required. Further information about option.	Further investigation into impact on groundwater levels of dewatering for construction and consideration of requirement to return water to the ground (through recharge trenches) to help minimise the impact of construction, if required. Use of clay stanks in pipeline route where groundwater potentially encountered. Where possible, ensure shafts for horizontal directional drilling (HDD) launch and reception are located outside/further from the SSSI. Shafts to be sealed to ensure minimal groundwater egress after construction.	1	None

3.1.29 Henley to SWA Transfer 2.4Ml/d and 5Ml/d

For this option two groundwater bodies were identified as requiring further assessment: Maidenhead Chalk and South-West Chilterns Chalk.

A summary of the Level 2 WFD assessment is included in Table 3.28 detailed outputs are presented in Annex B.

The Level 2 WFD assessment identified a temporary, minor localised effect (impact score 1) to quantitative status elements (quantitative dependent surface water body status and quantitative water balance) for both groundwater bodies. This is due to the installation of a pipeline crossing within 500m of a GWDTE. Mitigation includes any dewatering discharge to be used to support surface water or put back to ground in order to minimise impact of dewatering during construction.

The RNAG for both water bodies relate to:

- Trend assessment due to ‘pollution from waste water’, ‘pollution from rural areas’ and ‘pollution from towns, cities and transport’
- Quantitative dependent surface water body status due to ‘physical modifications
- Quantitative dependent surface water body status and quantitative water balance due to ‘changes to the natural flow and levels of water’

This option will not affect any of these reasons for not achieving good status and therefore this option is not anticipated to impede reaching GEP or compromise water body objectives.

Further investigation will be undertaken at an appropriate time, in line with the date the option is required for the plan. This investigation will be carried out to confirm this assessment, including assessment of the groundwater level changes due to construction dewatering. This investigation can also help identification of further mitigation measures, such as consideration of requirements to return water to the ground (through recharge trenches) to help minimise the impact of construction.

Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD compliance risk will remain as minor temporary (impact score 1) and, therefore this option is WFD compliant.

Table 3.28: Henley to SWA Transfer 2.4Ml/d and 5Ml/d Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data / confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB40601 G602600	Maidenhead Chalk	Low/Low	1	No	No	No	Further design information on major crossings. Dewatering design for shafts.	Dewatering discharge to surface water or groundwater to minimise impact of dewatering during construction.	1	No
GB40601 G601100	South-West Chilterns Chalk	Low/Low	1	No	No	No	Further design information on major crossings. Dewatering design for shafts.	Dewatering discharge to surface water or groundwater to minimise impact of dewatering during construction.	1	No

3.1.30 New Medmenham Surface Water Intake - 53 Ml/d

This option was assessed in WRMP19 and this assessment has been reviewed for rdWRMP24. For this option one water body was assessed: Thames (Reading to Cookham) river water body. The WRMP19 assessment identified minor impacts associated with the scheme which were considered unlikely to lead to changes in the status of any WFD elements.

As part of WRMP24, further option investigation and assessment has been undertaken. This review has not identified any change in the risk of deterioration following the implementation of this option, or any changes in the assessment from the changes from RBMP Cycle 2 to RBMP Cycle 3 data.

This review concludes (factoring in change to RBMP Cycle 3) that no change to the outcomes of the WRMP19 is necessary. This option remains WFD compliant with only minor and localised impacts. No further assessment is required at this time.

3.2 Summary of SRO WFD ACWG Level 2 outputs

All of the SROs have had a WFD assessment completed as part of the individual SRO projects. A summary of the WFD Level 2 assessment for each SRO is provided in this section of the report. WFD Level 1 summaries are provided in Section 2.2.

3.2.1 Thames to Southern Transfer (T2ST) SRO – Option B

The T2ST SRO Option B WFD Level 1 assessment identified eight water bodies as requiring further (Level 2) assessment[16]: Thames (Evenlode to Thame), Lambourn (Source to Newbury), Middle Kennet (Hungerford to Newbury), Test (Upper), Test (Bourne Rivulet to conf Dever) and Dever surface water bodies and Berkshire Downs Chalk and River Test Chalk groundwater bodies.

A summary of the Level 2 WFD assessment is included in Table 3.29. Detailed outputs are presented in Annex B.

The Level 2 WFD assessment for the Thames (Evenlode to Thame) water body identified negligible impact of abstraction from the river during high flow periods. Modelling also showed that there would be negligible impact on water quality in the reservoir and in the River Thames as a result of the support of the T2ST scheme.

For five river water bodies: Lambourn (Source to Newbury), Middle Kennet (Hungerford to Newbury), Test (Upper), Test (Bourne Rivulet to conf Dever) and Dever, the Level 2 assessment identified minor localised effects on groundwater levels and water quality due to construction of watercourse crossings, road crossings and crossings of the flood plains. The construction of below-ground structures and associated dewatering as a result of shafts, pipejacking and micro-tunnelling activities involved in rail, road and river crossings may also reduce groundwater levels, with potential negative impacts on biology.

For the Berkshire Downs Chalk and River Test Chalk groundwater bodies, the Level 2 WFD assessment identified potential risk of deterioration due to the proximity of construction to GWDTEs, which could impact on groundwater levels and biology within the GWDTEs. Minor localised impacts were identified for the Thatcham Tertiaries groundwater body due to risks posed for drinking water protected areas, as the scheme crosses several source protection zones (SPZs) for public water supply.

[16] Mott MacDonald (2022) Thames to Southern Transfer Water Framework Directive Regulations Compliance Assessment Report. Accessed 7th August 2023 from https://www.southernwater.co.uk/media/7738/t2st-gate-2-annex-b3-water-framework-directive-assessment.pdf

Suggested mitigation includes fish and eel screening at the new intake, adjustment of abstraction conditions to minimise changes to the hydrological regime, supporting river flow with water abstracted for dewatering purposes, provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourses.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to confirm this assessment including understanding the potential for groundwater level changes due to construction. This investigation can also help identification of further mitigation measures required, such as consideration of requirements to return water to the ground (through recharge trenches) to help minimise the impact of construction.

The option design is being progressed and this WFD assessment will continue to be updated throughout the RAPID gated process. At this plan level, following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD compliance risk will remain as minor localised (impact score 1) and, therefore this option is expected to be WFD compliant.

Table 3.29: Thames to Southern Transfer (T2ST) SRO – Option B Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB106039030334	Thames (Evenlode to Thame)	Low/Medium	0	No	No	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Further information about how much additional abstraction will be required for the T2ST scheme.	Fish and eel screening at new intake. Minimisation of changes to hydrological regime through adjustment of abstraction conditions. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	0	Assumed major river crossings will be carried out using pipejack or micro tunnel crossings. Assumes clay stanks will be used in pipeline route where potential for interaction with groundwater. Assumes dewatering discharge to groundwater or surface water to help maintain flows.
GB106039023220	Lambourn (Source to Newbury)	Low/Medium	1	No	No	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Detailed hydrological assessment of the impacts of abstraction on flow in the watercourses. Further information	Any dewatering needed for the construction will be discharged to the river to help maintain flow. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	1	Assumed major river crossings will be carried out using pipejack or micro tunnel crossings. Assumes clay stanks will be used in pipeline route where potential for interaction with groundwater. Assumes dewatering

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
							about option crossing of the River Lambourn.			discharge to groundwater or surface water to help maintain flows
GB106039023174	Middle Kennet (Hungerford to Newbury)	Low/Medium	1	No	No	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Detailed hydroecological assessment of the impacts of temporary abstraction for dewatering on flow in the watercourses. Further information about option crossing of the River Lambourn.	Any dewatering needed for the construction will be discharged to the river to help maintain flow. If shafts needed for river crossing these should be located outside of the SSSI/Special Area of Conservation (SAC). Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	1	Assumed major river crossings will be carried out using HDD or pipejacking. Clay stanks (clay bunds constructed within the pipeline trench) to be used in pipeline route where groundwater potentially encountered, to ensure pipeline route does not become a preferential flow path for groundwater. Assumes dewatering discharge to groundwater or surface water to help maintain flows.

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB107042022700	Test - Bourne Rivulet to conf Dever	Low/Medium	1	No	No	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Detailed hydrological assessment of the impacts of abstraction on flow in the watercourses. Further information about option crossing of the River Test and potential implications on SSSIs.	Ensure below ground shaft for river crossing is outside the SSSI boundary. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	1	Assumed major river crossings will be carried out using pipejack or micro tunnel crossings. Assumes clay stanks will be used in pipeline route where potential for interaction with groundwater. Assumes dewatering discharge to groundwater or surface water to help maintain flows.
GB107042022770	Dever	Low/Medium	1	No	No	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Detailed hydrological assessment of the impacts of abstraction on flow in the watercourses. Further information about option crossing of the River Dever and	Place shafts for pipejack or micro tunnel crossings outside of SSSIs. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	1	Assumed major river crossings will be carried out using pipejack or micro tunnel crossings. Assumes clay stanks will be used in pipeline route where potential for interaction with groundwater. Assumes dewatering discharge to groundwater or

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
							potential implications on SSSI.			surface water to help maintain flows.
GB40601 G600900	Berkshire Downs Chalk	Low/Medium	1	No	No	No	Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme. Detailed hydrological assessment of the impacts of abstraction on flow in the watercourses. Further information about option impacts on SSSI sites.	Dewatering discharge to surface water courses to maintain flow. Use of clay stanks in pipeline route where groundwater potentially encountered. Shafts to be sealed to ensure minimal groundwater egress after construction. Dewatering to be discharged to local watercourse to help maintain flow.	1	No
GB40701 G501200	River Test Chalk	Low/Medium	2	Uncertain	No	No	Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme. Investigation in potential contaminated land which could be	Further investigation into impact on groundwater levels of dewatering for construction and consideration of requirement to return water to the ground (through recharge trenches) to help minimise the	1	No

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
							affected by dewatering for river, road or railway crossings. Detailed hydrological assessment of the impacts of abstraction on flow in the watercourses. Further information about option impacts on SSSIs.	impact of construction, if required. Use of clay stanks in pipeline route where groundwater potentially encountered. If possible, shafts for river crossings should be moved outside of SSSIs. Shafts to be sealed to ensure minimal groundwater egress after construction.		

3.2.2 Thames to Southern Transfer (T2ST) SRO – Option C

The T2ST SRO Option B WFD Level 1 assessment identified eight water bodies as requiring further assessment[16]: Thames (Evenlode to Thame) river water body, Lambourn (Source to Newbury), Middle Kennet (Hungerford to Newbury), Test (Bourne Rivulet to conf Dever) and Dever surface water bodies, and Berkshire Downs Chalk and River Test Chalk groundwater bodies.

A summary of the Level 2 WFD assessment is included in Table 3.30. Detailed outputs are presented in Annex B.

The Level 2 WFD assessment for the Thames (Evenlode to Thame) water body identified negligible impact of abstraction from the river during high flow periods. Modelling also showed that there would be negligible impact on water quality in the reservoir and in the River Thames as a result of the support of the T2ST scheme.

For five river water bodies (Lambourn (Source to Newbury), Middle Kennet (Hungerford to Newbury), Test (Upper), Test (Bourne Rivulet to conf Dever) and Dever), the Level 2 assessment identified minor localised effects on groundwater levels and water quality due to construction of watercourse crossings, road crossings and crossings of the flood plains. The construction of below-ground structures and associated dewatering, which come as a result of shafts, pipejacking and micro tunnelling activities involved in rail, road and river crossings, may also reduce groundwater levels, with potential negative impacts on biology.

For the Berkshire Downs Chalk and River Test Chalk groundwater bodies the Level 2 WFD assessment identified potential risk of deterioration due to the proximity of construction to GWDTEs, which could impact groundwater levels and the biology of the GWDTEs.

Suggested mitigation includes fish and eel screening at the new intake, adjustment of abstraction conditions to minimise changes to the hydrological regime, supporting river flow with water abstracted for dewatering purposes, provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourses.

Further investigations will be undertaken at an appropriate time, in line with the date the option is required for the plan. These investigations are required to confirm this assessment including understanding the potential for groundwater level changes due to construction. This investigation can also help identification of further mitigation measures required, such as consideration of requirements to return water to the ground (through recharge trenches) to help minimise the impact of construction.

The option design is being progressed and this WFD assessment will continue to be updated throughout the RAPID gated process. At this plan level, following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD compliance risk will remain as minor localised (impact score 1) and, therefore this option is expected to be WFD compliant.

Table 3.30: Thames to Southern Transfer (T2ST) SRO - Option C Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB106039030334	Thames (Evenlode to Thame)	Low/Medium	0	No	No	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Further information about how much additional abstraction will be required for the T2ST scheme.	Fish and eel screening at new intake. Minimisation of changes to hydrological regime through adjustment of abstraction conditions. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	0	Assumed major river crossings will be carried out using pipejack or micro tunnel crossings. Assumes clay stanks will be used in pipeline route where potential for interaction with groundwater. Assumes dewatering discharge to groundwater or surface water to help maintain flows.
GB106039023220	Lambourn (Source to Newbury)	Low/Medium	1	No	No	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Detailed hydrological assessment of the impacts of abstraction on flow in the watercourses.	Any dewatering needed for the construction will be discharged to the river to help maintain flow. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	1	Assumed major river crossings will be carried out using pipejack or micro tunnel crossings. Assumes clay stanks will be used in pipeline route

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
							Further information about option crossing of the River Lambourn.			where potential for interaction with groundwater. Assumes dewatering discharge to groundwater or surface water to help maintain flows
GB106039023174	Middle Kennet (Hungerford to Newbury)	Low/Medium	1	No	No	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Detailed hydroecological assessment of the impacts of temporary abstraction for dewatering on flow in the watercourses. Further information about option crossing of the River Lambourn.	Any dewatering needed for the construction will be discharged to the river to help maintain flow. If shafts needed for river crossing, these should be located outside of the SSSI/SAC. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	1	Assumed major river crossings will be carried out using HDD or pipejacking. Clay stanks (clay bunds constructed within the pipeline trench) to be used in pipeline route where groundwater potentially encountered, to ensure pipeline route does not become a preferential

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
										flow path for groundwater. Assumes dewatering discharge to groundwater or surface water to help maintain flows.
GB107042022710	Test, Upper	Low/Medium	1	No	No	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Detailed hydrological assessment of the impacts of abstraction on flow in the watercourses. Further information about option crossing of the River Test and potential implications on SSSIs.	If shafts needed for river crossing, these should be located outside of the SSSI boundary, where possible. Assumes crossing of river will be by pipejack or micro tunnel crossings. Provision for dichlorination of pipeline water when draining down pipeline before discharge to watercourse.	1	Assumed major river crossings will be carried out using pipejack or micro tunnel crossings. Assumes clay stanks will be used in pipeline route where potential for interaction with groundwater. Assumes dewatering discharge to groundwater or surface water to help maintain flows.

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
GB107042022700	Test - Bourne Rivulet to conf Dever	Low/Medium	1	No	No	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Detailed hydrological assessment of the impacts of abstraction on flow in the watercourses. Further information about option crossing of the River Test and potential implications for SSSIs.	Ensure below ground shaft for river crossing is outside the SSSI boundary. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	1	Assumed major river crossings will be carried out using pipejack or micro tunnel crossings. Assumes clay stanks will be used in pipeline route where potential for interaction with groundwater. Assumes dewatering discharge to groundwater or surface water to help maintain flows.
GB107042022770	Dever	Low/Medium	1	No	No	No	Detailed review of all additional baseline ecological WFD data, including results of any surveys already undertaken for this scheme. Detailed hydrological assessment of the impacts of abstraction on flow in the watercourses. Further information about option	Place shafts for pipejack or micro tunnel crossings outside of the SSSI areas. Provision for de-chlorination of pipeline water when draining down pipeline before discharge to watercourse.	1	Assumed major river crossings will be carried out using pipejack or micro tunnel crossings. Assumes clay stanks will be used in pipeline route where potential for

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
							crossing of the River Dever and potential implications for SSSI.			interaction with groundwater. Assumes dewatering discharge to groundwater or surface water to help maintain flows.
GB40601G600900	Berkshire Downs Chalk	Low/Medium	1	No	No	No	Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme. Detailed hydrological assessment of the impacts of abstraction on flow in the watercourses. Further information about option impacts on SSSIs.	Dewatering discharge to surface water courses to maintain flow. Use of clay stanks in pipeline route where groundwater potentially encountered. Shafts to be sealed to ensure minimal groundwater egress after construction. Dewatering to be discharged to local watercourse to help maintain flow.	1	None
GB40701G501200	River Test Chalk	Low/Medium	2	Uncertain	No	No	Additional groundwater monitoring to understand groundwater levels and how they interact with the scheme Investigation in potential contaminated land which could be affected by dewatering for river, road or railway crossings. Detailed hydrological assessment of the impacts of abstraction on flow in the	Further investigation into impact on groundwater levels of dewatering for construction and consideration of requirement to return water to the ground (through recharge trenches) to help minimise the impact of construction, if required. Use of clay stanks in pipeline route where groundwater potentially encountered.	1	None

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Further comments
							watercourses. Further information about option impacts on SSSIs.	If possible, shafts for river crossings should be moved outside of the SSSIs. Shafts to be sealed to ensure minimal groundwater egress after construction.		

3.2.3 South East Strategic Reservoir Option (SESRO) SRO

This option is one of the SROs. These have been assessed under the individual SRO project[17], but a summary of the WFD assessment is provided in this report for completeness.

A summary of the Level 2 WFD assessment is included in Table 3.31; detailed outputs are presented in Annex B.

The SESRO WFD ACWG Level 1 assessments undertaken in the Gate 2 process have identified those water bodies that need to be screened into future assessment phases of work on SESRO. Five water bodies were screened in for further assessment; these are:

- Childrey Brook and Norbrook at Common Barn – GB106039023380
- Sandford Brook (source to Ock) – GB106039023410
- Cow Common Brook and Portobello Ditch – GB106039023360
- Ock and tributaries (Land Brook confluence to Thames) – GB106039023430
- Thames (Evenlode to Thames) – GB106039030334

The following WFD water bodies were screened out of the WFD ACWG Level 2 assessment, however, until further assessments into the hydrological impacts on the River Thames are completed, they cannot be fully discounted and so will be assessed again at Gate 3:

- Thames Wallingford to Caversham - GB106039030331
- Thames (Reading to Cookham) - GB106039023233
- Thames (Cookham to Egham) - GB106039023231
- Thames (Egham to Teddington) - GB106039023232

The ACWG Level 2 assessment concluded that proposed mitigation should include future modelling in terms of water quality, channel morphology and flow regime, as well as baseline assessments for hydrological, geomorphological, water quality and aquatic ecology surveys. Assuming these mitigations are implemented, all River Ock and River Thames WFD water bodies are compliant and therefore should not require WFD derogations.

Details of further environmental mitigation that will be completed in later stages of the project will help to confirm these assessments and give more detail on the level of impact. This is especially the case in relation to change of volumes of flow and water quality from the diverted watercourses within the River Ock catchment, and their possible effects on the Cow Common Brook and Portobello Ditch, Childrey Brook and Norbrook at Common Barn, and Ock and tributaries (Land Brook confluence to Thames) WFD water bodies.

Whilst current modelling suggests some reduction in flows and water quality in the Childrey Brook (change in ammonia and orthophosphate are both less than 10% with no change in predicted WFD class), other water quality benefits were observed in the Cow Common Brook and River Ock. Further hydrodynamic and water quality modelling is proposed in subsequent project stages for the River Ock to explore this.

The current assessment suggests that there will be benefits to aquatic communities as a result of improvements to aquatic habitats. There could also be a reduction in flows as a result of a change in flow routing and impingement of catchments by the reservoir. This may also locally change water quality, but this is subject to further modelling and assessment work.

[17] Atkins (2022) South East Strategic Reservoir Option Water Framework Directive Regulations Compliance Assessment report. Accessed 7th August 2023 at: https://www.thameswater.co.uk/media-library/home/about-us/regulation/regional-water-resources/south-east-strategic-reservoir/gate-2-reports/B-5---SESRO-WFD-Assessment.pdf

The SRO report sets out mitigation which is required in order to reduce the impacts on these water bodies. Following the mitigation proposed, the impact on all water bodies is reduced to ensure compliance with WFD.

The option design is being progressed and this WFD assessment will continue to be updated throughout the RAPID gated process.

Table 3.31: South East Strategic Reservoir Option (SESRO) SRO Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB106039023430	Ock and tributaries (Land Brook confluence to Thames)	Low/Low	2	Hydrological/ hydrogeological, water quality and aquatic ecology assessments to quantify impact of scheme footprint	Clear span bridge over the river and the realignment of a reach of the River Ock.	0	No	No	No	No
GB106039023360	Cow Common Brook and Portobello Ditch	Low/Low	3	-	Divert the Cow Common Brook around the footprint of the reservoir, improving the hydro-morphological, ecological and water quality of the newly created channels. This should compensate for the direct loss of channel length and habitat.	1	Possible	Possible	Possible	No
GB106039023380	Childrey Brook and Norbrook at Common Barn	Low/Low	2	Hydrological/ hydrogeological, water quality and aquatic ecology assessments to quantify effect of changing flows in part of the catchment (East Hanney Ditch).	Realign and improve the hydro-morphological, ecological and water quality of East Hanney Ditch as well as creating additional wetland habitat. This should compensate for channels affected by the reservoir footprint	1	Possible	Possible	Possible	No
GB106039023410	Sandford Brook (source to Ock)	Low/Low	2	-Further hydrodynamic and water quality modelling is proposed in subsequent project stages for the River Ock to explore this further.	Clear span bridge over the river and the realignment of a reach of the River Ock. Embedded mitigation in future stages of the	1	No	No	No	No

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
					design, ensuring that the culverts have a natural bed and are sized for ecological, hydrological and morphological reasons, rather than just hydraulic ones.					
GB106039030334	Thames (Evenlode to Thame)	Low/Low	2	More work is required to assess the interaction with weir level management and the opportunity to optimise velocity and level with navigation and environmental requirements. Assessment of changes in flow and level and potential for benefits/impacts during low flows as it could reduce the vulnerability of habitats to low flow conditions.	-	1	Possible	No	No	No

3.2.4 River Severn to River Thames Transfer (STT) SRO

The STT SRO WFD Level 1 assessment identified that all 22 water bodies would require a WFD Level 2 assessment[18].

A summary of the Level 2 WFD assessment is included in Table 3.32. Detailed outputs are presented in Annex B.

There is potential for the scheme to introduce impediments to achieving target status in four water bodies in the River Avon, from Stoneleigh to the confluence with the River Severn reach. The impediments are associated with the 115Ml/d advanced treated effluent transfer from Minworth WwTW. The water bodies in this reach at risk of status deterioration and impediments are:

- Avon (Warks) - conf R Sowe to conf R Leam – GB109054043840
- Avon (Wark) conf R Leam to Tramway Br, Stratford – GB109054044402
- Avon-Tramway Br Stratford to Workman Br Evesham – GB109054044401
- Avon conf Workman Br, Evesham to conf R Severn – GB109054044403

The STT SRO WFD[18] assessment states that in line with the evidence and assessment reports, there is potential for non-compliance related to specific pollutants/chemical status (Objective 2 introducing impediments). The risk of non-compliance is associated with the 115Ml/d advanced treated effluent transfer during the Full STT scenario where the Minworth Transfer is part of the support system. This potential non-compliance is a risk to future permitting requirements and will be subject to continued assessment. This assessment will consider the effect of further developed operating rules and treatment solutions as part of the consenting process.

There is potential for introducing impediments to target status in one water body in the River Severn from the confluence with the River Avon to Deerhurst. The impediments are associated with the pass forward effects from the 115Ml/d Minworth Transfer during the Full STT. The water body at risk of non-compliance in these reaches is Severn – conf R Avon to conf Upper Parting – GB109054044404.

The SRO WFD assessment states that, in line with the evidence and assessment reports, non-compliance is associated with specific pollutants/chemical status. The effects on the River Severn reaches upstream of the River Avon confluence (River Severn from the Vyrnwy Bypass Outfall to Bewdley, and the River Severn from Bewdley to the confluence with the River Avon), along with tidal reaches, are deemed to be WFD compliant. In these reaches, there is no pathway of environmental water quality change, and potential changes in velocity and depth are not considered to be of a magnitude to result in impacts on aquatic ecology or morphology. In the c.140km of the River Thames from Culham to the tidal limit at Teddington, modelled water quality predicts a small benefit to dissolved oxygen saturation, and a small benefit to PFOS and the polyaromatic hydrocarbon benzo(g-h-i)perylene. However, any betterment from the STT Solution would not lead to Environmental Quality Standards (EQS) being achieved in the River Thames for these chemicals. Phosphorus is predicted to increase during the scheme operation by around 0.05mg/l (from a baseline of 0.12mg/l – 0.35mg/l) at Culham downstream of the STT interconnector outfall, with a lower rate of increase downstream. Downstream of Culham, the River Thames is modelled to increase pressure on phosphorus concentrations, and the Rivers Pang and Kennet are modelled to reduce pressure.

[18] United Utilities on behalf of the STT group (2022) Severn Thames Transfer Solution Water Framework Directive Regulations Compliance Assessment Report. Accessed 7th August 2023 at: https://www.unitedutilities.com/globalassets/z_corporate-site/about-us-pdfs/gate-2-severn-to-thames-transfer-sro-documents/stt-g2-s3-122-water-framework-directive-wfd-assessment.pdf

The option design is being progressed and this WFD assessment will continue to be updated throughout the RAPID gated process. A number of priority actions are being progressed to support RAPID Gate 3; those relevant to WFD include:

- Drinking water quality:
  - Review and include the South East Water Drinking Water Safety Plan (DWSP) for River Thames abstractions in the Strategic Water Quality Risk Assessment (SWQRA).
  - Provide evidence that all relevant Drinking Water Quality teams have been consulted about the scheme and their views taken into account. This should include those teams at the downstream water companies (including South East Water).

Table 3.32: River Severn to River Thames Transfer (STT) SRO Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB109054 049880	Vrynwy – Lake Vrynwy to conf Afon Cownwy	Medium/ Medium	0	Further consideration in the context of Severn Regulation releases which also exert a managed flow regime on the River Vyrnwy is required from a WFD perspective.		0	No	No	No	None
GB109054 049720	Afon Vyrnwy – conf Afon Cownwy to conf Afon Banwy	Medium/ Medium	0	Further consideration in the context of Severn Regulation releases which also exert a managed flow regime on the River Vyrnwy is required from a WFD perspective.		0	No	No	No	None
GB109054 049852	Afon Vyrnwy DS of Banwy confluence	Medium/ Medium	0	Further consideration in the context of Severn Regulation releases which also exert a managed flow regime on the River Vyrnwy is required from a WFD perspective.		0	No	No	No	None
GB109054 049800	Afon Vyrnwy – conf Afon Tanat to conf R Severn	Medium/ Medium	0	Further consideration in the context of Severn Regulation releases which also exert a managed flow regime on the River Vyrnwy is required from a WFD perspective.		0	No	No	No	None
GB109054 049142	Severn – conf Bele Bk to conf Sundorne Bk	Medium/ Medium	0	-		0	No	No	No	None
GB109054 049141	Severn – Sundorne Bk to conf M Wenlock-Farley Bk	Medium/ Medium	0	-		0	No	No	No	None

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB109054049143	Severn conf M Wenlock – Farley Bk to conf R Worfe	Medium/ Medium	0	-		0	No	No	No	None
GB109054049145	Severn – conf R Worfe to conf R Stour	Medium/ Medium	0	-		0	No	No	No	None
GB109054049144	Severn – conf R Stour to conf River Teme	Medium/ Medium	0	-		0	No	No	No	None
GB109054039760	Severn – conf R Teme to conf R Avon	Medium/ Medium	0	-		0	No	No	No	None
GB109054044404	Severn – conf R Avon to conf Upper Parting	Medium/ Medium	1	-		1	No	Possible	Possible	None
GB109054043840	Avon (Warks) – conf R Sowe to conf R Leam	Medium/ Medium	2	Flow monitoring to inform the risk to weir pool habitats in the River Avon associated with the physical changes upstream of Alveston.		2	Possible	Possible	Possible	None

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB109054 044402	Avon (Wark) conf R Leam to Tramway Br, Stratford	Medium/ Medium	2			2	Possible	Possible	Possible	None
GB109054 044401	Avon – Tramway Br Stratford to Workman Br Evesham	Medium/ Medium	2			2	No	Possible	Possible	None
GB109054 044403	Avon conf Workman Br, Evesham to conf R Severn	Medium/ Medium	2			2	No	Possible	Possible	None
GB106039 030334	Thames (Evenlode to Thame)	Low/Medium	1	Further hydraulic modelling of the River Thames to improve confidence.		1	No	Possible	Possible	None
GB106039 030331	Thames Wallingford to Caversham	Low/Medium	1	Further hydraulic modelling of the River Thames to improve confidence.		1	No	Possible	Possible	None
GB106039 023233	Thames (Reading to Cookham)	Low/Medium	1	Further hydraulic modelling of the River Thames to improve confidence.		1	No	Possible	Possible	None

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives	Further comments
GB106039 023231	Thames (Cookham to Egham)	Low/Medium	1	Further hydraulic modelling of the River Thames to improve confidence.		1	No	Possible	Possible	None
GB106039 023232	Thames (Egham to Teddington)	Low/Medium	1	Further hydraulic modelling of the River Thames to improve confidence.		1	No	Possible	Possible	None
GB109054 032750	Severn (E Channel) – Horsebere Bk to Severn Est	Medium/ Medium	1	-		1	No	Possible	Possible	None
GB530905 415403	Severn Upper	Medium/ Medium	1	-		1	No	Possible	Possible	None

3.2.5 London Reuse SRO: Teddington DRA 75Ml/d

The London Reuse SRO: Teddington DRA scheme (75Ml/d) WFD ACWG Level 1 assessment identified two water bodies as requiring further assessment[19]: Thames (Egham to Teddington) river water body and Thames Upper transitional water body.

A summary of the Level 2 WFD assessment is included in Table 3.33. Detailed outputs are presented in Annex B.

The Level 2 WFD assessment for the Thames (Egham to Teddington) water body (GB106039023232) showed that there is a potential for moderate reductions (33%) in exceptionally low flows (of 300Ml/d) that could occur for a 1 in 20 return frequency, for 250m between the intake and outfall. However, no immediate potential for status deterioration or introduction of impediments to target status was identified in the Thames (Egham to Teddington) at the current stage of assessment. Minor changes to physico-chemical water quality were noted, although impacts on aquatic ecology and fish are currently expected to be negligible.

No potential for status deterioration or introducing impediments to target status was identified in the Thames Upper (GB530603911403) water body. This assessment has been supported by bespoke modelling and measured data on pathways of impact which have a medium to high confidence in outputs at the current stage of assessment.

Recommendations for further evidence collection, set out in the assessment reports, to further reduce uncertainties include:

- Continued spot water quality monitoring for WFD chemical and continuous physico-chemical water quality monitoring in the Mogden STW final effluent and River Thames at Teddington.
- Continued use of eDNA monitoring in the lower River Thames to identify the presence of sea lamprey and potentially river lamprey in order to support further assessment.
- Continued invertebrate and phytoplankton surveys in Thames Tideway in order to support further assessment. The EA has raised concerns around the uncertainties of the impact of this option. Investigations to reduce the uncertainty of the impact of the option on the water environment will be undertaken.

The option design is being progressed and this WFD assessment will continue to be updated throughout the RAPID gated process.

[19] Ricardo (2022), London Effluent Refuse SRO Gate 2 Water Framework Directive Regulations Report. Accessed 7th August 2023 at: https://www.thameswater.co.uk/media-library/home/about-us/regulation/regional-water-resources/water-recycling-schemes-in-london/gate-2-reports/Annex-B4--WFD-report.pdf

Table 3.33: London Reuse SRO: Teddington DRA 100Ml/d Level 2 WFD summary

Water body ID	Water body name	Confidence in WFD data/ confidence in option design	Maximum impact scope	Requirements to improve confidence	Mitigation measures	Post mitigation impact score	Deterioration between status classes	Compromises water body objectives	Assists attainment of water body objectives
GB106039023232	Thames (Egham to Teddington)	Medium/ Medium	1	Continued spot water quality monitoring programme for WFD chemicals and continuous physico-chemical water quality monitoring at monitoring points in Mogden STW final effluent and the River Thames. Further update to scheme and WFD assessment. Additional model development and model scenarios to support updated assessment.	-	1	No	No	No
GB530603911403	Thames upper	Low/Medium	0	Continued use of eDNA to resolve presence of sea lamprey and potentially river lamprey to support further assessment. Continued invertebrate and phytoplankton surveys to support further assessment.	-	0	No	No	No

4 WFD assessment of rdWRMP24

4.1 rdWRMP24 BVP preferred pathway assessment

The aim of this section is to set out the WFD Regulations compliance assessment of the rdWRMP24 BVP as a whole.

The rdWRMP24 BVP preferred pathway (Situation 4) contains 71 options. The WFD process requires specific geographic locations to base the assessment upon, however, these are not available for the non-supply options and so these options cannot be included here. Options which do not include changes in abstraction or discharge and make use of using existing infrastructure have also been excluded from this list as they have been assessed as appropriate as part of business as usual activities. The 26 DP and supply options within this plan are set out in Table 4.1 below.

Table 4.1: rdWRMP24 BVP preferred pathway (Situation 4) options

Option ID	Option name	Option type
TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon)	New Reservoir - SESRO 150Mm3 - Construction	SRO – SESRO
TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen	T2ST Spur to Kennet Valley - Speen	SRO – part of T2ST
TWU_KEM_HI-TFR_TED_ALL_tedd-kempton	Teddington to Kempton Conveyance Element	SRO – part of London reuse (Teddington DRA)
TWU_KGV_HI-TFR_TED_ALL_teddingtondrated/tlt	Direct River Abstraction - Teddington to Thames Lee Tunnel Shaft 75 MLD	SRO – part of London reuse (Teddington DRA)
TWU_TED_HI-RAB_RE1_CNO_teddington dra 75	Teddington Direct River Abstraction (Indirect Water Recycling) 75 MLD - Construction	SRO – part of London reuse (Teddington DRA)
TWU_TED_HI-TFR_TED_ALL_teddingtondramog/ted	Transfer of Treated Effluent from Mogden to Teddington 75Ml/d	SRO – part of London reuse (Teddington DRA)
TWU_GUI_RE-DRP_ALL_ALL_dp-shalford-guild	Shalford Drought Permit	DP
TWU_HEN_RE-DRP_ALL_ALL_dp-sheep/harp-hen	Sheeplands/Harpsden Drought Permit	DP
TWU_KVZ_RE-DRP_ALL_ALL_dp-playhatch-kv	Playhatch Drought Permit	DP
TWU_SWX_RE-DRP_ALL_ALL_dp-gatehampton-swox	Gatehampton Drought Permit	DP
TWU_GUI_HI-TFR_RZ4_ALL_sewtogui	SouthEast Water to Guildford	Supply
TWU_KVZ_HI-GRW_ALL_ALL_mortimer recomm	Groundwater Development - Recommission Mortimer Disused Source	Supply
TWU_LON_HI-GRW_ALL_ALL_addington gw	Groundwater Development - Addington	Supply
TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	Groundwater Development - Southfleet & Greenhithe	Supply
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw100 p1	New WTW at Kempton - 100Ml/d - Construction	Supply
TWU_LON_HI-TFR_LON_ALL_newriverhead pump 4	Replace New River Head Pump - TWRM	Supply
TWU_SWA_HI-GRW_ALL_ALL_datchet do	Datchet Increase DO	Supply

Option ID	Option name	Option type
TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw ph1	New Medmenham Surface Water WTW Ph1 - Construction	Supply
TWU_SWA_HI-TFR_UTC_ALL_medmenham intake 53	New Medmenham Surface Water Intake - 53 Ml/d	Supply
TWU_SWX_HI-GRW_ALL_ALL_moulsford gw	Groundwater Development - Moulsford Groundwater Source	Supply
TWU_SWX_HI-GRW_ALL_ALL_woods farm do	Groundwater Development - Woods Farm Existing Source Increase DO	Supply
TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox	Oxford Canal - Duke's Cut (SWOX) - Construction	Supply
TWU_SWX_HI-TFR_HEN_ALL_henley-swox5	Henley to SWOX Transfer – 5 Ml/d	Supply
TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe	Abingdon Reservoir to Farmoor Reservoir pipeline	Supply
TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor	Oxford Canal - Transfer from Duke's Cut to Farmoor	Supply
TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby	Managed Aquifer Recharge - Horton Kirby ASR	Supply

Environmental and social considerations have influenced the development of the rdWRMP24. The plan is influenced by a number of aspects which dictate the expected future demand within the region; these include a ‘High’ Environmental Destination (a decision to deliver long-term sustainability and environmental resilience). The Environmental Destination within the rdWRMP24 BVP preferred pathway (Situation 4) is the ‘High’ scenario, based on the EA’s ‘Enhanced’ scenario. This scenario sets out to achieve the Environmental Flow Indicator (EFI) at specific assessment points across the Thames Water region. The Environmental Destination scenario delivers 422Ml/d of water to the environment through reductions to deployable output. This will potentially lead to significant improvements for WFD in a large number of water bodies, supporting attainment of water body objectives. Although the precise impact of abstraction reductions on WFD is difficult to assess at this high level, no WFD risks will arise and the effects of this Environment Destination would be beneficial to WFD.

Whilst the WFD assessment focusses only on supply-side options, the implementation of demand management options is also beneficial to the environment. Reducing demand allows for more water to be kept in the environment, which will result in potential improvements in soil moisture retainment, increased resilience to climate change, and protection of water quality, water bodies, and the habitats that depend on those water bodies. For BVP Situation 4, by 2050, company-led demand management interventions account for 430 Ml/d of benefit and government-led interventions account for 305 Ml/d.

Climate change has been taken into consideration within the rdWRMP24 and is bound up with the options selected within the BVP, therefore no further WFD assessment is needed for climate change considerations.

For the rdWRMP24 BVP preferred pathway, where multiple supply-side options occur in the same water bodies, a cumulative effects assessment has been carried out. The cumulative effects assessment is based on the WFD Level 1 assessments (Section 2) and Level 2 assessment outcomes (Section 3).

A list of water bodies which are impacted by more than one of the BVP preferred pathway options is provided in Table 4.2. The cumulative effects assessment has shown that for the following water bodies, no increased risk of WFD deterioration has been identified at the water body scale over those already identified for individual options.

Table 4.2: Water bodies where cumulative effects are unlikely to lead to an increased risk of WFD deterioration in the BVP preferred pathway (Situation 4)

Water body ID and name	Options	Comments
GB106039023232: Thames (Egham to Teddington)	• Teddington DRA • SESRO	The Teddington DRA option involves a new intake, abstraction and pipelines in this water body. SESRO screened this water body in to consider downstream effects of abstraction and discharge into Thames to fill SESRO and manage flows in the River Thames. Despite options having overlapping construction periods, the cumulative assessment has not identified any increased risk of deterioration outside of what is described in Teddington DRA assessment. **No change in WFD compliance risk.**
GB106039030333: Thames (Leach to Evenlode)	• TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe - Abingdon to Farmoor Reservoir Pipeline • TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor – Duke's Cut to Farmoor	Both options involve the installation of pipelines across this water body. Duke's Cut to Farmoor option involves below ground construction, a low volume discharge of lower quality water and a new outfall. Despite options being first utilised together in 2040, and having overlapping construction periods, the cumulative assessment has not identified any increased risk of deterioration outside of what is described in the Duke's Cut to Farmoor Level 2 assessment. **No change in WFD compliance risk.**
GB40601G501800 : West Kent Darent and Cray Chalk	• TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby – ASR Horton Kirby • TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg - Southfleet/Greenhithe Licence Disaggregation	Both options will involve use of existing groundwater abstraction outside of licence conditions (first utilised in 2069 for Southfleet and 2030 for ASR Horton Kirby). This increase in abstraction (when both operational, increase will lead to a DO benefit exceeding 8Ml/d) could lead to changes in groundwater level and impact the flow in surrounding surface water bodies. However, the cumulative effects assessment has not identified any increased risk of WFD compliance. **No change in WFD compliance risk.**
GB70610542: Oxford Canal, Thrupp to Thames	• TWU_SWX_HI-IMP_SWX_CNO_oxc-dukescutswox – Oxford Canal to Duke's Cut SWOX • TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor – Duke's Cut to Farmoor	Oxford Canal to Duke's Cut SWOX option involves the transfer of water via a canal. Duke's Cut to Farmoor involves a new surface water abstraction. Despite options being first utilised together in 2040, and having overlapping construction periods, the cumulative effects assessment has not identified any change in the WFD compliance risk outside of what is described in the Duke's Cut to Farmoor Level 2 assessment. **No change in WFD compliance risk.**
GB106039023233: Thames (Reading to Cookham)	• TWU_SWX_HI-TFR_HEN_ALL_henley-swox5 - Henley to SWOX – 5Ml/d • DP – Playhatch-KV • DP – Sheeplands / Harpsden-Hen • TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw ph1 – Medmenham WTW • TWU_SWA_HI-TFR_UTC_ALL_medmenham intake 53 – Medmenham intake 53Ml/d • SESRO	The Henley to SWOX option will involve installation of pipelines across this water body. The Medmenham WTW option features below ground structures and new pipelines. The Playhatch DP and Sheeplands/Harpsden Henley DP options would lead to increases in peak licence during droughts (4.1Ml/d increase in peak abstraction first utilised in 2031 and 6Ml/d increase in peak abstraction when first utilised in 2031, respectively). The SESRO screened this water body in to consider downstream effects of abstraction and discharge into Thames to fill the reservoir. Medmenham Intake option features below ground structures, new pipelines with watercourse crossing(s), a new intake, new abstraction and construction of a new PS. After a review of the WRMP19 assessment outcomes, no risk of increased deterioration was identified for the Medmenham Intake option despite new abstraction. Construction of SESRO is likely to occur at the same time as construction for Henley to SWOX, but no cumulative effects are anticipated due to the short term nature of the construction work. The Medmenham options are both brought forward in late 2040s and therefore will not overlap with construction of other options. The cumulative effects assessment has not identified any increased risk of WFD compliance from the increased

Water body ID and name	Options	Comments
		abstraction from the water body. **No change in WFD compliance risk.** Further assessment will be undertaken to confirm this.
GB106039023231: Thames (Cookham to Egham)	• TWU_SWA_HI-GRW_ALL_ALL_datchet do - Datchet Increase DO • SESRO	Datchet Increase DO involves below ground construction activity and modification of an existing WTW. SESRO is assessed due to potential changes in flow from the upstream abstraction and discharge. Cumulative effects of these options are not anticipated to lead to an increase in the risk of deterioration, due to the short term nature of the construction works. **No change in WFD compliance risk.**
GB106039030331: Thames Wallingford to Caversham	• TWU_SWX_HI-GRW_ALL_ALL_woods farm do – Woods Farm Increase DO • TWU_SWX_HI-GRW_ALL_ALL_moulsford gw – Moulsford 1 • DP-Gatehampton SWOX • DP-Playhatch KV • SESRO	SESRO has the potential to impact on flows in this downstream water body (due to increased abstraction in winter and discharges in summer). Moulsford 1 will involve installation of a new pipeline and new abstraction borehole and increased groundwater abstraction (DO benefit of 3.5Ml/d peak). This could lead to reduced groundwater levels and to a reduction in flow. Woods Farm Increase DO will involve a new abstraction borehole and increased groundwater abstraction (bringing a DO benefit to 2.4Ml/d). This could lead to reduce groundwater levels and could lead to a reduction in flow. Cumulatively, both groundwater abstractions would result in a 5.9Ml/d increase in take from the water body and, including the two DPs, this would increase further to a cumulative increase in abstraction of 13.5Ml/d when the DPs are at peak. Some of this abstraction could be supported by discharges from SESRO in the summer period. It is noted that Woods Farm Increase DO is to be first utilised in 2074, whereas both DPs are first utilised in 2031 and Moulsford 1 in 2033. While there is construction period overlap, operational impacts as described in the above text (peak increase of 13.5Ml/d) will only become the case in 2074. The cumulative effect of these numerous impacts on surface flow and velocity (as a result of groundwater abstraction increases), which could be compensated for in the summer by discharge from SESRO, is not anticipated to lead to an increased risk of deterioration in this water body. **No change in WFD compliance risk.**
GB106039030334: Thames (Evenlode to Thame)	• TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe - Abingdon to Farmoor Reservoir Pipeline • TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor – Duke's Cut to Farmoor • SESRO • T2ST • TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox - Oxford Canal - Duke's Cut (SWOX) - Construction	SESRO will involve the construction of a new culvert, watercourse realignment and transfer of water. Abingdon to Farmoor Reservoir Pipeline will involve a transfer of water, new intake and outfall structures and a new discharge from WTW. Additional abstraction may be required. This could lead to a reduction in flow and velocity. Duke's Cut to Farmoor will involve below ground construction and new pipelines. Oxford Canal to Duke's Cut involves a low volume discharge of lower quality water to this water body. T2ST will involve a new surface water abstraction. The cumulative effect of these numerous impacts on surface flow and velocity (as a result of abstraction increases), which could be compensated for in the summer by discharge from SESRO, is not anticipated to lead to an increased risk of deterioration in this water body. **No change in WFD compliance risk.** Further assessment will be undertaken to confirm this.
GB106039023360: Cow Common Brook and Portobello Ditch	• TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe - Abingdon to Farmoor Reservoir Pipeline • SESRO	Both Abingdon to Farmoor Reservoir pipeline and SESRO involve below ground structures and new pipelines. SESRO also involves the construction of a new storage reservoir in line with a watercourse as well as construction of a new WTW. T2ST will involve the construction of a new intake structure in this water body. Despite options having overlapping construction periods, cumulative intra-plan

Water body ID and name	Options	Comments
	• T2ST	effects are not anticipated to lead to an increased risk of deterioration outside of what is described in SESRO Level 2 assessment. **No change in WFD compliance risk** from that as described in post-mitigation assessment of the SESRO Level 2 assessment.
GB106039023410: Sandford Brook (source to Ock)	• TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe - Abingdon to Farmoor Reservoir Pipeline • SESRO	Both options involve the installation of pipelines and below ground structures across this water body. Due to the minor nature of the works and the difference in timing of construction (2035 – 2040 for Abingdon to Farmoor Reservoir and 2031 – 2040 for SESRO), the cumulative intra-plan effects of the multiple pipelines are unlikely to have an increased risk of deterioration on the water environment. Cumulative intra-plan effects are unlikely to be significant at a water body scale and risk to water body. **No change in WFD compliance risk.**
GB106039023430: Ock and tributaries (Land Brook confluence to Thames)	• TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe - Abingdon to Farmoor Reservoir Pipeline • SESRO	Both options involve the installation of pipelines and below ground structures across this water body. Due to the minor nature of the works and the difference in timing of construction (2035 – 2040 for Abingdon to Farmoor Reservoir and 2031 – 2040 for New Reservoir Abingdon option), the cumulative intra-plan effects of the multiple pipelines are unlikely to have an increased risk of deterioration on the water environment. Cumulative intra-plan effects are unlikely to be significant at a water body scale and risk to water body. **No change in WFD compliance risk.**
GB106039023660: Ginge Brook and Mill Brook	• SESRO • T2ST	SESRO involves watercourse alignment, reservoir construction and new intake installation in this water body. T2ST involves installation of new pipelines and below ground construction activity. Construction periods will overlap for options, although cumulative intra-plan effects are not anticipated to lead to an increased risk of deterioration outside of what is described in SESRO Level 2 assessment. **No change in WFD compliance risk.**
GB106040024190: Ebbsfleet	• TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg – Southfleet / Greenhithe • TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby – ASR Horton Kirby	Southfleet/Greenhithe option involves below ground structures and pipelines. ASR Horton Kirby involves use of an increased groundwater abstraction which poses a potential minor risk of reduced surface water contribution to support Ebbsfleet water body. The construction periods of these options do not overlap and Southfleet/Greenhithe will be first utilised in 2069, 39 years after ASR Horton Kirby is to be first used. Cumulative intra-plan effects are unlikely to be significant at a water body scale and no risk of deterioration is expected. **No change in WFD compliance risk.**
GB40601G601000 : Vale of White Horse Chalk	• SESRO • T2ST	SESRO reviewed this water body for potential effects as a result of reservoir construction. T2ST involves potential below ground construction activity and installation of new pipelines in this water body. Construction periods will overlap for options. Cumulative intra-plan effects are not anticipated to lead to an increased risk of deterioration. **No change in WFD compliance risk.**
GB40601G601100 : South-West Chilterns Chalk	• TWU_SWX_HI-TFR_HEN_ALL_henley-swox5 • TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw ph1 • DP-Playhatch-KV	The Henley to SWOX option will involve installation of pipelines within this water body (2035 – 2040). The two DP options, Playhatch and Sheeplands/Harpsden, would lead to an increase in peak licence during droughts (4.1Ml/d increase in peak abstraction first utilised in 2031, and 6Ml/d increase in peak abstraction first utilised in 2031, respectively). Medmenham WTW has a pipeline crossing close to a GWDTE (Widdenton Park Wood SSSI) (2047 – 2050). The cumulative effects of the multiple options are unlikely to have a detrimental effect on the water

Water body ID and name	Options	Comments
	• DP – Sheeplands/ Harpsden-Hen	environment, due to the limited nature of the works and the different time periods for construction. Cumulative intra-plan effects are unlikely to be significant at a water body scale and no increased risk of deterioration is expected. **No change in WFD compliance risk.**
GB40601G604100 Chiltern Chalk Scarp	• TWU_SWX_HI-GRW_ALL_ALL_moulsford gw – Moulsford 1 • DP-Gatehampton SWOX	The Moulsford 1 option involves below ground structures within 500m of a GWDTE. The Gatehampton SWOX DP involves an increase in abstraction (DO benefit of 3.5Ml/d). Moulsford 1 is to be first utilised two years after DP – Gatehampton SWOX. Despite this, cumulative intra-plan effects are unlikely to be significant at a water body scale and no increased risk of deterioration is expected. **No change in WFD compliance risk** than that set out in the Level 2 assessment of Moulsford 1 option.
GB40602G600600 : Shrivenham Corallian	• TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe - Abingdon to Farmoor Reservoir Pipeline • SESRO	Abingdon to Farmoor Reservoir pipeline option involves below ground structures and installation of new pipelines. SESRO involves potential below ground construction as a result of new storage reservoir. Construction periods do not overlap (Datchet Increase DO to begin construction 39 years after SESRO in 2070). Cumulative intra-plan effects are unlikely to be significant at a water body scale and no increased risk of deterioration is expected. **No change in WFD compliance risk.**
GB40603G000300 : Lower Thames Gravels	• TWU_SWA_HI-GRW_ALL_ALL_datchet do - Datchet Increase DO • TWU_LON_HI-ROC_WT1_CNO_kemptonw tw 100 – Kempton WTW • Teddington DRA	Datchet Increase DO will involve below ground structures and refurbishment of existing borehole(s). The remaining options involve minor below ground works for pipeline installation or WTW/PS/intake/outfall upgrades. The cumulative intra-plan effects of the listed activities are unlikely to have a detrimental effect on the water environment. This is especially the case when considering the differences in construction periods. Datchet Increase DO is to be first utilised in 2074, whereas Kempton WTW is to be first utilised in 2050 and Teddington DRA in 2033. There is no construction overlap between any options. Cumulative effects are unlikely to be significant at a water body scale and no risk of deterioration is expected. **No change in WFD compliance risk.**

One water body has been identified as having the potential for an increased risk of WFD deterioration at a water body scale due to the rdWRMP24 BVP preferred pathway. This is summarised in the Table 4.3 below.

Table 4.3: Water body where cumulative effects from BVP preferred pathway (Situation 4) options could lead to an increased risk of WFD deterioration

Water body ID and name	Options	Comments
GB40601G600900 Berkshire Downs Chalk	• TWU_SWX_HI-GRW_ALL_ALL_woods farm do - Woods Farm Increase DO • TWU_SWX_HI-GRW_ALL_ALL_moulsford gw – Moulsford 1 • T2ST	T2ST is likely to require dewatering, which could lead to temporary reduced groundwater levels in this water body (construction between 2038 and 2050). Woods Farm Increase DO will involve a new abstraction and installation of a new pipeline (bringing a DO benefit of 2.4Ml/d by 2074). Moulsford 1 will involve drilling of new boreholes and a new abstraction licence (DO benefit of 3.5Ml/d peak by 2033). All of these options could therefore lead to reductions in groundwater levels (water balance) and could lead to a reduction in flow in surface water bodies supported by this groundwater body (cumulative abstraction DO benefit will be 7.9Ml/d at peak). This water body already has a Poor status for qualitative dependent surface water body status so this could further exacerbate the issue. The environmental

Water body ID and name	Options	Comments
		destination scenarios include closure of Bradfield and licence reduction at Pangbourne (reducing abstraction by 1.64Ml/d by 2030 and a further 5Ml/d by 2035 respectively) in this water body. These environmental destination reductions will help to reduce the cumulative impact of these options, and it is anticipated that with appropriate mitigation there would be **no increased risk of deterioration**. Further investigation will be undertaken (such as scenario modelling, hydroecology assessment etc) to confirm this. If further investigation does not confirm that the WFD deterioration risk can be removed then alternative options within the adaptive plan will be pursued.

4.2 In-combination effects assessment of rdWRMP24 BVP and other plans

In addition to the rdWRMP24, other planning applications and projects along with other water company WRMP options could lead to the potential for in-combination effects to some water bodies. This section sets out the assessment of the potential implication on WFD of multiple options and plans.

Table 4.4 lists the relevant water companies between whom in-combination effects could occur, with a summary of the level of information available within their dWRMP24s. Other water companies and WRSE have been preparing their rdWRMP24s in parallel, so the latest published information from other water companies remains the dWRMP24. It is acknowledged that the dWRMP24 assessments will be superseded, however, these assessments represent a snapshot in time during the development of WRMP24s and remain the most recent published datasets available at the time of writing. However, the rdWRMP24 options in-combination assessment for other water companies will be included in the imminent publication of the WRSE regional plan..

Table 4.4: Water companies' dWRMPs reviewed

Water company	Level of information available
Affinity Water	All necessary information available for in-combination effects assessment.
Anglian Water	All necessary information available for in-combination effects assessment.
South East Water	All necessary information available for in-combination effects assessment.
Sutton and East Surrey Water	All necessary information available for in-combination effects assessment.
Essex and Suffolk Water	All necessary information available for in-combination effects assessment.
Severn Trent Water	Only reports water bodies at risk of deterioration for individual options; no assessment possible of in-combination minor effects.
Southern Water	Only reports water bodies at risk of deterioration for individual options; no assessment possible of in-combination minor effects.

In addition to other water company options, other planning applications (including DCOs) and planning allocations, which could lead to in-combination effects, have been considered. Table 4.5Table 4.5 lists the various planning projects that have been included in the in-combination effects assessment, which occur in the same water bodies as the BVP preferred pathway options.

Table 4.5: Planning projects included within same water bodies as BVP preferred pathway (Situation 4) options

Name	Description
Local Planning Allocations (LPA)	

Name	Description
Cox's Farm	Sand and gravel mineral extraction (new / extension of existing quarry)
Blackburr Farm	Sand and gravel mineral extraction (new / extension of existing quarry)
North Farm	Sand and gravel mineral extraction (new / extension of existing quarry)
Land east of Calcutt	Sand and gravel mineral extraction (new / extension of existing quarry)
Land at Cotswold Community	Sand and gravel mineral extraction (new / extension of existing quarry)
The Briggens Estate	Sand and gravel mineral extraction (new / extension of existing quarry)
Large Scale Developments	
M25 Junction 10/A3 Wisley Interchange Improvement	Improvement of the Wisley interchange to allow free-flowing movement in all directions, together with improvements to the neighbouring Painshill interchange on the A3 to improve safety and congestion across the two sites.
HS2 Phase 1	Phase 1 delivery of HS2 scheduled for completion in 2029. WFD assessments will have been undertaken for this previously.
Oxford Station Phase 2 Improvements	Improvement and upgrade works in and around Oxford station.

Four additional large-scale developments were identified but have been excluded from the WFD in-combination effects assessment. Two of these developments, Oxfordshire Strategic Rail Freight Interchange and River Thames Scheme, are in the pre-application stage of planning and as such there is insufficient publicly available data for use in this in-combination effects assessment. The remaining two developments, East West Rail Bicester to Bedford Improvements and Barking Riverside Extension, have been fully or mostly constructed at the time of writing. As such, this stage, these developments are assumed to form part of the baseline for the purposes of the assessment.

Table 4.6 below identifies water bodies which are impacted by one of the BVP preferred pathway options, one or more planning projects/other water company dWRMP24s, but where the in-combination effects assessment has shown that the BVP preferred pathway option and planning projects will not lead to an increased risk of WFD deterioration at the water body scale, over those already identified for individual options.

Table 4.6: Water bodies where in-combination effects are unlikely to lead to an increased risk of WFD deterioration for the BVP preferred pathway (Situation 4)

Water body ID and name	Options	Comments
GB105033038210: Padbury Brook	• TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox – Oxford Canal to Duke's Cut (SWOX) • HS2 Phase 1	Oxford Canal to Duke's Cut option involves a new low volume discharge of worse quality water into this water body. HS2 Phase 1 WFD assessment identified a potential moderate impact to biology due to the in-combination impact of several culverts in this water body. In-combination effects assessment has not identified any increased risk of deterioration outside of what is already identified in both assessments. **No change in WFD compliance risk.**
GB106039017630: Wey (Shalford to River Thames confluence at Weybridge)	• TWU_GUI_HI-TFR_RZ4_ALL_sewt ogui – South East Water to Guildford • M25 Junction 10/A3 Wisley Interchange Improvement	Both options involve below ground construction activity in this water body with potential for dewatering. South East Water to Guildford option also involves new pipelines and construction of a new WTW/PS in this water body. In-combination effects assessment has not identified any increased risk of deterioration outside of what is already identified in these individual assessments. **No change in WFD compliance risk.**
GB106039023030: Crane	• Teddington DRA • Affinity: – AFF-TPO-WRZ4-0832 – AFF-CTR-WRZ4-1337	Teddington DRA involves installation of new pipelines in this water body. Other activities in this water body include three Affinity Water options also involving installation of new pipelines (with associated crossings). In-combination effects assessment has not identified any increased risk of deterioration outside of what is already identified in these individual assessments. **No change in WFD compliance risk.**

Water body ID and name	Options	Comments
	– AFF-CTR-WRZ4-1336	
GB106039023231: Thames (Cookham to Egham)	• TWU_SWA_HI-GRW_ALL_ALL_datchet do – Datchet Increase DO • SESRO • Affinity – AFF-NGW-WRZ6-2035 – AFF-CTR-WRZ4-1337	Datchet Increase DO involves below ground construction activity and modification of an existing WTW. Other activities in this water body include two Affinity Water options. AFF-NGW-WRZ6-2035 option involves a new groundwater abstraction, new abstraction borehole(s), new pipelines and construction of a new PS. AFF-CTR-WRZ4-1337 involves below ground construction activity within 500m of a GWDTE associated with new pipeline crossings. In-combination effects assessment has not identified any increased risk of deterioration outside of what is already identified in these assessments. **No change in WFD compliance risk.**
GB106039023232: Thames (Egham to Teddington)	• Teddington DRA • SESRO • Affinity: – AFF-CTR-WRZ4-1337	Teddington DRA involves a new intake, abstraction and pipelines in this water body. SESRO screened this water body in to consider downstream effects of abstraction and discharge into Thames to fill SESRO and manage flows in River Thames. Other activity in this water body includes one Affinity Water option. AFF-CTR-WRZ4-1337 involves installation of new pipelines. Despite BVP options having overlapping construction periods, in-combination effects assessment has bit identified any increased risk of deterioration outside of what is described in Teddington DRA further assessment. **No change in WFD compliance risk.**
GB106039023451: Portlane Brook	• TWU_LON_HI-ROC_WT1_CNO_kemptonwtw100 p1 – Kempton WTW • Affinity: – AFF-CTR-WRZ4-1337	Kempton WTW involves below ground construction activity, a new intake and installation of new pipeline (with associated crossings) in this water body. Other activity in this water body includes one Affinity Water option. AFF-CTR-WRZ4-1337 features new pipelines. In-combination effects assessment has not identified any increased risk of deterioration outside of what is already identified in these individual assessments. **No change in WFD compliance risk.**
GB106039030334: Thames (Evenlode to Thame)	• TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe - Abingdon to Farmoor Reservoir Pipeline • TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor – Duke's Cut to Farmoor • SESRO • T2ST • TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox - Oxford Canal - Duke's Cut (SWOX) - Construction • Oxford Station Phase 2 improvements	SESRO will involve the construction of a new culvert, watercourse realignment and transfer of water. Abingdon to Farmoor Reservoir Pipeline will involve a transfer of water, new intake and outfall structures and new discharge from WTW. Additional abstraction may be required. This could lead to a reduction in flow and velocity. Duke's Cut to Farmoor will involve below ground construction and new pipelines. Oxford Canal to Duke's Cut involves a low volume discharge of lower quality water to this water body. T2ST will involve a new surface water abstraction. The in-combination effect of these numerous impacts on flow and velocity and therefore water quality and biology from Thames BVP options could lead to a change in the risk of deterioration in this water body and it is expected to increase the risk from minor localised to amber adverse effect. Other activities in this option include one large-scale development in the Oxford Station Phase 2 Improvements project which involves below ground construction activity impacts in this water body. The addition of this option does not change the previously defined conclusions for this water body set out in the rdWRMP BVP assessment. **No change in WFD compliance risk.**
GB107042022710: Test (Upper)	• T2ST • South East Water: – WTW-31	T2ST involves below ground construction activity within 500m of a GWDTE in this water body. WTW-31 is considered WFD compliant and presents no adverse effect on the water environment. In-combination effects assessment has not identified any increased risk of deterioration in this water body. **No change in WFD compliance risk.**
GB40601G500300 : North Kent Medway Chalk	• TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg – Southfleet / Greenhithe	Southfleet/Greenhithe Licence Disaggregation option involves below ground structures, new pipelines, construction of a new WTW/PS and increase in abstraction within licence conditions but outside RA rates. Other activities in this water body include four South East Water options. These options involve activities including below ground construction, rehabilitation of an existing

Water body ID and name	Options	Comments
	• South East Water: – LIC-20 – ZON-26 – CTR-21 – CTR-22	borehole and modification of an existing WTW. In-combination effects assessment has not identified any increased risk of deterioration outside of what is described in Level 2 assessment for Southfleet/Greenhithe option. **No change in WFD compliance risk**.
GB40601G602200 : Epsom North Downs Chalk	• TWU_LON_HI-GRW_ALL_ALL_addington gw – Groundwater Addington • Sutton and East Surrey: – SES_SES_HIGRW_RE2_ALL_r22 – SES_SES_HILRE_WT2_ALL_r26	Addington GW option involves below ground structures, drilling of new borehole(s), new groundwater abstraction, pipelines and modification of an existing WTW. Other activities occurring in this water body include two Sutton and East Surrey Water options. Both options involve an increased groundwater abstraction. Despite all options being abstractions with potential implications on water balance, groundwater flow and level, due to the staggered selection of options and relative size of the groundwater body, no additional risk of WFD deterioration is expected. **No change in WFD compliance risk** over those set out in the Level 2 assessments completed for these options.
GB40602G601400 : Chobham Bagshot Beds	• TWU_GUI_HI-TFR_RZ4_ALL_sewtogui – South East Water to Guildford • M25 Junction 10 / A3 Wisley Interchange Improvement	South East Water to Guildford option involves below ground construction activity within 500m of a GWDTE and installation of new pipelines within this water body. M25 Junction 10 / A3 Wisley Interchange Improvement involves deep foundations and potential dewatering. In-combination effects assessment has not identified any increased risk of deterioration in this water body. **No change in WFD compliance risk.**
GB40603G000300 : Lower Thames Gravels	• TWU_LON_HI-ROC_WT1_CNO_kemptonwtw100 p1 – Kempton WTW • TWU_SWA_HI-GRW_ALL_ALL_datchet do – Datchet Increase DO • Affinity: – AFF-TPO-WRZ4-0832 – AFF-NGW-WRZ4-0624 – AFF-NGW-WRZ6-2035 – AFF-CTR-WRZ4-1337 – AFF-CTR-WRZ4-1336	Both Thames BVP options involve below ground construction activity, new PS and modification of a WTW. Kempton WTW also involves new pipelines and Datchet Increase DO involves refurbishment of existing borehole(s). Other activities in this water body include six Affinity Water options which involve below ground construction activity, new pipelines, construction of a new WTW/ PS, drilling of new abstraction borehole(s). AFF-CTR-WRZ4-1337 option also involves below ground structures within 500m of a GWDTE and was taken forward to Level 2 assessment, which concluded a minor and localised effect after further assessment. In-combination effects assessment has not identified any increased risk of deterioration in this water body. **No change in WFD compliance risk.**
GB530603911402: Thames Middle	• TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg – Southfleet / Greenhithe Licence Disaggregation • Essex and Suffolk: ESW-ABS-002	Southfleet/Greenhithe Licence Disaggregation option involves below ground structures, new pipelines, new WTW discharge to watercourse and construction of a new WTW. Other activities in this water body include an Essex and Suffolk Water option which involves a new low volume discharge of same water quality and modification of an existing WTW. In-combination effects assessment has not identified any increased risk of deterioration in this water body. **No change in WFD compliance risk.**

One additional water body impacted by one of the BVP preferred pathway options and/or by one or more planning projects/other water company dWRMP24 has been identified as having the potential for an in-combination effect. This is summarised below in Table 4.7.

Table 4.7: Water body where in-combination effects could have potential to lead to an increased risk of WFD deterioration for the BVP preferred pathway (Situation 4)

Water body ID and name	Options	Comments
GB40601G604100 : Chiltern Chalk Scarp	• TWU_SWX_HI-GRW_ALL_ALL_moulsford gw – Moulsford 1 • DP-Gatehampton SWOX • HS2 Phase 1	Moulsford 1 has a new abstraction in an adjacent water body which could affect groundwater levels in this water body. DP – Gatehampton SWOX involves an increase in abstraction (DO benefit of 3.5Ml/d). Other activities in this water body include a large-scale development in HS2 Phase 1 which involves permanent dewatering to support a new cutting. This may have lasting impacts on water balance. In-combination, there is potential for an increase in risk of WFD deterioration to this water body On a precautionary basis the risk to this water body has been identified as having the potential for a risk of WFD deterioration due to cumulative effects. Further investigation is required to better understand the risks to this water body and will require further information on the HS2 phase 1 works and its impacts. Cumulative effects investigations would include hydroecology investigation into the impact of changes in abstraction on surface water flows and a hydrogeological investigation into changes in water balance. Both of these assessments should take into account abstraction changes due to the environmental destination scenarios (including closure of Bradfield and licence reduction at Pangbourne (reducing abstraction by 1.64Ml/d by 2030 and a further 5Ml/d by 2035 respectively) in the adjacent water body as well as reduction at Chinnor in this water body by 1.61Ml/d). If further investigation does not confirm that the WFD deterioration risk can be removed then alternative options within the adaptive plan will be pursued.

5 OtherThames Water WRMP24 pathways and plans

5.1 Other BVP pathways (Situation 1 and 8)

As part of the rdWRMP24 a WFD assessment has been carried out on two other BVP pathways, Situation 1 and Situation 8. BVP Situation 1 represents the maximum need within the plan, as it includes maximum growth and high climate change and environmental destination scenarios. BVP Situation 8 is the core Ofwat pathway to be used as a guide for minimum future investment.

The BVP (Situation 1) contains some options which are not included in the BVP preferred pathway (Situation 4), and also does not include three options which are included in the preferred pathway. Different versions of the same option (differing capacities) have been included in different plans. As these options have been grouped together throughout the report (see Table 1.1), they have not been included in the below table for WFD, as the assessments are the same. The differences between the two plans are set out in Table 5.1 below.

Table 5.1: Differences in the options included in the BVP preferred pathway (Situation 4)and BVP Situation 1

Options included in alternative BVP (Situation 1) but not in the BVP preferred pathway (Situation 4)	Options included in the BVP preferred pathway (Situation 4) but not in alternative BVP (Situation 1)
TWRM extension - Coppermills to Honor Oak - Construction (TWU_HON_HI-ROC_NET_CNO_cop'mills-honoroak)	Shalford Drought Permit (TWU_GUI_RE-DRP_ALL_ALL_dp-shalford-guild)
Deephams Water Recycling – 46.5 Ml/d, to TLT - Construction (TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b)	Sheeplands/Harpsden Drought Permit (TWU_HEN_RE-DRP_ALL_ALL_dp-sheep/harp-hen)
Thames-Lee Tunnel extension from Lockwood PS to King George V Reservoir intake (TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res)	Henley to SWOX Transfer – 5Ml/d (TWU_SWX_HI-TFR_HEN_ALL_henley-swox5)
Beckton desalination (TWU_LON_HI-DES_ALL_CNO_beckton desal 150)	
Managed Aquifer Recharge - Addington (TWU_LON_HI-GRW_ALL_ALL_addington asr)	
Groundwater Development - Confined Chalk North London) (TWU_LON_HI-GRW_ALL_ALL_london conchalk)	
Groundwater Development - Merton Recommissioning (TWU_LON_HI-GRW_ALL_ALL_merton recommission)	
Managed Aquifer Recharge - Kidbrooke (SLARS1) Construction (TWU_LON_HI-GRW_ALL_CNO_kidbrooke slars)	
Merton Aquifer Recharge (SLARS3) (TWU_LON_HI-GRW_ALL_CNO_merton ar)	
Beckton to Coppermills tunnel (treated) - Construction (TWU_LON_HI-TFR_LON_CNO_beckton-coppermills)	
Transfer from SES WTW to Merton TWRM shaft (TWU_LON_HI-TFR_SES_ALL_cheam-merton)	

The WFD assessments of these options are presented in Sections 2.1 and 3.1.

The BVP core pathway (Situation 8) contains no new options which are not already included in the BVP preferred pathway. However, the preferred pathway contains 16 options which are not

included in the core pathway. The differences between the two situation pathways are set out in Table 5.2.

Table 5.2: Differences in the options included in the BVP preferred pathway (Situation 4) and BVP core pathway (Situation 8)

Options included in the BVP preferred pathway (Situation 4) but not in BVP core pathway	
SouthEast Water to Guildford (TWU_GUI_HI-TFR_RZ4_ALL_sewtogui)	Groundwater Development - Recommission Mortimer Disused Source (TWU_KVZ_HI-GRW_ALL_ALL_mortimer recomm)
T2ST Spur to Kennet Valley - Speen (TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen)	Groundwater Development - Southfleet & Greenhithe (TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg)
New WTW at Kempton - 100Ml/d - Construction (TWU_LON_HI-ROC_WT1_CNO_kemptonwtw100 p1)	Replace New River Head Pump - TWRM (TWU_LON_HI-TFR_LON_ALL_newriverhead pump 4)
Groundwater Development - Datchet Existing Source DO Increase (TWU_SWA_HI-GRW_ALL_ALL_datchet do)	New Medmenham Surface Water WTW Ph1 - Construction (TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw ph1)
New Medmenham Surface Water Intake - 53 Ml/d (TWU_SWA_HI-TFR_UTC_ALL_medmenham intake 53)	Groundwater Development - Woods Farm Existing Source Increase DO (TWU_SWX_HI-GRW_ALL_ALL_woods farm do)
Oxford Canal - Duke's Cut (SWOX) - Construction (TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox)	Henley to SWOX Transfer – 5 Ml/d (TWU_SWX_HI-TFR_HEN_ALL_henley-swox5)
Abingdon Reservoir to Farmoor Reservoir pipeline (TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe)	Oxford Canal - Transfer from Duke's Cut to Farmoor (TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor)

5.2 Least Cost Plan and Best Environmental and Societal Plan

As part of the Thames Water WRMP24, two other plans are also considered, the LCP and the BESP. These plans contain some options which are different from those set out in the the BVP preferred pathway (Situation 4). Different versions of the same option (differing capacities) have been included in different plans. As these options have been grouped together throughout the report (see Table 1.1), they have not been included in the below table for WFD, as the assessments are the same. The new options which are included in the LCP and BESP (and not included in either the BVP preferred pathway (Situation 4) or as an SRO) and those in either the LCP or BESP and not in the BVP preferred pathway (Situation 4) are shown in Table 5.3 and Table 5.4.

Table 5.3: Different options in the BVP preferred pathway (Situation 4)and LCP

Options included in LCP but not in the BVP preferred pathway (Situation 4)	Options included in the BVP preferred pathway (Situation 4) but not in LCP
Groundwater Development - Confined Chalk North London (TWU_LON_HI-GRW_ALL_ALL_london conchalk)	Sheeplands/Harpsden Drought Permit (TWU_HEN_RE-DRP_ALL_ALL_dp-sheep/harp-hen)
Groundwater Development - Merton Recommissioning (TWU_LON_HI-GRW_ALL_ALL_merton recommission)	Shalford Drought Permit (TWU_GUI_RE-DRP_ALL_ALL_dp-shalford-guild)
Cheam to Merton – London ring main (TWU_LON_HI-TFR_SES_ALL_cheam-merton)	
Managed Aquifer Recharge - Merton (SLARS3) Construction (TWU_LON_HI-GRW_ALL_CNO_merton ar)	

In addition to these new options, the LCP contains a Henley to SWOX Transfer option which is a different size to that in the BVP preferred pathway (Situation 4) (2.4Ml/d). In this case, the change in the option size does not alter the outcome of the WFD assessment, and the summaries presented in Section 3.2 remain valid.

Table 5.4: Different options in the BVP preferred pathway (Situation 4)and BESP

Options included in BESP but not in BVP preferred pathway (Situation 4)	Options included in BVP preferred pathway (Situation 4) but not in BESP
Groundwater Development - Confined Chalk North London (TWU_LON_HI-GRW_ALL_ALL_london conchalk)	New WTW at Kempton - 100Ml/d - Construction (TWU_LON_HI-ROC_WT1_CNO_kemptonwtw100 p1)
Groundwater Development - Merton Recommissioning (TWU_LON_HI-GRW_ALL_ALL_merton recommission)	Replace New River Head Pump - TWRM (TWU_LON_HI-TFR_LON_ALL_newriverhead pump 4)
Managed Aquifer Recharge - Merton (SLARS3) Construction (TWU_LON_HI-GRW_ALL_CNO_merton ar)	
Cheam to Merton - London Ring Main (TWU_LON_HI-TFR_SES_ALL_cheam-merton)	
Beckton Desalination (TWU_LON_HI-DES_ALL_CNO_beckton desal 100p1)	
Beckton to Coppermills tunnel (treated) - Construction (TWU_LON_HI-TFR_LON_CNO_beckton-coppermills)	
Managed Aquifer Recharge - Kidbrooke (SLARS1) Construction (TWU_LON_HI-GRW_ALL_CNO_kidbrooke slars)	

In addition to these new options, the BESP contains a SESRO which is a different size to that in the BVP preferred pathway (Situation 4) (75Mm^3). In this case, the change in the option size does not alter the outcome of the WFD assessment (post-mitigation), and the summaries presented in Section 3.2 remain valid.

5.3 Changes in cumulative effects of other BVP pathways (Situation 1)

When compared to the BVP preferred pathway (Situation 4)presented in Section 4.1, the BVP (Situation 1) includes options that could lead to additional potential cumulative effects on eight additional water bodies; these are set out in Table 5.5. Of these water bodies, the cumulative assessment did not identify any that lead to an increase in WFD deterioration risk.

Table 5.5: Water bodies where potential additional cumulative effects may occur for the alternative BVP (Situation 1) compared to the BVP preferred pathway (Situation 4).

Water body ID and name	Options	Comments
GB106039023232: Thames (Egham to Teddington)	• Teddington DRA • SESRO • TWU_LON_HI-GRW_ALL_CNO_merton ar – Merton Aquifer Recharge	In Situation 1, this water body has an additional option (Merton AR) over that in the preferred pathway. The Teddington DRA option involves a new intake, abstraction and pipelines in this water body. The SESRO screened this water body in to consider downstream effects of abstraction and discharge into the Thames to fill SESRO and manage flows in the Thames. Merton AR will involve an upgrade to the well and adit system, with a new AR borehole and a water main. Despite options having overlapping construction periods for Teddington DRA and SESRO, the cumulative effects assessment has not identified any increased risk of deterioration outside of what is described in Teddington DRA further assessment. **No change in WFD compliance.**
GB40601G602200: Epsom North Downs Chalk	• TWU_LON_HI-GRW_ALL_ALL_addington asr – South East London (Addington)	All three options involve below ground construction activity and installation of new or refurbishment of existing boreholes. Groundwater Addington and South East London (Addington) ASR also involve modification of a WTW. Groundwater Addington would abstract water from the Chalk and the surplus (during

Water body ID and name	Options	Comments
	• TWU_LON_HI-GRW_ALL_ALL_addington gw – Groundwater Addington • TWU_LON_HI-GRW_ALL_ALL_merton recommission – Merton Recommission	wetter months) would supply water to South East London ASR. Addington Groundwater and Merton recommissioning include new or increased groundwater abstractions within this water body. Groundwater Addington is selected for 2026, for first utilisation in 2029, South East London (Addington) ASR is selected for 2065 for first utilisation in 2075. Merton recommission is selected for 2070 for first utilisation in 2072. Despite the potential overlap in construction period between South East London (Addington) ASR and Merton Recommission, the construction of these two options will not increase WFD risk. Operation of the separate groundwater abstractions is not anticipated to lead to an increased risk of WFD deterioration above that described in the Groundwater Addington Level 2 assessment. **No change in WFD compliance.**
GB40602G602500: Greenwich Tertiaries and Chalk	• TWU_HON_HI-ROC_NET_CNO_cop'mills-honoroak – Coppermills to Honor Oak • TWU_LON_HI-DES_ALL_CNO_beckton desal 150 – Beckton Desalination • TWU_LON_HI-GRW_ALL_ALL_kidbrooke slars – Kidbrooke Aquifer Recharge / Aquifer Storage and Recovery	Coppermills to Honor Oak involves below ground construction activity, installation of new pipelines and modification of an existing WTW. Beckton Desalination involves groundwater implications due to potential hydraulic connectivity with surface water body where a new discharge of highly saline water is proposed. Kidbrooke AR/ARS involves below ground construction activity, new borehole(s), new pipelines and construction of a new PS. Beckton Desalination will be first selected in 2044 and first utilised in 2050. Coppermills to Honor Oak and Kidbrooke AR/ARS will be first selected in 2070 and first utilised in 2074. Construction periods overlap between two options, however, this is not anticipated to increase the risk of WFD deterioration. Cumulative effects assessment for the operation of these options are not anticipated to lead to an increased risk of WFD deterioration outside of what is already described in the Beckton Desalination Level 2 assessment. **No change in WFD compliance.**
GB530603911402: THAMES MIDDLE	• TWU_HON_HI-ROC_NET_CNO_cop'mills-honoroak – Coppermills to Honor Oak • TWU_LON_HI-DES_ALL_CNO_beckton desal 150 – Beckton Desalination • TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg – Southfleet / Greenhithe Licence Disaggregation • TWU_LON_HI-TFR_LON_CNO_beckton-coppermills – Beckton to Coppermills	All options involve below ground construction activity and installation of new pipelines. Coppermills to Honor Oak involves modification of an existing WTW and Southfleet/Greenhithe Licence Disaggregation involves construction of a new WTW/PS. These two options and Beckton Desalination all involve new discharges in this water body. Construction periods overlap for two options, Beckton Desalination and Beckton to Coppermills (first selected in 2044 and first utilised in 2050). There is no overlap with any other options in this water body. The cumulative effects assessment has not identified any increased risk of WFD deterioration outside of what is already described in the Beckton Desalination Level 2 assessment. **No change in WFD compliance.**
GB106038027910: Pymmes and Salmon Brooks - Deephams STW to Tottenham Locks	• TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b – Deephams Reuse • TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-	Both options involve below ground construction activity and the installation of new pipelines. Deephams Reuse will also involve a construction of a new WTW in this water body. Construction periods for these options do not overlap, Deephams Reuse is first utilised in 2069 whereas Lockwood PS to King George

Water body ID and name	Options	Comments
	kgv res – Lockwood PS to King George V reservoir	V reservoir option is first utilised in 2060. The cumulative effects assessment has not identified any increased risk of WFD deterioration. **No change in WFD compliance.**
GB106038027960: Salmon Brook upstream Deephams STW	• TWU_KGV_HI-REU_RE1_CNO_deephams reuse 46.5b – Deephams Reuse • TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res – Lockwood PS to King George V reservoir	Both options involve below ground construction activity and installation of new pipelines. Deephams reuse will also involve construction of a new WTW/PS. Construction periods for these options do not overlap. Deephams Reuse is first utilised in 2069 whereas Lockwood PS to King George V reservoir option is first utilised in 2060. The cumulative effects assessment has not identified any increased risk of WFD deterioration. **No change in WFD compliance.**
GB106038077852: Lee (Tottenham Locks to Bow Locks/Three Mills Locks)	• TWU_HON_HI-ROC_NET_CNO_cop'mills-honoroak – Coppermills to Honor Oak • TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res – Lockwood PS to King George V reservoir • TWU_LON_HI-TFR_LON_CNO_beckton-coppermills – Beckton to Coppermills	All three options involve below ground construction activities and installation of new pipelines. Lockwood PS to King George V reservoir also involves construction of a new PS and Coppermills to Honor Oak involves modification of an existing WTW. In addition to this, both Coppermills to Honor Oak and Beckton to Coppermills have below ground elements within 500m of sensitive groundwater, triggering further assessment. Construction periods do not overlap between any of the three options, with Coppermills to Honor Oak first utilised in 2074, Lockwood PS to King George V reservoir first utilised in 2060 and Beckton to Coppermills first utilised in 2050. The cumulative effects assessment has not identified any increased risk of WFD deterioration. **No change in WFD compliance.**
GB106039023250: Pool River	• TWU_LON_HI-GRW_ALL_ALL_addington asr – South East London (Addington) Aquifer Storage and Recovery • TWU_LON_HI-GRW_ALL_ALL_addington gw – Groundwater Addington	Both options involve below ground construction activity, refurbishment/drilling of new abstraction borehole(s), installation of new pipelines and modification of an existing WTW in the Pool River water body. Groundwater Addington is selected for 2026, while South East London (Addington) ARS is selected for 2065 and as such construction periods do not overlap. The Addington WSR would take surplus water from the Chalk borehole (Addington GW) to store in the deep greensand aquifer, therefore there is no cumulative effect on this surface water body. **No change in WFD compliance.**

5.4 Changes in cumulative effects of other BVP pathways: Core pathway (Situation 8)

The BVP core pathway (Situation 8) does not include any options not already considered in the BVP preferred pathway (Situation 4) and therefore no new cumulative effects on any water bodies are anticipated. However, the BVP preferred pathway contains 16 options which are not included in the BVP core pathway. Therefore, the cumulative effects reported for the following 11 water bodies are not applicable for BVP core pathway.

- GB106039030333: Thames (Leach to Evenlode)
- GB40601G501800: West Kent Darent and Cray Chalk
- GB70610542: Oxford Canal, Thrupp to Thames
- GB106039023231: Thames (Cookham to Egham)
- GB106039030334: Thames (Evenlode to Thame)

- GB106039023360: Cow Common Brook and Portobello Ditch
- GB106039023410: Sandford Brook (source to Ock)
- GB106039023430: Ock and tributaries (Land Brook confluence to Thames)
- GB106040024190: Ebbsfleet
- GB40602G600600: Shrivenham Corallian
- GB40603G000300: Lower Thames Gravels

5.5 Changes in cumulative intra-plan effects on LCP

The LCP includes four additional options, which are not included in the BVP preferred pathway, and does not include two options which are in the BVP. This section discusses the potential implications of these options on the cumulative effects assessment (as set out in Section 4.1).

Under the LCP the Thames (Reading to Cookham) water body would feature one less option than under the preferred pathway: DP Sheeplands / Harpsden-Henley. However, as this does not change the outcome of the cumulative effects assessment set out in Section 4.1, it has not been considered further.

When compared to the preferred pathway presented in Section 4.1, the LCP includes options that could lead to additional potential cumulative effects on two additional water bodies and changes to cumulative effects in one water body. These are set out in Table 5.6.

Table 5.6: Water bodies where cumulative effects for the LCP may differ from the BVP preferred pathway (Situation 4).

Water body ID and name	Options	Comments
GB106039023232: Thames (Egham to Teddington)	• Teddington DRA • SESRO • TWU_LON_HI-GRW_ALL_CNO_merton ar – Merton Aquifer Recharge	The LCP includes an additional option in this water body: Merton AR. Teddington DRA option involves a new intake, abstraction and pipelines in this water body. The SESRO screened this water body in to consider downstream effects of abstraction and discharge into the River Thames. Merton AR will involve an upgrade to the well and adit system, with a new AR borehole and a water main. Despite options having overlapping construction periods for Teddington DRA and SESRO, the cumulative effects assessment has not identified any increased risk of WFD deterioration. **No change in WFD compliance**
GB106039023460: Wandle (Croydon to Wandsworth) and the Graveney	• TWU_LON_HI-GRW_ALL_ALL_merton recommission – Merton Recommission • TWU_LON_HI-TFR_SES_ALL_cheam-merton – Cheam to Merton – London Ring Main	Merton Recommission involves modification of a WTW in this water body. Cheam to Merton involves below ground construction activity, installation of new pipelines and construction of a new PS. Construction periods do not overlap, with Cheam to Merton – London Ring Main being first selected in 2045 and first utilised in 2050, whereas Merton Recommission is to be first selected in 2070 and first utilised in 2072. The cumulative effects assessment has not identified any increased risk of WFD deterioration. **No change in WFD compliance.**
GB40601G602200: Epsom North Downs Chalk	• TWU_LON_HI-GRW_ALL_ALL_addington gw – Groundwater Addington • TWU_LON_HI-GRW_ALL_ALL_merton recommission – Merton Recommission	Both options involve below ground construction activity and installation of new or refurbishment of existing boreholes. Groundwater Addington will also involve modification of a WTW. Both options also include new or increased groundwater abstractions within this water body. Groundwater Addington is selected for 2056 for first utilisation in 2059, and Merton Recommission is selected for 2070 for first utilisation in 2072. The construction of the options will be staggered, likely reducing the cumulative effect on this water body. The cumulative effects from

Water body ID and name	Options	Comments
		operation of these two options are not anticipated to lead to an increased risk of WFD deterioration above that described in the Groundwater Addington Level 2 assessment. **No change in WFD compliance.**

5.6 Changes in cumulative intra-plan effects on BESP

The BESP includes seven additional options, which are not included in the BVP, and does not include seven options which are in the BVP. This section discusses the potential implications of these options on the cumulative effects assessment (as set out in Section 4.1).

Under the BESP the Lower Thames Gravels water body would feature fewer options than under the BVP (Situation 4). However, as this does not change the outcome of the cumulative effects assessment set out in Section 4.1, it has not been considered further.

When compared to the preferred pathway presented in Section 4.1, the BESP includes options that could lead to additional potential cumulative effects on three additional water bodies and changes to cumulative effects in two water bodies; these are set out in Table 5.7.

Table 5.7: Water bodies where cumulative effects for the BESP may differ from the preferred pathway.

Water body ID and name	Options	Comments
GB106039023232: Thames (Egham to Teddington)	• Teddington DRA • SESRO • TWU_LON_HI-GRW_ALL_CNO_merton ar – Merton Aquifer Recharge	The LCP includes an additional option in this water body: Merton AR. Teddington DRA option involves a new intake, abstraction and pipelines in this water body. The SESRO screened this water body in to consider downstream effects of abstraction and discharge into the River Thames. Merton AR will involve an upgrade to the well and adit system, with a new AR borehole and a water main. Despite options having overlapping construction periods for Teddington DRA and SESRO, the cumulative effects assessment has not identified any increased risk of WFD deterioration. **No change in WFD compliance.**
GB106039023460: Wandle (Croydon to Wandsworth) and the Graveney	• TWU_LON_HI-GRW_ALL_ALL_merton recommission – Merton Recommission • TWU_LON_HI-TFR_SES_ALL_cheam-merton – Cheam to Merton – London Ring Main	Merton Recommission involves modification of a WTW in this water body. Cheam to Merton involves below ground construction activity, installation of new pipelines and construction of a new PS. Construction periods do not overlap, with Cheam to Merton – London Ring Main being first selected in 2045 and first utilised in 2050, whereas Merton Recommission is to be first selected in 2070 and first utilised in 2072. The cumulative effects assessment has not identified any increased risk of WFD deterioration. **No change in WFD compliance.**
GB40601G602200: Epsom North Downs Chalk	• TWU_LON_HI-GRW_ALL_ALL_addington gw – Groundwater Addington • TWU_LON_HI-GRW_ALL_ALL_merton recommission – Merton Recommission	Both options involve below ground construction activity and installation of new or refurbishment of existing boreholes. Groundwater Addington will also involve modification of a WTW. Both options also include new or increased groundwater abstractions within this water body. Groundwater Addington is selected for 2056 for first utilisation in 2059, and Merton recommission is selected for 2070 for first utilisation in 2072. The construction of the options will be staggered, likely reducing the cumulative effect on this water body. The cumulative effects from operation of these two options are not anticipated to lead to an increased risk of WFD deterioration above that described in the Groundwater Addington Level 2 assessment. **No change in WFD compliance.**

Water body ID and name	Options	Comments
GB40601G601100: South-West Chilterns Chalk	• TWU_SWX_HI-TFR_HEN_ALL_henley-swox5 • DP-Playhatch-KV • DP – Sheeplands / Harpsden-Hen • TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw ph1 – Medmenham WTW	The Henley to SWOX option will involve installation of pipelines within this water body. The two DP options, Playhatch and Sheeplands/Harpsden, would lead to an increase in peak licence during droughts (4.1Ml/d increase in peak abstraction first utilised in 2031, and 6Ml/d increase in peak abstraction when first utilised in 2031, respectively). The Medmenham WTW option involves below ground construction activity within 500m of a GWDTE and new pipelines. The cumulative effects of the multiple options are unlikely to have a detrimental effect on the water environment, due to the limited nature of the works. The cumulative effects assessment has not identified any increased risk of WFD deterioration. **No change in WFD compliance.**
GB40602G602500: Greenwich Tertiaries and Chalk	• TWU_LON_HI-DES_ALL_CNO_beckton desal 150 – Beckton Desalination • TWU_LON_HI-GRW_ALL_ALL_kidbrooke slars – Kidbrooke Aquifer Recharge / Aquifer Storage and Recovery	Beckton Desalination involves groundwater implications due to potential hydraulic connectivity with surface water body where a new discharge of highly saline water is proposed. Kidbrooke AR/ARS involves below ground construction activity, new borehole(s), new pipelines and construction of a new PS. Beckton Desalination will be first selected in 2044 and first utilised in 2050, whereas Kidbrooke AR/ARS will be first selected in 2065 and first utilised in 2069. Construction periods do not overlap for the options. Despite this, cumulative intra-plan effects are not anticipated to lead to an increased risk of WFD deterioration outside of what is already described in the Beckton Desalination Level 2 assessment. **No change in WFD compliance.**

6 Summary and conclusions

This report (Appendix D) presents the findings of the WFD assessments on the Thames Water rdWRMP24. It forms part of a suite of environmental documents that accompanies the Thames Water rdWRMP24 submission to regulators. The ACWG approach to WFD has been applied and a summary of the Level 1 screenings and Level 2 detailed water body assessments is presented below in addition to a summary of the WRMP cumulative effects and in-combination effects assessments.

6.1 WFD ACWG Level 1 summary

The rdWRMP24 BVP preferred pathway (Situation 4) contains 71 options. The WFD process requires a specific geographic location to base the assessment upon, however, as these are not available for the non-supply options, these options have not been included here. Options using existing infrastructure have also been excluded from this list as they have been assessed as appropriate as part of business as usual activities. The remaining 26 supply options were assessed using the ACWG Level 1 methodology. Of these, six options form part of SRO projects and four are considered under DPs; summaries of these are provided in this report. The Level 1 WFD assessments indicated that eight options are anticipated to have very low risks of being non-compliant with WFD objectives and do not require further assessment (as shown in Table 6.1).

Table 6.1: rdWRMP24 BVP preferred pathway (Situation 4) options which required no additional assessment

Option ID	Option title
TWU_GUI_RE-DRP_ALL_ALL_dp-shalford-guild	Shalford Drought Permit
TWU_HEN_RE-DRP_ALL_ALL_dp-sheep/harp-hen	Sheeplands/Harpsden Drought Permit
TWU_KVZ_HI-GRW_ALL_ALL_mortimer recomm	Groundwater Development - Recommission Mortimer Disused Source
TWU_KVZ_RE-DRP_ALL_ALL_dp-playhatch-kv	Playhatch Drought Permit
TWU_LON_HI-ROC_WT1_CNO_kemptonwtw150	New WTW at Kempton - 150Ml/d - Construction
TWU_LON_HI-TFR_LON_ALL_newriverhead pump 4	Replace New River Head Pump - TWRM
TWU_SWX_HI-TFR_HEN_ALL_henley-swox5	Henley to SWOX Transfer – 5Ml/d
TWU_SWX_RE-DRP_ALL_ALL_dp-gatehampton-swox	Gatehampton Drought Permit

6.2 WFD ACWG Level 2 summary

WFD Level 2 assessments have been completed for 18 of the remaining options that make up the BVP preferred pathway (Situation 4). Six of these were carried out under the relevant SRO projects and the findings are summarised in this report. The options assessed are set out in Table 6.2.

Table 6.2: Thames Water WRMP24 BVP options which required additional assessment at Level 2

Option ID	Option title
TWU_GUI_HI-TFR_RZ5_ALL_sewtogui	South East Water to Guildford
TWU_LON_HI-GRW_ALL_ALL_addington gw	Groundwater Development - Addington
TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	Groundwater Development - Southfleet & Greenhithe
TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby	Managed Aquifer Recharge - Horton Kirby ASR
TWU_SWA_HI-GRW_ALL_ALL_datchet do	Groundwater Development - Datchet Existing Source DO Increase
TWU_SWA_HI-ROC_WT1_CNO_medmenhamwtw ph1	New Medmenham Surface Water WTW Ph1 - Construction
TWU_SWA_HI-TFR_UTC_ALL_medmenham intake 53	New Medmenham Surface Water Intake - 53 Ml/d
TWU_SWX_HI-GRW_ALL_ALL_moulsford gw	Groundwater Development - Moulsford Groundwater Source
TWU_SWX_HI-GRW_ALL_ALL_woods farm do	Groundwater Development - Woods Farm Existing Source Increase DO
TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox	Oxford Canal - Duke's Cut (SWOX) - Construction
TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe	Abingdon Reservoir to Farmoor Reservoir pipeline
TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor	Oxford Canal - Transfer from Duke's Cut to Farmoor
TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen	SRO: T2ST
TWU_STR_HI-RSR_RE1_CNO_abingdon150(lon)	SRO: SESRO
TWU_KEM_HI-TFR_TED_ALL_tedd-kempton	SRO: London Reuse: Teddington DRA
TWU_KGV_HI-TFR_TED_ALL_teddingtondrated/tlt	
TWU_TED_HI-RAB_RE1_CNO_teddington dra 75	
TWU_TED_HI-TFR_TED_ALL_teddingtondramog/ted	

The majority of the options assessed as part of the BVP have only been subject to high level design, and if they are taken forward would require additional design and assessment as they progress to the next stage of optioneering. Due to this, the confidence in the option design has been rated as low throughout all of the Level 2 assessments undertaken. For the SROs, WFD assessments have been undertaken using the Gate 2 designs and therefore design is assessed as medium confidence.

The findings indicate that there are precautionary WFD compliance risks associated primarily with the operation of additional/new abstractions. The potential hydrological effects of these activities, among several other varying impacts, could conflict with achieving WFD status objectives. This is particularly the case where hydrology/river flow is an existing limiting factor, recorded in WFD baseline data as a ‘reason for not achieving good’. The potential biological effects, particularly on fish, and physico-chemical changes (for example, reduced dilution as a result of a new or increased abstraction) would benefit from further assessment to improve certainty of the scale of effects.

For groundwater bodies, deterioration risks were primarily associated with changes to quantitative surface water dependent status elements or water balance, as a result of new or increased groundwater abstractions, or construction of below ground works.

For new or modified intakes, it is recognised that appropriate fish and eel screening would be required to prevent entrainment. At this stage, this has been considered as likely mitigation, but moderate/amber risks have been maintained until option designs and assessments are further progressed. The same conservative approach has been taken with other likely mitigation, such as using trenchless methods to cross watercourses where feasible or discharging dewatered water into a watercourse to maintain flow.

6.3 Further investigations and assessment

Subject to their progression through the approvals process, of those options which have been assessed at Level 2, further WFD mitigation and assessment would be required for the nine BVP options set out in Table 6.3. At this stage the Level 2 assessments have determined a potential risk of deterioration to some water bodies due to these options. Additional investigation and information is required to improve the certainty of the levels of WFD risk outlined in the rdWRMP WFD Level 2 assessments. Following further investigation, design development and implementation of any resultant targeted mitigation, it is anticipated that the WFD compliance risk will be reduced to minor (impact score 1) and, therefore all the options in this plan are expected to be WFD compliant.

Table 6.3: rdWRMP24 BVP preferred pathway (Situation 4) Level 2 assessed options which require further investigation

Option ID	Option title	Water bodies currently at risk of deterioration
TWU_GUI_HI-TFR_RZ5_ALL_sewtogui	South East Water to Guildford	GB70610019: Basingstoke Canal
TWU_LON_HI-GRW_ALL_ALL_addington gw	Groundwater Development - Addington	GB40601G602200: Epsom North Downs Chalk
TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg	Groundwater Development - Southfleet & Greenhithe	GB40601G500300: North Kent Medway Chalk GB40601G501800: West Kent Darent and Cray Chalk
TWU_SWX_HI-GRW_ALL_ALL_moulsford gw	Groundwater Development - Moulsford Groundwater Source	GB40601G600900: Berkshire Downs Chalk
TWU_SWX_HI-GRW_ALL_ALL_woods farm do	Groundwater Development - Woods Farm Existing Source Increase DO	GB40601G60090: Berkshire Downs Chalk
TWU_SWX_HI-IMP_SWX_CNO_oxc-dukes cutswox	Oxford Canal - Duke's Cut (SWOX) - Construction	GB70410212: Coventry & Ashby Canal GB70910513: North Oxford Canal GB70910511: Grand Union Canal, Braunston to Leamington Spa GB70910196: Oxford Canal, summit pound GB70610197: Oxford Canal, summit to Aynho GB70610198: Oxford Canal, Aynho to Thrupp GB70610542: Oxford Canal, Thrupp to Thames And associated surface water bodies
TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor	Oxford Canal - Transfer from Duke's Cut to Farmoor	GB106039030333: Thames (Leach to Evenlode) GB70610542: Oxford Canal, Thrupp to Thames
TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby	Managed Aquifer Recharge - Horton Kirby ASR	GB40601G501800: West Kent Darent and Cray Chalk
T2ST	T2ST	GB40701G501200: River Test Chalk

6.4 WFD assessment of rdWRMP24 BVP preferred pathway (Situation 4)

Environmental and social considerations have influenced the development of the rdWRMP24. The BVP preferred pathway (Situation 4) is influenced by a number of aspects which dictate the expected future demand within the region; these aspects include an Environmental Destination (a decision to deliver long-term sustainability and environmental resilience). The Environmental Destination within the rdWRMP24 BVP preferred pathway (Situation 4) sets out to achieve the EFI at specific assessment points across the Thames Water region. The Environmental Destination scenario delivers 422Ml/d of water to the environment through reductions to DO.

This will potentially lead to significant improvements for WFD in a large number of water bodies, supporting attainment of water body objectives.

The cumulative effects assessment for the BVP preferred pathway Situation 4 has identified 19 water bodies which are impacted by more than one BVP preferred pathway option. Of these water bodies, only one was assessed to have the potential for an increased risk of WFD deterioration due to multiple options: (Woods Farm increase DO (increasing abstraction by 2.4Ml/d by 2074), Moulsford 1 (new abstraction of 3.5Ml/d peak by 2033) and T2ST SRO (possible construction dewatering 2038 to 2050)). This is water body GB40601G600900 Berkshire Downs Chalk. This water body already has a poor status for quantitative dependent surface water body status so the increased abstraction could further exacerbate the issue. The environmental destination scenarios include closure of Bradfield and licence reduction at Pangbourne (reducing abstraction by 1.64Ml/d by 2030 and 5Ml/d by 2035 respectively) in this waterbody. These environmental destination reductions will help to reduce the cumulative impact of these options, and it is anticipated that with appropriate mitigation there would be no increased risk of deterioration. Further investigation is needed (such as scenario modelling, hydroecology assessment etc) to confirm this.

In addition to rdWRMP24 BVP preferred pathway, other planning applications and projects along with other water company WRMP options could lead to the potential for in-combination effects to some water bodies. The in-combination effects assessment identified 14 water bodies where multiple options and other plans occur. The in-combination effect assessment indicated that only one of these water bodies (GB40601G604100: Chiltern Chalk Scarp) is at risk of further WFD deterioration due to the combination of options and planning projects. Further information on the HS2 Phase 1 impacts would be required to quantify the in-combination effects on this water body.

6.5 Other plans and pathways

6.5.1 Other BVP pathways (Situations 1 and 8)

As part of the rdWRMP24, a WFD assessment has been carried out on two other BVP pathways, Situation 1 and Situation 8.

The BVP (Situation 1) contains 11 options that are not included in the BVP preferred pathway (Situation 4), but does not include three options which are included in the preferred pathway. When compared to the preferred pathway, the BVP (Situation 1) includes options that could lead to additional potential cumulative effects on eight additional water bodies. The cumulative effects assessment has not identified any additional water bodies at increased risk of WFD deterioration due to these combinations of options, over those already reported for the preferred pathway.

The BVP core pathway (Situation 8) contains no additional options that are not included in the preferred pathway, but does not include 16 options that are included in the preferred pathway. The cumulative effects assessment for core pathway does not require assessment of 11 waterbodies identified in the preferred pathway and has not identified any additional water bodies at increased risk of WFD deterioration. Under this situation the cumulative effect on the Berkshire Downs Chalk reported for the preferred pathway is not applicable.

6.5.2 LCP

The LCP includes four additional options, which are not included in the BVP preferred pathway (Situation 4) and does not include two options which are in the preferred pathway. When compared to the preferred pathway, the LCP includes options that could lead to additional potential cumulative effects on two additional water bodies and changes to cumulative effects in

one water body. The cumulative effects assessment has not identified any additional water bodies at increased risk of WFD deterioration due to these combinations of options.

Under the LCP the Thames (Reading to Cookham) water body would feature one less option than under the preferred pathway Sheeplands/Harpsden Drought Permit. However, as this does not change the outcome of the cumulative effects assessment as set out in the preferred pathway assessment, it has not been considered further.

6.5.3 BESP

The BESP includes seven additional options, which are not included in the BVP preferred pathway (Situation 4) and does not include seven options which are in the preferred pathway. When compared to the preferred pathway, the BESP includes options that could lead to additional potential cumulative effects on three additional water bodies and changes to cumulative effects in two water bodies. However, the cumulative effects assessment has not identified any additional water bodies at increased risk of WFD deterioration due to these combinations of options.

Under the BESP the Lower Thames Gravels water body would feature fewer options than under the preferred pathway. However, as this does not change the outcome of the cumulative effects assessment as set out in the preferred pathway assessment, it has not been considered further.

6.6 Next steps

Areas for future focus for any options carried forward include:

- Consultation with the EA to present and discuss key WFD risks and proposed approach to improving certainty of assessments.
- Collation and review of HMWB measures information from the EA for inclusion into the assessment of potential impediment to obtaining GEP.
- Collation and review of detailed baseline data concerning WFD biological, physico-chemical and hydromorphological elements identified as being at yellow, amber, or red risk in the Level 2 assessments. This may include targeted baseline surveys being undertaken specifically for the option assessments.
- Potential development of a conceptual model per water body linking together how potential hydrological changes could influence water quality and the sensitivity of aquatic communities to those changes. This will include a diagrammatic/visual presentation of linkages between abstraction impacts and the direct and indirect effects on physico-chemical and biological WFD status elements, indicating thresholds of WFD classes or tolerance to change. This step would aid consultation and discussion with stakeholders and the requirement for, or scoping of, any detailed modelling.
- Further assessment and investigations as set out in the WFD assessment and SRO WFD assessments.
- Further information on the design and operation of the options available as part of further option development.
- Update to Level 2 WFD assessments at a project level as the design progresses to incorporate additional information.

A. Updated WFD ACWG Level 1 output tables

The updated Level 1 WFD outputs are available on request.

B. WFD ACWG Level 2 assessment output tables

The outputs from the further WFD assessment undertaken can be provided upon request.


Thames
Water