



Thames to Affinity Transfer (T2AT)

Technical Annex B3 Water Framework Directive
(WFD) Compliance Assessment

Notice

Position Statement

- This document has been produced as the part of the process set out by RAPID for the development of the Strategic Resource Options (SROs). This is a regulatory gated process allowing there to be control and appropriate scrutiny on the activities that are undertaken by the water companies to investigate and develop efficient solutions on behalf of customers to meet future drought resilience challenges.
- This report forms part of suite of documents that make up the 'Gate 2 submission.' That submission details all the work undertaken by Thames Water and Affinity Water in the ongoing development of the proposed SROs. The intention of this stage is to provide RAPID with an update on the concept design, feasibility, cost estimates and programme for the schemes, allowing decisions to be made on their progress and future funding requirements.
- Should a scheme be selected and confirmed in the companies' final Water Resources Management Plan, in most cases it would need to enter a separate process to gain permission to build and run the final solution. That could be through either the Town and Country Planning Act 1990 or the Planning Act 2008 development consent order process. Both options require the designs to be fully appraised and, in most cases, an environmental statement to be produced. Where required that statement sets out the likely environmental impacts and what mitigation is required.
- Community and stakeholder engagement is crucial to the development of the SROs. Some high-level activity has been undertaken to date. Much more detailed community engagement and formal consultation is required on all the schemes at the appropriate point. Before applying for permission Thames Water and Affinity Water will need to demonstrate that they have presented information about the proposals to the community, gathered feedback and considered the views of stakeholders. We will have regard to that feedback and, where possible, make changes to the designs as a result.
- The SROs are at a very early stage of development, despite some options having been considered for several years. The details set out in the Gate 2 documents are still at a formative stage and consideration should be given to that when reviewing the proposals. They are for the purposes of allocating further funding not seeking permission.

Disclaimer

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

Contents

Notice	1-2
Position Statement	1-2
Disclaimer	1-2
Figures and Tables	1-6
Glossary	1-7
1. Introduction	1-1
1.1 Background	1-1
1.2 Legislative Drivers	1-2
1.2.1 The Water Framework Directive	1-2
1.2.2 Surface water bodies	1-2
1.2.3 Groundwater Bodies	1-3
1.2.4 Regulation 19	1-4
1.2.5 Summary of key WFD concepts	1-4
1.3 Purpose of report	1-6
1.4 Structure of report	1-6
1.5 Gate 1 WFD Findings for T2AT	1-7
1.5.1 Overview	1-7
1.5.2 Options Identification	1-9
2. Scheme Description	2-10
2.1 Introduction	2-10
2.2 Beckton Reuse Indirect (BRI)	2-10
2.3 Lower Thames Reservoir (LTR)	2-10
2.4 Design Assumptions	2-11
3. Methodology	3-1
3.1 ACWG methodology	3-1
3.2 Planning Inspectorate (PINS) WFD assessment methodology	3-2
3.3 Identification of relevant water bodies	3-1
3.4 Level 1 WFD – basic screening	3-1
3.4.1 Level 1 WFD – basic screening of surface water bodies	3-1
	1-3
Thames to Affinity Transfer (T2AT) Water Framework Directive (WFD) Compliance Assessment	

3.4.2	Level 1 – basic screening of groundwater bodies	3-1
3.5	ACWG Level 2 – detailed screening	3-3
4.	Identification of relevant water bodies	4-4
4.1	WFD water bodies	4-4
4.1.1	Beckton Reuse Indirect (BRI)	4-4
4.1.2	Lower Thames Reservoir (LTR)	4-1
4.2	Relevant water bodies summary	4-1
5.	Level 1 – basic screening	5-2
5.1	Introduction	5-2
5.2	BRI WFD baseline	5-2
5.2.1	Lea Navigation Enfield Lock to Tottenham Locks (GB106038027950)	5-2
5.2.2	Lea Navigation (Fieldes Weir to Enfield Lock) (GB106038077851)	5-3
5.2.3	Small River Lee (and tributaries) (GB106038033200)	5-4
5.2.4	Turkey Brook and Cuffley Brook (GB106038033180)	5-5
5.2.5	New River (GB806100111)	5-6
5.2.6	Lee (from Luton Hoo Lakes to Hertford) (GB106038033392)	5-6
5.2.7	Colne (upper east arm including Mimshall Brook) (GB106039029850)	5-7
5.2.8	Radlett Tertiaries (GB40602G602800)	5-8
5.2.9	Mid-Chilterns Chalk (GB40601G601200)	5-9
5.2.10	Relevant Local Target Measures	5-9
5.2.11	Designated sites	5-9
5.3	LTR WFD baseline	5-11
5.3.1	Overview	5-11
5.3.2	Colne Brook (GB106039023010)	5-11
5.3.3	Colne (Confluence with Chess to River Thames) (GB106039023090)	5-11
5.3.4	Alderbourne (GB106039023080)	5-12
5.3.5	Pinn (GB106039023070)	5-13
5.3.6	Horton Brook (GB106039023040)	5-14
5.3.7	Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm	5-14

5.3.8	Grand Union Canal, Maple Lodge to Uxbridge (Rivers Colne and Chess plus canal)	5-15
5.3.9	Thames (Cookham to Egham) (GB106039023231)	5-16
5.3.10	Queen Mother Reservoir (GB30642334)	5-16
5.3.11	Wraysbury Reservoir (GB30641523)	5-17
5.3.12	Lower Thames Gravels (GB40603G000300)	5-18
5.3.13	Radlett Tertiaries (GB40602G602800) and Mid-Chilterns Chalk (GB40601G601200)	5-18
5.3.14	Relevant Local Target Measures	5-18
5.3.15	Designated sites	5-18
5.4	Preliminary outcomes of the Level 1 – basic screening assessment	5-19
5.4.1	Introduction	5-19
5.4.2	Scheme activities	5-20
5.4.3	WFD groundwater body assessment	5-3
5.4.4	Temporary impacts	5-1
5.4.5	Level 1 – basic screening conclusions	5-1
6.	Preliminary Level 2 – detailed screening	6-3
6.1	Introduction	6-3
6.2	Confidence	6-4
6.3	BRI surface water findings	6-4
6.3.1	Impacts	6-4
6.3.2	Mitigation Measures assessment	6-6
6.4	LTR surface water findings	6-6
6.4.1	Impacts	6-6
6.4.2	Mitigation Measures assessment	6-9
6.5	Summary of findings	6-9
7.	Conclusion and recommendations	7-11
7.1	Summary	7-11
7.1.1	BRI summary	7-11
7.1.2	LTR summary	7-12
7.2	Recommendations	7-12

Appendix A	Complete ACWG Spreadsheets	A-1
A.1	WFD_Framework_Assessment_Spreadsheet_template_2019_data_LTR_100 MI/d A-1	
A.2	WFD_Framework_Assessment_Spreadsheet_template_2019_data_BRI_100 MI/d A-1	
Appendix B	Baseline WFD Data BRI option	B-1
B.1	Surface water baseline	B-1
B.2	WFD groundwater baseline	B-1
Appendix C	Baseline WFD Data LTR option	C-1
C.1	Surface water baseline	C-1
C.2	WFD lake baseline	C-1
C.3	WFD groundwater baseline	C-2
Appendix D	Assumed Embedded Mitigation Measures	D-1

Figures and Tables

Figure 1.1	Background to the WFD.....	1-6
Figure 2.1	Working solutions indicative route options for BRI and LTR.....	2-1
Figure 3.1	Levels of assessments required for each SRO Gate (ACWG, 2020).....	3-1
Figure 4.1	BRI option indicative location and associated WFD water bodies	4-1
Figure 4.2	LTR option indicative location and associated WFD water bodies.....	4-1
Figure 5.1	WFD watercourse interactions relating to the indicative BRI option.....	5-1
Figure 5.2	WFD watercourse interactions relating to the indicative LTR option	5-1

Table 1.1	Summary of the Gate 1 assessment findings.....	1-7
Table 3.1	Scoring system adopted in Level 1 – basic screening as outlined in the ACWG Methodology.....	3-2
Table 4.1	Baseline WFD water bodies interacting with the BRI option	4-4
Table 4.2	Baseline WFD water bodies interacting with the LTR option.....	4-1
Table 5.1	BRI relevant measures in RBMP2 Thames River Basin Management Plan ...	5-10
Table 5.2	LTR relevant measures in RBMP2 Thames River Basin Management Plan ...	5-18

Table 5.3:	Operational activities associated with both options which are likely to impact on the water environment with associated assumed mitigation.....	5-2
Table 5.4:	Operational activities associated with each option as outlined in the ACWG methodology and Appendix A.	5-1
Table 5.5	Activities associated with both options in relation to groundwater receptors	5-3
Table 5.6	Activities relating directly to each groundwater body and option with associated ACWG impact scores post embedded mitigation.....	5-6
Table 6.1	Potential impacts for the BRI option on the Lea Navigation Enfield Lock to Tottenham Locks water body	6-5
Table 6.2	Potential impacts for the LTR option on the River Thames (Cookham to Egham) water body	6-7
Table 6.3	Potential impacts for the LTR option on the Queen Mother and Wraysbury Reservoirs	6-8
Table 6.4	WFD water bodies screened into Level 2 – detailed screening assessment (see descriptions for Level 2 scores in Table 3.1).....	6-9

Glossary

Term	Acronym/Definition
ACWG	All Company Working Group
A/HMWB	Artificial/Heavily Modified Water Body
Baseline	This term describes the existing nature of the water environment and WFD status within the study area at a fixed point in time.
BNG	Biodiversity Net Gain – term used to describe the leaving of the environment in an improved state then at the start of a scheme.
CDR	Conceptual Design Report
Construction	Construction, also referred to as the construction phase, refers to the all activity on and offsite required to implement the proposed development. The construction phase is considered to commence with the first activity on site, for example the creation of site access or site clearance works, and ends with demobilisation.
DO	Deployable Output
DCO	Development Consent Order – application for a consent to undertake a NSIP which is made to the PINS.
Defra	Department of the Environment, Food and Rural Affairs – Defra is the government department responsible for environmental

Term	Acronym/Definition
	protection, food production and standards, agriculture, fisheries and rural communities in the United Kingdom of Great Britain and Northern Ireland. Defra is a ministerial department, supported by 33 agencies and public bodies.
DRA	Direct River Abstraction
dRBMP3	Draft River Basin Management Plan Cycle 3. Publication due in September 2022.
EA	Environment Agency – A non-departmental public body with responsibilities relating to the protection and enhancement of the environment in England.
EU	European Union
Effect	The nature of the change(s) likely to occur as a result of a particular impact.
Enhancement	Measures that seek to improve the landscape of the site and/or its wider setting beyond its baseline condition
Gate	The first SRO gate. This stage is for initial concept design and decision making. This gate has been completed for SESRO.
Gate 2	The second SRO gate. This stage is for detailed feasibility, concept design and multi-solution decision making. SESRO is currently at this gate.
Gate 3	The third SRO gate. This stage is for develop design, finalised feasibility, pre-planning investigations and planning applications. The next stage for SESRO.
Gate 4	The fourth SRO gate. This stage is for planning applications, procurement and land purchase. To inform the EIA.
GCS	Good Chemical Status
GEP	Good Ecological Potential
GES	Good Ecological Status
GPP	Guidance for Pollution Prevention
GWDTE	Groundwater Dependent Terrestrial Ecosystems
HMWB	Heavily Modified water body

Term	Acronym/Definition
km	Kilometre
Land use	This term refers to what land is used for and is based on broad categories such as urban, industrial, agriculture or forestry.
Main River	Designated as Main Rivers rather than Ordinary Watercourses. The Environment Agency carries out maintenance, improvement or construction work on main rivers to manage flood risk. Although usually larger rivers and streams, this is not always the case.
Mitigation Measures	Improvement measures that need to be delivered in HMWBs to attain Good Ecological Potential
NGR	National Grid Reference
NSIP	Nationally Significant Infrastructure Project
Operation	Also referred to as completion, this term describes the operation phase of the completed development and is considered to commence at the end of the construction phase, after demobilisation. The duration of the operation phase is dependent on the nature of the proposed development.
Ordinary watercourse	Any watercourse that is not designated as Main River. Lead local flood authorities, district councils and internal drainage boards carry out flood risk management work on ordinary watercourses.
PINS	Planning Inspectorate
PPGs	Pollution Prevention Guidelines
RAPID	Regulators Alliance for Progressing Infrastructure Development
Raw Water	Non-Potable Water
RBD	River Basin District
RBMPs	River Basin Management Plans
Regulation 19	Regulation under WFD. This can be invoked to allow for a project to go ahead even if there are adverse impacts at a water body scale caused by a scheme, provided certain conditions are met.
RFD	Reason for Deterioration
RNAG	Reasons for Not Achieving Good

Term	Acronym/Definition
Scheme elements	The different parts of the proposed scheme that make up the whole, such as the reservoir footprint or access road, which need to be assessed individually for their impact.
Sensitivity (of a receptor)	A judgement regarding the susceptibility of a receptor to the change arising as a result of the proposed development and the value attached to the receptor.
SESRO	South-East Strategic Reservoir Option
SRO	Strategic Resource Options
SSSI	Site of Special Scientific Interest – A conservation designation denoting a protected area in the United Kingdom. The Sites are protected by law to conserve their wildlife or geology.
Study area	The area within which it is considered that changes arising as a result of the proposed development would result in the highest and/or most important direct or indirect effects.
WB	Water body
WFD	Water Framework Directive – The Water Framework Directive (2000/60/EC) is a EU directive which was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (“the WFD Regulation”). It aims to achieve good status of all water bodies (surface waters, groundwaters and the sites that depend on them, estuaries and near-shore coastal waters) and prevent any deterioration to these water bodies. It has introduced a comprehensive River Basin Management Plan system to protect and improve the ecological quality of the water environment. It is underpinned by the use of environmental standards.
Worst case	Reasonable prediction of the scenario that would result in the highest level of effect(s).
WRSE	Water Resources in the South East
WTW	Water Treatment Works

1. Introduction

1.1 Background

1.1 This document presents a project-specific, Water Framework Directive (WFD) assessment for the proposed Thames to Affinity Transfer Strategic Resource Option (T2AT). The aims of the document are to provide:

- background information on the proposed scheme and the WFD legislation;
- a baseline understanding of the WFD water bodies that would be affected by the proposed scheme;
- an assessment of the potential for the proposed scheme to cause deterioration in the baseline WFD status of any water body; and,
- an assessment of the potential to impact any proposed water body improvement measures and therefore the ability to meet target WFD objectives.

1.2 The assessment builds upon work undertaken at Gate 1 of the Regulators Alliance for Progressing Infrastructure Development (RAPID) gated process, which undertook a high-level screening assessment of WFD compliance¹ of a large number of T2AT options using the All Company Working Group (ACWG) methodology.² This method applied a standardised approach as part of wider optioneering to assess eight strategic options. The Gate 1 screening process reviewed the options and assessed the potential impacts on the various water bodies impacted by the proposed scheme using a simple scoring system. The assessment undertaken as part of Gate 1 examined each of the proposed options to assess whether (and where possible, how) individual scheme elements are likely to impact WFD water bodies. The report was a deliverable for the RAPID which was formed to help accelerate the development of new water infrastructure and design future regulatory frameworks and was undertaken for all eight T2AT Strategic Resource Options (SROs).

1.3 The assessment presented in this document is provided in respect of the requirements of RAPID (see Main Gate 2 Report). A formal WFD assessment will be undertaken pursuant to the consenting process, based on more detailed information which will be available at subsequent stages in the gated process.

1.4 As part of Gate 2, four strategic options are being taken forward for T2AT:

- Beckton Reuse Indirect (BRI) 100 MI/d Deployable Output (DO)
- Beckton Reuse Indirect (BRI) 50 MI/d DO

¹ Mott Macdonald, 2021, Thames to Affinity Transfer Strategic Reservoir Option – Water Framework Directive Assessment. Rapid Gate 1 submission – Annex B3.

² WRSE (2020) All Company Working Group Water Framework Directive: Consistent framework for undertaking no deterioration assessments

- Lower Thames Reservoir Transfer (LTR) 100 MI/d DO
- Lower Thames Reservoir Transfer (LTR) 50 MI/d DO

1.5 The ACWG methodology template for WFD has been filled out for the largest two supply options (i.e. BRI 100 MI/d DO and LTR 100 MI/d DO) and is presented in Appendix A. As the only alterations between the 100 MI/d and 50 MI/d options are the diameter of pipes and water treatment work capacity, it is assumed that if the 100 MI/d options are compliant with the WFD, the 50 MI/d options will, by default, also be compliant.

1.6 This assessment will use the greater design detail and findings of studies to update the Gate 1 WFD assessment,³ providing more certainty on the likely impacts and their severity.

1.2 Legislative Drivers

1.2.1 The Water Framework Directive

1.7 The WFD is an EU Directive which was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (“the WFD Regulation”). As of 31/12/2020 the WFD Regulations became retained EU law, and the references in the WFD Regulations to the Water Framework Directive refer to the version of the Directive that was in force at the time when the WFD Regulations came into force (10 April 2017). Therefore, the principal legal basis is the WFD Regulations which currently mirror the EU Directive. In this report “WFD” refers to WFD Regulations applicable to England and Wales, not the EU Directive. The WFDs principal aims are to protect and improve the water environment and promote the sustainable use of water. The headline environmental objectives of the WFD and its daughter directives are to:

- Prevent the deterioration of aquatic ecosystems; and,
- Protect, enhance and restore water bodies to Good Status, which is based on ecology (with its supporting hydromorphological and physico-chemical factors) and chemical factors for surface water, and water quantity and Chemical Status for groundwaters. Where a water body is designated as Heavily Modified, or Artificial, the water body will need to meet Good Ecological Potential.

1.2.2 Surface water bodies

1.8 The WFD sets a default objective for all rivers, lakes, estuaries, groundwater and coastal water bodies to achieve Good Status by 2027 at the latest. For natural surface water bodies, Good Status is a function of both Good Chemical Status (GCS) and

³ Mott Macdonald, 2021, Thames to Affinity Transfer Strategic Reservoir Option – Water Framework Directive Assessment. Rapid Gate 1 submission – Annex B3.

Good Ecological Status (GES). The River Basin Management Plans (RBMPs) outline the actions required to enable natural water bodies to achieve these objectives through a programme of measures to address pressures. Artificial and Heavily Modified Water Bodies (A/HMWBs) are considered unable to attain GES due to the modifications that are necessary to maintain their function for society or their 'human use' as they provide important socio-economic benefits. They are, however, required to achieve Good Ecological Potential (GEP), through the implementation of a series of Mitigation Measures outlined in the RBMP which essentially aim to enhance the ecology in the water body without compromising its human use. A/HMWBs still need to attain GCS which, along with GEP will collectively result in Good Status in these water bodies.

- 1.9 New activities and schemes that affect the water environment may adversely impact biological, hydromorphological, physico-chemical and/or chemical quality elements (WFD quality elements) that could lead to a deterioration in water body status. They may also preclude the implementation or effectiveness of the proposed improvement measures, leading to the water body failing to meet its WFD objectives for GES/GEP. Under the WFD, activities and schemes must not cause deterioration in water body status or prevent a water body from meeting GES/GEP by precluding the ability for these improvement measures (termed Mitigation Measures in HMWBs) to be delivered.
- 1.10 The overall ecological status of a water body is primarily based on consideration of its biological quality elements (phytoplankton, macrophytes, phytobenthos, benthic invertebrates and fish) and is determined by the lowest scoring of these elements. These biological elements are 'supported' by the physico-chemical (water quality) and hydromorphological (hydrological or tidal regime, river continuity and morphological conditions (i.e. habitat)) quality elements.
- 1.11 To achieve GCS, a water body must pass a separate chemical status assessment, relating to pass/fail checks on the concentrations of various identified priority substances.

1.2.3 Groundwater Bodies

- 1.12 For groundwater bodies, good status has a quantitative and a chemical component. Both are measured on a scale of good or poor, and a confidence rating is assigned to the status assessment of high or low. Together, these provide a single final classification of either good or poor status. There is also a trend objective set for groundwater bodies where environmentally significant and sustained rising trends in pollutant concentrations need to be identified along with a definition of the starting point (percentage of level or concentration) for trend reversal. Furthermore, the daughter directive of the WFD specifically concerning groundwater (the

Groundwater Directive) also requires the prevention of any input of priority substances and limiting (or control) of the input of all other substances to groundwater to prevent the deterioration of status.

1.2.4 Regulation 19

1.13 Regulation 19 can be invoked if; ‘new modifications’ are:

- of overriding public interest and/or the environmental and social benefits of achieving the WFD objectives are outweighed by the benefits of the new modifications to human health, safety and sustainable development;
- there are no significantly better environmental options that are technically feasible or not disproportionately costly; and,
- all practicable steps for mitigation have been taken.

1.2.5 Summary of key WFD concepts

1.14 A summary of key WFD concepts is presented in Figure 1.1. This includes a definition of what a water body is in relation to this assessment.

WFD Objectives

The WFD is a European Directive, which sets out a strategic planning process for the purposes of managing, protecting and improving the water environment. The Water Framework Directive is an EU Directive which was transposed into law in England and Wales by the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (“the WFD Regulation”). As of 31/12/2020 the WFD Regulations became retained EU law, and the references in the WFD Regulations to the Water Framework Directive refer to the version of the Directive that was in force at the time when the WFD Regulations came into force (10 April 2017). Therefore, the principal legal basis is the WFD Regulations which currently mirror the EU Directive. In this report “WFD” refers to WFD Regulations applicable to England and Wales, not the EU Directive.

The WFD separates the water environment into discreet spatial units, referred to as ‘water bodies’. Water bodies are intended to represent either (i) spatially constrained bodies of water e.g. lakes or groundwater aquifers or (ii) zones of a linear body of water that share similar physical characteristics e.g. the division of larger rivers into discreet reaches that are relatively homogenous in character.

The main aims of the original WFD legislation are to:

- Prevent deterioration in the status of aquatic ecosystems, protect them and improve the ecological condition of waters;
- Aim to achieve at least ‘Good Status’ for all waters by 2015 (2021 or 2027) where fully justified within an extended deadline under Article 4.4;
- Promote sustainable use of water;
- Conserve habitats and species that depend directly on water;
- Progressively reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;
- Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; and,
- Help reduce the effects of floods and droughts.

The Environment Agency is the Government’s ‘competent authority’ for implementing the WFD; it monitors, advises and manages many aspects of the water environment through regulating discharges, abstractions and processing environmental permits and licenses. The Environment Agency is committed to implementing environmental improvements that would result in the achievement of the objectives of the WFD.

Figure 1.1 Background to the WFD

WFD Classification

The WFD classification for a defined water body is produced by the assessment of a wide variety of different 'elements' which includes:

- 'biological elements' such as phytoplankton, macrophytes, phytobenthos, benthic invertebrates and fish;
- 'supporting elements' that include chemical measurements such as ammonia, dissolved oxygen, pH, phosphate, copper, zinc and temperature; and,
- 'supporting conditions' (sometimes referred to as hydromorphology) that assess the physical attributes of the water body such as 'river continuity', 'quantity and dynamics of flow' and 'morphology'.

The assessment given for each element is also accompanied by a measure of certainty in the result. The status classification is published in the RBMP and provides a baseline condition against which compliance and future improvements can be measured.

Figure 1.1 Background to the WFD

1.3 Purpose of report

1.15 The aims of the document are to provide:

- background information on the proposed scheme and the WFD legislation;
- a high-level baseline understanding of the water bodies that would be affected by the proposed scheme, within the context of the WFD;
- an assessment of the potential for the proposed scheme to cause deterioration in the WFD status of any water body directly or indirectly; and,
- an assessment of the potential impacts on water body improvement measures and the ability to meet WFD objectives.

1.4 Structure of report

1.16 The document is structured as follows:

- Introduction (Section 1);
- Scheme description (Section 2);
- Methodology (Section 3);
- Identification of Relevant water bodies (Section 4);
- Level 1 – Basic screening (Section 5);
- Level 2 – Detailed screening (Section 6); and,
- Conclusions and recommendations (Section 7).

1.5 Gate 1 WFD Findings for T2AT

1.5.1 Overview

1.17 The Gate 1 WFD assessment was undertaken by Mott MacDonald in 2021.⁴ The assessment followed the ACWG methodology and the Level 1 – basic screening assessment was completed. The assessment was undertaken for eight options⁵:

- Sunnymeads 1;
- Maidenhead;
- Teddington Direct River Abstraction (DRA);
- Sunnymeads 2a;
- Walton 2b (and Mogden Reuse Indirect 3);
- Lower Thames Reservoir Transfer 2a;
- Beckton Reuse Indirect; and,
- Mogden Reuse Indirect 3 (assessed as Walton 2b due to identical option in terms of environmental impact).

1.18 A summary of the Gate 1 findings can be found in Table 1.1.

Table 1.1 Summary of the Gate 1 assessment findings

Options	Level 1 basic screening findings	Level 2 detailed screening findings
Sunnymeads 1	No/very low potential for WFD deterioration. No Level 2 assessment required.	N/A
Maidenhead	Potential for WFD deterioration. Level 2 assessment required.	Potential for deterioration of fish, invertebrates, hydrological regime, dissolved oxygen and phosphate due to potential risk of reduced flow from additional abstraction. Potential impediments to meeting Good Ecological Status are phosphate levels increased as this is currently below Good.

⁴ Mott Macdonald, 2021, Thames to Affinity Transfer Strategic Reservoir Option – Water Framework Directive Assessment. Rapid Gate 1 submission – Annex B3.

⁵ Mott Macdonald, 2021, Gate 1 submission for Thames to Affinity Transfer. [Microsoft Word - Gate one submission - T2AT \(amazonaws.com\)](#)

Options	Level 1 basic screening findings	Level 2 detailed screening findings
Teddington Direct River Abstraction (DRA)	Potential for WFD deterioration. Level 2 assessment required.	Potential for deterioration of fish, macrophytes and phytobenthos, hydrological regime, dissolved oxygen and phosphate due to potential risk of reduced flow from additional abstraction. Potential impediments to meeting Good Ecological Status if the hydrological regime is impacted as this currently does not support Good status.
Sunnymeads 2a	No/very low potential for WFD deterioration. No Level 2 assessment required.	N/A
Walton 2b (and Mogden Reuse Indirect 3)	Potential for WFD deterioration. Level 2 assessment required.	Potential for deterioration of fish, macrophytes and phytobenthos, hydrological regime, dissolved oxygen and phosphate. Potential impediments to meeting Good Ecological Status if the hydrological regime is impacted as this currently does not support Good status
Lower Thames Reservoir Transfer 2a	No/very low potential for WFD deterioration. No Level 2 assessment required.	N/A
Beckton Reuse Indirect	No/very low potential for WFD deterioration. No Level 2 assessment required.	N/A

1.5.2 Options Identification

- 1.19 Since the Gate 1 assessment was undertaken, an Options Identification process has been completed. The method and results of this process are outlined in the Options Appraisal Methodology Report (Technical Supporting Document A4 Options Appraisal Methodology Report). The outcomes being that two options have been carried through to this Gate 2 assessment: Beckton Reuse Indirect (BRI) and Lower Thames Reservoir (LTR).

2. Scheme Description

2.1 Introduction

2.1 The two options which are included as part of this Gate 2 assessment are currently at concept design and are outlined below. They are: Beckton Reuse Indirect (BRI) and Lower Thames Reservoir (LTR). A high-level scheme description, including the selection of these two options from a longer list of options considered at Gate 1, is provided in Appendix A4 Options Appraisal Methodology Report, within which is further supporting information detail that complements this WFD assessment. Further technical detail is provided in the T2AT Gate 2 Technical Supporting Document A1, Concept Design Report.

2.2 Beckton Reuse Indirect (BRI)

2.2 The BRI option involves the abstraction of raw water from the River Lee downstream of Enfield Island and transfer to a new wastewater treatment work (WTW), followed by conveyance of the drinking water produced to the existing Brookmans Park service reservoir (SR) and directly into the existing drinking water transfer network. The scheme will depend directly on the indirect transfer of recycled water from the Beckton effluent reuse scheme (part of the London Effluent Reuse SRO). The provision of water to the River Lee (from the London Effluent Reuse) has been separately assessed to be compliant with WFD⁶. As such, this element of the scheme is not considered further as part of this assessment. Abstraction from the River Lee as part of the BRI option is therefore directly dependant on the outfall volumes from the London Effluent Reuse SRO (a 'put and take' licence scenario). One of these SROs would not be delivered without the other.

2.3 The key components of the Scheme will include:

- an intake on the River Lea south of the Enfield Island loop and raw water pumping station set back from the watercourse;
- a raw water transfer pipeline to a new WTW at Seawardstone;
- a treated water transfer pipeline from the new WTW to Brookmans Park SR; and,
- a gravity driven treated water transfer pipeline from Brookmans Park SR to the existing North Mymms WTW

2.3 Lower Thames Reservoir (LTR)

2.4 The LTR option proposes an increased abstraction from Thames Water's Datchet and Sunnymead intakes, compared to current abstraction rates but remains within the

⁶ London Effluent ReUse SRO – B.2.4. Gate 2 Water Framework Directive (WFD) Regulations Assessment Report (Thames Water, 2022)

current licensed quantity, which supply the Wraysbury and Queen Mother reservoirs respectively. This option would be directly dependant on raw water supplied to the River Thames from the South East Strategic Reservoir Option (SESRO), with the volume of water abstracted being equivalent to the volume supplied. As noted in Section 2.2, the provision of water to the River Lee (from the London Effluent Reuse) has been separately assessed to be compliant with WFD⁶. As such, this element of the scheme is not considered further as part of this assessment. The increase in supply of water to the two reservoirs will be proportionate to an increased discharge from the reservoirs via a proposed connection into Affinity Water's existing Wraysbury tunnel at the existing Iver WTW. This raw water would then be diverted to a new WTW to the north of the existing Iver WTW. The treated water would then be subsequently conveyed to Harefield to utilise the available storage capacity at the existing Harefield SR.

2.5 The key components of the Scheme will include:

- increased abstractions from the River Thames at Datchet and Sunnymead intakes;
- a connection into the existing Wraysbury tunnel at the existing Iver WTW and a new raw water pumping station;
- a new raw water connection from the new raw water pumping station at Iver WTW to the new WTW;
- a new emergency discharge from the WTW to the Colne Brook; and,
- a clean water transfer pipeline from the new WTW to the existing Harefield SR.

2.6 The indicative location of the options are shown in Figure 2.1.

2.4 Design Assumptions

2.7 In the absence of a formal detailed design for the T2AT options, a number of design assumptions have been made in order to predicate the assessment presented in this document and therefore understand the potential impacts of the options on the water environment. These assumptions have been outlined through review of the Thames to Affinity Transfer: Gate 2, Supporting Documents Orientation Report, discussions with the design engineers and review of the ACWG methodology,⁷ however, none of these assumptions have been formally committed to and therefore they cannot be assumed to be definitive at this stage. The assumptions are outlined below and are in addition to the mitigation measures assumed as part of the ACWG Methodology (Appendix A and Appendix D).

⁷ WRSE (2020) All Company Working Group Water Framework Directive: Consistent framework for undertaking no deterioration assessments

- Below ground structures (including pipelines, piling and foundations) will be constructed such that they will not form a preferential pathway for pollution to groundwater or cause alterations in groundwater flow or levels;
- Risk assessments will be undertaken for excavation works and dewatering to ensure no adverse impact on watercourses, wetland habitats or abstractions. Dewatering discharge will be treated and recharged, if necessary, before discharge to the water environment;
- Any discharge from WTW or commission lagoons will be to the WFD water body which the WTW is situated and will be treated to a suitable level (to be agreed with the regulator) as to not cause any potential impacts to water quality of the receiving water body. Flow will also not exceed the maximum agreed rate;
- Best practice pollution prevention will be followed for all construction works which will include following the Guidance for Pollution Prevention (GPPs) in particular, GPP1, GPP5 and GPP21;⁸
- Where watercourses have not been identified as being micro-tunnelled as part of the option crossing schedules it is assumed they will be flumed during construction. This will be a short-term construction activity (i.e. fewer than seven days) which will ensure the watercourse is returned to its natural function following installation of the pipe section;
- The pipe network will not be buried any deeper than 8 m below existing ground level for both options;
- The only section of either option to extend below ground further than 8 m is the shaft required for the LTR option at Iver WTW which is expected to be approximately 14 m below existing ground level. Water extracted from the ground during construction will be discharged to Iver WTW and treated before discharging to the water environment;
- There will be no weirs or impoundments as part of the two options. This assumption will need to be reviewed at the next stage of design and the assessment updated accordingly;
- The provision of water from the River Thames (from SESRO) and from the River Lee (from the London Effluent Reuse) have been separately assessed as compliant with WFD. As such, this will not be considered as part of this assessment as it is covered in the WFD assessments for both respective SROs; and,
- Abstraction from the River Lee (BRI option), River Thames, Queen Mother Reservoir and Wraysbury Reservoirs (LTR option) will remain within licensed quantities as granted by the Environment Agency; the additional volumes taken being provided by the London Effluent Reuse SRO and SESRO Schemes.

⁸ National Resources Wales, Scottish Environment Protection Agency, Northern Ireland Environment Agency, (2021) Guidance for Pollution Prevention: [Guidance for Pollution Prevention \(GPPs\) - Full list | NetRegs | Environmental guidance for your business in Northern Ireland & Scotland](#)

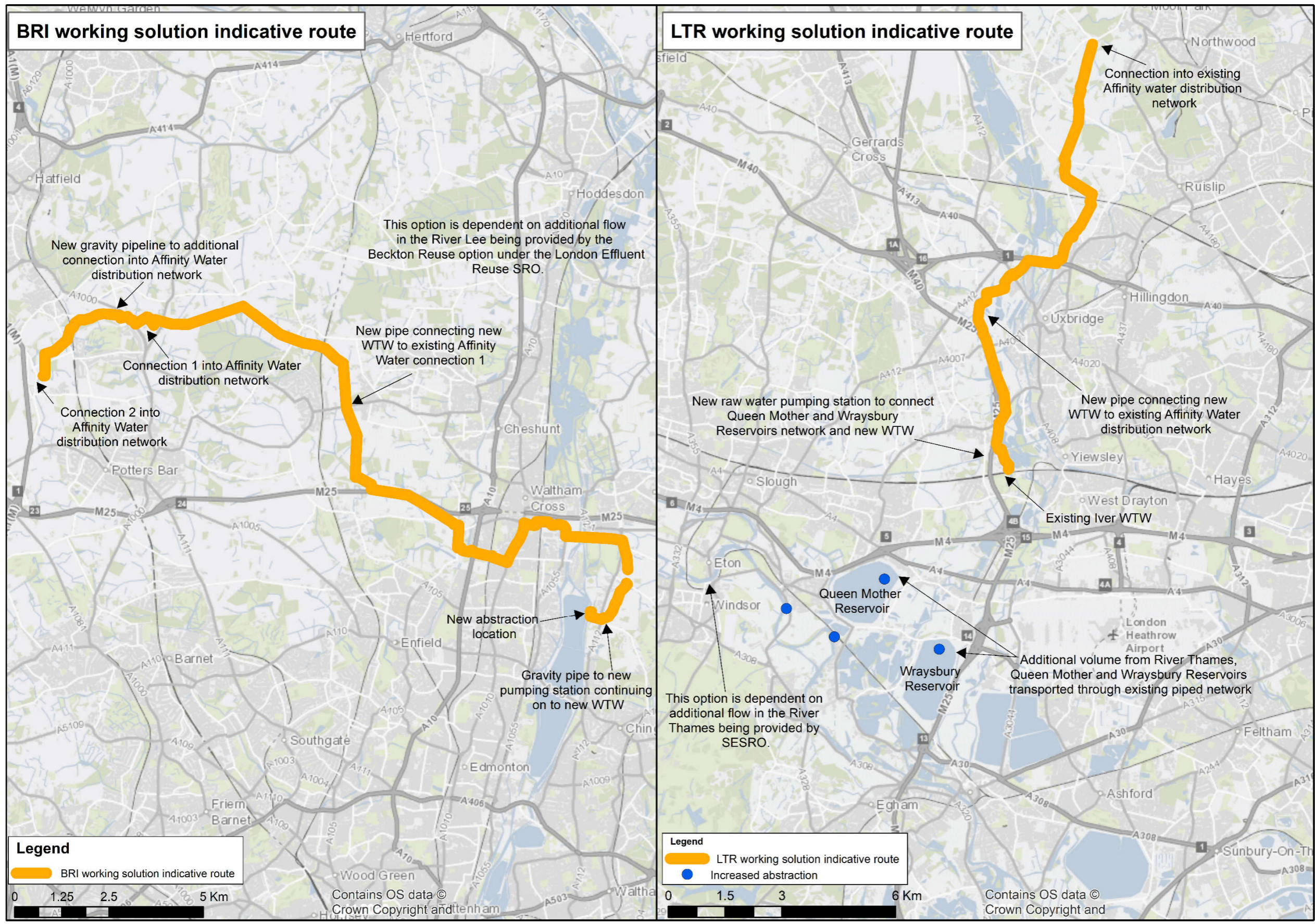


Figure 2.1 Working solutions indicative route options for BRI and LTR

3. Methodology

3.1 ACWG methodology

3.1 The ACWG guidelines set out an approach and an accompanying reporting spreadsheet for assessing WFD risk for all SROs. An illustration of the gated process from these guidelines is shown in Figure 3.1.

3.2 The ACWG guidelines identify three WFD objectives for assessing WFD risk. These are established from Regulation 13 of the original European WFD legislation as follows:

- Objective 1: To prevent deterioration of any WFD element of any surface and groundwater body – in line with Regulation 13(2)(a) and 13(5)(a);
- Objective 2: To protect, enhance and restore each body of surface water, and groundwater, with the aim of achieving the respective good ecological and chemical status if not already achieved, by 22 December 2021 – in line with Regulation 13(2)b and 13(5)c; and,
- Objective 3: To ensure that the legally-binding planned programme of water body measures in the second cycle of River Basin Management Planning (RBMP2) to protect and enhance the status of water bodies is not compromised – in line with Regulation 14(a).

3.3 The WFD Assessment Objectives detailed above are the fundamental WFD Assessment Objectives that have been used for testing as a ‘test of constraint’ for the two 100 MI/d DO T2AT options as outlined in Section 1.1.

3.4 There are a number of further WFD Assessment Objectives, set out in the Water Resource Planning Guidelines (WRPG), which are outlined below. These are considered as progressive WFD Assessment Objectives rather than tests of constraint and do not lead to WFD non-compliance of T2AT if not achieved. These are as follows:

- To assist the attainment of the WFD Objectives for the waterbody – in line with Regulation 13(2)(b) and 13(2)(c);
- To assist the attainment of the objectives for associated WFD protected areas – in line with Regulation 13(6); and,
- To reduce the treatment needed to produce drinking water and look to work in partnership with others, promoting the requirements of Article 7 of the WFD.

3.5 The ACWG assessments from Gate 1 have been reviewed and updated. The Gate 2 assessments involve a review and update of the ACWG assessments which were completed at Gate 1 based on additional design detail and further baseline

information. The methodology and design information can be found in Appendix A4 – Options Appraisal Methodology Report.

3.6 The ACWG methodology has been adopted and follows a staged process:

- List relevant water bodies – identify water bodies which have the potential to be impacted by the Scheme.
- Level 1 – basic screening assessment – A preselected list of activities are assigned to those water bodies identified based on design information.
- Level 2 – detailed screening assessment – where water bodies have been identified as being potentially impacted (as outlined in Section 4) they are carried forward to Level 2 where specific activities and potential impacts are assessed against all relevant WFD elements for the three objectives identified above.

3.2 [Planning Inspectorate \(PINS\) WFD assessment methodology](#)

3.7 This assessment follows the ACWG methodology in order to assess WFD compliance risk during the initial stages of design. However, once the design has been sufficiently progressed such that the project will enter into the formal planning system (the project could be designated as a Nationally Significant Infrastructure Project (NSIP) and therefore it would enter the Development Consent Order (DCO) process) WFD compliance will be assessed in respect of the process set out in The Planning Inspectorate (PINS) Advice Note 18.⁹ The guidance suggests that a WFD compliance assessment be comprised of three key components:

- Screening assessment – to determine what activities associated with the proposed development can be screened out at this stage of the process;
- Scoping assessment – to identify activities as part of the proposed development which have the potential to impact relevant water bodies and their quality elements, and;
- Impact assessment – a detailed impact assessment of the water bodies and their quality elements that are considered to be likely affected by the proposed development. Any potential issue for non-compliance would be highlighted at this stage along with consideration to Mitigation Measures and enhancements that would contribute to WFD objectives.

3.8 At the current stage (Gate 2), the assessment is set out to align with the ACWG methodology adopted for all SROs up to and including Gate 3. At Gate 4, this WFD assessment will be refined to support the Development Consent Order (DCO) process which will require the assessment to align with the PINS guidance. An illustration of the gated process from is shown in Figure 3.1.

⁹ Planning Inspectorate, 2017, The Water Framework Directive, Advice Note 18.

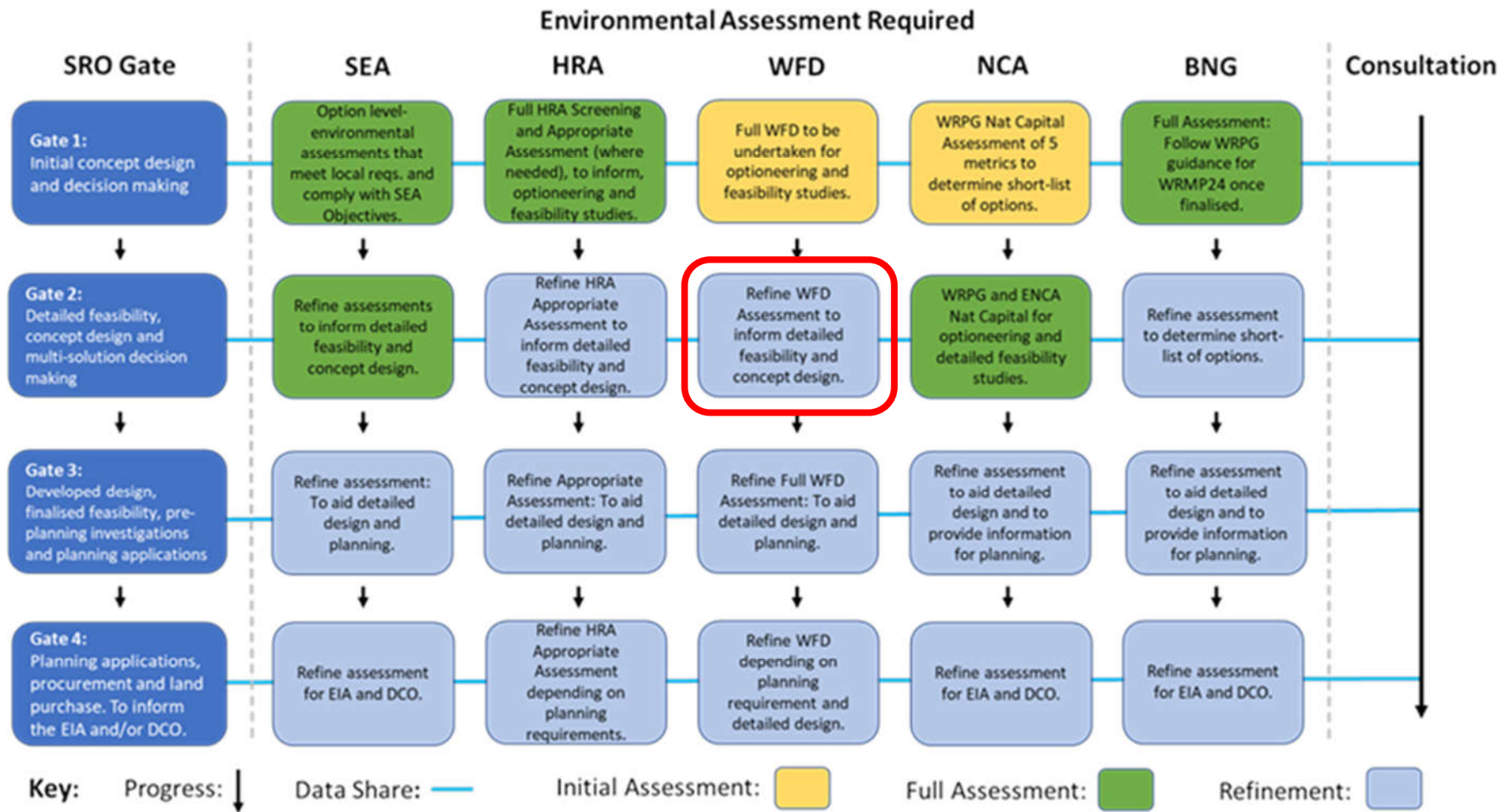


Figure 3.1 Levels of assessments required for each SRO Gate (ACWG, 2020)

3.3 Identification of relevant water bodies

3.9 The first step of the ACWG methodology is to identify any water bodies which have the potential to be impacted by the Scheme. For this assessment, any water body crossed by either of the options was included in this assessment. This included surface and groundwater bodies. The name, ID and type of water body are included, and the requirement of a groundwater body assessment is determined.

3.4 Level 1 WFD – basic screening

3.4.1 Level 1 WFD – basic screening of surface water bodies

3.10 The Level 1 screening has been completed for all construction works and the combined operating effects of the options. The method used for the Level 1 – basic screening assessment screens in those water bodies that have the potential to be impacted by scheme activities based on a scoring methodology outlined in the ACWG methodology and Table 3.1 below.

3.11 Predefined activities have an associated score from –2 to 3 which can be assigned to each water body based on the option design information and assumed embedded mitigation measures as outlined in the ACWG assessment spreadsheet. Where specific Embedded Mitigation is known to be in place as part of the preliminary design, this mitigation has been added to the AGWG assessment spreadsheet and Appendix D where appropriate. If a water body achieves a maximum score above 1 (i.e. one or more of the scheme activities has a medium or high impact) they are carried forward to the Level 2 – detailed screening assessment.

3.12 The scores associated with each activity will be reviewed using professional judgement to ensure that no activity is screened out at the Level 1 assessment stage without consideration of the significance.

3.4.2 Level 1 – basic screening of groundwater bodies

3.13 The ACWG assessment spreadsheet does not accommodate the assessment of groundwater bodies. Therefore, the basic screening of groundwater bodies will be completed within this report. The activities outlined in the ACWG assessment will be used to determine potential impact scores to the groundwater bodies. Where there are no relevant activities listed in the ACWG assessment spreadsheet which align with the Scheme activities potentially impacting the water body, the most appropriate activity will be adopted to identify the most likely impact score.

3.14 Although the ACWG methodology screens out water bodies which receive an impact score of 1 or lower, professional judgement will also be used to determine if the methodology applied through the ACWG is sufficiently robust to ensure that

potential impacts are not screened out without consideration of their significance. At later stages of the design process, these will be reassessed to ensure design changes have not caused the impact score to increase and/or there is evidence to demonstrate that the conclusions of the ACWG screening process is not sufficiently robust.

Table 3.1 Scoring system adopted in Level 1 – basic screening as outlined in the ACWG Methodology

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 waterbody.
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 waterbody 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.
Low	1	Impacts that, when taken on their own, have the potential to lead to a minor localised, short-term and fully reversible effects 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.
Medium	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.
High	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.

3.5 ACWG Level 2 – detailed screening

3.15 Any activity outlined in the Level 1 – basic screening with an impact score greater than 1 which has been highlighted as taking place within a water body is carried through to the Level 2 – detailed screening assessment. The same impact scoring (Table 3.1) is used to determine if the activity has a potential to impact on any of the WFD elements in relation to the objectives outlined in Section 1.2.

3.16 Within the ACWG template, we note the following guide to how we have documented the WFD assessment:

- Assessment has been undertaken against the published draft RBMP3 (dRBMP3) (2019) status and dRBMP3 status targets,¹⁰ however, RBMP2 Mitigation Measures have been used for the assessment of A/HMWB. The pre-populated data in the ACWG template also includes status in other years, but these are not applicable and have not been assessed against.
- For WFD status elements, in the upper section of the worksheet, the relevant WFD objectives that have been assessed against are ‘Deterioration between status classes’ (Objective 1) and ‘Impediments to GES/GEP’ (Objective 2).
- Where dRBMP3 (2019) reported status is High or Good, Objective 2 is not applicable and has not been assessed against. The relevant WFD status elements for assessment of Objective 1 and Objective 2 in river water bodies are those in the WFD Regulations.
- For RBMP2 Mitigation Measures, in the lower section of the worksheet, the relevant WFD objective that has been assessed against is “Compromise WB objectives” (Objective 3).
- For proportionality of assessment, the ACWG template ‘potential impacts of asset’ have been collated for each ‘activity’ with one consolidated assessment undertaken for each WFD status element.
- All assessments have been undertaken using the mitigation designed into the T2AT scheme, as documented in Section 2.4. Furthermore, this includes the assumptions/ mitigations as set out in the ACWG template which recognise compliance with regulations and good design practice. As such, there is no difference between the “impact” and “post mitigation impact” in the Level 2 – detailed screening assessment worksheet.

¹⁰ Environment Agency, 2022, Catchment Data Explorer. Catchment Data Search: Environment Agency - Catchment Data Explorer

4. Identification of relevant water bodies

4.1 This section outlines the WFD waterbodies which have the potential to be impacted by the two T2AT options. This is in line with the ACWG methodology using the 'List relevant water bodies' section.

4.1 WFD water bodies

4.2 Both of the T2AT options lie within the Thames River Basin District which is outlined within the Thames River Basin Management Plan (RBMP).¹¹ The site baseline has been summarised for each of the T2AT options.

4.1.1 Beckton Reuse Indirect (BRI)

4.3 The BRI option lies within three surface water Management Catchments: Colne, London and the Upper Lee and three Operational Catchments: Colne, Lower Lee Rivers and Lakes and Upper Lee. The option interacts with seven WFD Surface water bodies within these catchments including one Surface Water Transfer as outlined in Table 4.1.

4.4 The option interacts with two WFD groundwater bodies which both lie within the Thames Groundwater Management Catchment and the Colne Groundwater Operational catchment.

4.5 The BRI option and associated WFD water bodies are shown in Figure 4.1. For further details on how these water bodies interact with the option, see Section 5.4.

Table 4.1 Baseline WFD water bodies interacting with the BRI option

Management Catchment	Operational Catchment	Water Body	Water Body ID	Type
Colne	Colne	Colne (upper east arm including Mimshall Brook)	GB106039029850	River
London		Lea Navigation Enfield	GB106038027950	River

¹¹ Environment Agency, 2015, Part 1 Thames river basin district, River basin management plan: Thames_RBD_Part_1_river_basin_management_plan.pdf (publishing.service.gov.uk)

Management Catchment	Operational Catchment	Water Body	Water Body ID	Type
	Lower Lee Rivers and Lakes	Lock to Tottenham Locks		
		Lea Navigation (Fieldes Weir to Enfield Lock)	GB106038077851	River
		Small River Lee (and tributaries)	GB106038033200	River
		Turkey Brook and Cuffley Brook	GB106038033180	River
		New River	GB806100111	Surface Water Transfer
Upper Lee	Upper Lee	Lee (from Luton Hoo Lakes to Hertford)	GB106038033392	River
Thames Groundwater	Colne Groundwater	Mid-Chilterns Chalk	GB40601G601200	Groundwater
		Radlett Tertiaries	GB40602G602800	Groundwater

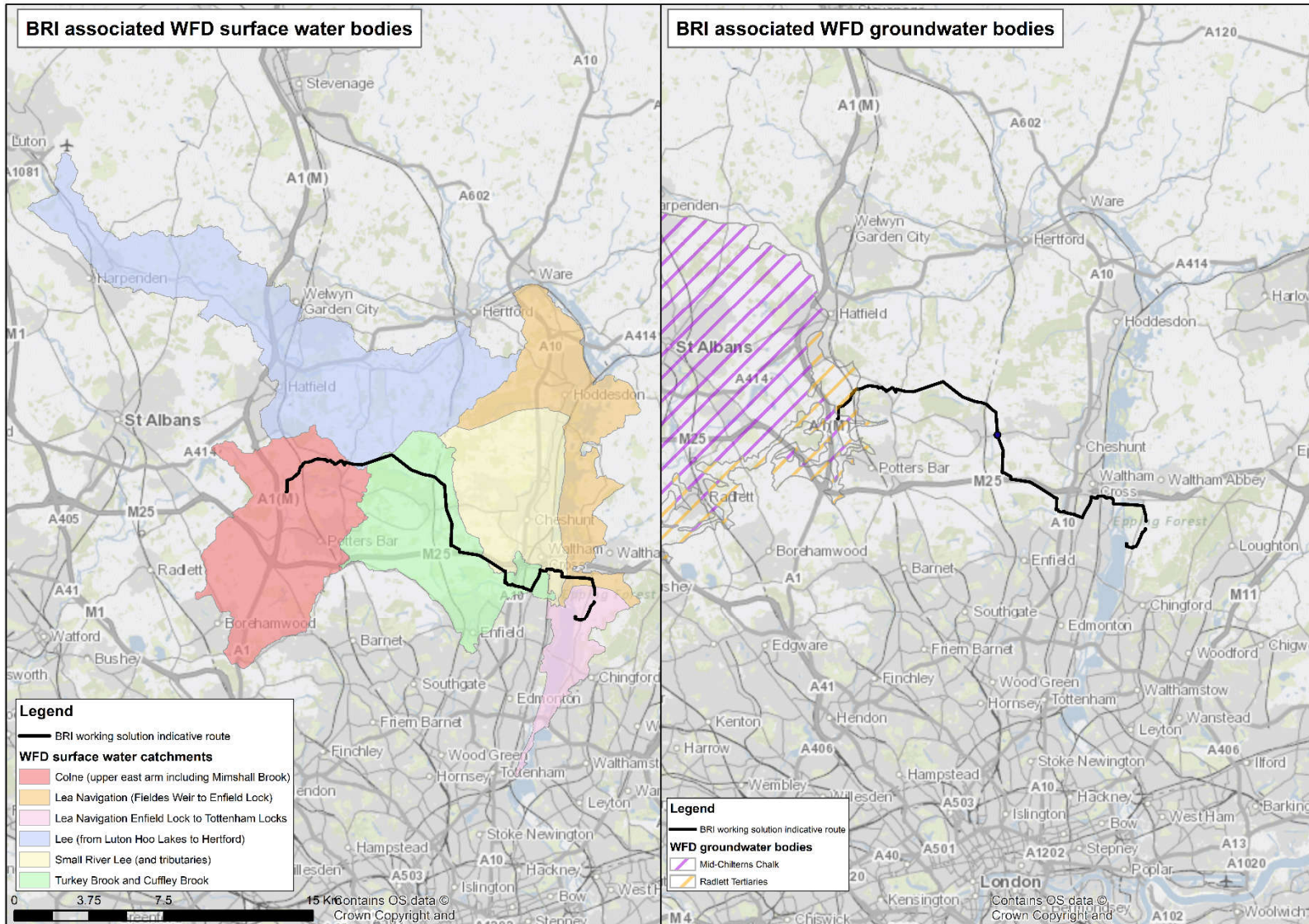


Figure 4.1 BRI option indicative location and associated WFD water bodies

4.1.2 Lower Thames Reservoir (LTR)

- 4.6 The LTR option lies principally within the Colne Management catchment. Although there will be no physical works within any other Management Catchment, the Queen Mother and Wraysbury Reservoirs and the Thames (Cookham to Egham) all lie within Maidenhead and Sunbury Management Catchment. The LTR pipeline route lies within a single Operational Catchment: Colne, with the two reservoirs and the River Thames within the Lower Thames Operational Catchment.
- 4.7 The option interacts with ten surface water bodies including two WFD lakes, and two canals as outlined in Table 4.2.
- 4.8 The LTR option interacts with three WFD groundwater bodies, all within the Thames Management Catchment and Colne Groundwater Operational Catchment.
- 4.9 The LTR option and associated WFD water bodies are shown in Figure 4.2. For further details on how these water bodies interact with the option, see Section 5.4.

Table 4.2 Baseline WFD water bodies interacting with the LTR option

Management Catchment	Operational Catchment	Water Body	Water Body ID	Type
Colne	Colne	Colne Brook	GB106039023010	River
		Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm	GB70610078	Canal
		Alderbourne	GB106039023080	River
		Colne (Confluence with Chess to River Thames)	GB106039023090	River
		Pinn	GB106039023070	River
		Grand Union Canal, Maple Lodge to Uxbridge	GB70610252	Canal

Management Catchment	Operational Catchment	Water Body	Water Body ID	Type
		(Rivers Colne and Chess plus canal)		
		Horton Brook	GB106039023040	River
Maidenhead and Sunbury	Lower Thames	Thames (Cookham to Egham)	GB106039023231	River
		The Queen Mother Reservoir	GB30642334	Lake
		Wraysbury Reservoir	GB30642417	Lake
Thames Groundwater	Colne Groundwater	Lower Thames Gravels	GB40603G000300	Groundwater
		Mid-Chilterns Chalk	GB40601G601200	Groundwater
		Radlett Tertiaries	GB40602G602800	Groundwater

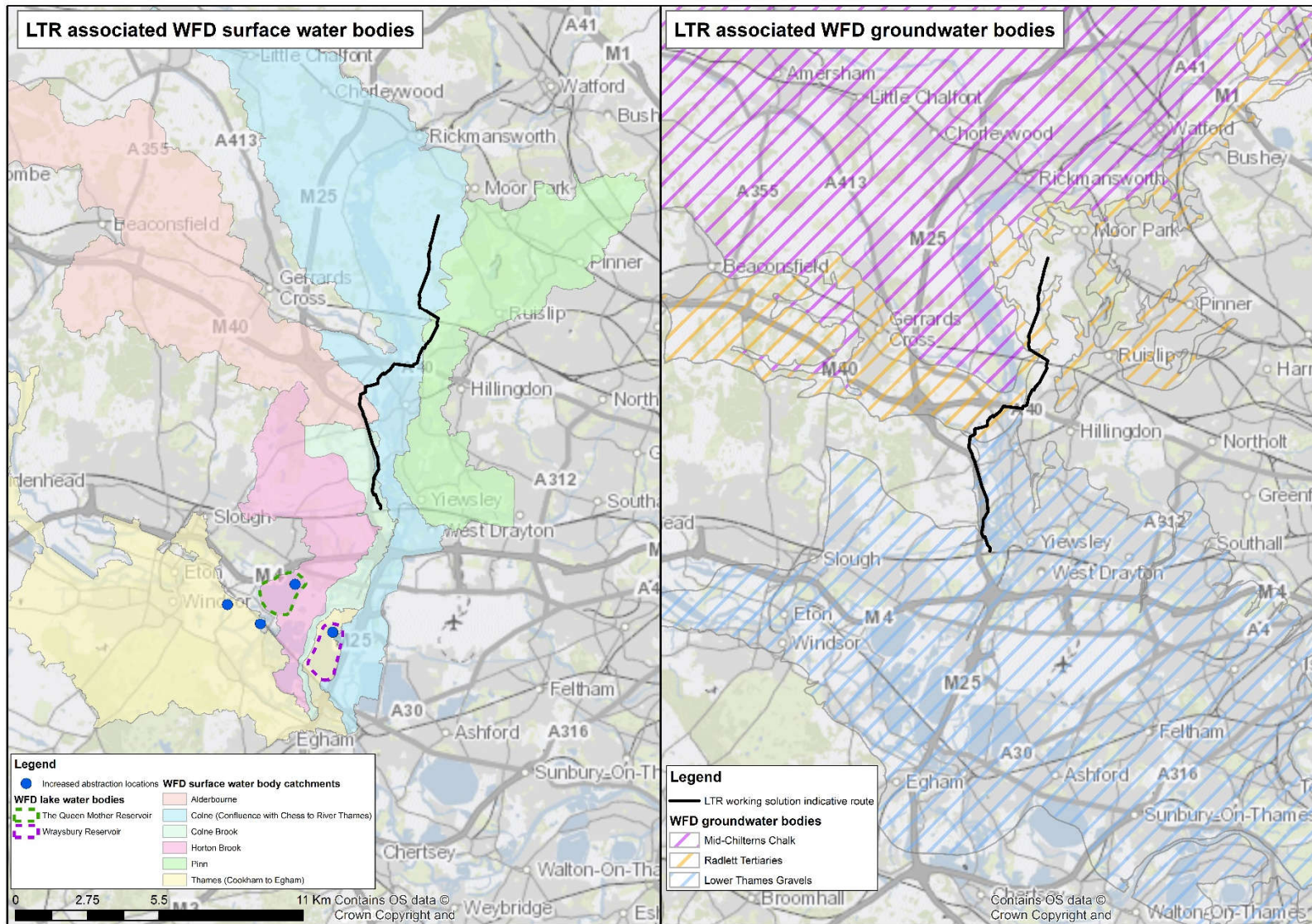


Figure 4.2 LTR option indicative location and associated WFD water bodies

4.2 Relevant water bodies summary

- 4.10 At this stage of the assessment, based on the design assumptions outlined in section 2.4, the BRI interacts with seven surface water bodies and two groundwater bodies as outlined in Table 4.1. All of these water bodies will be carried forward to the Level 1 – basic screening assessment section and will be assessed using the Level 1 – basic screening assessment methodology. This differs from the Gate 1 assessment where only four surface water bodies and no groundwater bodies were listed as relevant water bodies for this option.
- 4.11 The LTR option interacts with ten surface water bodies, including two surface water reservoirs and three groundwater bodies as outlined in Table 4.2. All of these water bodies will be carried forward to the Level 1 – basic screening assessment. These results differ from the Gate 1 assessment where only four surface water bodies and no groundwater bodies were listed as relevant water bodies for this option.
- 4.12 As the project progresses through to subsequent stages and a preferred route is selected, if any of the activities, baseline data or design assumptions change, this WFD assessment will be reviewed and updated.

5. Level 1 – basic screening

5.1 Introduction

- 5.1 Section 5.2 and 5.3 set out the baseline WFD data in relation to the water bodies carried forward for each option. Data relating to specific Mitigation Measures for each A/HMWB have been assessed using the Environment Agency Cycle 2 Measures data.¹² A summary of the relevant mitigation measures for each option have also been taken from the Cycle 2 Thames RBMP¹³ and included in Table 5.1 and Table 5.2.
- 5.2 Section 5.4 outlines the results of the Level 1 – basic screening by outlining activities assigned to each water body based on design information and mitigation assumptions outlined in the ACWG methodology (Appendix A and Appendix D) and giving an impact score as outlined in the ACWG guidance for the Level 1 – basic screening methodology and defined in Section 3.4.
- 5.3 The ACWG template Level 1 – basic screening findings have been recorded in Appendix A, notably: Worksheet 2 – “Level 1 activities”
- 5.4 Worksheet 3 “Level 1 summary” is auto-generated to summarise those water bodies to be carried forward to the Level 2 – detailed screening assessment.

5.2 BRI WFD baseline

- 5.5 Seven surface water bodies and two groundwater bodies have been included as part of this assessment for the BRI option. The baseline data for those water bodies are outlined below. Appendix B shows a detailed breakdown of the dRBMP3 2019 classifications and objectives for all waterbodies associated with the BRI option.

5.2.1 Lea Navigation Enfield Lock to Tottenham Locks (GB106038027950)

- 5.6 The water body is designated as a HMWB and therefore has an objective to reach GEP.
- 5.7 The water body is currently at Poor status. This is due to both ecological and chemical status, with Biological quality elements, macrophytes and phytobenthos combined and phosphate achieving Poor status. Polybrominated diphenyl ethers (PBDE) status is currently Fail and pH, invertebrates and Mitigation Measures achieve Moderate status. Based on the dRBMP3 data, the objective for this water body was to achieve good by 2063.

¹² Environment Agency (2020) [2nd cycle measures not linked to 2021 element outcomes v2 - data.gov.uk](https://data.gov.uk)

¹³ Environment Agency (2015) [Thames RBD Part 1 river basin management plan.pdf \(publishing.service.gov.uk\)](https://publishing.service.gov.uk)

5.8 The reasons for not achieving GEP as listed below:

- Point source – sewage discharge and misconnections from the water industry and the domestic general public are responsible for phosphate and macrophytes and phytobenthos combined not achieving Good status;
- Diffuse source – urban development and transport drainage from the urban transport sector are responsible for macrophytes and phytobenthos combined, phosphate and pH not achieving Good status;
- Physical modification – inland boating, urbanisation, flood protection and others not listed from the Local Government, recreation, urban transport and navigation industries are responsible for the Mitigation Measures assessment, invertebrates and macrophytes and phytobenthos combined not achieving Good status;
- Flow – surface water abstraction from the water industry category responsible for the hydrological regime not achieving Good status;
- Invasive non-native species – floating pennywort which was not due to any specific sector but was responsible for macrophytes and phytobenthos combined not achieving Good status;
- Measures delivered to address Reason, awaiting classification – there are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status.

5.9 There is a single Mitigation Measure assigned to this water body as part of the cycle 2 Measures: To improve modified habitat by removal of barriers to fish migration which will manage the risk of fish entrainment. The mitigation measure should be led and funded by the water industry.

5.2.2 [Lea Navigation \(Fieldes Weir to Enfield Lock\) \(GB106038077851\)](#)

5.10 The water body is designated as a heavily modified water body (HMWB) and therefore has an objective to reach GEP.

5.11 The water body is currently at Poor status. This is due to both ecological and chemical status, with macrophytes and phytobenthos and fish at Poor, Mitigation Measures, physico-chemical quality elements and phosphate at Moderate, PBDE, perfluorooctane sulphonate (PFOS) and Tributyltin Compounds at Fail in Priority Hazardous Substances. Based on the dRBMP3 data, the objective for the water body was to reach Poor by 2021. The reason for an objective below GEP is that no known technical solution is available.

5.12 The reasons for not achieving GEP as listed below:

- Point source – sewage discharge, misconnections and the use of restricted substrates from the water industry, domestic general public and navigation

sectors are responsible for phosphate, macrophytes and phytobenthos combined and Tributyltin Compounds not achieving Good status;

- Diffuse source – urban development and contaminated water body bed sediments from the urban and transport sector are responsible for phosphate and macrophytes and phytobenthos combined and Tributyltin Compounds not achieving Good status;
- Physical modification – inland boating and structures along with other (not listed) activities from Local Government, recreation and navigation industries are responsible for the Mitigation Measures assessment and macrophytes and phytobenthos combined not achieving Good status;.
- Flow – surface water abstraction from the water industry category responsible for the hydrological regime not achieving Good status;
- Invasive non-native species – floating pennywort which was not due to any specific sector but was responsible for macrophytes and phytobenthos combined not achieving Good status;
- Suspect data – unknown activities from unknown sectors are responsible for fish and invertebrates not achieving Good status;
- Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for PFOS not achieving Good status; and,
- Measures delivered to address Reason, awaiting classification – There are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status.

5.13 There are two Mitigation Measure assigned to this water body as part of the cycle 2 Measures. Both are to improve modified habitat by removal of barriers to fish migration which will manage the risk of fish entrainment. Both mitigation measures should be led and funded by the water industry.

5.2.3 [Small River Lee \(and tributaries\) \(GB106038033200\)](#)

5.14 The water body is not classified as being artificial or heavily modified and therefore has an objective to reach GES.

5.15 The water body is currently at Moderate status due to both ecological and chemical status. PBDE and PFOS are currently at a status of Fail with phosphate at Poor. Dissolved oxygen, invertebrates and macrophytes and phytobenthos combined are at Moderate status. Based on the dRBMP3 data, the objective for this water body is Good by 2063.

5.16 The reasons for not achieving GES as listed below:

- Point source – sewage discharge and misconnections from the water industry and domestic general public are responsible for phosphate, invertebrates and dissolved oxygen not achieving Good status;
- Diffuse source – urban development from the urban transport sector is responsible for phosphate, invertebrates and dissolved oxygen not achieving Good status;
- Physical modification – urban development from the urban transport sector is responsible for invertebrates and macrophytes and phytobenthos combined not achieving Good status;
- Flow – Land drainage from other sectors is responsible for macrophytes and phytobenthos combined not achieving Good status;
- Invasive non-native species – other riparian plants which are not due to any specific sector are responsible for macrophytes and phytobenthos combined not achieving Good status;
- Measures delivered to address Reason, awaiting classification – There are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status; and,
- Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for PFOS and macrophytes and phytobenthos combined not achieving Good status.

5.17 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.2.4 Turkey Brook and Cuffley Brook (GB106038033180)

5.18 The water body is not classified as being artificial or heavily modified and therefore is expected to reach GES.

5.19 The water body is currently at Poor status due to both ecological and chemical status. PBDE is currently achieving Fail status with macrophytes and phytobenthos combined and phosphate at Poor status. Invertebrates are currently at Moderate status. Based on the dRBMP3 data, the objective for this water body is Good by 2063.

5.20 The reasons for not achieving GES as listed below:

- Point source – sewage discharge, private sewage treatment and misconnections from the domestic general public are responsible for phosphate, dissolved oxygen and macrophytes and phytobenthos combined not achieving Good status;
- Diffuse source – transport drainage, urban development and poor nutrient management from the urban and transport and agriculture and rural land management sectors are responsible for macrophytes and phytobenthos combined, dissolved oxygen, fish and phosphate not achieving Good status;

- Physical modification – urban development, ecological discontinuity (barriers) and flood protection structures from the urban and transport and agriculture and rural land management sectors are responsible for fish and macrophytes and phytobenthos not achieving Good status;
- Invasive non-native species – topmouth gudgeon is responsible for fish not achieving Good status;
- Natural – drought and natural conditions are responsible for macrophytes and phytobenthos and dissolved oxygen not achieving Good status;
- Measures delivered to address Reason, awaiting classification – There are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status; and,
- Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for Benzo(g-h-i)perylene not achieving Good status.

5.21 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.2.5 [New River \(GB806100111\)](#)

5.22 The New River Surface water transfer water body is classified as artificial. Therefore, it has an objective to reach GEP.

5.23 The water body is currently at Moderate status due to both ecological and chemical status. PFOS is currently at a status of Fail with Mitigation Measures assessment achieving Moderate status. Based on the dRBMP3 data, the objective for this water body is Good by 2063.

5.24 The reasons for not achieving GEP as listed below:

- Measures delivered to address Reason, awaiting classification – There are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status; and,
- Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for PFOS not achieving Good status.

5.25 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.2.6 [Lee \(from Luton Hoo Lakes to Hertford\) \(GB106038033392\)](#)

5.26 The water body is not classified as being artificial or heavily modified and therefore it has an objective to reach GES.

- 5.27 The water body is currently at Bad status due to both ecological and chemical status. PBDE and PFOS are currently at a status of Fail. Phosphate has a status of Poor and dissolved oxygen is at Moderate status. Based on the dRBMP3 data, the objective for the water body is to achieve Moderate by 2015 which it did achieve. The water body has an objective below Good status is because there are no known technical solutions available.
- 5.28 The reasons for not achieving GES as listed below:
- Point source – sewage discharge and airports from the water industry urban and transport industries are responsible for benzo (b) and (k) fluoranthene, benzo(a)pyrene, benzo (ghi) perylene and indeno (123-cd) pyrene, macrophytes and phytobenthos combined not achieving Good status;
 - Diffuse source – urban development, transport drainage and contaminated water body bed sediments from the urban transport sector are responsible for benzo (b) and (k) fluoranthene, benzo(a)pyrene, benzo (ghi) perylene and indeno (123-cd) pyrene and fluoranthene not achieving Good status;
 - Measures delivered to address Reason, awaiting classification – there are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status;
 - Suspect data – no sector is responsible for the suspect data resulting in macrophytes and phytobenthos not achieving Good status; and,
 - Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for PFOS not achieving Good status.
- 5.29 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.
- 5.2.7 [Colne \(upper east arm including Mimshall Brook\) \(GB106039029850\)](#)
- 5.30 The water body is not classified as being artificial or heavily modified and therefore has an objective to reach GES.
- 5.31 The water body is currently at Bad status due to both ecological and chemical status. Fish are currently at Bad status with PBDE and PFOS at Fail. Phosphate and macrophytes and phytobenthos combined are both at Moderate status with invertebrates at Poor. Based on the dRBMP3 data, the objective for this water body is to achieve Moderate status by 2015 which it did achieve. The water body has an objective lower than Good status because mitigation measures are deemed disproportionately expensive.
- 5.32 The reasons for not achieving GES as listed below:

- Point source – sewage discharge, private sewage treatment and misconnections from the water industry and the domestic general public are responsible for phosphate, invertebrates and macrophytes and phytobenthos combined not achieving Good status;
- Diffuse source – urban development, transport drainage, poor nutrient management, poor soil management and poor livestock management from the urban transport and agriculture and rural land management sectors are responsible for invertebrates, fish phosphate and phytobenthos combined, phosphate and pH not achieving Good status;
- Physical modification – urbanisation and flood protection from the Local Government and urban transport are responsible for fish, invertebrates and macrophytes and phytobenthos combined not achieving Good status;
- Natural – natural conditions and drought which is not caused by any in particular sector is responsible for fish, invertebrates and hydrological regime not achieving Good status;
- Invasive non-native species – other plants are responsible for macrophytes and phytobenthos not achieving Good status;
- Measures delivered to address Reason, awaiting classification – there are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status; and,
- Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for PFOS and Benzo(g-h-i)perylene not achieving Good status.

5.33 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.2.8 Radlett Tertiaries (GB40602G602800)

5.34 This water body is currently at Poor status due to the quantitative status elements (specifically due to suspect data in relation to the quantitative dependent surface water body status element). The quantitative dependent surface water body status is currently at Poor whereas all other elements are at Good with the trend assessment achieving No trend. The objective for the water body is to reach Poor by 2015 which it did. The reason for the objective being below Good status is due to an unfavourable balance of costs and benefits.

5.35 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.2.9 Mid-Chilterns Chalk (GB40601G601200)

5.36 This water body is currently at Poor status due to both quantitative and chemical status'. The quantitative dependent surface water body status, general chemical test and chemical drinking water protected areas elements are all at poor status. The objective for the water body is to achieve Poor status by 2015 which it did. The reason for the objective being below Good status is due to an unfavourable balance of costs and benefit and disproportionate burdens.

5.37 The reasons for not achieving GES as listed below:

- Point Source – Sewage discharge, private sewage treatment and incidents from the water industry, urban and transport and Industry sectors are responsible for the Trend assessment and chemical drinking water protected areas not achieving Good status.
- Diffuse source – Poor nutrient management and contaminated land from the agriculture and rural land management, urban and transport and other sectors are responsible for the Trend assessment and chemical drinking water protected areas not achieving Good status.
- Flow – groundwater abstraction from the water industry are responsible for the quantitative water balance and quantitative dependant surface water body status elements not achieving Good status.

5.38 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.2.10 Relevant Local Target Measures

5.39 The relevant Mitigation Measures associated with the water bodies potentially impacted by the BRI option summarised from the Thames RBMP and outlined in Table 5.1.

5.2.11 Designated sites

5.40 Groundwater Dependent Terrestrial Ecosystems (GWDTE), like wetlands, flushes and fens are environments reliant upon groundwater for their continued success and health. This makes them particularly sensitive to hydrological and ecological changes caused as a result of new developments that disrupt existing groundwater flow, such as pipelines. No GWDTE would be impacted during construction.

5.41 The BRI option crosses three source protection zones (SPZs) including SPZ 1.

5.42 Four other designated sites have the potential to be impacted by the BRI option. These are:

- Wormley-Hoddesdonpark Wood Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI)
- Northaw Great Wood SSSI
- Water End Swallow Holes SSSI

5.43 There are no other designated sites likely to be impacted by the option.

Table 5.1 BRI relevant measures in RBMP2 Thames River Basin Management Plan

Operation Catchment	Measure Proposed
Colne	Contributions to environmental outcomes for 2021 include reductions in abstraction to improve morphology, and habitat. The work is to be completed by Affinity Water and the Environment Agency.
	Support a programme to produce or update flood modelling for priority water bodies in the catchment, in order to support and facilitate decision making for river restoration projects.
	Establish a new programme, 'Weir today Gone tomorrow' to focus on removal or adaptation of modifications. Addressing a minimum of three barriers per year and opening up a minimum of 2 km of impacted river per year to contribute to status/element level improvements.
	Lead 'Catching the Colne', a programme to increase engagement and enjoyment of key sites along the Colne Valley, (River Colne and tributaries) improve access for local communities, and implement a minimum of 10 km of river and riparian improvement per year.
Upper Lee	Affinity Water will invest over £1,000,000 to improve river morphology and undertake other improvements with landowners and local communities.
	Support was granted to the Living River Champions strategy to lead community level rivers groups.
	Produce updated flood modelling for priority water bodies to support and facilitate timely and confident decision making for river restoration projects.

5.3 LTR WFD baseline

5.3.1 Overview

5.44 Ten surface water bodies and three groundwater bodies have been included as part of this assessment for the LTR option. The baseline data for those water bodies are outlined below. Appendix C shows a detailed breakdown of the dRBMP3 2019 classifications and objectives for all waterbodies associated with the LTR option.

5.3.2 Colne Brook (GB106039023010)

5.45 The Colne Brook is classified as a HMWB, therefore, has an objective to achieve GEP.

5.46 The water body is currently at Moderate status due to both ecological and chemical statuses. PBDE and PFOS is currently at Fail. Phosphate and fish are currently at Poor status with the Mitigation Measures assessment at Moderate status. Based on the dRBMP3 data, the objective for this water body is Good by 2063.

5.47 The reasons for not achieving GEP as listed below:

- Point source – sewage discharge from the water industry is responsible for phosphate not achieving Good status;
- Diffuse source – urban development and contaminated land from the urban and transport are responsible for phosphate not achieving Good status;
- Physical modification – other activities which are not listed from the local and central government are responsible for the Mitigation Measures assessment not achieving Good status;
- Measures delivered to address Reason, awaiting classification – There are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status; and,
- Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for PFOS not achieving Good status.

5.48 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.3.3 Colne (Confluence with Chess to River Thames) (GB106039023090)

5.49 The Colne is classified as a HMWB, therefore has an objective to achieve GEP.

5.50 The water body is currently at Moderate status due to both the ecological and chemical statuses. PBDE and PFOS are currently at a status of Fail with phosphate at Poor. Macrophytes and phytobenthos and the Mitigation Measures assessment are currently at moderate status. Based on the dRBMP3 data, the objective for this water body is to achieve Moderate status by 2015 which it did. The reason for an objective

lower than GEP is that there are disproportionate burdens including an unfavourable balance of costs and benefits. Good status is prevented by A/HMWB designated use with action to get biological element to good expected to have significant adverse impact on use.

5.51 The reasons for not achieving GEP as listed below:

- Point source – sewage discharge, private sewage treatment and misconnections from the water industry, urban and transport and the domestic general public are responsible for phosphate and macrophytes and phytobenthos combined not achieving Good status;
- Diffuse source – urban development from the urban and transport sector are responsible for phosphate and macrophytes and phytobenthos combined not achieving Good status;
- Physical modification – urban development and other activities from the urban and transport, recreation and local and central government are responsible for the Mitigation Measures assessment, macrophytes and phytobenthos combined and hydrological regime not achieving Good status;
- Natural – drought is responsible for macrophytes and phytobenthos combined not achieving Good status;
- Flow – groundwater abstraction from the water industry are responsible for hydrological regime and macrophytes and phytobenthos combined not achieving good status;
- Measures delivered to address Reason, awaiting classification – There are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status; and,
- Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for PFOS not achieving Good status.

5.52 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.3.4 [Alderbourn \(GB106039023080\)](#)

5.53 The water body is not classified as artificial or heavily modified, therefore, has an objective to achieve GES.

5.54 The current status of the water body is Moderate due to both the ecological and chemical statuses. PBDE is currently at Fail and macrophytes and phytobenthos combined is at Moderate. Based on the dRBMP3 data, the objective for this water body is Good by 2063.

5.55 The reasons for not achieving GES as listed below:

- Physical modification – arable land use by the agriculture and rural land management sector are responsible for macrophytes and phytobenthos not achieving Good status;
- Measures delivered to address Reason, awaiting classification – There are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status;
- Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for Benzo(b)fluoranthene not achieving Good status; and,
- Method Change (RFD Only) – unknown activities from a sector under investigation are responsible for hydrological regime not achieving Good status.

5.56 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.3.5 [Pinn \(GB106039023070\)](#)

5.57 The water body is classified heavily modified; therefore, has an objective to achieve GEP.

5.58 The current status of the water body is Moderate due to both the ecological and chemical statuses. PBDE, Benzo(g-h-i)perylene and PFOS are currently at Fail and phosphate is at Poor status. Physiochemical quality elements and Mitigation Measures are currently at Moderate status. The objective for this water body as part of the dRBMP3 data is Good by 2063.

5.59 The reasons for not achieving GEP as listed below:

- Diffuse source – urbanisation from the urban and transport sector is responsible for phosphate not achieving Good status;
- Physical modification – other activities which are not listed from the urban and transport sector are responsible for the Mitigation Measures assessment not achieving Good status;
- Measures delivered to address Reason, awaiting classification – There are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status; and,
- Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for Benzo(b)fluoranthene not achieving Good status.

5.60 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.3.6 Horton Brook (GB106039023040)

- 5.61 The water body is not classified as artificial or heavily modified, therefore, has an objective to achieve GES.
- 5.62 The water body is currently at Moderate status due to both the ecological and chemical status elements. PBDE is currently Failing with phosphate and physiochemical quality elements and invertebrates at Moderate. The objective of the water body is to achieve Good by 2063.
- 5.63 The reasons for not achieving GES as listed below:
- Point source – misconnections and trade/industry discharge from the domestic general public and industry sectors are responsible for invertebrates and phosphate not achieving Good status;
 - Diffuse source – urbanisation from urban development within the urban transport sector is responsible for invertebrates and phosphate not achieving Good status;
 - Physical modification – urbanisation from urban development and reservoir impoundment from the urban and transport and other industries are responsible for invertebrates not achieving Good status; and,
 - Measures delivered to address Reason, awaiting classification – There are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status.
- 5.64 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.3.7 Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm

- 5.65 This water body is classified as being artificial, therefore, has an objective to achieve GEP.
- 5.66 The status of the water body is currently at Moderate due to both ecological and chemical statuses. The PBDE and PFOS currently achieve a status of Fail with phosphate, physiochemical quality elements and Mitigation Measures assessment achieving Moderate status. Based on the dRBMP3 data, the objective for the water body is at Moderate by 2015. The reason for the objective being lower than Good status is due to unfavourable balance of costs and benefits and disproportionate burdens.
- 5.67 The reasons for not achieving GES as listed below:

- Point source – misconnections, sewage discharge and private sewage treatment from the domestic general public, water industry and urban and transport sectors are responsible for Phosphate not achieving Good status;
- Diffuse source – urbanisation from the urban and transport sector is responsible for phosphate not achieving Good status;
- Physical modification – other activities which are not listed due to recreational sector are responsible for the Mitigation Measures assessment not achieving Good status; and,
- Unknown pending investigation – unknown activities from an unknown sector are responsible for PBDE not achieving Good status.

5.68 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.3.8 Grand Union Canal, Maple Lodge to Uxbridge (Rivers Colne and Chess plus canal)

5.69 This water body is classified as being artificial, therefore, is expected to achieve GEP.

5.70 The status of the water body is currently at Moderate due to both ecological and chemical statuses. The PBDE and PFOS currently achieve a status of Fail with phosphate achieving Poor and physiochemical quality elements and Mitigation Measures assessment achieving Moderate status. Based on the dRBMP3 data, the objective for the water body is at Moderate by 2015. The reason for the objective being lower than Good status is due to unfavourable balance of costs and benefits and disproportionate burdens. The reasons for not achieving GES as listed below:

- Point source – misconnections, sewage discharge and private sewage treatment from the domestic general public, water industry and urban and transport sectors are responsible for Phosphate not achieving Good status;
- Diffuse source – urbanisation from the urban and transport sector is responsible for phosphate not achieving Good status;
- Physical modification – other activities which are not listed due to recreational sector are responsible for the Mitigation Measures assessment not achieving Good status; and,
- Unknown pending investigation – unknown activities from an unknown sector are responsible for PBDE not achieving Good status.

5.71 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.3.9 [Thames \(Cookham to Egham\) \(GB106039023231\)](#)

5.72 The water body is designated as a HMWB and therefore is expected to reach GEP rather than GES.

5.73 The water body is currently at Moderate status. This is due to both ecological and chemical status, with Mitigation Measures assessment at Moderate or less, phosphate at Moderate, and PBDE, and PFOS at Fail in Priority Hazardous Substances. The objective for this water body was to reach Moderate Status by 2015 which it achieved. The reasons for an objective below Good are, no known technical solution is available, Practical technical constraints prevent implementation of the measure by an earlier deadline and Chemical status recovery time.

5.74 The reasons for not achieving GES as listed below:

- Point source - continuous sewage discharge from the Water Industry responsible for Phosphate;
- Diffuse source – poor nutrient management in the agriculture and rural land management category and Transport Drainage in the urban and transport sector responsible for Phosphate;
- Physical modification – by local and central government, the water industry and for navigation responsible for Mitigation Measures Assessment;
- Flow – surface water abstraction by the water industry responsible for hydrological regime.
- Unknown (pending investigation) – sector under investigation responsible for PFOS; and,
- Measures delivered to address reason, awaiting classification, no sector responsible for PBDE.

5.75 There are four Mitigation Measure assigned to this water body as part of the cycle 2 Measures. Three of these are in relation to the improvement of modified habitat by removing or easing barriers to fish migration which will help to manage the risk of fish entrainment. These measures should be led and funded by the water industry. The last Mitigation Measure is for Catchment level government funded improvements form the catchment partnership action fund (CPAF) to improve diffuse source pollution that arises from rural land use.

5.3.10 [Queen Mother Reservoir \(GB30642334\)](#)

5.76 This water body is classified as being an artificial lake, therefore, has an objective to achieve GEP.

5.77 The water body is currently achieving Moderate status due to both ecological and chemical statuses. PBDE and PFOS are currently at a status of Fail with the Mitigation Measures assessment achieving Moderate status. Based on the dRBMP3 data, the objective of this water body is Good by 2063.

5.78 The reasons for not achieving GEP as listed below:

- Physical modification – other activities from the recreational sector are responsible for the Mitigation Measures assessment not achieving Good status;
- Measures delivered to address Reason, awaiting classification – there are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status; and,
- Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for PFOS not achieving Good status.

5.79 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.3.11 [Wraysbury Reservoir \(GB30641523\)](#)

5.80 This water body is classified as being an artificial lake, therefore, has an objective to achieve GEP.

5.81 The water body is currently achieving Moderate status due to both ecological and chemical statuses. PBDE and PFOS are currently at a status of Fail with the total nitrogen and total phosphorous achieving Bad status. The Mitigation Measures assessment is achieving Moderate status. The objective of this water body is Moderate by 2015 which it achieved. The reasons for the objective lower than GEP is that there is no known technical solution.

5.82 The reasons for not achieving GEP as listed below:

- Point source – sewage discharge from the water industry is responsible for total phosphorous not achieving Good status;
- Diffuse source – poor livestock management and urban development from the agriculture and rural land management and urban transport sectors are responsible for total phosphorous not achieving Good status;
- Physical modification – other activities from the recreational sector are responsible for the Mitigation Measures assessment not achieving Good status;
- Measures delivered to address Reason, awaiting classification – there are unknown activities from unknown sectors which are responsible for PBDE not achieving Good status; and,

- Unknown (pending investigations) – unknown activities from a sector under investigation are responsible for PFOS not achieving Good status.

5.83 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.3.12 Lower Thames Gravels (GB40603G000300)

5.84 This water body is currently achieving Poor status due to the qualitative status. Quantitative Water Balance is the only element achieving Poor status with all other elements achieving Good. The objective for this water body is Good by 2015 which was not achieved.

5.85 The reasons for not achieving GES as listed below:

- Point source – sewage discharge from the water industry is responsible for the trend assessment not being upward.

5.86 There are no Mitigation Measure assigned to this water body as part of the cycle 2 Measures.

5.3.13 Radlett Tertiaries (GB40602G602800) and Mid-Chilterns Chalk (GB40601G601200)

5.87 The baseline information for these water bodies is summarised in Sections 5.2.8 and 5.2.9 under the BRI baseline data.

5.3.14 Relevant Local Target Measures

5.88 The relevant Mitigation Measures associated with the water bodies potentially impacted by the LTR option summarised from the Thames RBMP and outlined in Table 5.2.

5.3.15 Designated sites

5.89 Groundwater Dependent Terrestrial Ecosystems (GWDTE), like wetlands, flushes and fens are environments reliant upon groundwater for their continued success and health. This makes them particularly sensitive to hydrological and ecological changes caused as a result of new developments that disrupt existing groundwater flow, such as pipelines. Kingcup Meadows & Oldhouse Wood SSSI, Denham Lock Wood SSSI, Fray's Farm Meadows SSSI and Ruislip Woods SSSI are GWDTE that would potentially be impacted during construction of the LTR option. However, below ground structures will be constructed such that they will not form a preferential pathway for pollution to groundwater or cause alterations in groundwater flow or levels.

Table 5.2 LTR relevant measures in RBMP2 Thames River Basin Management Plan

Operation Catchment	Measure Proposed
<p>Colne</p>	<p>Contributions to environmental outcomes for 2021 include reductions in abstraction to improve morphology, and habitat. The work is to be completed by Affinity Water and the Environment Agency.</p>
	<p>Support a programme to produce or update flood modelling for priority water bodies in the catchment, in order to support and facilitate decision making for river restoration projects.</p>
	<p>Establish a new programme, 'Weir today Gone tomorrow' to focus on removal or adaptation of modifications. Addressing a minimum of three barriers per year and opening up a minimum of 2 km of impacted river per year to contribute to status/element level improvements.</p>
	<p>Lead 'Catching the Colne', a programme to increase engagement and enjoyment of key sites along the Colne Valley, (River Colne and tributaries) improve access for local communities, and implement a minimum of 10 km of river and riparian improvement per year.</p>
<p>Lower Thames</p>	<p>The major issues to tackle in this catchment relate to habitat biodiversity, water quality and collecting evidence. Such measures could include channel structures and functions, barriers to fish passage, habitat management, phosphorous management and sediment and pesticide management.</p>
	<p>Future aims of for this catchment include:</p> <ul style="list-style-type: none"> • Engagement and training in relation to river restoration and invasive species management • Implementing small scale habitat projects including re-naturalising a river corridor, improving water quality, habitat biodiversity, removing hard bank protection, planting and flood resilience

5.4 Preliminary outcomes of the Level 1 – basic screening assessment

5.4.1 Introduction

5.90 This section preliminary assesses where the proposed scheme design may impact the WFD water bodies within the assessment area based on the methodology outlined in Section 3.4 and the design information that is available at this point in time.

5.4.2 Scheme activities

- 5.91 There are several scheme activities that may have an impact on the WFD water bodies within the vicinity of the options. A description of the options can be found in Section 2 above and in more detail in the Technical Supporting Document Annex A1, CDR for each option. A review of watercourse crossings has been undertaken using WFD water body data. Figure 5.1 and Figure 5.2 show the location of watercourse crossings in relation to each to the options.
- 5.92 As the ACWG does not outline a methodology for assessing the impact to groundwater, the assessment to the three groundwater bodies carried forward to the Level 1 – basic screening assessment stage has been completed outside of the ACWG assessment spreadsheet (Appendix A) and will be covered in Section 5.4.3.
- 5.93 Construction impacts, or temporary impacts are discussed in Section 5.4.4.
- 5.94 The ACWG WFD assessment is undertaken using a standard list of construction and operation activities, as specified in the ACWG methodology. However, there are several construction and operation activities in the standard list that are not relevant to the options and so are not discussed in this document but can be found in the ACWG assessment (Appendix A).
- 5.95 Table 5.3 outlines the activities which have been highlighted as part of the Level 1 – basic screening assessment, their associated score as described in Table 3.1 and their relevant assumed mitigation which has been taken from the ACWG methodology and the design assumptions outlined in section 2.4. A full list of the assumed mitigation measures for all activities can be found in Appendix D. Additional design assumptions outlined in Section 2.4 should also be assumed as part of the design. Table 5.4 highlights which water bodies have the potential to be impacted by these activities.
- 5.96 Following a review of the scores associated with these activities, it was determined that they align with the likely significance of impact and no updates are required.

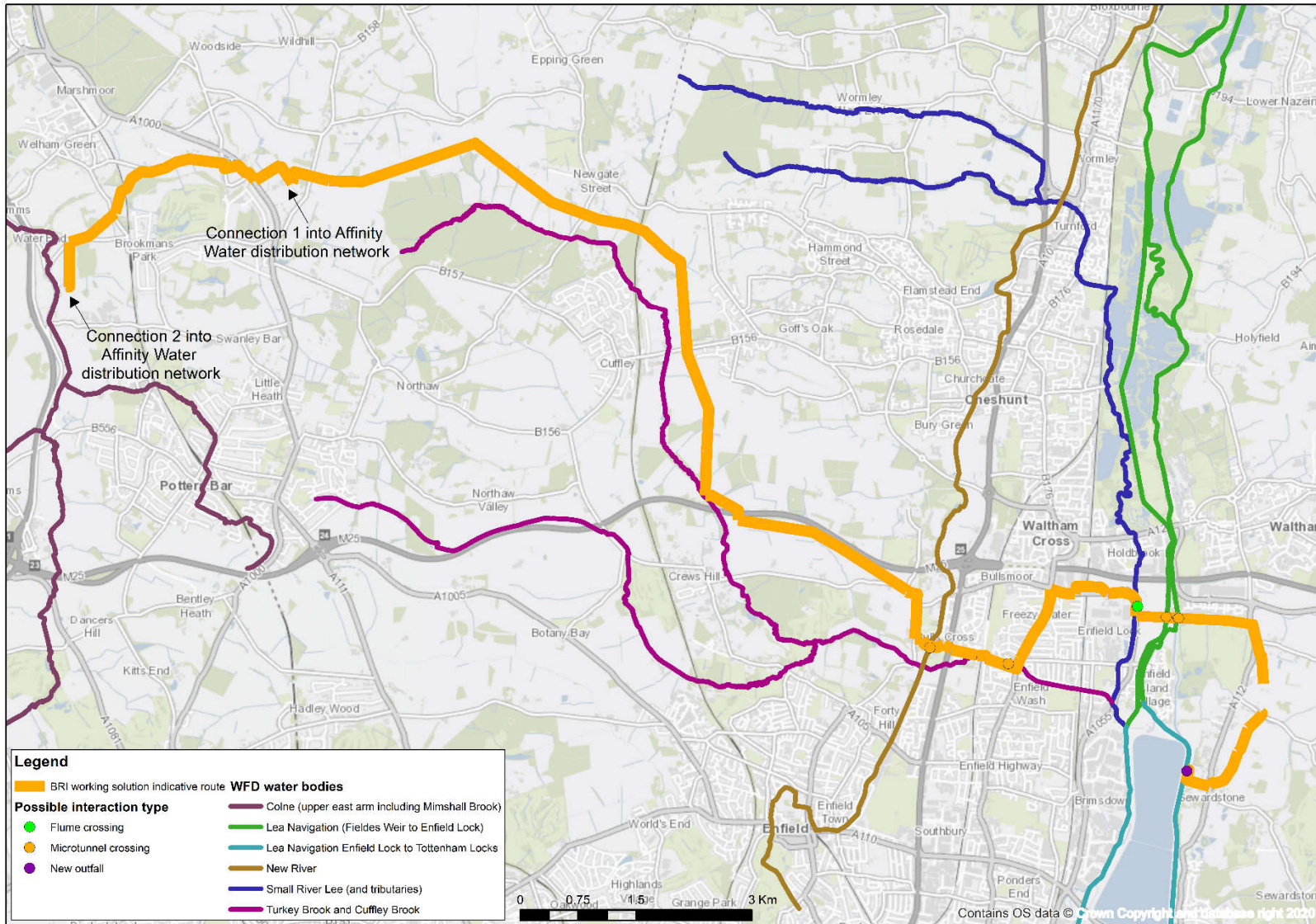


Figure 5.1 WFD watercourse interactions relating to the indicative BRI option

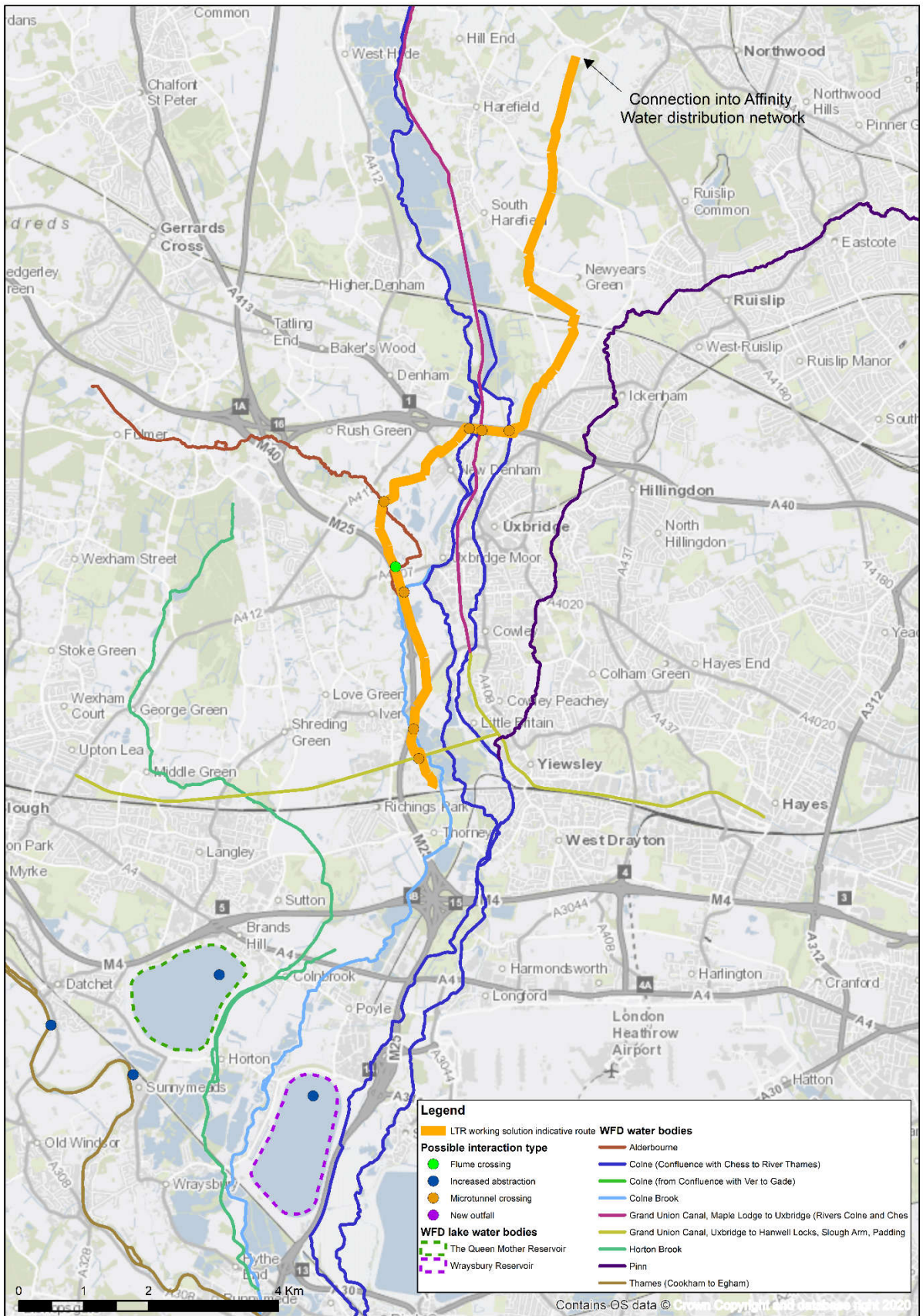


Figure 5.2 WFD watercourse interactions relating to the indicative LTR option

Table 5.3: Operational activities associated with both options which are likely to impact on the water environment with associated assumed mitigation.

Activity	ACWG score	Assumed mitigation as outlined in the ACWG guidance.
Presence of new underground structure (tunnel/shaft/retaining wall), with no sensitive groundwater feature within 500 m	1	Land drainage will be provided on the upgradient side of the scheme such that they will not cause an increase in groundwater flooding risk. This drainage will be discharged into local watercourses to maintain flow.
New WTW discharge to watercourse	1	Discharge will be treated to a suitable standard and agreed with the regulatory authority. Discharge flow will be less than the agreed maximum rate.
Maintenance and use of river intakes	1	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
New or increased surface water abstraction	3	No assumed mitigations
Maintenance of pipe lines	1	No assumed mitigations
Draining of pipelines for maintenance	1	If water is drained to local watercourse, this will be short term and temporary impacts only
Maintenance and use of pumping stations and WTW	1	No assumed mitigations

Activity	ACWG score	Assumed mitigation as outlined in the ACWG guidance.
Low volume discharge of water with a quality element of the same WFD status than the receiving water body	-1	No assumed mitigations

Table 5.4: Operational activities associated with each option as outlined in the ACWG methodology and Appendix A.

T2AT Option	WFD water Body	Activities (and associated impact scores)									Maximum Level 1 assessment Score
		Presence of new underground structure (tunnel/shaft/retaining wall), with no sensitive groundwater feature within 500 m	New WTW discharge to watercourse	Maintenance and use of river intakes	New or increased surface water abstraction	Maintenance of pipe lines	Draining of pipelines for maintenance	Maintenance and use of pumping stations and WTW	Low volume discharge of water with a quality element of the same WFD status than the receiving water body	New discharge to watercourse/reservoir	
BRI	Colne (upper east arm including Mimshall Brook) (GB106039029850)					1	1				1
	Turkey Brook and Cuffley Brook (GB106038033180)					1	1				1
	Small River Lee (and tributaries) (GB106038033200)	1				1	1				1
	Lea Navigation (Fieldes Weir to Enfield Lock) (GB106038077851)		1			1	1				1
	Lea Navigation Enfield Lock to Tottenham Locks (GB106038027950)	1		1	3	1	1	1			3
	New River (GB806100111)					1	1				1
	Lee (from Luton Hoo Lakes to Hertford) (GB106038033392)					1	1				1
LTR	Colne Brook (GB106039023010)	1	1			1	1	1			1
	Colne (Confluence with Chess to River Thames) (GB106039023090)					1	1				1
	Alderbourne (GB106039023080)					1	1				1

T2AT Option	WFD water Body	Activities (and associated impact scores)									Maximum Level 1 assessment Score
		Presence of new underground structure (tunnel/shaft/retaining wall), with no sensitive groundwater feature within 500 m	New WTW discharge to watercourse	Maintenance and use of river intakes	New or increased surface water abstraction	Maintenance of pipe lines	Draining of pipelines for maintenance	Maintenance and use of pumping stations and WTW	Low volume discharge of water with a quality element of the same WFD status than the receiving water body	New discharge to watercourse/reservoir	
	Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm (GB70610078)					1	1				1
	Grand Union Canal, Maple Lodge to Uxbridge (Rivers Colne and Chess plus canal) (GB70610252)					1	1				1
	Horton Brook (GB106039023040)										1
	Pinn (GB106039023070)					1	1				1
	The Queen Mother Reservoir (GB30642334)				3				-1	1	3
	Wraysbury Reservoir (GB30642417)				3				-1	1	3
	Thames (Cookham to Egham) (GB106039023231)				3						3

5.97 Based on current understanding, four water bodies have been assigned a maximum score of 3 which results in them being carried forward to the Level 2 – detailed screening assessment at this preliminary stage. These water bodies are:

- BRI: Lea Navigation Enfield Lock to Tottenham Locks (GB106038027950)
- LTR: The Thames (Cookham to Egham) (GB106039023231), The Queen Mother Reservoir (GB30642334) and Wraysbury Reservoir (GB30642417).

5.98 The activities that have resulted in a score of 3 is ‘New or increased surface water abstraction’ and from the understanding of design information, baseline data and professional judgement, the conclusion to carry these surface water bodies through to the Level 2 – detailed screening assessment is appropriate for these options. Although the ‘put and take’ abstraction licences will offset any potential downstream impacts from the new abstractions, these water bodies will be carried forward to ensure all potential impacts are considered. This will also be checked at next stages of the design process.

5.4.3 WFD groundwater body assessment

5.99 As the ACWG assessment spreadsheets are not set up to undertake assessments on Groundwater bodies, the Level 1 – basic screening assessment has been completed as part of this document. Table 5.5 outlines the activities within the ACWG assessment spreadsheet which have been identified as occurring for the options. It outlines any alterations which are required for the assessment of impacts to groundwater, the impact score and assumed embedded mitigation (Also found in Appendix D).

Table 5.5 Activities associated with both options in relation to groundwater receptors

Activity	Adaptation for groundwater assessment	ACWG Associated score	Assumed mitigation as outlined in the ACWG guidance.
Presence of new underground structure (tunnel/shaft/retaining wall), with no sensitive groundwater feature within 500 m	No change required	1	Land drainage will be provided on the upgradient side of the scheme such that they will not cause an increase in groundwater flooding risk. This drainage will be discharged into local watercourses to maintain flow.

Activity	Adaptation for groundwater assessment	ACWG Associated score	Assumed mitigation as outlined in the ACWG guidance.
Construction of below ground structures (shaft/retaining wall) with associated dewatering, with no sensitive groundwater feature within 500 m	No change required	1	Risk assessments will be undertaken for excavation works and dewatering to ensure no adverse impact on watercourses, wetland habitats or abstractions. Dewatering discharge will be treated before discharge.
Construction/repair of new tunnels and conduits	No change required	1	Tunnels and conduits will be constructed such that they will not form a preferential pathway for the flow of groundwater
Trenching and laying of pipelines involving watercourse crossings	Trenching and laying of pipelines within a groundwater body	1	Assumed that bedding material for pipelines will be constructed such that they do not form preferential pathways for groundwater flow. Assumed that watercourse crossings will be carried out using directional drilling or if the watercourse needs to be temporarily diverted, appropriate measures will be in place to protect ecology and watercourse will be returned back to its natural state.

5.4.3.1 BRI Groundwater Level 1 – basic screening assessment

5.100 Two groundwater bodies have been screened into this assessment for the BRI Scheme: Mid-Chilterns Chalk and Radlett Tertiaries. The activities which have been identified as being undertaken within these groundwater bodies are highlighted in Table 5.6 with the maximum impact score highlighted.

5.101 As neither of the groundwater bodies achieve a maximum score above 1, they are not carried through to the Level 2 – detailed screening assessment. Through understanding of the design details, baseline data and professional judgement, it is

determined that this conclusion to exclude the groundwater bodies from the Level 2 – detailed screening assessment is appropriate for this option at this preliminary stage. This conclusion should be reconsidered at subsequent project stages when further design detail is known.

5.4.3.2 LTR Groundwater Level 1 – basic screening assessment

- 5.102 Three groundwater bodies have been screened into this assessment for the LTR Scheme: Mid-Chilterns Chalk, Radlett Tertiaries and Lower Thames Gravels. The activities which have been identified as being undertaken within these groundwater bodies are highlighted in Table 5.6 with the maximum impact score highlighted.
- 5.103 As none of the groundwater bodies achieve a maximum score above 1, they are not carried through to the Level 2 – detailed screening assessment. Through understanding of the design details, baseline data and professional judgement, it is determined that this conclusion to exclude the groundwater body from the Level 2 – detailed screening assessment is appropriate for this option at this stage. This conclusion should be reconsidered at subsequent project stages when further design detail is known.

Table 5.6 Activities relating directly to each groundwater body and option with associated ACWG impact scores post embedded mitigation

T2AT Option	Groundwater bodies	Activities				Maximum Impact score
		Presence of new underground structure (tunnel/shaft/retaining wall), with no sensitive groundwater feature within 500 m	Construction of below ground structures (shaft/retaining wall) with associated dewatering, with no sensitive groundwater feature within 500 m	Construction/repair of new tunnels and conduits	Trenching and laying of pipelines within a groundwater body	
BRI LTR	Mid-Chilterns Chalk (GB40601G601200)			1	1	1
BRI LTR	Radlett Tertiaries (GB40602G602800)			1	1	1
LTR	Lower Thames Gravels (GB40603G000300)	1	1	1	1	1

5.4.4 Temporary impacts

- 5.104 From a WFD compliance perspective, only permanent impacts are considered and mitigated against. As a result, construction impacts, as long as they are only temporary will not be considered to be causing any WFD compliance issues. To ensure that this happens it is assumed that mitigation as set out in the ACWG assessment spreadsheet (Appendix A and Appendix D) are undertaken.
- 5.105 The AGWG methodology assumes also that all measures will be in line with the requirements set out within the Planning Policy Statement 23: Planning and Pollution Control¹⁴ and CIRIA guidance.

5.4.5 Level 1 – basic screening conclusions

- 5.106 The Level 1 – basic screening of the ACWG assessment has identified one surface water body which has an activity impact score greater than 1 for the BRI option: Lea Navigation Enfield Lock to Tottenham Locks (GB106038027950) and three surface water bodies which have an activity impact score greater than 1 for the LTR option: the Thames (Cookham to Egham) (GB106039023231), The Queen Mother Reservoir (GB30642334) and Wraysbury Reservoir (GB30642417). This is based on the activities which have been highlighted in Table 5.4, the assumed mitigation outlined in Table 5.3 and Appendix D and design assumptions set out in Section 2.4. As the project progresses through to subsequent stages and a preferred route is selected, if any of the activities, mitigation or design assumptions change, this WFD assessment will be reviewed and updated.
- 5.107 At this preliminary stage, with the mitigation associated with all construction activities (as outlined in the ACWG assessment: Appendix A and Appendix D), it is suggested that all construction activities associated with the options are likely to be temporary and therefore would not require further assessment.
- 5.108 The assessment of groundwater bodies has suggested that the activities associated with the BRI and LTR options will not require any groundwater bodies to be carried through to the Level 2 – detailed impact assessment based on the current design understanding and mitigation (as outlined in the ACWG assessment: Appendix A and Appendix D). Therefore, impacts to groundwater bodies are screened out of any further assessment in this document. However, the WFD assessment that will be undertaken at subsequent project stages will re-examine the evidence available to ascertain potential groundwater body impacts and overall WFD compliance risk.

¹⁴ [NAT22 - PPS23 Planning and Pollution Control .pdf](#)

5.109 This Level 1 – basic screening assessment has been completed for the BRI and LTR options at 100 MI/d. As all impacts are expected to be the same for the 50M/d options, it is assumed that the lower volume options will have the same conclusions.

6. Preliminary Level 2 – detailed screening

6.1 Introduction

6.1 This section provides the outcome from the Gate 2 ACWG Level 2 – detailed screening assessment and is based on the design information available at the time of writing. The assessment will be undertaken again at subsequent project stages and based on updated design and baseline information as appropriate. The outcomes of the impact assessment presented in this section are, therefore, preliminary, and may be subject to change.

6.2 The water bodies screened into this assessment during the Level 1 – basic screening are:

- BRI: Lea Navigation Enfield Lock to Tottenham Locks (GB106038027950)
- LTR: The River Thames (Cookham to Egham) (GB106039023231), The Queen Mother Reservoir (GB30642334) and Wraysbury Reservoir (GB30642417).

6.3 The assessment has been undertaken for the 100 MI/d DO of the BRI and LTR options based on the activities which have been highlighted in Table 5.4, the assumed mitigation outlined in Table 5.3 and Appendix D and design assumptions set out in Section 2.4. As the project progresses through to subsequent stages and a preferred route is selected, if any of the activities, mitigation or design assumptions change, this WFD assessment will be reviewed and updated.

6.4 The ACWG template Level 2 – detailed assessment comprises the following worksheets completed by Atkins:

- Worksheet 4 “Assign Level2 WB Impacts” – these are the specific activities to be assessed per water body. For consistency, these have been selected as those reported in worksheet “2. Level 1 activities” and set out in Section 4 above.
- Worksheet 5 “Level 2 assessment template” – a copy of this template has been set out for each of the water bodies carried forward to the Level 2 assessment and these are renamed as the water body ID code.
- A third worksheet “6. Level 2 summary” is auto-generated by the template to summarise the per water body level 2 assessments.

6.5 Using the information presented in the spreadsheets, summary of the findings of the WFD compliance assessment for each option is provided below.

6.6 This section outlines the potential impacts associated with the assigned activities as outlined in the ACWG Level 2 – detailed screening assessment methodology.

6.7 No site visits have been undertaken for this Gate 2 assessment, therefore, the Technical Supporting Document B1, Environmental Appraisal Report for each of the options should be read in tandem to this assessment to understand the physical environment, water quality and aquatic ecology information and assessments that underpin the WFD compliance assessment.

6.2 Confidence

6.8 As part of the ACWG methodology, a confidence level must be applied to the data and design details. As the data for WFD classifications and objectives are still in draft form (dRBMP3) the confidence is set to Medium. As with the design information, there are still a number of design assumptions associated with both options due to the current stage of the project. Therefore, design confidence has also been set to Medium.

6.3 BRI surface water findings

6.3.1 Impacts

6.9 The activity associated with the BRI option which results in a score of 3 is the new or increased surface water abstraction activity in the Lea Navigation Enfield Lock to Tottenham Locks (GB106038027950). This activity has been carried forward to Level 2 – detailed screening.

6.10 Based on the ACWG methodology, the activity has the potential to impact the following features of the water environment which were assessed for Objective 1 and 2 against each WFD element for the Lea Navigation Enfield Lock to Tottenham Locks water body:

- Changes to channel footprint;
- Changes in flow velocity and volume (increase or decrease);
- Changes in sediment deposition;
- Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream; and,
- Change in water quality due to new or changes to existing discharge of surface water into surface water body.

6.11 A summary of the potential impacts is shown in Table 6.1.

Table 6.1 Potential impacts for the BRI option on the Lea Navigation Enfield Lock to Tottenham Locks water body

WFD element	Impacts associated with the BRI option on the Lea Navigation Enfield Lock to Tottenham Locks water body
Hydromorphology	<p>There will be no net change in flow in the River Lee downstream of the BRI abstraction; therefore, there is no possibility for any change in flow within the River Lee downstream of this Scheme or change in morphology. The potential for change in flow between the Beckton Reuse discharge and the BRI abstraction has been assessed as part of the Beckton Reuse WFD (Annex B.4. London Effluent Reuse SRO Gate 2 Water Framework Directive Assessment Report), which concluded no significant effects at the waterbody scale.</p> <p>There will be negligible impacts on the morphology of the River Lee due to the new intake structure. There will be temporary impacts due to construction which will be mitigated for through best practice measures. Any impact on hydromorphology due to the operation of the structure will be localised.</p>
Physico-chemical and chemical (water quality)	<p>As the abstraction from the River Lee as part of the BRI option will not reduce baseline flow (see above, hydromorphology), there will be no impact on the water quality (both physiochemical and chemical) as a result of increased concentrations. Any alterations in the water quality input to the River Lee as part of the Beckton Reuse Scheme will be assessed within the Beckton Reuse WFD (Annex B.4. London Effluent Reuse SRO Gate 2 Water Framework Directive Assessment Report).</p>
Biology	<p>As there will be no change from the baseline conditions in relation to morphology, flow, and water quality there are expected to be no impacts on biological quality elements as a result of the BRI option.</p>

6.12 Based on the design assumptions outlined in Section 2.4, there will be no potential for deterioration of any WFD elements as a result of the BRI option, passing Objective 1. There will be no potential for the BRI option to result in any WFD waterbody not achieving their objectives, therefore passing Objective 2. Therefore, based on the current design information, it is concluded that this option is compliant with the WFD. This conclusion will be revisited at subsequent project stages when additional design information is known.

6.3.2 Mitigation Measures assessment

6.13 As part of the ACWG methodology, an assessment against Mitigation Measures is completed for all A/HMWB carried through to the Level 2 – detailed assessment. The assessment determined that the BRI option does not have the potential to impact on any of the Mitigation Measures for the Lea Navigation Enfield Lock to Tottenham Locks water body as outlined in the RBMP Cycle 2. This suggests that this option does not prevent the water body from achieving GEP.

6.4 LTR surface water findings

6.4.1 Impacts

6.14 Three water bodies have been included as part of the Level 2 – detailed screening assessment for the LTR option: River Thames (Cookham to Egham) (GB106039023231), The Queen Mother Reservoir (GB30642334) and Wraysbury Reservoir (GB30642417). All water bodies are impacted by the activity ‘new or increased surface water abstraction’. The reservoirs are also impacted by the ‘new discharge/transfer to a watercourse or reservoir’ activity. The impacts associated with these activities are outlined below:

6.15 New or increased surface water abstraction:

- Changes to channel footprint;
- Changes in flow velocity and volume (increase or decrease);
- Changes in sediment deposition;
- Changes to water body hydromorphology leading to changes in river processes and habitats upstream and downstream;
- Change in water quality due to new or changes to existing discharge of surface water into surface water body;

6.16 New discharge/transfer to a watercourse or reservoir

- All of the above, with the addition of change in INNS present in surface water body

6.17 A summary of the impacts associated with each water body is outlined in Table 6.2 and Table 6.3.

Table 6.2 Potential impacts for the LTR option on the River Thames (Cookham to Egham) water body

WFD element	Impacts associated with the LTR option on the River Thames (Cookham to Egham) water body
Hydromorphology	<p>The SESRO scheme will increase the volumes within the River Thames (at Culham) for the sole purpose of supplying additional volumes for abstraction. The associated impacts of the inflow and additional volume within the River Thames are assessed as part of the SESRO Scheme. The abstraction from the River Thames as part of the LTR option will be under a put and take license which will ensure the abstraction will not be greater than the increased inflow volume from the SESRO scheme. This will result in no net change from the baseline flow in the River Thames downstream of the LTR abstraction locations at Datchet and Sunnymeads. It is unlikely that any additional volume will be left within the River Thames to provide downstream benefit as this is likely to reduce the viability of the SESRO scheme.</p> <p>As there is no change in volumes downstream of the increased abstraction, there will be no change in morphology.</p> <p>There will be no impacts on the morphology of the River Thames at the intake location as there will be no structural changes associated with the additional abstraction.</p>
Physico-chemical and chemical (water quality)	<p>The SESRO scheme will increase the volumes within the River Thames (SESRO Technical Supporting Document B1 EAR (Aquatic)). However, as the abstraction from the River Thames as part of the LTR option will not reduce baseline flow downstream of the abstraction point, there will be no impact on the water quality (both physiochemical and chemical) as a result of the LTR option.</p>
Biology	<p>As there will be no change from the baseline conditions in relation to morphology, flow, and water quality there are expected to be no impacts on biological quality elements as a result of the LTR option.</p>

Table 6.3 Potential impacts for the LTR option on the Queen Mother and Wraysbury Reservoirs

WFD element	Impacts associated with the LTR option on the Queen Mother and Wraysbury Reservoirs
Hydromorphology	As the volumes supplied to the Wraysbury and Queen Mother reservoirs will be equal to that abstracted, there will be no overall change in volumes within the reservoirs as a result of the LTR option. While there is increased transfer, the unchanged volumes will ensure no change to hydromorphology.
Physico-chemical and chemical (water quality)	The water quality modelling work undertaken as part of the SESRO scheme has shown that, overall, the water quality in the River Thames downstream of the SESRO discharge (at Culham, downstream of Abingdon-on-Thames) may improve as a result of SESRO. This suggests that the additional volume of water supplied to Wraysbury and Queen Mother reservoirs (from the River Thames) will be of equal or better quality than the baseline conditions. Therefore, no deterioration in water quality is expected.
Biology	As there will be no change from the baseline conditions in relation to WFD watercourse morphology, flow, and water quality there are expected to be no impacts on biological quality elements as a result of the LTR option. As there is expected to be no deterioration in water quality within the reservoir systems, therefore, no deterioration in phytoplankton is expected.

6.18 Based on the design assumptions outlined in Section 2.4, and the details outlined in Table 6.2, there will be no potential for deterioration of any WFD elements in the Thames (Cookham to Egham) water body as a result of the LTR option; passing Objective 1. There will be no potential for the LTR option to result in any WFD status not achieving their objectives, therefore passing Objective 2.

6.19 Based on the design assumptions outlined in Section 2.4, and the details outlined in Table 6.3, there will be no potential for deterioration of any WFD elements in the Queen Mother or Wraysbury Reservoirs as a result of the LTR option, passing Objective 1. There will be no potential for the LTR option to result in any WFD status not achieving their objectives, therefore passing Objective 2.

6.20 These conclusions will be revisited at subsequent project stages when additional design information is known.

6.4.2 Mitigation Measures assessment

6.21 As part of the ACWG methodology, an assessment against Mitigation Measures is completed for all A/HMWB carried through to the Level 2 – detailed assessment. The assessment (Appendix A.1) determined that the LTR option does not have the potential to impact on any of the Mitigation Measures for the River Thames (Cookham to Egham), Queen Mother Reservoir or Wraysbury Reservoir water bodies as outlined in the RBMP Cycle 2. This suggests that this option does not prevent the water body from achieving GEP.

6.5 Summary of findings

6.22 At this preliminary design stage, the Scheme has been deemed as compliant with the WFD objectives assessed against as outlined in Table 6.4 based on the activities in Table 5.4, the assumed mitigation outlined in Table 5.3 and design assumptions set out in Section 2.4. As the project progresses through to subsequent project stages and a preferred route is selected, this WFD assessment will be reviewed and updated to accommodate any changes in design or mitigation.

Table 6.4 WFD water bodies screened into Level 2 – detailed screening assessment (see descriptions for Level 2 scores in Table 3.1)

T2AT option	WFD Water body name	Level 2 Maximum score (pre-mitigation)	Level 2 Maximum score (post-mitigation)	WFD compliant against assessed WFD objective	Potential non-compliant issue
BRI	Lea Navigation Enfield Lock to Tottenham Locks	0	0	Yes	No
LTR	The Queen Mother Reservoir	0	0	Yes	No
	Wraysbury Reservoir	0	0	Yes	No

T2AT option	WFD Water body name	Level 2 Maximum score (pre-mitigation)	Level 2 Maximum score (post-mitigation)	WFD compliant against assessed WFD objective	Potential non-compliant issue
	Thames (Cookham to Egham)	0	0	Yes	No

7. Conclusion and recommendations

7.1 Summary

7.1 This WFD assessment has been completed for the Gate 2 process for the T2AT SRO Scheme.

7.2 The assessment has identified potential impact for the two options at a DO of 100 MI/d which are included as part of the Gate 2 design process. These are:

- Beckton Reuse Indirect (BRI) 100 MI/d; and,
- Lower Thames Reservoir (LTR) 100 MI/d.

7.3 Due to the assumption that activities associated with the 50 MI/d are the same as those associated with the 100 MI/d options, it is assumed that the worst-case options have been assessed. In other words, apart from the volume of water that would be abstracted, transferred and discharged, all other activities are equal. Hence, if the 100 MI/d options are preliminarily judged, at this stage, to be compliant with the WFD objectives, the 50 MI/d options will also be compliant by default.

7.4 The assessment has been undertaken following the ACWG methodology and has assessed the activities highlighted in Table 5.4, the assumed mitigation outlined in Table 5.3 and design assumptions set out in Section 2.4. As the project progresses through to subsequent project stages and a preferred route is selected this WFD assessment will be reviewed and updated to accommodate any design and/or mitigation changes. .

7.1.1 BRI summary

7.5 The WFD assessment identified nine water bodies in relation to the BRI option: six surface water rivers, one surface water transfer and two groundwater bodies.

7.6 The preliminary Level 1 basic screening assessment determined which activities have the potential to impact the surface water bodies.

7.7 It was identified that only one surface water body: Lea Navigation Enfield Lock to Tottenham Locks, received an impact score greater than 1 and was carried through to the Level 2 – detailed impact assessment.

7.8 No groundwater bodies were determined to have an impact score greater than 1. Hence, no groundwater bodies were carried through to the Level 2 – detailed screening assessment.

7.9 The preliminary level 2 assessment determined that impacts associated with the new or increased surface water abstraction activity does not have the potential to

deteriorate the WFD elements of the Lea Navigation Enfield Lock to Tottenham Locks water body or prevent them from attaining Good status. Although the Scheme does not support the Mitigation Measures for this water body, it does not compromise the ability for any of these measures to be delivered. Therefore, the option is compliant with the WFD at this preliminary design stage.

7.1.2 LTR summary

7.10 The WFD screening assessment identified thirteen water bodies in relation to the BRI option: six surface water rivers, two lakes, two canals and three groundwater bodies.

7.11 The preliminary Level 1 – basic screening assessment outlined the two WFD lakes as having an impact score greater than 1 due to new or increased abstraction. These water bodies were carried through to the preliminary Level 2 – detailed screening assessment where it was found that the impacts associated with this activity do not have the potential to deteriorate the WFD element status' or prevent the attainment of Good in the future. Although the Scheme does not support the Mitigation Measures for the water bodies, it does not compromise the ability for any of these measures to be delivered.

7.12 Three groundwater bodies were assessed as part of the preliminary Level 1 – basic screening assessment. None of the groundwater bodies were determined to have an impact score greater than 1 and were scoped out of further assessment

7.13 This option is, therefore, compliant with the WFD at this preliminary design stage.

7.2 Recommendations

7.14 It is recommended that, following the identification of a preferred option (either or both BRI or LTR) and the development of a detailed design solution, further assessment be carried out on the potential impacts on the WFD to improve data and design confidence to High. This should include:

- Additional work to identify the baseline water quality to determine an appropriate discharge licence to be agreed with the Environment Agency at the Queen Mother and Wraysbury Reservoirs. Whilst this is not a requirement for the WFD assessment during the planning stage, it will be a requirement of the discharge license application, post planning consent, to demonstrate WFD compliance;
- A review of updated design information at subsequent project stages in relation to operational and construction activities in order to evaluate the continued validity of the conclusions that have been reached in this report. This will form the basis of the WFD assessment at subsequent stages;

- Review of additional baseline information on any of the watercourses potentially impacted by the Scheme;
- Update the assessment with RBMP3 status and objectives;
- At the planning stage, a cumulative assessment should be completed to determine potential cumulative effects of this SRO in combination with other developments within the study area; and,
- Additionally, an in-combination assessment should be completed at the planning stage to determine the in-combination effects from multiple SROs which have the potential to impact the River Thames.

Appendix A Complete ACWG Spreadsheets

- A.1 WFD_Framework_Assessment_Spreadsheet_template_2019_data_LTR_100
MI/d
- A.2 WFD_Framework_Assessment_Spreadsheet_template_2019_data_BRI_100
MI/d

Appendix B Baseline WFD Data BRI option

B.1 Surface water baseline

Water body name	Lea Navigation (Fieldes Weir to Enfield Lock)		Lea Navigation Enfield Lock to Tottenham Locks		Small River Lee (and tributaries)		Turkey Brook and Cuffley Brook		New River		Colne (upper east arm including Mimshall Brook)		Lee (from Luton Hoo Lakes to Hertford)	
Water body ID	GB106038077851		GB106038027950		GB106038033200		GB106038033180		GB806100111		GB106039029850		GB106038033392	
National Grid Reference	TL3801906906		TQ3475189468		TL3580005356		TQ3488598774		TQ3440998871		TL2312402069		TL2208912451	
River Basin District	Thames		Thames		Thames		Thames		Thames		Thames		Thames	
Management catchment	London		London		London		London		London		Colne		Upper Lee	
Operational Catchment	Lower Lee Rivers and Lakes		Lower Lee Rivers and Lakes		Lower Lee Rivers and Lakes		Lower Lee Rivers and Lakes		Lower Lee Rivers and Lakes		Colne		Upper Lee	
A/HMWB	Heavily modified		Heavily modified		Not designated artificial or heavily modified		Not designated artificial or heavily modified		Artificial		Not designated artificial or heavily modified		Not designated artificial or heavily modified	
Classification	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3
Overall Water Body	Poor	Poor by 2021	Poor	Good by 2063	Moderate	Good by 2063	Poor	Good by 2063	Moderate	Good by 2063	Bad	Moderate 2015	Moderate	Moderate by 2015
Ecological	Poor	Poor by 2021		Bad by 2015	Moderate	Good by 2027 (low)	Poor	Good by 2027 (low)	Moderate	Good by 2021	Bad	Good by 2027 (low)	Moderate	Moderate by 2015
Supporting elements (Surface Water)	Moderate	Good by 2027 (low)	Moderate	Good by 2027 (low)		Not assessed by 2015		Not assessed by 2015	Moderate	Good by 2021		Not assessed by 2015		Not assessed by 2015
Expert Judgement									Good	Good by 2015				
Mitigation Measures Assessment	Moderate or less	Good by 2027 (low)		Good by 2027 (low)					Moderate or less	Good by 2021				
Biological quality elements	Poor	Poor by 2021		Bad by 2015	Moderate	Good by 2027 (low)	Poor	Good by 2027 (low)		Not assessed by 2015	Bad	Good by 2027 (low)	Good	Good by 2015
Macrophytes and Phytobenthos Combined	Poor	Poor by 2021		Bad by 2015	Moderate	Good by 2015	Poor	Good by 2027 (low)			Moderate	Good by 2027 (low)	High	Good by 2015
Fish	Poor	Good by 2015			High	Good by 2015	Good	Good by 2021			Bad	Good by 2027 (low)		

Water body name	Lea Navigation (Fieldes Weir to Enfield Lock)		Lea Navigation Enfield Lock to Tottenham Locks		Small River Lee (and tributaries)		Turkey Brook and Cuffley Brook		New River		Colne (upper east arm including Mimshall Brook)		Lee (from Luton Hoo Lakes to Hertford)	
Invertebrates	Good	Good by 2015	Moderate	Moderate by 2015	Moderate	Good by 2027 (low)	Moderate	Good by 2027 (low)			Poor	Good by 2027 (low)	Good	Good by 2015
Hydromorphological Supporting Elements	Supports Good	Supports Good by 2015	Supports Good	Supports Good by 2015	Supports Good	Supports Good by 2015	Supports Good	Supports Good by 2015		Not assessed by 2015	Supports Good	Supports Good by 2015	Supports Good	Supports Good by 2015
Hydrological Regime	Does Not Support Good	Does Not Support Good by 2015	Does Not Support Good	Does Not Support Good by 2015	Supports Good	Supports Good by 2015	Supports Good	Supports Good by 2015			Does Not Support Good	Supports Good by 2015	Supports Good	Supports Good by 2015
Morphology					Supports Good		Supports Good				Supports Good			
Physico-chemical quality elements	Moderate	Moderate by 2015	Moderate	Moderate by 2015	Moderate	Good by 2027 (low)	Moderate	Good by 2027 (low)		Not assessed by 2015	Moderate	Good by 2027 (low)	Moderate	Moderate by 2015
Acid Neutralising Capacity			High	Good by 2015			High	Good by 2015					High	Good by 2015
Ammonia (Phys-Chem)	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015			High	Good by 2015	High	Good by 2015
Dissolved oxygen	High	Good by 2015	High	Good by 2015	Moderate	Good by 2027 (low)	High	Good by 2015			High	Good by 2015	Moderate	Good by 2015
pH	High	Good by 2015		Good by 2027 (low)	High	Good by 2015	High	Good by 2015			High	Good by 2015	Moderate	Good by 2015
Phosphate	Moderate	Poor by 2015		Poor by 2015	Poor	Good by 2027 (low)	Poor	Good by 2027 (low)			Moderate	Good by 2027 (low)	High	Moderate by 2027
Temperature	High	Good by 2015	Good	Good by 2015	High	Good by 2015	High	Good by 2015			High	Good by 2015	Poor	Good by 2015
Specific pollutants	High	High by 2015	High	High by 2015	High	High by 2015	High	High by 2015		Not assessed by 2015	High	High by 2015	Good	High by 2015
Triclosan	High	High by 2015		High by 2015	High	High by 2015	High	High by 2015			High	High by 2015	High	High by 2015
Manganese				High by 2015							High	High by 2015	High	High by 2015
Copper	High	High by 2015	High	High by 2015							High	High by 2015	High	High by 2015

Water body name	Lea Navigation (Fieldes Weir to Enfield Lock)		Lea Navigation Enfield Lock to Tottenham Locks		Small River Lee (and tributaries)		Turkey Brook and Cuffley Brook		New River		Colne (upper east arm including Mimshall Brook)		Lee (from Luton Hoo Lakes to Hertford)			
Iron	High	High by 2015	High	High by 2015								High	High by 2015	High	High by 2015	
Permethrin														High	High by 2015	
Zinc	High	High by 2015		High by 2015								High	High by 2015	High	High by 2015	
Arsenic			High	High by 2015										High	High by 2015	
Chemical	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063		
Priority substances	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Fail	Good by 2039		
Cypermethrin (Priority hazardous)	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015			Good	Good by 2015	Fail	Good by 2039		
Fluoranthene	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015		
Lead and Its Compounds	Good	Good by 2015	Good	Good by 2015							Good	Good by 2015	Good	Good by 2015		
Nickel and Its Compounds	Good	Good by 2015	Good	Good by 2015							Good	Good by 2015	Good	Good by 2015		
Pentachlorophenol													Good	Good by 2015		
Bifenox			Good	Good by 2015												
Terbutryn				Good by 2015												
Other Pollutants	Does not require assessment	Does not require assessment by 2015	Good	Good by 2015	Does not require assessment	Does not require assessment by 2015	Does not require assessment	Does not require assessment by 2015	Does not require assessment	Does not require assessment by 2015	Does not require assessment	Does not require assessment by 2015	Does not require assessment	Does not require assessment by 2015	Good	Good by 2015
Priority hazardous substances	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063
PBDE	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063

Water body name	Lea Navigation (Fieldes Weir to Enfield Lock)		Lea Navigation Enfield Lock to Tottenham Locks		Small River Lee (and tributaries)		Turkey Brook and Cuffley Brook		New River		Colne (upper east arm including Mimshall Brook)		Lee (from Luton Hoo Lakes to Hertford)	
PFOS	Fail	Good by 2039	Good	Good by 2015	Fail	Good by 2039	Good	Good by 2015	Fail	Good by 2039	Fail	Good by 2039	Fail	Good by 2039
Benzo(a)pyrene	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Cadmium and Its Compounds			Good	Good by 2015							Good	Good by 2015	Good	Good by 2015
Dioxins and dioxin-like compounds	Good	Good by 2015		Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Benzo(b)fluoranthene	Good	Good by 2015		Good by 2015			Good	Good by 2015			Good	Good by 2015	Good	Good by 2015
Benzo(g-h-i)perylene	Good	Good by 2015	Good	Good by 2015			Fail	Good by 2033			Fail	Good by 2033	Good	Good by 2015
Benzo(k)fluoranthene	Good	Good by 2015	Good	Good by 2015			Good	Good by 2015			Good	Good by 2015	Good	Good by 2015
Heptachlor and cis-Heptachlor epoxide	Good	Good by 2015		Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Hexabromocyclododecane (HBCDD)	Good	Good by 2015		Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Di(2-ethylhexyl)phthalate (Priority hazardous)			Good	Good by 2015							Good	Good by 2015	Good	Good by 2015
Hexachlorobenzene	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Hexachlorobutadiene	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Mercury and Its Compounds	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Nonylphenol			Good	Good by 2015			Good	Good by 2015			Good	Good by 2015	Good	Good by 2015
Tributyltin Compounds	Fail	Good by 2050	Good	Good by 2015	Good	Good by 2015	Poor				Bad		Good	Good by 2015

B.2 WFD groundwater baseline

Water body name	Mid-Chilterns Chalk		Radlett Tertiaries	
Water body ID	GB40601G601200		GB40602G602800	
National Grid Reference	TL0261203926		TQ0887990646	
River Basin District	Thames		Thames	
Management catchment	Thames Groundwater		Thames Groundwater	
Operational Catchment	Colne Groundwater		Colne Groundwater	
A/HMWB	Mid-Chilterns Chalk		Radlett Tertiaries	
Classification	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3
Overall Water Body	Poor	Poor by 2015	Poor	Poor by 2015
Quantitative	Poor	Poor by 2015	Poor	Poor by 2015
Quantitative Status element	Poor	Poor by 2015	Poor	Poor by 2015
Quantitative Dependent Surface Water Body Status	Poor	Poor by 2015	Poor	Poor by 2015
Quantitative Saline Intrusion	Good	Good by 2015	Good	Good by 2015
Quantitative Water Balance	Poor	Poor by 2015	Good	Good by 2015
Chemical (GW)	Poor	Good by 2027 (low)	Good	Good by 2015
Chemical Status element	Poor	Good by 2027 (low)	Good	Good by 2015
Chemical GWDEs test	Good	Good by 2015	Good	Good by 2015
Chemical Dependent Surface Water Body Status	Good	Good by 2015	Good	Good by 2015
Chemical Drinking Water Protected Area	Poor	Good by 2027 (low)	Good	Good by 2015
Chemical Saline Intrusion	Good	Good by 2015	Good	Good by 2015

Water body name	Mid-Chilterns Chalk		Radlett Tertiaries	
General Chemical Test	Poor	Good by 2027 (low)	Good	Good by 2015
Trend Assessment	Upward trend		No trend	

Appendix C Baseline WFD Data LTR option

C.1 Surface water baseline

Water body name	Colne Brook		Alderbourne		Colne (Confluence with Chess to River Thames)		Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm		Grand Union Canal, Maple Lodge to Uxbridge (Rivers Colne and Chess plus canal)		Horton Brook		Pinn		Thames (Cookham to Egham)	
Water body ID	GB106039023010		GB106039023080		GB106039023090		GB70610078		GB70610252		GB106039023040		GB106039023070		GB106039023231	
National Grid Reference	TQ0466379170		TQ0031885465		TQ0459793541		TQ0520781531		TQ0519087645		TQ0167776963		TQ0847887782		TQ0099272440	
River Basin District	Thames		Thames		Thames		Thames		Thames		Thames		Thames		Thames	
Management catchment	Colne		Colne		Colne		Colne		Colne		Colne		Colne		Maidenhead and Sunbury	
Operational Catchment	Colne		Colne		Colne		Colne		Colne		Colne		Colne		Thames Lower	
A/HMWB	heavily modified		not designated artificial or heavily modified		heavily modified		Artificial		Artificial		not designated artificial or heavily modified		Heavily modified		Heavily modified	
Classification	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3
Overall Water Body	Moderate	Good by 2063	Moderate	Good by 2063	Moderate	Moderate by 2015	Moderate	Moderate by 2015	Moderate	Moderate by 2015	Moderate	Good by 2063	Moderate	Good by 2063	Moderate	Moderate by 2015
Ecological	Moderate	Moderate by 2015	Moderate	Good by 2027 (low)	Moderate	Moderate by 2015	Moderate	Moderate by 2015	Moderate	Moderate by 2015	Moderate	Good by 2027 (low)	Moderate	Good by 2027 (low)	Moderate	Moderate by 2015
Supporting elements (Surface Water)	Moderate	Good by 2027 (low)		Not assessed by 2015	Moderate	Good by 2027 (low)	Moderate	Good by 2027 (low)	Moderate	Good by 2027 (low)		Not assessed by 2015	Moderate	Good by 2027 (low)	Moderate	Good by 2033
Mitigation Measures Assessment	Moderate or less				Moderate or less	Good by 2027 (low)	Moderate or less	Good by 2027 (low)	Moderate or less	Good by 2027 (low)			Moderate or less	Good by 2027 (low)	Moderate or less	Good by 2033
Biological quality elements	Poor	Good by 2027 (low)	Moderate		Moderate	Good by 2021		Not assessed by 2015		Not assessed by 2015	Moderate	Good by 2027 (low)	Good	Good by 2015	Good	Good by 2015
Macrophytes and		Good by 2027 (low)	Moderate	Good by 2027 (low)	Moderate	Good by 2015					Good	Good by 2015		Not assessed by 2015		Not assessed by 2015

Water body name	Colne Brook	Alderbourne	Colne (Confluence with Chess to River Thames)	Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm	Grand Union Canal, Maple Lodge to Uxbridge (Rivers Colne and Chess plus canal)	Horton Brook	Pinn	Thames (Cookham to Egham)								
Phytobenthos Combined																
Fish	Poor	Not assessed by 2015	Good by 2027 (low)	Good	Good by 2021		Good	Good by 2015								
Invertebrates	High	Good by 2027 (low)	High		High	Good by 2015	Moderate	Good by 2027 (low)	Good	Good by 2015	Good	Good by 2015				
Hydromorphological Supporting Elements	Supports Good	Good by 2015	Supports Good	Good by 2015	Supports Good	Supports Good by 2015	Not assessed by 2015	Not assessed by 2015	Supports Good	Supports Good by 2015	Supports Good	Supports Good by 2015	Not assessed by 2015			
Hydrological Regime	Supports Good	Supports Good by 2015	Does Not Support Good	Does Not Support Good by 2021		Does Not Support Good by 2015			Supports Good	Supports Good by 2015	Supports Good	Supports Good by 2015				
Morphology		Supports Good by 2015	Supports Good	Supports Good by 2015					Supports Good							
Physico-chemical quality elements	Moderate		Good		Moderate	Moderate by 2015	Moderate	Moderate by 2015	Moderate	Moderate by 2015	Moderate	Good by 2027 (low)	Moderate	Good by 2027 (low)	Moderate	Moderate by 2015
Acid Neutralising Capacity	High	Moderate by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015				High	Good by 2015	
Ammonia (Phys-Chem)	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015
Biochemical Oxygen Demand (BOD)		Good by 2015		Good by 2015												
Dissolved oxygen	High	Good by 2015	Good	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	Good	Good by 2015	High	Good by 2015	High	Good by 2015
pH	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015

Water body name	Colne Brook		Alderbourne		Colne (Confluence with Chess to River Thames)		Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm		Grand Union Canal, Maple Lodge to Uxbridge (Rivers Colne and Chess plus canal)		Horton Brook		Pinn		Thames (Cookham to Egham)	
Phosphate	Poor	Poor by 2015	High	Good by 2015	Poor	Moderate by 2027	Moderate	Moderate by 2015	Poor	Poor by 2015	Moderate	Good by 2027 (low)	Poor	Good by 2027 (low)	Moderate	Moderate by 2015
Temperature	High	Good by 2015	High	Good by 2015	Good	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015	High	Good by 2015
Specific pollutants	High	High by 2015	High	High by 2015	High	High by 2015		Not assessed by 2015	High	High by 2015	High	High by 2015	High	High by 2015	High	High by 2015
Triclosan	High	High by 2015	High	High by 2015	High	High by 2015					High	High by 2015	High	High by 2015		
Manganese	High	High by 2015			High	High by 2015					High	High by 2015			High	High by 2015
Copper	High	High by 2015	High	High by 2015	High	High by 2015			High	High by 2015	High	High by 2015			High	High by 2015
Iron	High	High by 2015			High	High by 2015			High	High by 2015	High	High by 2015			High	High by 2015
Permethrin					High	High by 2015										
Zinc	High	High by 2015	High	High by 2015	High	High by 2015			High	High by 2015	High	High by 2015			High	High by 2015
Arsenic					High	High by 2015			High	High by 2015					High	High by 2015
Toluene									High						High	High by 2015
Chromium (VI)									High	High by 2015						
Chemical	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063
Priority substances	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Cypermethrin (Priority hazardous)	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015					Good	Good by 2015	Good	Good by 2015	Good	Good by 2015

Water body name	Colne Brook		Alderbourne		Colne (Confluence with Chess to River Thames)		Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm		Grand Union Canal, Maple Lodge to Uxbridge (Rivers Colne and Chess plus canal)		Horton Brook		Pinn		Thames (Cookham to Egham)	
Fluoranthene	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Lead and Its Compounds	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015			Good	Good by 2015	Good	Good by 2015			Good	Good by 2015
Nickel and Its Compounds	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015			Good	Good by 2015	Good	Good by 2015			Good	Good by 2015
Pentachlorophenol					Good	Good by 2015										
Atrazine					Good	Good by 2015			Good	Good by 2015					Good	Good by 2015
Simazine					Good	Good by 2015			Good	Good by 2015					Good	Good by 2015
Other Pollutants	Does not require assessment	Does not require assessment by 2015	Does not require assessment	Does not require assessment by 2015	Good	Good by 2015		Does not require assessment by 2015		Does not require assessment by 2015	Does not require assessment	Does not require assessment by 2015	Does not require assessment	Does not require assessment by 2015	Good	Good by 2015
Priority hazardous substances	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063
PBDE	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063	Fail	Good by 2063
PFOS	Fail	Good by 2039	Good	Good by 2015	Fail	Good by 2039	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Fail	Good by 2039
Benzo(a)pyrene	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Cadmium and Its Compounds	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good		Good	Good by 2015	Good	Good by 2015			Good	Good by 2015
Dioxins and dioxin-like compounds	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Benzo(b)fluoranthene			Fail	Good by 2033							Good	Good by 2015	Good	Good by 2015	Good	Good by 2015

Water body name	Colne Brook		Alderbourne		Colne (Confluence with Chess to River Thames)		Grand Union Canal, Uxbridge to Hanwell Locks, Slough Arm, Paddington Arm		Grand Union Canal, Maple Lodge to Uxbridge (Rivers Colne and Chess plus canal)		Horton Brook		Pinn		Thames (Cookham to Egham)		
Benzo(g-h-i)perylene			Fail	Good by 2033								Good	Good by 2015	Fail	Good by 2033	Good	Good by 2015
Benzo(k)fluoranthene			Good	Good by 2015								Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Heptachlor and cis-Heptachlor epoxide	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good by 2015
Hexabromocyclo dodecane (HBCDD)	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good by 2015
Di(2-ethylhexyl)phthalate (Priority hazardous)			Good	Good by 2015								Good	Good by 2015				
Hexachlorobenzene	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good by 2015
Hexachlorobutadiene	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good by 2015
Mercury and Its Compounds	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015	Good by 2015
Nonylphenol	Good	Does not require assessment by 2015	Good	Good by 2015	Good	Good by 2015						Good	Good by 2015	Good	Good by 2015		
Tributyltin Compounds					Good	Good by 2015										Good	Good by 2015

C.2 WFD lake baseline

Water body name	The Queen Mother Reservoir		Wraysbury Reservoir	
Water body ID	GB30642334		GB30642417	
National Grid Reference	TQ0080776843		TQ0243174593	
River Basin District	Thames		Thames	
Management catchment	Lower Thames		Lower Thames	
Operational Catchment	Horton Brook		Thames (Cookham to Egham)	
A/HMWB	Artificial		Artificial	
Classification	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3
Overall Water Body	Moderate	Good by 2063	Moderate	Moderate by 2015
Ecological	Moderate	Good by 2021	Moderate	Moderate by 2015
Supporting elements (Surface Water)	Moderate	Good by 2021	Moderate	Good by 2021
Expert Judgement	Good	Good by 2015	Good	Good by 2015
Mitigation Measures Assessment	Moderate or less	Good by 2021	Moderate or less	Good by 2021
Biological quality elements		Not assessed by 2015	High	Good by 2015
Phytoplankton			High	Good by 2015
Physico-chemical quality elements		Not assessed by 2015	Moderate	Moderate by 2015
Salinity			High	Good by 2015
Total Nitrogen			Bad	Good by 2027 (low)
Total Phosphorus			Bad	Bad by 2015
Specific pollutants		Not assessed by 2015	High	High by 2015
Copper			High	High by 2015
Chemical	Fail	Good by 2063	Fail	Good by 2063
Priority substances	Good	Good by 2015	Good	Good by 2015
Fluoranthene	Good	Good by 2015	Good	Good by 2015
Other Pollutants	Does not require assessment	Does not require assessment by 2015	Does not require assessment	Does not require assessment by 2015
Priority hazardous substances	Fail	Good by 2063	Fail	Good by 2063
PBDE	Fail	Good by 2063	Fail	Good by 2063
PFOS	Fail	Good by 2039	Fail	Good by 2039
Benzo(a)pyrene	Good	Good by 2015	Good	Good by 2015
Dioxins and dioxin-like compounds	Good	Good by 2015	Good	Good by 2015
Heptachlor and cis-Heptachlor epoxide	Good	Good by 2015	Good	Good by 2015
Hexabromocyclododecane (HBCDD)	Good	Good by 2015	Good	Good by 2015
Hexachlorobenzene	Good	Good by 2015	Good	Good by 2015
Hexachlorobutadiene	Good	Good by 2015	Good	Good by 2015
Mercury and Its Compounds	Good	Good by 2015	Good	Good by 2015

C.3 WFD groundwater baseline

Water body name	Mid-Chilterns Chalk		Radlett Tertiaries		Lower Thames Gravels	
Water body ID	GB40601G601200		GB40602G602800		GB40603G000300	
National Grid Reference	TL0261203926		TQ0887990646		TQ0543576430	
River Basin District	Thames		Thames		Thames	
Management catchment	Thames Groundwater		Thames Groundwater		Thames Groundwater	
Operational Catchment	Colne Groundwater		Colne Groundwater		Colne Groundwater	
A/HMWB	Mid-Chilterns Chalk		Radlett Tertiaries		Lower Thames Gravels	
Classification	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3	Classification 2019 dRBMP3	Objective 2019 dRBMP3
Overall Water Body	Poor	Poor by 2015	Poor	Poor by 2015	Poor	Good by 2015
Quantitative	Poor	Poor by 2015	Poor	Poor by 2015	Poor	Good by 2015
Quantitative Status element	Poor	Poor by 2015	Poor	Poor by 2015	Poor	Good by 2015
Quantitative Dependent Surface Water Body Status	Poor	Poor by 2015	Poor	Poor by 2015	Good	Good by 2015
Quantitative Saline Intrusion	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Quantitative Water Balance	Poor	Poor by 2015	Good	Good by 2015	Poor	Good by 2015
Chemical (GW)	Poor	Good by 2027 (low)	Good	Good by 2015	Good	Good by 2015
Chemical Status element	Poor	Good by 2027 (low)	Good	Good by 2015	Good	Good by 2015
Chemical GWDTEs test	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Chemical Dependent Surface Water Body Status	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
Chemical Drinking Water Protected Area	Poor	Good by 2027 (low)	Good	Good by 2015	Good	Good by 2015
Chemical Saline Intrusion	Good	Good by 2015	Good	Good by 2015	Good	Good by 2015
General Chemical Test	Poor	Good by 2027 (low)	Good	Good by 2015	Good	Good by 2015
Trend Assessment	Upward trend		No trend		No trend	

Appendix D Assumed Embedded Mitigation Measures

Activity	Assumed embedded mitigation as outlined by the ACWG
Construction/repair of new tunnels and conduits	Tunnels and conduits will be constructed such that they will not form a preferential pathway for the flow of groundwater
Construction of below ground structures (shaft/retaining wall) with associated dewatering, with no sensitive groundwater feature within 500 m	"Risk assessments will be undertaken for excavation works and dewatering to ensure no adverse impact on watercourses, wetland habitats or abstractions. Dewatering discharge will be treated before discharge. "
Presence of new underground structure (tunnel/shaft/retaining wall), with no sensitive groundwater feature within 500 m	Land drainage will be provided on the upgradient side of the scheme such that they will not cause an increase in groundwater flooding risk. This drainage will be discharged into local watercourses to maintain flow.
Construction of below ground structures (shaft/retaining wall) with associated dewatering, within 500 m of a sensitive groundwater feature	"Risk assessments will be undertaken for excavation works and dewatering to ensure no adverse impact on watercourses, wetland habitats or abstractions. If impact likely appropriate mitigation to be put in place. Dewatering discharge will be treated before discharge. "
Presence of new underground structure (tunnel/shaft/retaining wall) within 500 m of a sensitive groundwater feature	Land drainage will be provided on the upgradient side of the scheme such that they will not cause an increase in groundwater flooding risk. This drainage will be discharged into local watercourses to maintain flow.
Construction of new cutting with external dewatering with no sensitive groundwater feature within 500 m	"Risk assessments will be undertaken for excavation works and dewatering to ensure no adverse impact on watercourses, wetland habitats or abstractions. If impact likely appropriate mitigation to be put in place. Dewatering discharge will be treated before discharge. "

Activity	Assumed embedded mitigation as outlined by the ACWG
Construction of new cutting with external dewatering within 500 m of a sensitive groundwater feature	"Risk assessments will be undertaken for excavation works and dewatering to ensure no adverse impact on watercourses, wetland habitats or abstractions. If impact likely appropriate mitigation to be put in place. Dewatering discharge will be treated before discharge. "
Construction of new culvert	Appropriate precautions will to be taken when working in the channels of or adjacent to watercourses, providing new culverts and or extending culverts, if required, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water: and PPG23 Maintenance of structures over water).
Construction of new inverted siphon or drop inlet culvert	Appropriate precautions will to be taken when working in the channels of or adjacent to watercourses, providing new culverts and or extending culverts, if required, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water: and PPG23 Maintenance of structures over water).
Presence of new culvert, in headwaters or on drainage ditches	Appropriate improvements to local habitat to offset the presence of the culvert

Activity	Assumed embedded mitigation as outlined by the ACWG
Presence of new culvert mid or lower catchment	No assumed mitigations
Presence of new inverted siphon or drop inlet culvert	No assumed mitigations
Removal of significant in channel watercourse structure (such as impassable weir)	No assumed mitigations
Removal of existing culverts or other in channel watercourse structure	No assumed mitigations
High volume discharge of water with a quality element of higher WFD status than the receiving water body	No assumed mitigations
High volume discharge of water with a quality element of a lower WFD status than the receiving water body	No assumed mitigations
Low volume discharge of water with a quality element of the same WFD status than the receiving water body	No assumed mitigations
Low volume discharge of water with a quality element of a lower WFD status than the receiving water body	No assumed mitigations
Low volume discharge of water with a quality element of the same WFD status as the receiving water body	No assumed mitigations
High volume discharge of water with a quality element of the same WFD status as the receiving water body	No assumed mitigations
New WTW discharge to watercourse	Discharge will be treated to a suitable standard and agreed with the regulatory authority. Discharge flow will be less than the agreed maximum rate.
Transfer of water via a river, canal or aqueduct	No assumed mitigations

Activity	Assumed embedded mitigation as outlined by the ACWG
Construction of a new abstraction borehole headworks and associated infrastructure	No assumed mitigations
Refurbishment of existing boreholes	Work will be carried out under appropriate consent from the EA
Drilling new abstraction boreholes	Work will be carried out under appropriate consent from the EA
Maintenance and use of abstraction borehole infrastructure	No assumed mitigations
Creation of significant areas of riparian habitats	Appropriate precautions will to be taken when working in the channels of or adjacent to watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Minor habitat creation	Appropriate precautions will to be taken when working in the channels of or adjacent to watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Daylighting of existing culverts	Appropriate precautions will to be taken when working in the channels of or adjacent to watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out

Activity	Assumed embedded mitigation as outlined by the ACWG
	within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Channel realignment with natural bed substrate and good riparian connections	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Channel realignment with artificial banks/base	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Construction or modification of a new pumping station and/or river intake	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Maintenance and use of river intakes	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other

Activity	Assumed embedded mitigation as outlined by the ACWG
	forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Use of existing ground and surface water abstraction licences, within licence conditions and recent abstraction patterns	No assumed mitigations
Use of existing surface water and groundwater abstraction licences, within existing licence conditions but outside of the recent actual rates	No assumed mitigations
New or increased surface water abstraction	No assumed mitigations
New or increased groundwater abstraction	No assumed mitigations
Increase in surface water and groundwater abstraction licences	No assumed mitigations
Construction of a new outfall structure to a watercourse or reservoir	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Cessation of existing discharge to a watercourse	No assumed mitigations
Removal of existing WTW and associated discharge	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the

Activity	Assumed embedded mitigation as outlined by the ACWG
	potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Maintenance and use of river outfall	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency's PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Trenching and laying of pipe lines within the interfluves of a catchment (no watercourse crossings)	Assumed that bedding material for pipelines will be constructed such that they do not form preferential pathways for groundwater flow.
Trenching and laying of pipe lines involving watercourse crossings	"Assumed that bedding material for pipelines will be constructed such that they do not form preferential pathways for groundwater flow. Assumed that watercourse crossings will be carried out using directional drilling or if the watercourse needs to be temporarily diverted, appropriate measures will be in place to protect ecology and watercourse will be returned back to its natural state. "
Trenching and laying of pipe lines involving large watercourse crossings with in channel modifications	Flood risk assessment will be carried out to ensure that new in channel features will not adversely impact on flood risk
Maintenance of pipe lines	No assumed mitigations
Draining of pipelines for maintenance	If water is drained to local watercourse, this will be short term and temporary impacts only

Activity	Assumed embedded mitigation as outlined by the ACWG
removal/decommissioning of existing pipeline (no watercourse crossings)	No assumed mitigations
removal/decommissioning of existing pipeline (involving watercourse crossings)	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency’s PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Construction of small storage reservoir (set back from watercourse)	No assumed mitigations
Construction of new impounding reservoir (in line/next to watercourse, or large compared to watercourse)	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency’s PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Modification of an existing reservoir	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency’s PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).

Activity	Assumed embedded mitigation as outlined by the ACWG
Presence of new reservoir or modified existing reservoir	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency’s PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).
Catchment management schemes	No assumed mitigations
Modification of an existing WTW	No assumed mitigations
Construction of a new WTW (set back from a watercourse)	No assumed mitigations
Maintenance and use of pumping stations and WTW	No assumed mitigations
removal of existing WTW discharge outlet structure	Appropriate precautions will to be taken when working in the channels of watercourses, to appropriately manage flood risk and the potential for deposition of silt or release of other forms of suspended material or pollution within the water column. All measures will be in line with the requirements set out within the Environment Agency’s PPGs (PPG1: General Guide to Prevention of Pollution; PPG5: Works and maintenance in or near water).

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