



Water Resources Management Plan 2024

Technical Appendix R – Scheme Dossiers

Contents

Background and Introduction	6
Supply options: Scheme dossiers	6
Introduction.....	6
Overview of Constrained List Elements.....	8
East London	10
West London	10
Element references.....	13
Desalination	18
Beckton Desalination treatment plant	18
Crossness Desalination treatment plant	20
Raw Water Transfers	22
Minworth STW to River Avon 115 MI/d	22
Netheridge STW to River Severn 35 MI/d.....	23
Oxford Canal - BCN Surplus – Raw Water Transfer Resource (Cropredy).....	25
Oxford Canal - BCN Surplus – Raw Water Transfer Resource (Duke's Cut)	26
Lake Vyrnwy (United Utilities) – 180 MI/d.....	27
Water Recycling	29
Deephams Recycling and conveyance to King George V Reservoir (46.5 MI/d)	29
Deephams Recycling and conveyance to Thames Lee Tunnel (46.5 MI/d)	30
Mogden South Sewer – Recycling Treatment Plant – 25 MI/d.....	32
Mogden Effluent Recycling – Recycling Treatment Plant	34
Beckton Effluent Recycling – Recycling Treatment Plant	36
Direct River Abstraction.....	38
Teddington DRA Tertiary Treatment Plant	38
Raw Water Purchase.....	40
Didcot Raw Water Purchase	40
Lower Thames Licence Trade	41
Inter Company Transfers	42
South East Water to Guildford Transfer	42
Cheam to Merton Transfer (15 MI/d)	43
Woodmansterne WTW to Epsom Downs (10 MI/d).....	43
Reigate to Guildford Transfer (5 MI/d or 20 MI/d)	44
Thames to Affinity Transfer – Conjunctive Use Benefit.....	45
SESRO / STT interconnector – Conjunctive Use Benefit.....	46

Inter Zonal Transfers	47
Henley to SWA Transfer (2.4 MI/d or 5 MI/d).....	47
Henley to SWOX Transfer (2.4 MI/d or 5 MI/d)	48
Kennet Valley to SWOX Transfer (2.3 MI/d or 6.7 MI/d)	49
T2ST KV Spur: Culham to Newbury (Potable).....	50
Groundwater.....	51
South London Artificial Recharge Scheme – Kidbrooke	51
South London Artificial Recharge Scheme – Streatham.....	53
South London Artificial Recharge Scheme Merton Abbey.....	54
Horton Kirby Aquifer Storage and Recovery.....	56
ASR South East London (Addington).....	57
Thames Valley Central ASR	58
Groundwater Addington	60
Dapdune Licence Disaggregation	61
Datchet Increase DO	62
Dorney Increase DO	63
Wood Farm Increase DO	64
Honor Oak Increase DO	65
Taplow Increase DO	66
Groundwater Honor Oak	67
London Confined Chalk (north)	68
Mortimer Disused Source Recommissioning.....	69
Moultsford 1 groundwater option.....	70
Southfleet/Greenhithe Licence Disaggregation	71
Ashton Keynes borehole pumps Removal of Constraints.....	72
Dapdune removal of constraints to DO.....	73
East Woodhay borehole pumps Removal of Constraints to DO.....	74
Merton Recommissioning.....	75
New River Head Removal of Constraints – RES-RC-NRV	77
Reservoirs.....	78
South East Strategic Reservoir Option (SESRO)	78
Marsh Gibbon Reservoir – 75 Mm ³ / 50 Mm ³ / 30 Mm ³	80
Chinnor Reservoir – 30Mm ³	82
Raw Water Conveyance	84
Raw Water System Conveyance – Thames to Fobney 40 MI/d	84

Recycling Mogden to Walton 150 MI/d – Conveyance for Mogden Effluent Recycling Treatment	85
Abingdon to Farmoor Transfer	86
Beckton to Lockwood Conveyance	87
Desalination – Beckton to Crossness tunnel	89
Raw Water System – Conveyance from Break Tank to Coppermills	90
Raw Water System – Chingford South intake increase	91
Raw Water System – Datchet intake increase	92
Raw Water System - Oxford Canal – Duke’s Cut to Farmoor 15 MI/d Pipeline	93
Raw Water System – KGV Reservoir intake increase	94
Raw Water System – KGV Reservoir to Break Tank	95
Direct River Abstraction – Teddington to Thames Lee Tunnel	96
Teddington DRA Conveyance from Mogden to River Thames (Teddington Outfall)	98
TLT extension from Lockwood PS to King George V Reservoir intake	99
Raw Water System – Increase capacity of Littleton intake PS	101
Raw Water System – New Medmenham Intake	102
Raw Water System – Queen Mary Reservoir to Kempton WTW site	103
Raw Water System – Increase capacity of Surbiton intake	104
Raw Water System – TLT upgrade	105
Severn Thames Transfer – Deerhurst to Culham (300MI/d) pipeline	106
Severn Thames Transfer – Deerhurst to Culham (400 MI/d) pipeline	108
Severn Thames Transfer – Deerhurst to Culham (500MI/d) pipeline	110
New Lower Thames Intake: Surbiton to Queen Mary reservoir	112
Catchment Management	114
Bean Wellfield (Groundwater)	114
Green Street Green (Groundwater)	114
Wilmington (Groundwater)	115
Drought Permit options	116
Gatehampton	116
Playhatch	116
Harpsden/Sheeplands	116
Water Treatment Works	117
East London (600 MI/d)	117
Kempton WTW expansion (800 MI/d)	118
Medmenham WTW (72 MI/d)	120



Abingdon WTW new 24 MI/d (SWOX)	121
Radcot WTW (72 MI/d)	122
Coppermills WTW – Mecana Ultrafibre (200 MI/d, 480 MI/d or 680 MI/d)	124
Network reinforcement	125
Desalination Beckton to Coppermills tunnel	125
Desalination – Crossness to Beckton tunnel	126
SWOX to SWA (48/72) MI/d	127
Network Reinforcement – Barrow Hill Pump 6 replacement	128
Coppermills WTW to New Honor Oak Service Reservoir TWRM Extension	129
Network Reinforcement New Header tank and Pumping Station at Coppermills WTW	130
Hampton WTW to Battersea Extension	131
Network Reinforcement – Kempton WTW New shaft	132
Network Reinforcement – New River Head Pump 4 replacement	134
Merton TWRM Shaft to Hampton 36 Flow Monitoring Zone (FMZ)	135
Kempton WTW to Merton TWRM Shaft	135
Battersea TWRM Shaft to Nunhead Service Reservoir	136
Coppermills 70” Tunnel to Woodford FMZ	138
Coppermills WTW to Finsbury Park and Woodford C FMZs	139
Woodford PS to Chigwell Service Reservoir	140
Brookfield Lane (Cheshunt) PS to Hoddesdon Service Reservoir	142
Streatham TWRM Shaft to Norwood Service Reservoir	144
Demand options: Scheme dossiers	145
Metering – Progressive Metering Programme (PMP)	145
Metering – Progressive Smart Upgrade Programme Household (HH PSUP)	146
Metering – Bulk Metered Area (BMA)	147
Metering – Mini Bulk Metered Area (mBMA)	148
Metering – Progressive Smart Upgrade Programme Non-Household (NHH PSUP)	149
Metering – Metering Innovation – PMP	149
Metering – Metering Innovation – PSUP	150
Water Efficiency – Digital Engagement	151
Water Efficiency – Household Innovation and Tariffs	152
Water Efficiency – Smarter Home Visit – Progressive Metering Programme (PMP)	154
Water Efficiency – Smarter Home Visit – Optants	155
Water Efficiency – Smarter Home Visit – Progressive Smart Upgrade Programme (PSUP)	156
Water Efficiency – Wastage Fix	156

Water Efficiency – Green Redeem	157
Water Efficiency – Smarter Business Visits (SBVs)	158
Water Efficiency – Non-Household Continuous Flow Fixes.....	158
Water Efficiency – Non-Household New Tariff Structure	158
Water Efficiency – Non-Household Retailer Activity	159
Leakage Reduction – Advanced District Metered Area Intervention (DMAi)	159
Leakage Reduction – Leakage Innovation	160
Leakage Reduction – Mains Rehabilitation.....	161
Annex A: Changes Made Between Plan Iterations	163

Figures

Figure R-1: Overview of WRMP24 Supply options reports.....	7
--	---

Tables

Table R-1: Constrained List Elements – London WRZ	9
Table R-2: Raw water system reinforcement requirements for additional water resources in East or West London.....	10
Table R-3: Network reinforcement requirements for additional water resources treated in East or West London.....	10
Table R-4: Constrained List Elements – Thames Valley WRZs	12
Table R-5: Abbreviations used for element references (WRMP19).....	15
Table R-6: Abbreviations used for water resource element references (WRMP24)	17

Background and Introduction

This document is an appendix to Section 7 of the WRMP documents. The document provides a summary of each constrained list option. A summary is also provided for network reinforcement and raw water network elements which are required to support a constrained list option. The second part of this appendix provides a summary of demand options.

Appendix R Scheme Dossiers provide:

- List of Constrained List options, these are options which passed:
 - Feasibility Assessment Stages 1, 2, 3, and Validation
 - Further Screening
- A summary of each option on the Constrained List
- A summary of each demand option

All Constrained List options and demand options were included in the WRSE investment model.

Structure of Appendix

This appendix provides a high-level description of the options that have been included in the Constrained List for our 2024 Water Resources Management Plan. The appendix is in two sections; the first section describes our options to provide additional water resources and the second section describes our options to reduce demand for water.

R.1 *Note on terminology:*

- At WRMP19 the terminology 'Reuse' was used, the terminology at WRMP24 has moved on to be 'Water Recycling'. The WRMP documents refer to options as recycling options however WRSE IDs refer to reuse as these were defined before this change in terminology. The terms Reuse and Recycling can be considered interchangeably.
- At WRMP19 the terminology Abingdon Reservoir was used, this has been further developed and is now referred to as South East Strategic Reservoir Option (SESRO). When referring to different reports and information it is necessary to refer to both these names. In reading the WRMP documents Abingdon Reservoir and SESRO are used interchangeably and refer to the same option.

Supply options: Scheme dossiers

Introduction

R.2 Appendix R – Scheme Dossiers should be read in conjunction with the following reports as detailed

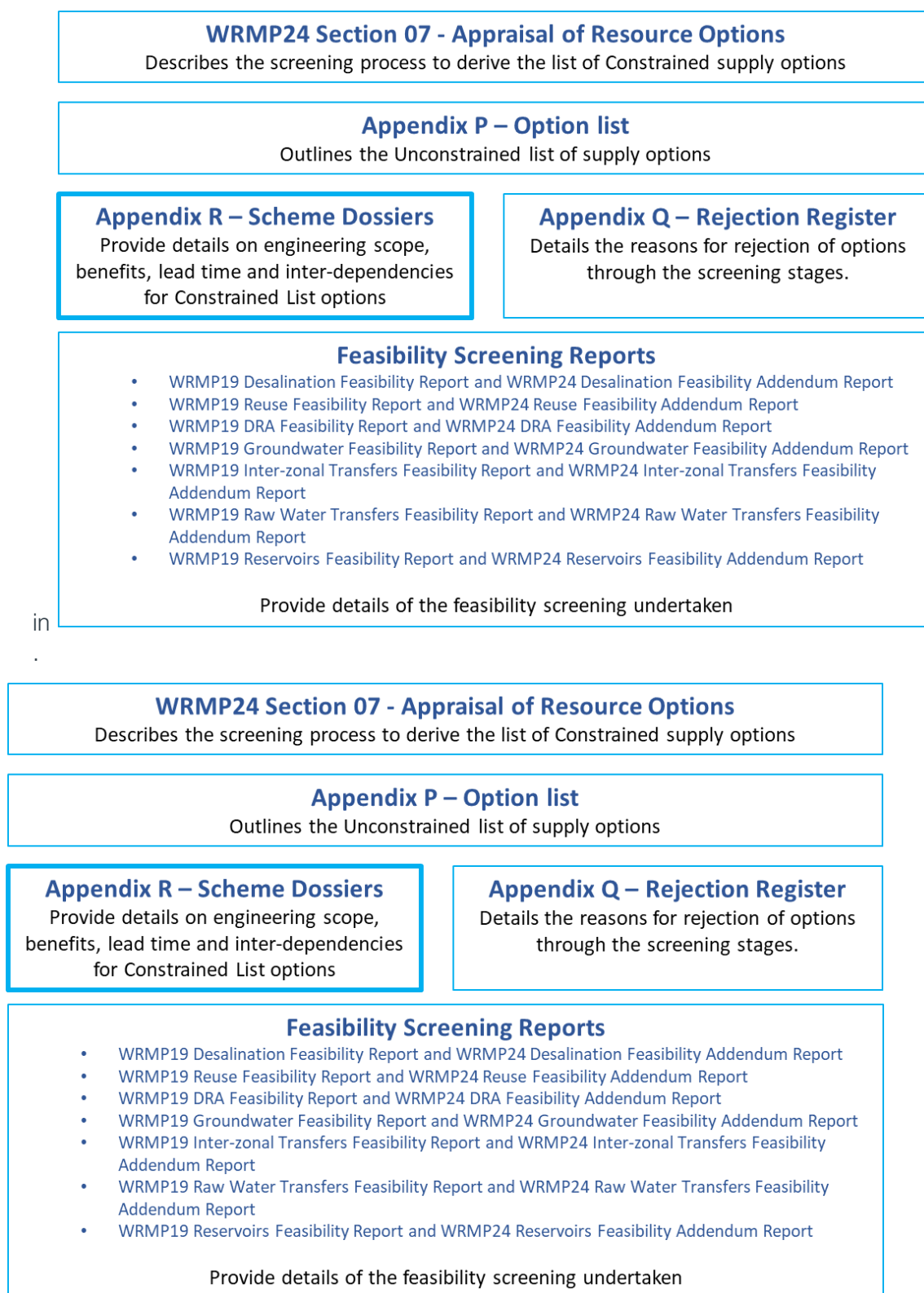


Figure R-1: Overview of WRMP24 Supply options reports

R.3 This section provides a high-level description of the elements that form our water resource options that have been included in the Constrained List for our draft Water Resources Management Plan 2024.

R.4 Firstly, resource elements are described, followed by the system elements that are required for delivering the additional resource into the distribution network. Following this introduction, the structure of this section is as follows:

- Overview of Constrained List Elements
- Desalination
- Raw water transfers
- Water Recycling
- Direct River Abstraction
- Raw Water Purchase
- Inter-company transfers
- Inter-zonal transfers
- Groundwater
- Reservoirs
- Raw water conveyance
- Catchment management
- Water treatment works
- Network reinforcements

Overview of Constrained List Elements

R.5 An overview of the elements included in the Constrained List and how they can be combined to provide water resources options is shown in Table R-1 for the London Water Resources Zone (WRZ). Table R-2 show the elements required for reinforcement of the London raw water system and the London transmission network depending upon whether resources are supplied from the east of London or the west of London. Selection of these elements is dependent of which combination of resource elements are selected and if water is supplied into the east or west of London. Once resource elements are selected by the WRSE investment model, Table R-2 and Table R-3 are used to define which raw water network and network reinforcement elements are required.

R.6 Table R-4 shows the elements included in the Constrained List for Thames Valley WRZs covering:

- Guildford WRZ
- Henley WRZ
- Kennet Valley WRZ
- Slough Wycombe and Aylesbury (SWA) WRZ
- Swindon and Oxfordshire (SWOX) WRZ

R.7 Options included in the Best Value Plan are presented in revised draft WRMP24, Section 11.

Option Type	Resource Element		Conveyance Element		Raw Water System	Treatment Element Location	Network Element
	Location	DO DYAA M/d	Location	Nominal Capacity M/d			
Water reuse	Deephams	42	Deephams to KGV	60	See raw water system matrix	East London	See network reinforcement matrix
	Beckton 50 M/d	46	Deephams to TLT extension			East London	
	Beckton 100 M/d	89	Beckton to Lockwood shaft	800			
	Beckton 150 M/d	130					
	Beckton 200 M/d	172					
	Beckton 300 M/d	252					
	Reuse Mogden - 150 M/d	130	Mogden to Walton	150		Kempton	
	Reuse Mogden - 100 M/d	88				Kempton	
	Reuse Mogden - 50 M/d	46					
	Reuse Mogden S Sewer - 25 M/d	23	N/A				
DRA	Teddington DRA - 50 M/d	46	Teddington Outfall	75	See raw water system matrix	Kempton & East London	See network reinforcement matrix
	Teddington DRA - 75 M/d	67	Teddington to Thames Lee Tunnel	75			
Raw Water Transfer	Vynny	29/43/57/78/86/103	Deerhurst to Culham	300/400/500	See raw water system matrix	Kempton	See network reinforcement matrix
	Netheridge to River Severn	24					
	Minworth (Phase 1 and 2)	70					
	Oxford Canal	10.3	N/A				
Desalination	Beckton Desalination - 150 M/d	133	N/A		N/A	N/A	See matrix plus Beckton to Coppermills
	Beckton Desalination - 100 M/d	89					
	Beckton Desalination - 50 M/d	44					
	Crossness Desalination (Blended) - 300 M/d	267	N/A		Beckton-Crossness	N/A	As above plus Crossness to Beckton
	Crossness Desalination (Blended) - 250 M/d	222					
	Crossness Desalination (Blended) - 200 M/d	178					
	Crossness Desalination (Blended) - 150 M/d	133					
	Crossness Desalination (Blended) - 100 M/d	89					
	Crossness Desalination (Blended) - 50 M/d	44					
New Reservoir	SESRO / Abingdon Reservoir - 150 Mm³	271	N/A		See raw water system matrix	Kempton	See network reinforcement matrix
	SESRO / Abingdon Reservoir - 125 Mm³	230					
	SESRO / Abingdon Reservoir - 100 Mm³	185					
	SESRO / Abingdon Reservoir - 75 Mm³	149					
	SESRO / Abingdon Reservoir Phased - 80 + 42 Mm³	224 M/d (155.1 + 68.9)					
	SESRO / Abingdon Reservoir Phased - 30 + 100 Mm³	238 M/d (65.5 + 173.1)					
	Chinnor Reservoir 30 Mm³	86					
	Marsh Gibbon Reservoir - 75 Mm³	149					
	Marsh Gibbon Reservoir - 50 Mm³	103					
	Marsh Gibbon Reservoir - 30 Mm³	66					
Aquifer Recharge	AR/SLARS - Kidbrooke (SLARS1)	8	N/A		N/A	N/A	N/A
	AR Merton (SLARS3)	6					
	AR Streatham (SLARS2)	7					
Aquifer Storage and Recovery	ASR South East London (Addington)	3	N/A		N/A	N/A	N/A
	ASR Thames Valley/Thames Central	3					
	ASR Horton Kirby	5					
Groundwater	GW - Addington	2.7	N/A		N/A	N/A	N/A
	GW - London Confined Chalk (north)	2					
	GW - Southfleet/Greenhithe (new WTW)	8.8					
	GW - New River Head Removal of Constraints	3					
	GW - Honor Oak	1.4					
	Honor Oak Increase DO	1.7					
Raw Water Purchase	Didcot Raw Water Purchase	22.6	N/A		See raw water system matrix	Kempton	See network reinforcement matrix
	Lower Thames Licence Trade	50					
Catchment Management	Bean Wellfield (Groundwater)	0.1	N/A		N/A	N/A	N/A
	Green Street Green (Groundwater)	0.3					
	Wilmington (Groundwater)	0.2					
Inter-co. transfers			Cheam to Merton	15	N/A	N/A	N/A
			Woodmansterne WTW to Epsom Downs	10			

Table R-1: Constrained List Elements – London WRZ

Additional raw Water Resource in East (M/d)										
		0	100	200	300	400	500	600	700	800
Additional Raw Water Resource in West (M/d)	0	-	3	1,3,5	1-3,5,6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6
	100	-	3	1,3,5	1-3,5,6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6
	200		3	1,3,5	1-3,5,6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6
	300		3	1,3,5	1-3,5,6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6	1-3, 5, 6
	400	7	3,7	1,3,5,7	1-3,5-7	1-3, 5-7				
	500	7/8,10	3,7/8,10	1,3,5,7/8,10	1-3,5-7/8,10					
	600	7/8,10	3,7/8,10	1,3,5,7/8,10						
	700	7/8,10	3,7/8,10							
	800	7/8,10								

Table R-2: Raw water system reinforcement requirements for additional water resources in East or West London

East London

- 1) King George V Reservoir intake capacity increase
- 2) Chingford South (above Chingford Mill) intake capacity increase
- 3) TLT extension from Lockwood PS to King George V Reservoir intake
- 4) TLT upgrade to remove existing constraints to maximise transfer capacity (not shown in table)
- 5) Additional conveyance from King George V Reservoir to break tank
- 6) Second Spine Tunnel from break tank to Reservoir 5 upstream of Coppermills WTW

West London

- 7) Datchet intake capacity increase with transfer to Queen Mother and Wraysbury Reservoirs
- 8) Littleton intake capacity increase with transfer to Queen Mary
- 9) Surbiton intake capacity increase with transfer to Walton inlet channel (not shown in table)
- 10) Additional conveyance from Queen Mary Reservoir to Kempton WTW

		East (MI/d)								
		0	100	200	300	400	500	600	700	800
West (MI/d)	0	-	-	5	4,5	4,5	4,5	4,5	1,4,5	1,4,5
	100	1	1	3,4,5	3,4,5	3,4,5	3,4,5	4,5	1,4,5	
	200	1,3	1,3	3,4	3,4,5	3,4,5	3,4,5	3,4,5		
	300	1,3	1,3	1,3,4	3,4,5	3,4,5	3,4,5			
	400	1,3	1,3	1,3,5	3,4,5	3,4,5				
	500	1,3,5,6	1,3,5,6	1,3,5	1,3,5					
	600	1,2,3,5,6	1,3,5,6	1,3,5,6						
	700	1,2,3,5,6	1,2,3,5,6							
	800	1,2,3,5,6								

Table R-3: Network reinforcement requirements for additional water resources treated in East or West London

R.8 The network reinforcement requirements identified are:

- 1) Replace New River Head Pump 4
- 2) Replace Barrow Hill Pump 6
- 3) TWRM extension – Hampton to Battersea
- 4) TWRM level controlled by new header tank at Coppermills WTW and pumping station
- 5) TWRM extension – Coppermills to Honor Oak
- 6) Resolve issues with supply to Surbiton during TWRM outage

R.9 Additional network reinforcement elements have been identified that are specific for individual options. These include:

- Tunnel from Beckton to Coppermills WTW for blending of water from Beckton and Crossness desalination options
- Tunnel from Crossness desalination plant site to Beckton to extend the Beckton-Coppermills tunnel to Crossness so that it can transfer resource from the proposed desalination plant at Crossness
- New shaft on the TWRM at Kempton is required the first phase of additional treatment

R.10 Since draft WRMP24 further water balance modelling has been undertaken for London WRZ and identified potential network constraints and associated local deficits which would require network upgrades before 2040. The water balance modelling has identified the following potential network upgrades.

- Merton TWRM Shaft to Hampton 36 Flow Monitoring Zone (FMZ)
- Kempton WTW to Merton TWRM Shaft
- Battersea TWRM Shaft to Nunhead Service Reservoir
- Coppermills 70" Tunnel to Woodford FMZ
- Coppermills WTW to Finsbury Park and Woodford C FMZs
- Woodford PS to Chigwell Service Reservoir
- Park Lane TWRM Shaft to Putney Service Reservoir
- Brookfield Lane (Cheshunt) Pumping Station to Hoddesdon Service Reservoir
- Streatham TWRM Shaft to Norwood Service Reservoir

Final WRMP24 - Technical Appendix R: Scheme Dossiers
August 2023



	Option Type	Resource Element		Conveyance Element		Raw Water System	Treatment Element	Network Element
		Location	DO MI/d ADPW	Location	Nominal Capacity MI/d		Location	Location
Swinford & Oxfordshire (SWOX)	Raw Water Transfer	Sewer Thames Transfer (See London WRZ for support elements)	See London Constrained list table	Deerhurst to Culham	300 400 500	N/A	Radcot WTW 24 MI/d each phase	Transfers to service reservoir included in WTW elements
		Oxford Canal	12	Dukes Cut to Farmoor	15			
	New Reservoir	SESRO / Abingdon Reservoir - 150 Mm3	271	Abingdon to Farmoor Reservoir (if treatment capacity not required)	24	N/A		
		SESRO / Abingdon Reservoir - 125 Mm3	230				Abingdon SWOX WTW (if treatment capacity reqd) 24 MI/d each phase	Transfers to service reservoir included in WTW elements
		SESRO / Abingdon Reservoir - 100 Mm3	185				TBC	TBC
		SESRO / Abingdon Reservoir - 75 Mm3	149	N/A				
		SESRO / Abingdon Reservoir Phased - 80 + 42 Mm3	224 MI/d (155.1 + 68.9)					
		SESRO / Abingdon Reservoir Phased - 30 + 100 Mm3	238 MI/d (65.5 + 173.1)					
		Chinnor Reservoir 30 Mm3	66					
		Marsh Gibbon Reservoir - 75 Mm3	149					
Slough, Weymouth & Aylesbury (SWA)	Groundwater	Woods Farm Increase DO	2.9	N/A		N/A	N/A	N/A
		GW - Moultsford 1	3.5	N/A		N/A	N/A	N/A
	Removal of constraints to DO	Ashton Keynes borehole pumps	2.04	N/A		N/A	N/A	N/A
	Inter-zonal transfers			Henley to SWOX	2.4 5	N/A	N/A	N/A
		GW - Mortimer disused source	4.5	Kennet Valley to SWOX	6.7 2.3			
	Raw Water Transfer	Sewer Thames Transfer ^a (See London WRZ for support elements)	See London Constrained list table	Deerhurst to Culham	300/400/500	N/A New intake 80 / 53	Abingdon SWA WTW Medmenham WTW	Abingdon to north SWA Transfers to service reservoir included in WTW elements
		Oxford Canal	12					
	New Reservoir ^a	SESRO / Abingdon Reservoir - 150 Mm3	271	N/A		N/A	Abingdon SWA WTW	Abingdon to north SWA
		SESRO / Abingdon Reservoir - 125 Mm3	230				Medmenham WTW	Transfers to service reservoir included in WTW elements
		SESRO / Abingdon Reservoir - 100 Mm3	185				Medmenham WTW	
Guildford		SESRO / Abingdon Reservoir - 75 Mm3	149					
		SESRO / Abingdon Reservoir Phased - 80 + 42 Mm3	224 MI/d (155.1 + 68.9)					
		SESRO / Abingdon Reservoir Phased - 30 + 100 Mm3	238 MI/d (65.5 + 173.1)					
		Chinnor Reservoir 30 Mm3	66					
		Marsh Gibbon Reservoir - 75 Mm3	149					
		Marsh Gibbon Reservoir - 50 Mm3	103					
		Marsh Gibbon Reservoir - 30 Mm3	66					
	Raw Water Purchase	Didcot	22.6	N/A		New intake 80 / 53	Medmenham WTW	Transfers to service reservoir included in WTW elements
	Groundwater	Taplow Increase DO	5.7	N/A		N/A	N/A	N/A
		Datchet Increase DO	6.2					
Kennet Valley		Dorney Increase DO	4.3					
	Inter-zonal transfers			Henley to SWA	2.4 / 5	N/A	N/A	N/A
	Groundwater	Dapdune licence disaggregation	2.2	N/A		N/A	N/A	N/A
	Removal of constraints to DO	Dapdune removal of constraints	1	N/A		N/A	N/A	N/A
	Inter-co. transfers			SouthEast Water to Guildford	10	N/A	N/A	N/A
				SES Reigate to Guildford	5 20			
	Groundwater	GW - Mortimer disused source (recommission)	4.5	N/A		N/A	N/A	N/A
	Removal of constraints to DO	East Woodhay borehole pumps	2.1	N/A		N/A	N/A	N/A
	Inter-zonal transfers			T2ST KV Spur: Culham to Newbury (Potable)	10	N/A	N/A	N/A

Table R-4: Constrained List Elements – Thames Valley WRZs

R.11 Since draft WRMP24 we have carried out initial analysis of the 2022 drought specific learnings in relation to our abstractions from the Lower Thames and the benefits. This analysis has revealed that constraints may exist on the Lower Thames which mean that, during times of low flow, we are not able to abstract water sufficient volumes to allow us to hit the 300 MI/d Teddington Target Flow. The modelling identified the following potential raw water system upgrades to address these constraints:

- A new river abstraction from the River Thames near Teddington and transfer to Queen Mary Reservoir
- A new river abstraction from the River Thames near Surbiton and transfer to Queen Mary Reservoir
- A new river abstraction from the River Thames near Walton and transfer to Queen Mary Reservoir

R.12 More detailed modelling and option assessment will be undertaken to confirm the raw water system upgrades needed to address both the learning from 2022 drought and the future impacts associated with the River Thames flood relief scheme.

Element references

R.13 At WRMP19 each resource element was allocated a unique reference. The element references comprised an element type, sub-type, location and size (where there is more than one size variant). Table R-5 provides a list of WRMP19 abbreviations used for element references.

Type	Sub-type	Location
RES (Resource)	DES (Desalination)	BEC (Beckton)
		CRO (Crossness)
		MIN (Minworth)
	RWTS (Raw Water Transfer Support)	NTH (Netheridge)
		OX-CRP (Oxford Canal to Cropredy)
		OX-DKC (Oxford Canal to Duke's Cut)
		VYR (Vyrnwy)
		WYE (Wye)
	RU (Recycling)	BEC (Beckton)
		DPH (Deephams)
	WRP (Raw Water Purchase)	DID (Didcot)
		CHD (Chingford)
	ICT (Inter-Company Transfer)	SEW-GUI-MNT (South East Water to Guildford, Mount Service Reservoir)
		WSX-FLX (Wessex Water to SWOX, Flaxlands Service Reservoir)
	IZT (Inter-Zonal Transfers)	HEN-SWA-HAM (Henley to SWA, Hambleden WTW)
		HEN-SWX-NET (Henley to SWOX, Nettlebed)

Type	Sub-type	Location
		KEN-SWOX-CLV (Kennet Valley to SWOX, Cleeve)
		SLARS (South London Artificial Recharge Scheme)
	ASR (Aquifer Storage and Recovery)	HTK (Horton Kirby)
		SEL (South East London)
		TV (Thames Valley)
	GW (Groundwater)	ADD (Addington)
		DAP (Dapdune)
		DAT (Datchet)
		HON (Honor Oak)
		LCC (London Confined Chalk)
		MOR (Mortimer)
		MOU (Moulsford)
		SOU (Southfleet/Greenhithe)
	RC (Removal of Constraints)	ASH (Ashton Keynes)
		DAP (Dapdune)
		DAT (Datchet)
		EPS (Epsom)
		EWO (East Woodhay)
		LAD (Ladymead)
		MTN (Merton)
		NRV (New River Head)
	RRR (Reservoir)	ABI (Abingdon)
CON (Conveyance)	RU (Recycling)	BEC-LCK (Beckton to Lockwood)
		DPH-KGV (Deephams to King George V)
		DPH-TLTEX (Deephams to TLT extension)
	RWS (Raw Water Systems)	ABI-FMR (Abingdon to Farmoor)
		BEC-CRO (Beckton to Crossness)
		BT-COP (Break tank to Coppermills)
		CHS (Chingford South intake)
		DAT (Datchet intake)
		DKC-FMR (Duke's Cut to Farmoor)
		KGV (KGV Reservoir intake)
		LCK-KGV (Lockwood PS to KGV Intake)

Type	Sub-type	Location
WTW (Water Treatment Works)		LTN (Littleton intake)
		MMM (Medmenham intake)
		QMR-KEM (Queen Mary Reservoir to Kempton WTW)
		SUR (Surbiton intake)
		TLT-UPG (Thames Lee Tunnel Upgrade)
	RWT (Raw Water Transfers)	DEH-CLM (Deerhurst to Culham)
	LON (London)	COP (Coppermills)
		KEM (Kempton)
	SWA (Slough, Wycombe & Aylesbury)	MMM (Medmenham)
	SWOX (Swindon and Oxford)	ABI (Abingdon)
NET (Network Reinforcement)	DES (Desalination)	ABI-SWA (Abingdon to SWA)
		RAD (Radcot)
	GUI (Guildford)	BEC-COP (Beckton to Coppermills)
		CRO-BEC (Crossness to Beckton)
	IZT (Inter-Zonal Transfers)	SFD-NML (Shalford to Netley Mill)
		AB-LC (Abingdon to Long Crendon)
	TWRM (Thames Water Ring Main)	BAR-PUM (Barrow Hill Pump)
		COP-HEA (Coppermills Header Tank)
		COP-HON (Coppermills WTW to New Honor Oak SR)
		COP-PS (Coppermills Pumping Station)
		HAM-BAT (Hampton WTW to Battersea)
		KEM (Kempton WTW New shaft)
		NRV-PUM (New River Head Pump)

Table R-5: Abbreviations used for element references (WRMP19)

- R.14 The option references have been updated for WRMP24 to align with the Water Resources South East (WRSE) naming convention. Table R-6 summarises the abbreviations used for the element references for WRSE and WRMP24.
- R.15 For some elements we have included the ability to bring the option online in phases, these are options which can be built in a modular way, which gives us flexibility to meet incremental increases in need over time. The WRSE ID may include P1, P2 etc to denote the phasing. The phasing also allows alternative capacities of both phase 1 and subsequent phases. In the option dossiers the WRSE ID has been simplified to remove P1, P2 etc and the potential phasing is described in the dossier.

- R.16 The first phase of delivery of large options has been split into planning, development, and construction stages, denoted by PLA, DEV and CNO in the WRSE ID. In the option dossiers this has been simplified to a single WRSE ID with XXX replacing PLA, DEV and CNO.
- R.17 The planning and development stages are common across all capacities of phase 1. Later phases have not been split into these 3 stages and this is denoted in the WRSE ID by ALL. Likewise options which have not been split into planning, development and construction stages are denoted by ALL in the WRSE ID.
- R.18 Beckton Recycling is an example of an option where the WRSE ID has been simplified in the dossier. This option has planning, development and construction stages and options for a first phase of 50 MI/d, 100 MI/d or 150 MI/d, followed by further phases of 50 MI/d, 100 MI/d or 150 MI/d up to a combined limit of 300 MI/d. The full list of WRSE IDs is:
- TWU_KGV_HI-REU_RE1_PLA_reuse beckton
 - TWU_KGV_HI-REU_RE1_DEV_reuse beckton
 - TWU_KGV_HI-REU_RE1_CNO_reuse beckton 50
 - TWU_KGV_HI-REU_RE1_CNO_reuse beckton 100
 - TWU_KGV_HI-REU_RE1_CNO_reuse beckton 150
 - TWU_KGV_HI-REU_RE2_ALL_reuse beckton 50 p2
 - TWU_KGV_HI-REU_RE2_ALL_reuse beckton 100 p2
 - TWU_KGV_HI-REU_RE2_ALL_reuse beckton 150 p2
- R.19 This has been simplified in the dossier to:
- TWU_KGV_HI-REU_RE1_XXX_reuse beckton 50
 - TWU_KGV_HI-REU_RE1_XXX_reuse beckton 100
 - TWU_KGV_HI-REU_RE1_XXX_reuse beckton 150



Company code	WRZ code	Option Type ID	Element	Real Options stage
TWU: Thames Water	GUI: Thames, Guildford	HI-GRW: Groundwater	RE1: first resource phase	PLA: Planning
	HEN: Thames, Henley	HI-IMP: Water import (raw or potable)	RE2: subsequent resource phase	DEV: Development
	KVZ: Thames, Kennet Valley	HI-TFR: Water transfer (raw or potable)	CON: raw water conveyance	CNO: Construction and operation
	LON: Thames, London	HI-LRE: Loss reduction	WT1: first water treatment phase	
	SWA: Thames, Slough, Wycombe and Aylesbury	HI-ROC: Removal of constraints	WT2: subsequent water treatment phase	
	SWX: Thames, Swindon and Oxfordshire	HI-RSR: Reservoir	NET: network reinforcement	
		HI-REU: Reuse	ALL: integrated option	
		HI-RAB: River abstraction		
		HI-DES: Desalination		
		HI-OTH: Other		
		BG-CAT: Catchment management		
		BG-OTH: Other		

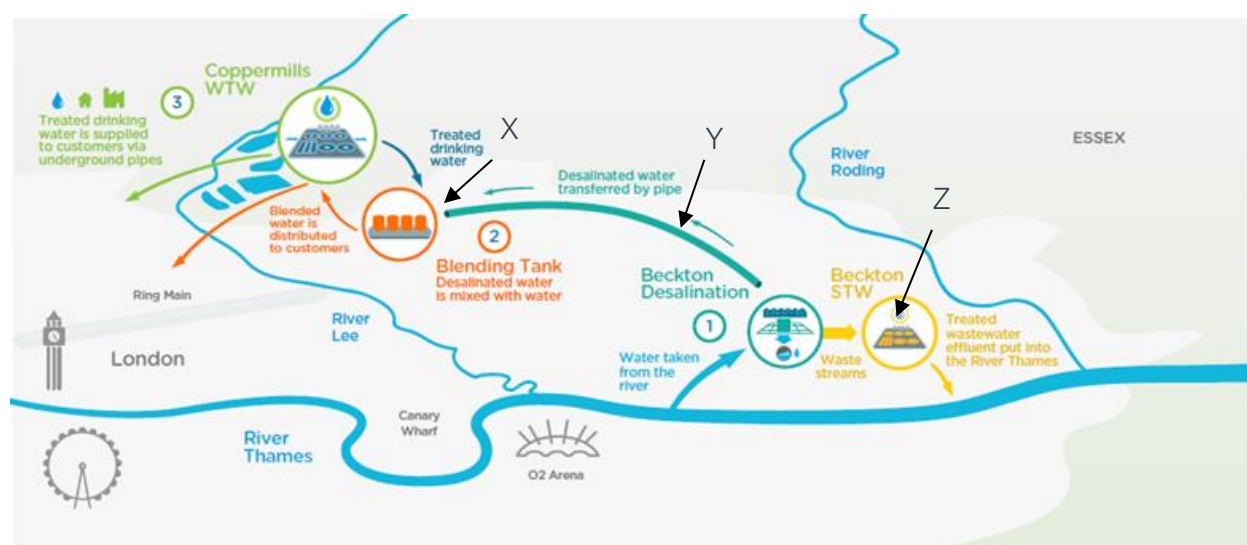
Table R-6: Abbreviations used for water resource element references (WRMP24)

Desalination

Beckton Desalination treatment plant

Name	Desalination – Beckton Desalination treatment plant								
WRSE ID	TWU_LON_HI-DES_ALL_XXX_beckton desal 150 TWU_LON_HI-DES_ALL_XXX_beckton desal 100 TWU_LON_HI-DES_ALL_XXX_beckton desal 50								
WRMP19 Reference	RES-DES-BEC-150								
Element Type	Resource								
WRZ	LONDON								
Engineering Scope	<p>Brackish estuarine water would be abstracted at low tide and used as raw water for the desalination plant. The new desalination plant will be located on land within the existing Beckton STW site. Treatment would include clarification, rapid gravity filters, ultrafiltration membranes, reverse osmosis, re-mineralisation, disinfection and final chemical treatment. The desalinated water would then be transferred via a tunnel to the Coppermills WTW Thames Water Ring Main (TWRM) shaft location and blended with potable treated water from Coppermills WTW prior to entering supply.</p>								
Engineering Components	<p>Treatment works includes;</p> <ul style="list-style-type: none"> • Water abstracted through eel screens • Storage reservoirs • Clarification, and rapid gravity filters (RGF) • Ultra-filtration (UF) membranes • Multistage reverse osmosis (RO) membranes • Water conditioning to add alkalinity and hardness • Disinfection and final water chemical addition • The waste streams from the clarifiers, RGF, UF membranes and the neutralised chemical cleaning wastewater would be pumped back to the Beckton STW inlet works for treatment • Brine waste stream from the RO would be returned to the final effluent channel for blending prior to discharge in the River Thames 								
Phases/benefits	<p>Beckton desalination can be developed in phases of 50, 100 or 150 MI/d up to a maximum capacity of 150 MI/d.</p> <table border="1"> <thead> <tr> <th>Capacity (MI/d)</th><th>DO Benefits (MI/d)</th></tr> </thead> <tbody> <tr> <td>150</td><td>133</td></tr> <tr> <td>100</td><td>89</td></tr> <tr> <td>50</td><td>44</td></tr> </tbody> </table> <p>DO benefits above apply for 1 in 2 average, 1 in 500 average and 1 in 500 peak.</p>	Capacity (MI/d)	DO Benefits (MI/d)	150	133	100	89	50	44
Capacity (MI/d)	DO Benefits (MI/d)								
150	133								
100	89								
50	44								

Name	Desalination – Beckton Desalination treatment plant
Lead times ¹	The lead time for each phase is 11 years.
Mutual Exclusivities	Deephams Reuse , Crossness Desalination , Beckton Desalination and Beckton Reuse are subject to a combined Tidal Thames Limit for desalination and recycling options of 366 MI/d due to the impact on salinity in the river. ²
Interdependencies/ Exclusivity	<p>The Beckton desalination option is dependent on the following elements which would be constructed with the initial phase of Beckton desalination, with capacity for all phases:</p> <ul style="list-style-type: none"> • Beckton to Coppermills Tunnel (Conveyance of treated water to Coppermills WTW for blending and supply). • New Header Tank and Pumping Station at Coppermills WTW <p>To provide an additional resource to London WRZ the following system element may also be required:</p> <ul style="list-style-type: none"> • Additional capacity in the Thames Water ring main



X	New Header Tank and Pumping Station at Coppermills WTW
Y	Beckton to Coppermills Tunnel
Z	Beckton Desalination

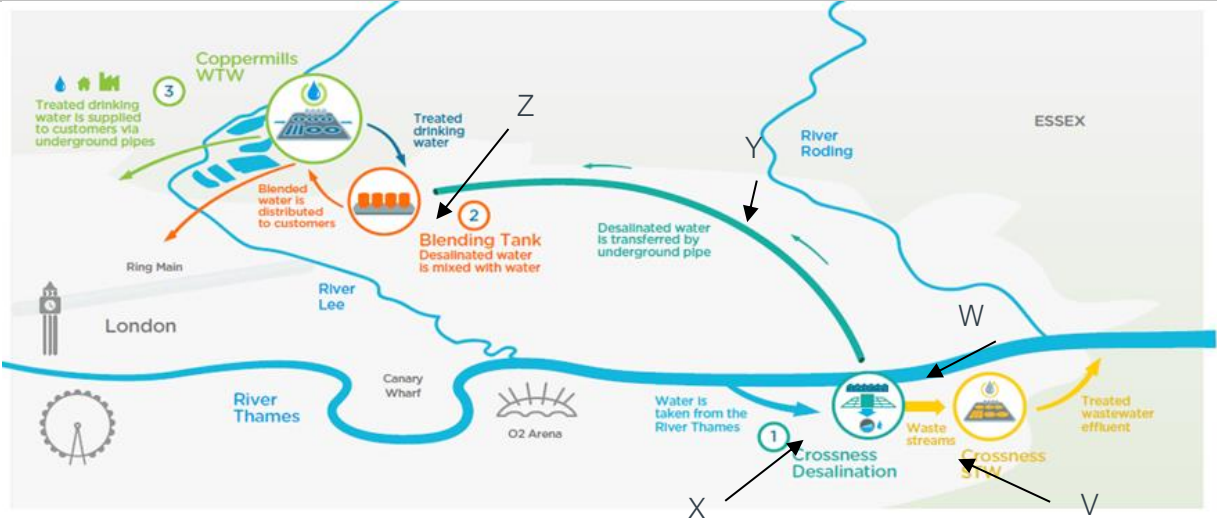
¹ Lead time is the time from starting to develop the option to be producing water this include the planning, development and construction period.

² Further work is ongoing to review the combined Tidal Thames Limit for desalination and reuse.

Crossness Desalination treatment plant

Name	Crossness desalination treatment plant														
WRSE ID	TWU_LON_HI-DES_ALL_XXX_crossnessdesal50 TWU_LON_HI-DES_ALL_XXX_crossnessdesal100														
WRMP19 Reference	RES-DES-CRO-100														
Element Type	Resource														
WRZ	LONDON														
Engineering Scope	Brackish estuarine water shall be abstracted at low tide and used as raw water for the desalination plant. The new phased construction of the desalination plant will be located on land to the south of the existing Crossness STW site. Treatment includes clarification, rapid gravity filters, reverse osmosis re-mineralisation and disinfection. The desalinated water will then be transferred via a tunnel to Beckton to then be transferred to the Coppermills WTW Thames Water Ring Main (TWRM) shaft location and blended with potable treated water from Coppermills WTW prior to entering supply.														
Engineering Components	<p>Treatment works key engineering components:</p> <ul style="list-style-type: none"> • Water abstracted through eel screens • Storage reservoirs • Clarification, and rapid gravity filters (RGF) • Ultra-filtration (UF) membranes • Multistage reverse osmosis (RO) membranes • Water conditioning to add alkalinity and hardness • Disinfection and final water chemical addition • The waste streams from the clarifiers, RGF, UF membranes and the neutralised chemical cleaning wastewater will be pumped back to the Crossness STW inlet works for treatment • Brine waste stream from the RO will be returned to the final effluent channel for blending prior to discharge in the River Thames 														
Phases/benefits	<p>Crossness desalination can be developed in phases of 50 or 100 MI/d up to a maximum capacity of 300 MI/d</p> <table border="1"> <thead> <tr> <th>Capacity (MI/d)</th><th>DO Benefits (MI/d)</th></tr> </thead> <tbody> <tr> <td>300</td><td>267</td></tr> <tr> <td>250</td><td>222</td></tr> <tr> <td>200</td><td>178</td></tr> <tr> <td>150</td><td>133</td></tr> <tr> <td>100</td><td>89</td></tr> <tr> <td>50</td><td>44</td></tr> </tbody> </table> <p>DO benefits above apply for 1 in 2 average, 1 in 500 average and 1 in 500 peak.</p>	Capacity (MI/d)	DO Benefits (MI/d)	300	267	250	222	200	178	150	133	100	89	50	44
Capacity (MI/d)	DO Benefits (MI/d)														
300	267														
250	222														
200	178														
150	133														
100	89														
50	44														
Lead Time	The lead time for each phase is 11 years.														

Name	Crossness desalination treatment plant
Mutual exclusivities	Deephams Reuse , Crossness Desalination , Beckton Desalination and Beckton Reuse are subject to a combined Tidal Thames Limit for Desal and recycling options of 366 MI/d due to the impact on salinity in the river. ³
Interdependencies/ Exclusivity	<p>The Crossness desalination option is dependent on the following elements:</p> <ul style="list-style-type: none">• Beckton to Crossness tunnel (would be constructed with the initial phase of Crossness desalination)• Crossness to Beckton Tunnel (would be constructed with the initial phase of Crossness desalination)• Beckton to Coppermills Tunnel (Conveyance of treated water to Coppermills for blending and supply)• New Header Tank and Pumping Station at Coppermills WTW <p>The above elements are sized to have sufficient capacity for all phases of Crossness desalination and do not need to be duplicated for later phases.</p> <p>To provide an additional resource to London WRZ the following system elements may also be required:</p> <ul style="list-style-type: none">• Additional capacity in the Thames Water ring main



V	Crossness Desalination
W	Crossness to Beckton Tunnel
X	Beckton to Crossness Tunnel
Y	Beckton to Coppermills Tunnel
Z	New Header Tank and Pumping Station at Coppermills WTW

³ Further work is ongoing to review the combined Tidal Thames Limit for desalination and reuse.

Raw Water Transfers

Minworth STW to River Avon 115 MI/d

Name	Minworth STW to River Avon 115 MI/d																		
WRSE ID (separate ID have been given to the source elements for each different STT conveyance option)	For 300 MI/d pipeline conveyance																		
	TWU_STT_HI-REU_RE1_ALL_p7-300-minworth_115																		
	TWU_STT_HI-REU_RE1_ALL_p11-300-min_115_p2																		
	TWU_STT_HI-REU_RE1_ALL_p-300-minworth_all																		
	For 400 MI/d pipeline conveyance																		
	TWU_STT_HI-REU_RE1_ALL_p7-400-minworth_115																		
	TWU_STT_HI-REU_RE1_ALL_p11-400-min_115_p2																		
	TWU_STT_HI-REU_RE1_ALL_p-400-minworth_all																		
	For 500 MI/d pipeline conveyance																		
	TWU_STT_HI-REU_RE1_ALL_p7-500-minworth_115																		
	TWU_STT_HI-REU_RE1_ALL_p11-500-min_115_p2																		
	TWU_STT_HI-REU_RE1_ALL_p-500-minworth_all																		
WRMP19 Reference	RES-RWTS-MIN																		
Element Type	Resource																		
WRZ	LONDON / SWOX / SWA																		
Engineering Scope	This option involves the construction of an advanced water treatment plant and laying of a new pipeline from Minworth WwTW to the river Avon near Stoneleigh to allow transfer of up to 115 MI/d for abstraction in the lower Severn at Deerhurst. Water would then be transferred through the Severn Thames Transfer (STT) to the River Thames.																		
Engineering Components	The element is offered by Severn Trent Water and includes all engineering works required to deliver the flow to the River Avon <ul style="list-style-type: none"> • Tertiary treatment and intake after the treatment • Pumping station at Minworth WTW • Rising main • An outfall to the River Avon 																		
Phases/Benefits	Maximum capacity delivered at the discharge to the River Avon is 115 MI/d and can be implemented in two phases of 58 MI/d and 57 MI/d. <table border="1" data-bbox="526 1624 1289 1886"> <thead> <tr> <th></th><th colspan="3">DO Benefits (MI/d)</th></tr> <tr> <th>Capacity (MI/d)</th><th>1 in 2 average</th><th>1 in 500 average</th><th>1 in 500 peak</th></tr> </thead> <tbody> <tr> <td>115</td><td>74</td><td>74</td><td>103</td></tr> <tr> <td>58</td><td>37</td><td>37</td><td>53</td></tr> </tbody> </table>				DO Benefits (MI/d)			Capacity (MI/d)	1 in 2 average	1 in 500 average	1 in 500 peak	115	74	74	103	58	37	37	53
	DO Benefits (MI/d)																		
Capacity (MI/d)	1 in 2 average	1 in 500 average	1 in 500 peak																
115	74	74	103																
58	37	37	53																

Name	Minworth STW to River Avon 115 MI/d
Lead Time	The lead time of the STT Deerhurst to Culham pipeline conveyance element is 10 years. Minworth can be delivered within this timescale.
Mutual exclusivities	None.
Interdependencies/ Exclusivity	Dependent on the provision of a conveyance i.e. – the Severn Thames Transfer pipeline. Deerhurst to Culham (300 MI/d) pipeline Deerhurst to Culham (400 MI/d) pipeline Deerhurst to Culham (500 MI/d) pipeline



Netheridge STW to River Severn 35 MI/d

Name	Netheridge STW to River Severn 35 MI/d
WRSE ID (separate ID have been given to the source elements for each different STT conveyance option)	For 300 MI/d pipeline conveyance TWU_STT_HI-REU_RE1_ALL_p5-300-neth_p35 For 400 MI/d pipeline conveyance TWU_STT_HI-REU_RE1_ALL_p5-400-neth_p35 For 500 MI/d pipeline conveyance TWU_STT_HI-REU_RE1_ALL_p5-500-neth_p35
WRMP19 Reference	RES-RWTS-NTH
Element Type	Resource
WRZ	LONDON / SWOX / SWA
Engineering Scope	Transfer of a 35 MI/d of final effluent from Netheridge Sewage Treatment Works to the River Severn downstream of the proposed water intake at Deerhurst to replace water abstracted to the Severn Thames Transfer Deerhurst to Culham Pipeline.

Name	Netheridge STW to River Severn 35 MI/d
Engineering Components	<p>The element is offered by Severn Trent Water and includes all engineering works required to deliver the flow to the River Severn.</p> <ul style="list-style-type: none"> • Tertiary treatment and an intake manhole to enable the required flow to be directed to the Netheridge FE pumping station • A pumping station which would pump the water from Netheridge STW to River Severn at Deerhurst; • A rising main; • An outfall to the River Severn. <p>Netheridge has the potential to support the sweetening flows through the Deerhurst to Culham pipeline by augmenting flows in the River Severn when base flows are below the 'Hands off Flow'.</p>
Phases/Benefits	<p>Maximum capacity delivered at the discharge to the River Severn is 35 MI/d, which provides the following DO benefit:</p> <ul style="list-style-type: none"> • 24 MI/d (1 in 2 average) • 24 MI/d (1 in 500 average) • 34 MI/d (1 in 500 peak)
Lead Time	The lead time of the Severn Thames Transfer Deerhurst to Culham Pipeline conveyance element is 10 years, Netheridge can be delivered in this timescale.
Mutual exclusivities	None.
Interdependencies/ Exclusivity	<p>Dependent on the provision of a conveyance i.e., the Severn Thames Transfer pipeline.</p> <p>Deerhurst to Culham (300 MI/d) pipeline</p> <p>Deerhurst to Culham (400 MI/d) pipeline</p> <p>Deerhurst to Culham (500 MI/d) pipeline</p>



Sources of water:

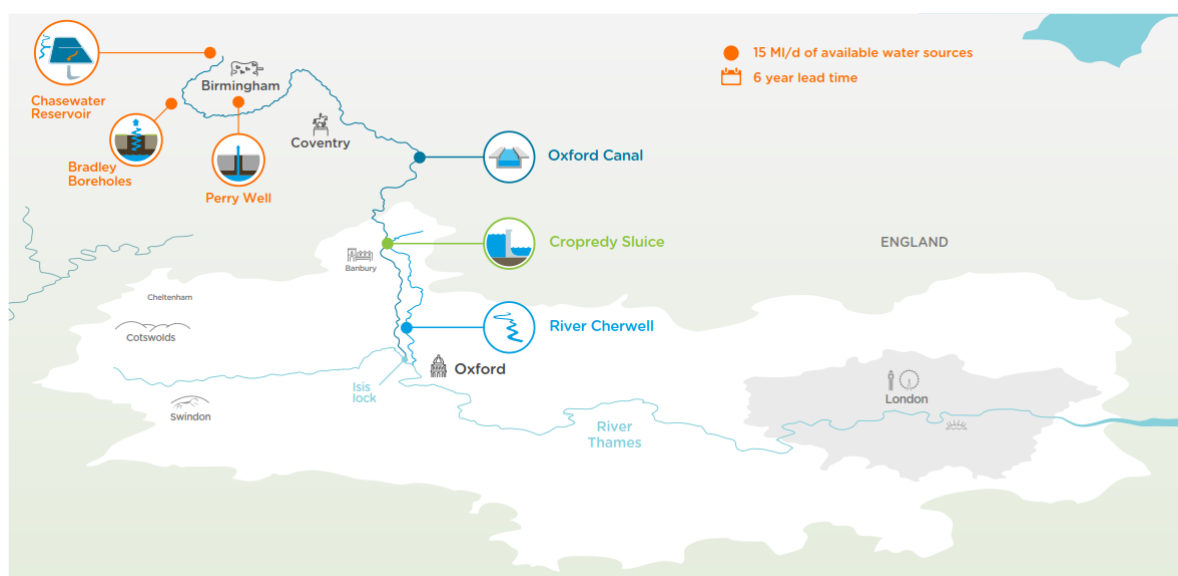
- 1 Temporary use of existing United Utilities abstraction from Lake Vyrnwy.
- 2 Water resource redeployment at Shrewsbury.
- 3 Treated water from Minworth STW.
- 4 River abstraction reduction at Mythe.
- 5 Treated water from Netheridge STW.

New water transfer infrastructure:

- 6 Pipeline to bypass the River Vyrnwy.
 - 7 Pipeline from Gloucestershire to Oxfordshire (preferred option).
 - 8 Pipeline and restoration of the Cotswold canals (alternative option).
 - 9 Water is abstracted from the River Severn near Deerhurst for transfer via the preferred pipeline option to Culham.
 - 10 Water is released into the River Thames at Culham for re-abstraction further downstream.
- New pipeline.
- Interconnector canal (restored).

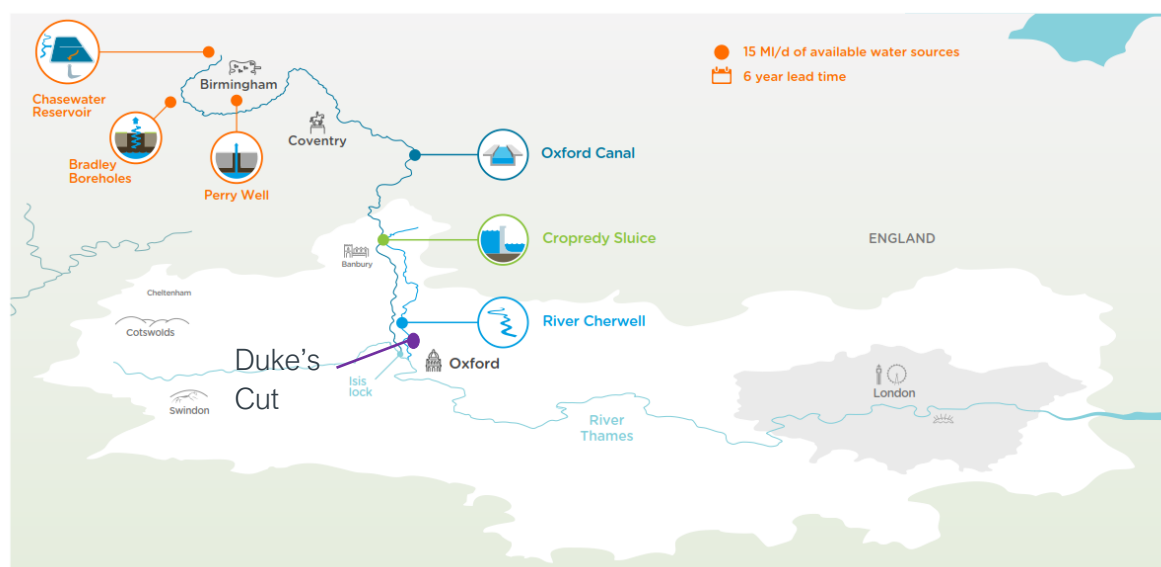
Oxford Canal - BCN Surplus – Raw Water Transfer Resource (Cropredy)

Name	Oxford Canal - BCN Surplus – Raw Water Transfer Resource (Cropredy)
WRSE ID	TWU.UTC_HI-IMP.UTC_XXX_oxcanal-cropredy
WRMP19 Reference	RES-RWTS-OXC-CRP-15
Element Type	Resource
WRZ	LON / SWA
Engineering Scope	This element includes upgrades to the canal network to transfer 15 MI/d surplus from the Wolverhampton Levels to Cropredy, where it is discharged to the River Cherwell for onward transfer to the River Thames.
Engineering Components	All engineering works provided by others – the Canal and River Trust (CRT), key elements including: <ul style="list-style-type: none"> • Three new Pump Stations • Rebuild two Pump Stations • Bypass pipelines • Bypass weirs
Phasing/Benefits	DO benefits of: <ul style="list-style-type: none"> • 1 In 2 average: 10.3 MI/d • 1 In 500 average: 10.3 MI/d • 1 In 500 peak: 10.3 MI/d
Lead Time	7 years
Mutual exclusivities	This element is mutually exclusive with the Oxford Canal to Duke's Cut
Interdependencies/ Exclusivity	This resource could support the following new WTWs: <ul style="list-style-type: none"> Medmenham WTW (72 MI/d) Kempton WTW expansion (800 MI/d)



Oxford Canal - BCN Surplus – Raw Water Transfer Resource (Duke's Cut)

Name	Oxford Canal - BCN Surplus – Raw Water Transfer Resource (Duke's Cut)
WRSE ID	TWU_SWX_HI-IMP_SWX_XXX_oxc-dukes cutswox
WRMP19 Reference	RES-RWTS-OXC-DKC-15
Element Type	Resource
WRZ	SWOX
Engineering Scope	This element includes upgrades to the canal network to transfer 15 MI/d surplus from the Wolverhampton Levels to upstream of Duke's Cut. From that point, the water would be transferred to the River Thames upstream of Farmoor Reservoir, in the Duke's Cut to Farmoor 15 MI/d Pipeline .
Engineering Components	All engineering works provided by others – the Canal and River Trust (CRT), key elements including: <ul style="list-style-type: none"> • Three new Pump Stations • Rebuild two Pump Stations • Bypass pipelines • Bypass weirs
Phasing/Benefits	DO benefits of: <ul style="list-style-type: none"> • 1 In 2 average: 12 MI/d • 1 In 500 average: 12 MI/d • 1 In 500 peak: 12 MI/d
Lead Time	7 Years
Mutual exclusivities	This element is mutually exclusive with Oxford Canal to Cropredy
Interdependencies/Exclusivity	This element is interdependent with Duke's Cut to Farmoor 15 MI/d Pipeline



Lake Vyrnwy (United Utilities) – 180 MI/d

Name	Lake Vyrnwy (United Utilities) – 180 MI/d
WRSE ID (separate ID have been given to the source elements for each different STT conveyance option) ⁴	<p>For 300 MI/d pipeline conveyance</p> <p>TWU_STT_HI-RAB_RE1_ALL_p3-300-vyrnwy_50</p> <p>TWU_STT_HI-RAB_RE1_ALL_p4-300-vyrnwy_75</p> <p>TWU_STT_HI-RAB_RE1_ALL_p9-300-vyrnwy_100_b</p> <p>TWU_STT_HI-RAB_RE1_ALL_p7-300-vyrnwy_135_b</p> <p>TWU_STT_HI-RAB_RE1_ALL_p8-300-vyrnwy_155_b</p> <p>TWU_STT_HI-RAB_RE1_ALL_p10-300-vyrnwy_180_b</p> <p>TWU_STT_HI-RAB_RE1_ALL_p6-300-shrewsbury_25</p> <p>For 400 MI/d pipeline conveyance</p> <p>TWU_STT_HI-RAB_RE1_ALL_p3-400-vyrnwy_50</p> <p>TWU_STT_HI-RAB_RE1_ALL_p4-400-vyrnwy_75</p> <p>TWU_STT_HI-RAB_RE1_ALL_p9-400-vyrnwy_100_b</p> <p>TWU_STT_HI-RAB_RE1_ALL_p7-400-vyrnwy_135_b</p> <p>TWU_STT_HI-RAB_RE1_ALL_p8-400-vyrnwy_155_b</p> <p>TWU_STT_HI-RAB_RE1_ALL_p10-400-vyrnwy_180_b</p> <p>TWU_STT_HI-RAB_RE1_ALL_p6-400-shrewsbury_25</p> <p>For 500 MI/d pipeline conveyance</p> <p>TWU_STT_HI-RAB_RE1_ALL_p3-500-vyrnwy_50</p> <p>TWU_STT_HI-RAB_RE1_ALL_p4-500-vyrnwy_75</p> <p>TWU_STT_HI-RAB_RE1_ALL_p7-500-vyrnwy_135_b</p> <p>TWU_STT_HI-RAB_RE1_ALL_p8-500-vyrnwy_155_b</p> <p>TWU_STT_HI-RAB_RE1_ALL_p10-500-vyrnwy_180_b</p> <p>TWU_STT_HI-RAB_RE1_ALL_p6-500-shrewsbury_25</p>
WRMP19 Reference	RES-RWTS-VYR-60, RES-RWTS-VYR-148, RES-RWTS-VYR-180
Element Type	Resource
WRZ	LONDON / SWOX / SWA
Engineering Scope	<p>A release of water from Lake Vyrnwy, which is an existing river regulation reservoir. The release will be a combination of a direct release into the River Vyrnwy (a tributary of the River Severn) and a bypass pipeline to discharge additional flows further downstream (to address environmental impacts). The combined release will be used for downstream abstraction and transfer into the Thames Water area.</p> <p>The reservoir is owned and operated by Hafren Dyfrdwy but supplies water to United Utilities, who have offered the water to Thames Water.</p>

⁴ Please note that the option IDs align with the option variants considered in the dWRMP. Between dWRMP and rdWRMP, option variants were altered (phases of Vyrnwy water being 25, 50, 80, 110, 140, 160, 180, rather than 50, 75, 100, 135, 155, 180).

Name	Lake Vyrnwy (United Utilities) – 180 MI/d			
Engineering Components	It is assumed that water for direct release to the River Vyrnwy will be through existing dam pipework and valves with only minor works at that location. The bypass will work in combination with the Vyrnwy Aqueduct and Oswestry WTW to transfer flows by gravity further downstream.			
Phases/Benefits	Maximum capacity delivered at the discharge to the River Vyrnwy is 180 MI/d, which can be delivered in phases.			
	DO Benefits (MI/d)			Option ID Reference
Capacity (MI/d)	1 in 2 average	1 in 500 average	1 in 500 peak	
180	0	112	160	Shrewsbury 25
160	0	100	141	180
140	0	87	123	155
110	0	68	96	135
80	0	48	68	100
50	0	29	41	75
25	0	13	18	50
Lead Time	The lead time of the STT Deerhurst to Culham pipeline conveyance element is 10 years. Vyrnwy can be delivered within this timescale			
Mutual exclusivities	None.			
Interdependencies/ Exclusivity	<p>This option is enabled by the North West Transfer SRO which is being promoted by United Utilities.</p> <p>Dependent on the provision of a conveyance i.e. – the Severn Thames Transfer pipeline conveyance :</p> <ul style="list-style-type: none"> • Deerhurst to Culham (300 MI/d) pipeline • Deerhurst to Culham (400 MI/d) pipeline • Deerhurst to Culham (500 MI/d) pipeline <p>Vyrnwy options are being selected by both WRW and WRSE. Adaptive planning enables the use of 75 MI/d from the North West Transfer by Severn Trent until the year the scheme is selected by WRSE.</p>			

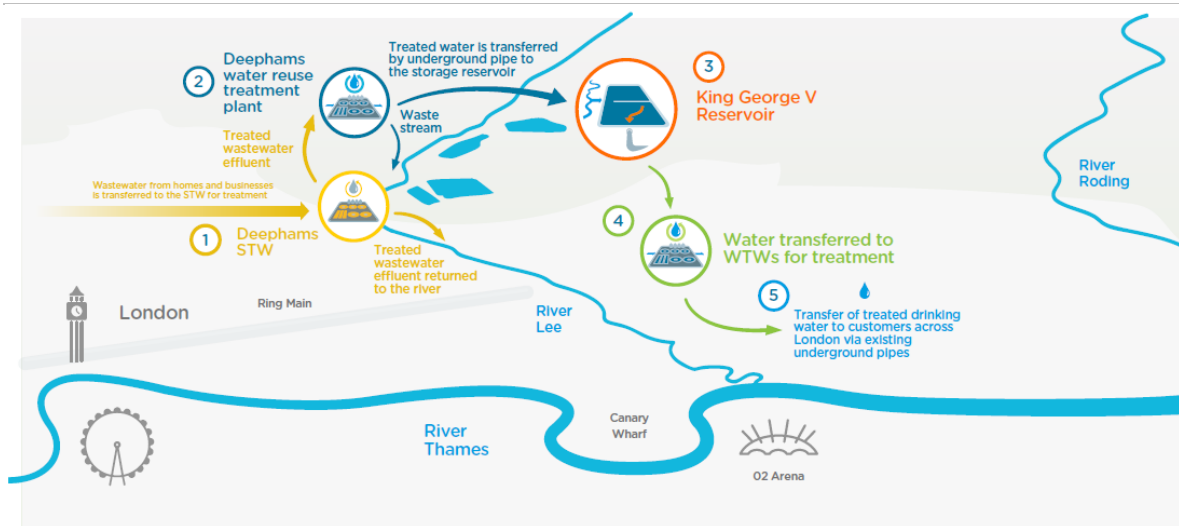


Water Recycling

Deephams Recycling and conveyance to King George V Reservoir (46.5 MI/d)

Name	Deephams Recycling and conveyance to King George V Reservoir (46.5 MI/d)
WRSE ID	TWU_KGV_HI-REU_RE1_XXX_deephams recycling 46.5
WRMP19 Reference	RES-RU-DPH CON-RU-DPH-KGV
Element Type	Resource
WRZ	LONDON
Engineering Scope	46.5 MI/d capacity Water Recycling Treatment Plant, located within the existing Deephams STW boundary and treating the STW effluent. The treated water will then be pumped to a proposed discharge location on the River Lee Diversion with the opportunity to discharge into the King George V Reservoir.
Engineering Components	<p>46.5 MI/d Water Recycling treatment plant, consisting of the following treatment processes:</p> <ul style="list-style-type: none"> • Duty/standby pressurised automatic backwash screens • Ferric addition • Ultrafiltration plant complete with filtrate pumps • Backwash, and clean in place (CIP) system • RO membrane plant • Hydrogen peroxide and UV treatment (AOP) • Remineralisation plant consisting of a lime and CO₂ dosing • Waste stream system returned to the Deephams STW inlet works for treatment • Conveyance from Deephams Recycling plant to King George V Reservoir (KGV)
Phases/Benefits	DO benefits of:

Name	Deephams Recycling and conveyance to King George V Reservoir (46.5 MI/d)
	<ul style="list-style-type: none"> • 1 In 2 average: 42 MI/d • 1 In 500 average: 42 MI/d • 1 In 500 peak: 42 MI/d
Lead Time	7.5 years (earliest delivery date is c.2060)
Mutual exclusivities	This option is mutually exclusive with Deephams Reuse and conveyance to Thames Lee Tunnel
Interdependencies/ Exclusivity	<p>To provide an additional resource to London WRZ the following system elements may⁵ also be required:</p> <ul style="list-style-type: none"> • Additional capacity in the raw water systems to allow the water to be abstracted from the Lee Valley Reservoirs and conveyed to a Water Treatment Works in east London • Additional treatment in east London • Additional capacity in the Thames Water ring main <p>Deephams Reuse, Crossness Desalination, Beckton Desalination and Beckton Effluent Reuse are subject to a combined Tidal Thames Limit for Desal and recycling options of 366 MI/d due to the impact on salinity in the river. ⁶</p>



Deephams Recycling and conveyance to Thames Lee Tunnel (46.5 MI/d)

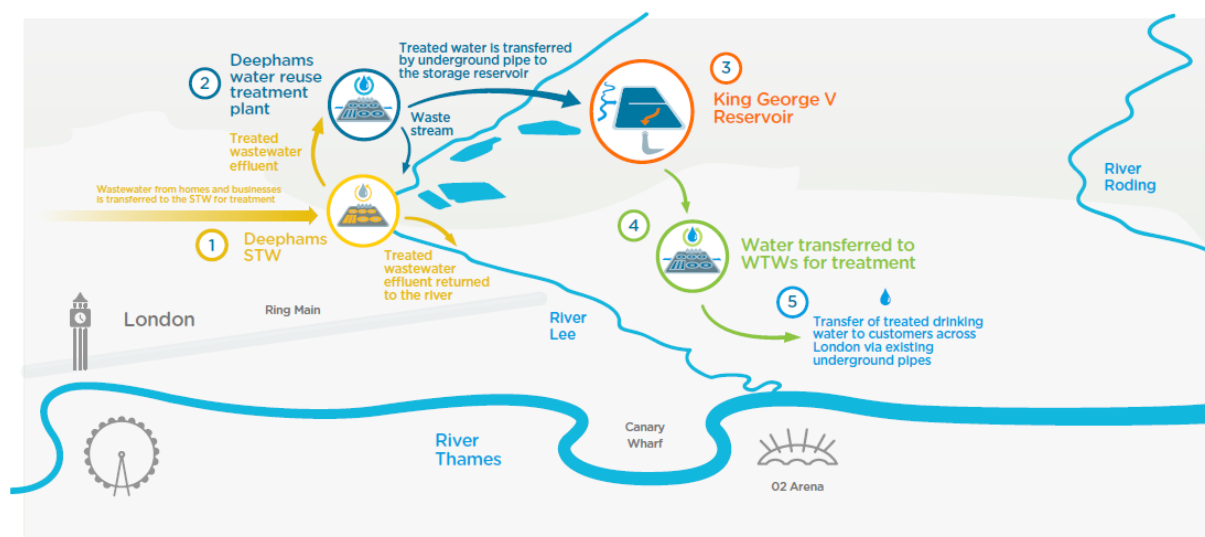
Name	Deephams Recycling and conveyance to Thames Lee Tunnel (46.5 MI/d)
WRSE ID	TWU_KGV_HI-REU_RE1_XXX_deephams reuse 46.5b
WRMP19 Reference	RES-RU-DPH CON-RU-DPH-TLTEX
Element Type	Resource
WRZ	LONDON

⁵ The requirement for system elements is dependent on which combination of resource options is selected. This is not related to a single resource element.

⁶ Further work is ongoing to review the combined Tidal Thames Limit for desalination and reuse.

Name	Deephams Recycling and conveyance to Thames Lee Tunnel (46.5 MI/d)
Engineering Scope	46.5 MI/d capacity Water Recycling Treatment Plant, located within the existing Deephams STW boundary and treating the STW effluent. The treated water would then be pumped to a proposed discharge location into a shaft the Thames Lee Tunnel extension.
Engineering Components	<p>46.5 MI/d Water recycling treatment plant, consisting of the following treatment processes:</p> <ul style="list-style-type: none"> • Duty/standby pressurised automatic backwash screens. • Ferric addition • Ultrafiltration plant with filtrate pumps • Backwash, and clean in place (CIP) system • RO membrane plant • Hydrogen peroxide and UV treatment (AOP) • Remineralisation plant consisting of a lime and CO₂ dosing • Waste stream system, returned to the Deephams STW inlet works for treatment • Conveyance from Deephams Recycling Plant to Thames Lee Tunnel Shaft
Phasing/Benefit	<p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 In 2 average: 42 MI/d • 1 In 500 average: 42 MI/d • 1 In 500 peak: 42 MI/d
Lead Time	7.5 years (earliest delivery date is c2060).
Mutual exclusivities	This option is mutually exclusive with Deephams Reuse and conveyance to King George V Reservoir
Interdependencies/ Exclusivity	<p>Dependent on the TLT extension from Lockwood PS to KGV reservoir intake</p> <p>To provide an additional resource to London WRZ the following system elements may⁷ also be required:</p> <ul style="list-style-type: none"> • Additional capacity in the raw water systems to allow the water to be abstracted from the Lee Valley Reservoirs and conveyed to a Water Treatment Works in east London; • Additional treatment in east London • Additional capacity in the Thames Water ring main <p>Deephams Reuse, Crossness Desalination, Beckton Desalination and Beckton Effluent Reuse are subject to a combined Tidal Thames Limit for Desal and recycling options of 366 MI/d due to the impact on salinity in the river.</p>

⁷ The requirement for system elements is dependent on which combination of resource options is selected. This is not related to a single resource element.

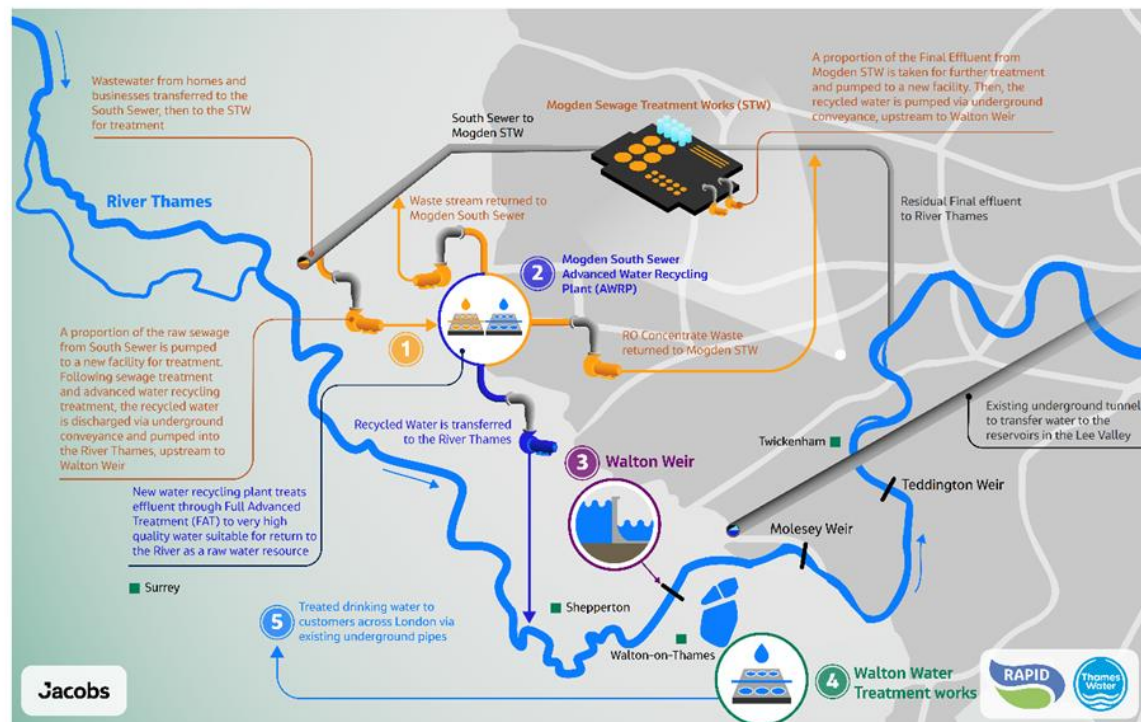


Mogden South Sewer – Recycling Treatment Plant – 25 MI/d

Name	Mogden South Sewer – Recycling Treatment Plant
WRSE ID	TWU_WLJ_HI-REU_RE1_ALL_reusemogdenssewer25
WRMP19 Reference	RES-RU-MSS-50; CON-RU-MSS-WAL-50
Element Type	Resource & Conveyance – Bulk Raw Water Transfer
WRZ	LONDON
Engineering Scope	Planned indirect potable recycling (IPR) is the process of actively managing returns of highly treated wastewater effluent to water courses above abstraction points. For the Mogden South Sewer scheme, this has been combined with a traditional sewage treatment plant stage to allow raw sewage from the Mogden Sewage Treatment Works (STW) catchment to be transferred via a new pumping station to a new combined STW and Advanced Water Recycling Plant (AWRP) to produce a high purity water stream. The recycled water will then be pumped to a proposed discharge location on the River Thames at Walton to supplement the raw water supply to downstream WTWs. The AWRP can be built in a single phase for a maximum yield of 25 MI/d total.
Engineering Components	<p>The Advanced Water Recycling Plant can be constructed in a single phase of 25 MI/d yield.</p> <p>The treatment stages include:</p> <ul style="list-style-type: none"> • Sewage Treatment Works – inlet works (screens and grit removal system); Primary Settlement; Fine screening; Activated Sludge Process, Membrane Bioreactor and odour control systems • AWRP stage – Ultrafiltration; Reverse Osmosis (RO); hydrogen peroxide dosing and UV treatment; remineralisation plant; and waste stream systems • Incoming Transfer Pump Station • Recycled Water Pump Station • Wastewater Discharge Pump Station <p>The associated conveyance stages include:</p>

Name	Mogden South Sewer – Recycling Treatment Plant
	<ul style="list-style-type: none"> • Transfer pipeline from the South Sewer to the treatment works • Waste return pipeline from the treatment works to the South Sewer • Recycled water pipeline from the treatment works to the River Thames • RO concentrate return pipeline from the treatment works to Mogden STW
Phases/Benefits	<p>Mogden South Sewer would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 23 MI/d • 1 in 500 average: 23 MI/d • 1 in 500 peak: 23 MI/d
Lead Time	<p>Alternative delivery programmes have been developed for London Effluent Recycling Gate 2 submission which show a lead time of 8 years and an earliest operational date of 2030.</p>
Mutual Exclusivities	<p>The combined yield of Mogden South Sewer, Teddington DRA and Mogden Effluent Reuse options is limited to 200 MI/d because the three schemes use final effluent of Mogden STW or sewage from the Mogden STW catchment as a water source.</p> <p>Further considerations are being made regarding the impacts on the Middle Thames Tideway and mutual exclusivities between the options.</p>
Interdependencies/ Exclusivity	<p>To provide an additional resource to London WRZ, the following elements may also be required:</p> <ul style="list-style-type: none"> • Upgrades to the west London raw water system • Additional treatment capacity at Kempton WTW • Network reinforcements, potentially including extensions to the London ring main <p>Mogden South Sewer has the potential to support the Thames to Affinity Transfer (T2AT) SRO as T2AT SRO may abstract raw water from the River Thames. Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents.</p>

Mogden South Sewer Schematic

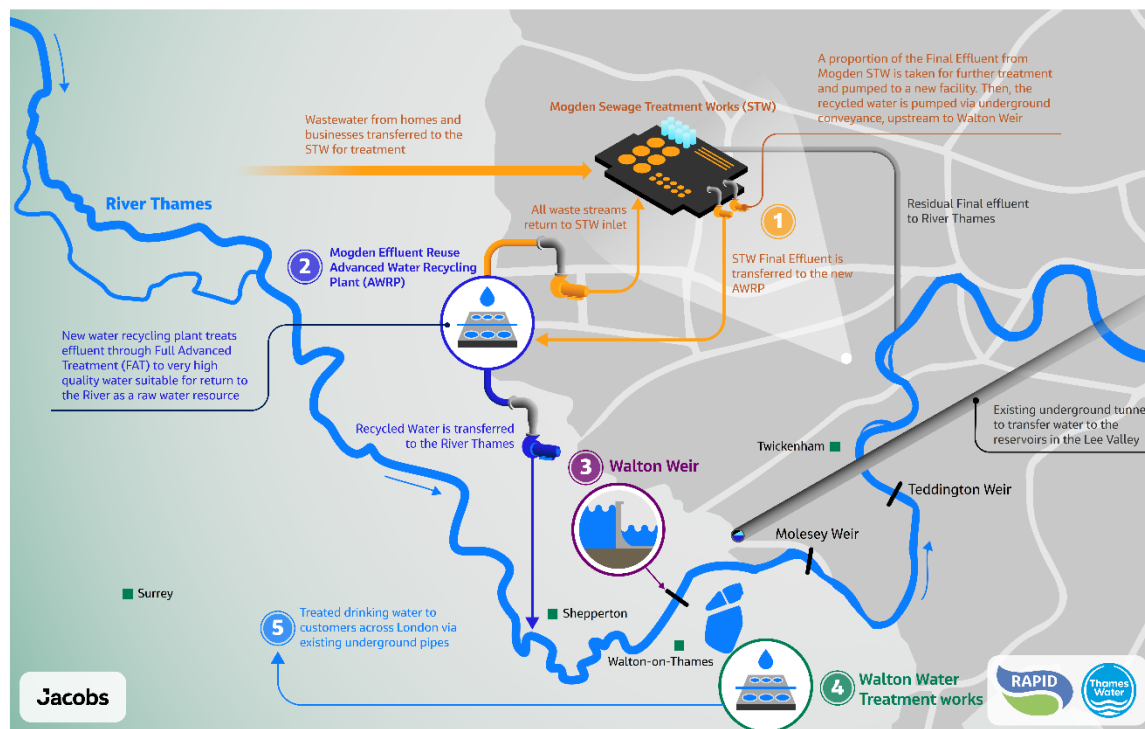


Mogden Effluent Recycling – Recycling Treatment Plant

Name	Mogden Effluent Recycling – Recycling Treatment Plant
WRSE ID	<p>TWU_WLJ_HI-REU_RE1_XXX_reuse mogden 50</p> <p>TWU_WLJ_HI-REU_RE1_XXX_reuse mogden 100</p>
WRMP19 Reference	RES-RU-MOG-50, RES-RU-MOG-100,
Element Type	Resource
WRZ	LONDON
Engineering Scope	<p>Planned indirect potable recycling (IPR) is the process of actively managing returns of highly treated wastewater effluent to water courses above abstraction points. Final effluent from the Mogden Sewage Treatment Works (STW) is to be transferred via a new pumping station to a new Advanced Water Recycling Plant (AWRP) to produce a high purity water stream. The recycled water will then be pumped to a proposed discharge location on the River Thames at Walton to supplement the raw water supply to downstream WTWs. The AWRP can be built in up to three phases for a maximum yield of 150 MI/d total (based on available final effluent, physical space for the assets, etc).</p>
Engineering Components	<p>The Advanced Water Recycling Plant includes:</p> <ul style="list-style-type: none"> • Ultrafiltration plant • Reverse Osmosis (RO) membrane plant • Hydrogen peroxide dosing and UV treatment (UVAOP) • Remineralisation plant • Final effluent pumping station

Name	Mogden Effluent Recycling – Recycling Treatment Plant									
	<ul style="list-style-type: none">Recycled water pumping stationWastewater return pump station									
Phases/Benefits	<p>Mogden Recycling can be developed in phases of 50 or 100 MI/d up to a maximum capacity of 150 MI/d.</p> <table><tr><th>Capacity (MI/d)</th><th>DO Benefits (MI/d)</th></tr><tr><td>150</td><td>130</td></tr><tr><td>100</td><td>88</td></tr><tr><td>50</td><td>46</td></tr></table> <p>DO benefits above apply for 1 in 2 average, 1 in 500 average and 1 in 500 peak.</p>		Capacity (MI/d)	DO Benefits (MI/d)	150	130	100	88	50	46
Capacity (MI/d)	DO Benefits (MI/d)									
150	130									
100	88									
50	46									
Lead Time	Alternative delivery programmes have been developed for Gate 2 which show a lead time of 9 years (per phase) and an earliest operational date of 2031.									
Mutual Exclusivities	The combined yield of Mogden Effluent Recycling scheme, Teddington DRA and Mogden South Sewer Reuse is limited to 200 MI/d ⁴ because the three schemes use final effluent of Mogden STW or sewage from the Mogden STW catchment as a water source.									
Interdependencies/ Exclusivity	<p>To provide an additional resource to London WRZ, the following elements may also be required:</p> <ul style="list-style-type: none">Upgrades to the west London raw water systemAdditional treatment capacity at Kempton WTWNetwork reinforcements, potentially including extensions to the London ring main <p>Mogden Recycling has the potential to support the Thames to Affinity Transfer (T2AT) SRO as T2AT SRO may abstract raw water from the River Thames. Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents.</p>									

Mogden Effluent Reuse Schematic

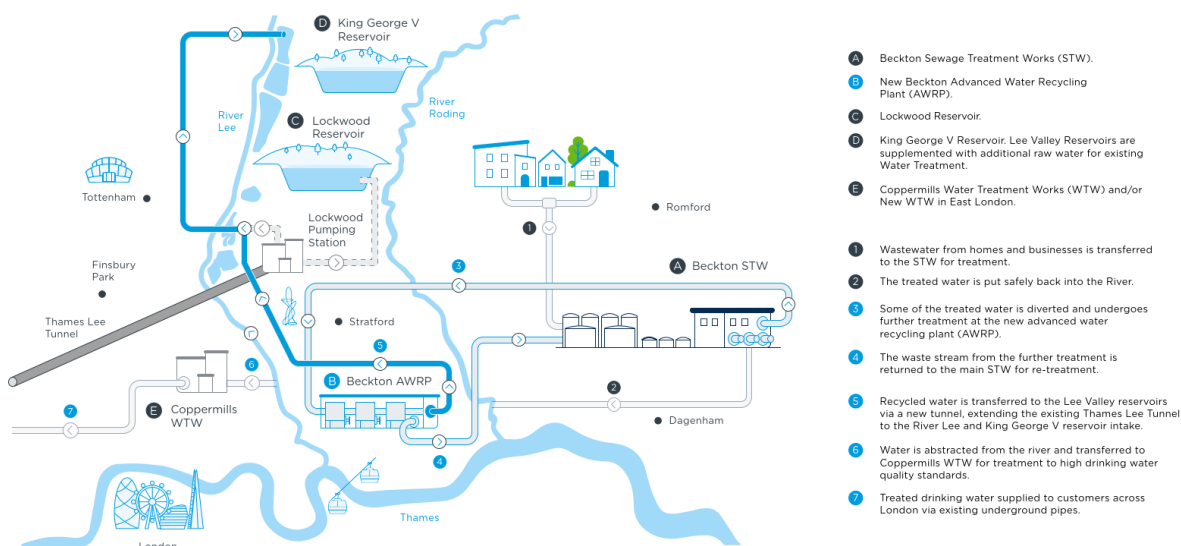


Beckton Effluent Recycling – Recycling Treatment Plant

Name	Beckton Effluent Recycling – Recycling Treatment Plant
WRSE ID	<p>TWU_KGV_HI-REU_RE1_XXX_reuse beckton 50</p> <p>TWU_KGV_HI-REU_RE1_XXX_reuse beckton 100</p> <p>TWU_KGV_HI-REU_RE1_XXX_reuse beckton 150</p>
WRMP19 Reference	RES-RU-BEC-50, RES-RU-BEC-100, RES-RU-BEC-150
Element Type	Resource
WRZ	LONDON
Engineering Scope	<p>Planned indirect potable Recycling (IPR) is the process of actively managing returns of highly treated wastewater effluent to water courses above abstraction points. Final effluent from the Beckton Sewage Treatment Works (STW) is to be subjected to an advanced treatment process to produce a high purity water stream. The recycled water will then be pumped to a proposed discharge location on the River Lee diversion to supplement the raw water supply to the Lee Valley reservoirs. The proposed site for the treatment plant will be within the Beckton STW boundary to the north of the operational area.</p>
Engineering Components	<p>The Advanced Water Recycling Plant includes:</p> <ul style="list-style-type: none"> • Ultrafiltration plant • Reverse Osmosis (RO) membrane plant • Hydrogen peroxide dosing and UV treatment (UVAOP) • Remineralisation plant • Final effluent pumping station

Name	Beckton Effluent Recycling – Recycling Treatment Plant												
	<ul style="list-style-type: none"> Recycled water pumping station Wastewater return pump station 												
Phases/Benefits	<p>Beckton Effluent Recycling can be developed in phases of 50, 100 or 150 MI/d up to a maximum capacity of 300 MI/d.</p> <table border="1"> <thead> <tr> <th>Capacity (MI/d)</th><th>DO Benefits (MI/d)</th></tr> </thead> <tbody> <tr> <td>300</td><td>252</td></tr> <tr> <td>200</td><td>172</td></tr> <tr> <td>150</td><td>130</td></tr> <tr> <td>100</td><td>89</td></tr> <tr> <td>50</td><td>46</td></tr> </tbody> </table> <p>DO benefits above apply for 1 in 2 average, 1 in 500 average and 1 in 500 peak.</p>	Capacity (MI/d)	DO Benefits (MI/d)	300	252	200	172	150	130	100	89	50	46
Capacity (MI/d)	DO Benefits (MI/d)												
300	252												
200	172												
150	130												
100	89												
50	46												
Lead Time	Alternative delivery programmes have been developed for Gate 2 which show a lead time of 9 years (per phase) and the earliest operational date of 2031.												
Mutual Exclusivities	<p>There are no other options or schemes that are mutually exclusive with the Beckton Effluent Reuse scheme.</p> <p>Deephams Reuse, Crossness Desalination, Beckton Desalination and Beckton Reuse are subject to a combined Tidal Thames Limit for desalination and recycling options of 366 MI/d due to the impact on salinity in the river. ⁸</p>												
Interdependencies/Exclusivity	<p>The first phase of Beckton Effluent Reuse is dependent on the following elements:</p> <p>Beckton to Lockwood Conveyance</p> <p>TLT extension from Lockwood PS to KG reservoir intake</p> <p>To provide an additional resource to London WRZ the following system elements may also be required:</p> <ul style="list-style-type: none"> Additional capacity in the raw water systems to allow the water to be abstracted from the River Lee Diversion into the Lee Valley Reservoirs and from there conveyed to a Water Treatment Works in east London Additional treatment capacity in east London Additional capacity in the Thames Water ring main <p>Beckton Recycling has the potential to support the Thames to Affinity Transfer (T2AT) SRO as T2AT SRO may abstract raw water from the River Lee. Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents.</p>												

⁸ Further work is ongoing to review the combined Tidal Thames Limit for desalination and reuse.



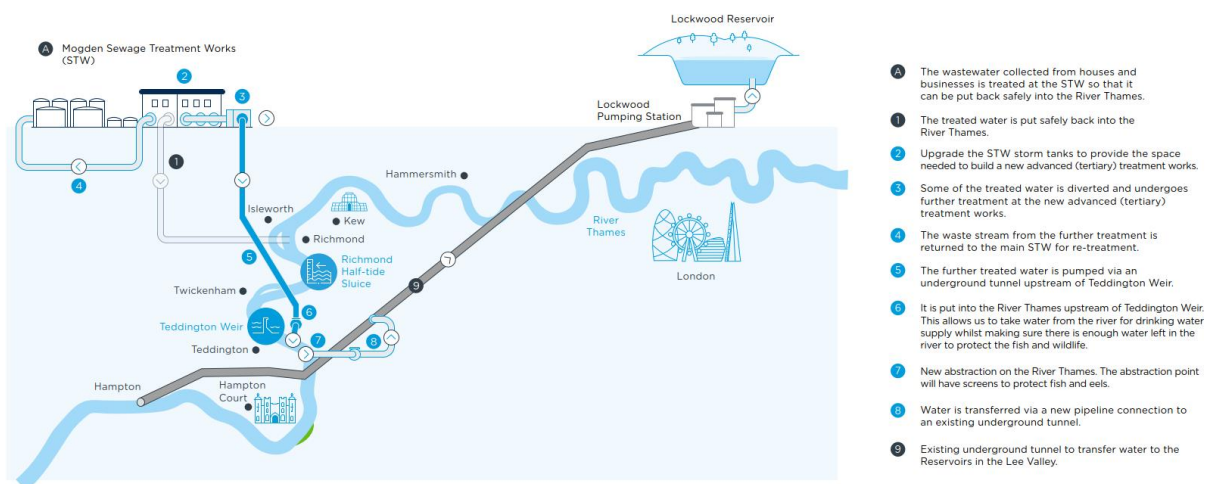
Direct River Abstraction

Teddington DRA Tertiary Treatment Plant

Name	Teddington DRA Tertiary Treatment Plant – 50 MI/d output and 75 MI/d output)
WRSE ID	<p>TWU_TED_HI-RAB_RE1_XXX_teddington dra 50</p> <p>TWU_TED_HI-RAB_RE1_XXX_teddington dra 75</p>
WRMP19 Reference	RES-DRA-TED-50, RES-DRA-TED-75
Element Type	Resource
WRZ	LONDON
Engineering Scope	<p>A portion of final effluent from Mogden STW would undergo treatment at a new Tertiary Treatment Plant, sized at a capacity of either 50 MI/d or 75 MI/d yield, within the Mogden STW boundary, sufficient to allow consented discharge into the river. The Treated Effluent will then be transferred to a new outfall location on the River Thames, upstream of Teddington Weir and the waste stream will be returned to Mogden STW. This option is part of the Teddington DRA scheme which also includes a new direct river abstraction from the River Thames, to supply the Thames Lee Tunnel with raw water.</p> <p>It is noted that at this stage, a maximum capacity for the Teddington DRA scheme has been set at 75 MI/d, so no phased construction options are available.</p>

Name	Teddington DRA Tertiary Treatment Plant – 50 MI/d output and 75 MI/d output)							
Engineering Components	<p>Teddington DRA tertiary treatment plant (TTP) includes:</p> <ul style="list-style-type: none">• Coagulation dosing and mixing tank• Nitrifying Sand Filters• Mechanical Filters• Wastewater equalisation tank• Civil/structural works to deepen 2No. existing storm tanks to create extra storm capacity• Demolition and in-filling of 2No. existing storm tanks to make space for the new TTP• Upgrades to deepened storm tank equipment (pumps, mixers, etc)• Final Effluent Pumping Station• Treated Effluent Pumping Station• Wastewater Pumping Station							
Phases/benefits	<p>For capacities up to 75 MI/d no phasing has been included. The TTP can be constructed with either 50 MI/d or 75 MI/d capacity</p> <table><tr><th>Capacity (MI/d)</th><th>DO Benefit (MI/d)</th></tr><tr><td>50</td><td>46</td></tr><tr><td>75</td><td>67</td></tr></table> <p>DO benefits above apply for 1 in 2 average, 1 in 500 average and 1 in 500 peak.</p>		Capacity (MI/d)	DO Benefit (MI/d)	50	46	75	67
Capacity (MI/d)	DO Benefit (MI/d)							
50	46							
75	67							
Lead Time	<p>Alternative delivery programmes have been developed for Gate 2 which show a lead time of 9 years and an earliest operational date of 2031.</p>							
Mutual Exclusivities	<p>The combined capacity of Teddington DRA, Mogden Effluent Recycling and Mogden South Sewer schemes is limited to 200 MI/d because the three schemes use final effluent of Mogden STW or sewage from the Mogden STW catchment as a water source.</p>							
Interdependencies/ Exclusivity	<p>The following elements are also required for the Teddington DRA option:</p> <ul style="list-style-type: none">• Teddington to Thames Lee Tunnel• Teddington Outfall <p>Teddington DRA scheme does not have dependencies on other options.</p> <p>To provide an additional resource to London WRZ, the following elements may also be required:</p> <ul style="list-style-type: none">• Additional treatment capacity at Water Treatment Works (WTWs) in both east and west London• Sufficient available extra capacity in the Thames Water Ring Main• Upgrades to raw water conveyance systems• Network reinforcements <p>Teddington DRA scheme has the potential to support the Thames to Affinity Transfer (T2AT) SRO. Additional requirements to supply</p>							

Name	Teddington DRA Tertiary Treatment Plant – 50 MI/d output and 75 MI/d output)
water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents.	

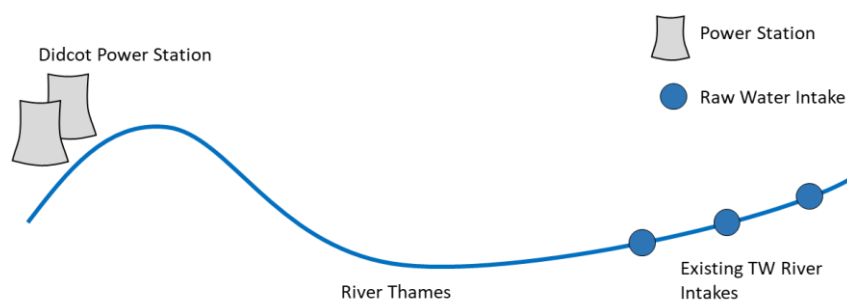


Raw Water Purchase

Didcot Raw Water Purchase

Name	Didcot Raw Water Purchase (available 2025 – 2030)
WRSE ID	TWU_LON_HI-OTH_ALL_ALL_didcot purchase
WRMP19 Reference	RES-RWP-DID
Element Type	Resource
WRZ	LONDON / SWA
Engineering Scope	Agreement between Thames Water and RWE NPower that NPower will abstract less than the maximum amount of their abstraction licence at Didcot Power Station. This water would then be available downstream for abstraction at Thames Water intakes. Option is available for use between 2025 and 2030.
Engineering Components	n/a
Phases/Benefits	DO benefits of: <ul style="list-style-type: none"> 1 In 2 average: nil 1 In 500 average: 22.6 MI/d (2025 – 2030) 1 In 500 peak: 22.6 MI/d (2025 – 2030)
Lead Time	0 Years
Mutual exclusivities	none
Interdependencies/ Exclusivity	To provide a benefit to SWA, the additional elements required are: <ul style="list-style-type: none"> New Medmenham Intake

Name	Didcot Raw Water Purchase (available 2025 – 2030)
	<ul style="list-style-type: none"> Medmenham WTW <p>To provide an additional resource to London WRZ, the following elements may also be required:</p> <ul style="list-style-type: none"> Upgrades to the west London raw water system Additional treatment capacity at Kempton WTW Network reinforcements, potentially including extensions to the London ring main



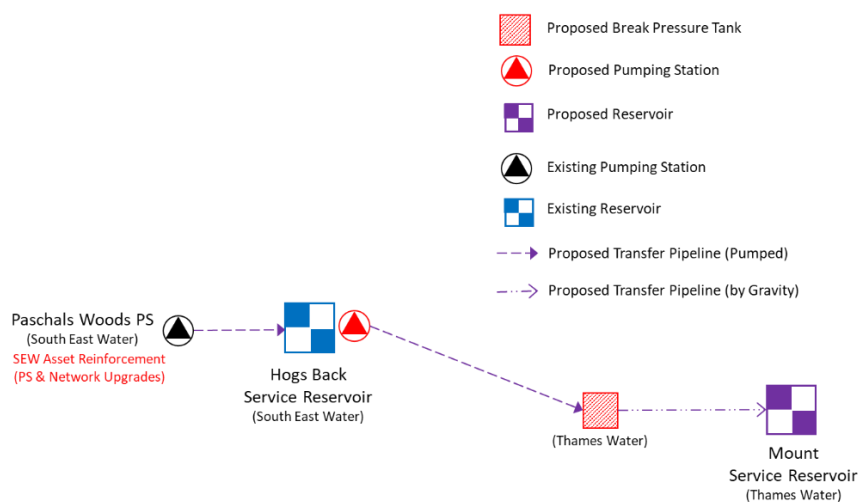
Lower Thames Licence Trade

Name	Lower Thames Licence Trade
WRSE ID	TWU_WLJ_EF-TFR_RE1_ALL_egham
WRMP19 Reference	n/a new option at WRMP24
Element Type	Resource
WRZ	LONDON
Engineering Scope	Agreement between Thames Water and Affinity Water that Affinity Water will abstract less than the maximum amount of their abstraction licence from their Lower Thames intakes. This water would then be available for abstraction at Thames Water intakes.
Engineering Components	n/a
Phases/Benefits	DO benefits of up to 50 MI/d
Lead Time	0 Years
Mutual exclusivities	none
Interdependencies/ Exclusivity	In order to reduce abstraction from the Lower Thames, Affinity Water will need to develop the Grand Union Canal transfer option as an alternative supply.

Inter Company Transfers

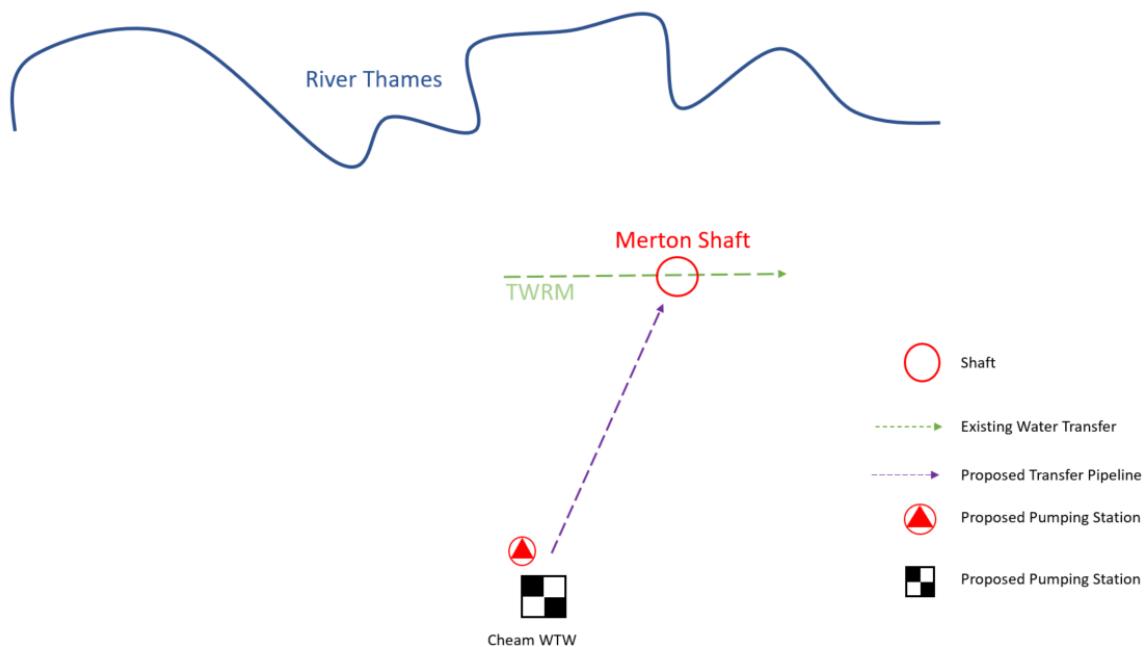
South East Water to Guildford Transfer

Name	South East Water to Guildford Inter-company transfer
WRSE ID	TWU_GUI_HI-TFR_RZ4_ALL_sewtogui
WRMP19 Reference	RES-ICT-SEW-GUI-MNT-10
Element Type	Resource
WRZ	Guildford
Engineering Scope	Inter-zonal (inter-company) transfer of 10 MI/d from Hogs Back Service Reservoir (SR) in South East Water (SEW) supply area to Mount SR in Guildford WRZ.
Engineering Components	<p>Within SEW Supply area:</p> <ul style="list-style-type: none"> • A new main from Colonels Gate to Mytchett Place, Keogh Barracks • A new main inlet to Hogs Back SR • New pumping station at Hogs Back • Booster upgrade (10MI/d) requiring a new building/kiosk and new power supply • Additional 8 MI storage <p>Within Guildford WRZ:</p> <ul style="list-style-type: none"> • Treated water pipeline from Hogs Back SR (SEW) to Mount SR • Break pressure tank
Phases/Benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 10 MI/d • 1 in 500 average: 10 MI/d • 1 in 500 peak: 10 MI/d
Lead Time	5 Years
Mutual exclusivities	None
Interdependencies/Exclusivity	No interdependency with other WRMP elements.



Cheam to Merton Transfer (15 MI/d)

Name	Cheam to Merton Transfer (15 MI/d) – Inter-zonal (inter-company) transfer
WRSE ID	TWU_LON_HI-TFR_SES_ALL_cheam-merton
WRMP19 Reference	n/a new option at WRMP24
Element Type	Resource
WRZ	LON
Engineering Scope	Inter-zonal (inter-company) transfer of 15 MI/d from SES at Cheam to Thames Water at Merton.
Engineering Components	<ul style="list-style-type: none"> • A treated water pipeline from Cheam to Merton • A new pump station
Phases/Benefits	This option would be developed in a single phase. DO benefits: 15 MI/d (TBC)
Lead Time	5 Years
Mutual exclusivities	None
Interdependencies/Exclusivity	No interdependency with other WRMP elements.



Woodmansterne WTW to Epsom Downs (10 MI/d)

Name	Woodmansterne WTW to Epsom Downs (10 MI/d) – Inter-zonal (inter-company) transfer
WRSE ID	TWU_LON_HI-TFR_SES_ALL_woodman-epsom p
WRMP19 Reference	n/a new option at WRMP24
Element Type	Resource
WRZ	LON
Engineering Scope	Inter-zonal (inter-company) transfer of 10 MI/d from SES at Woodmansterne WTW to Thames Water at Epsoms Downs.

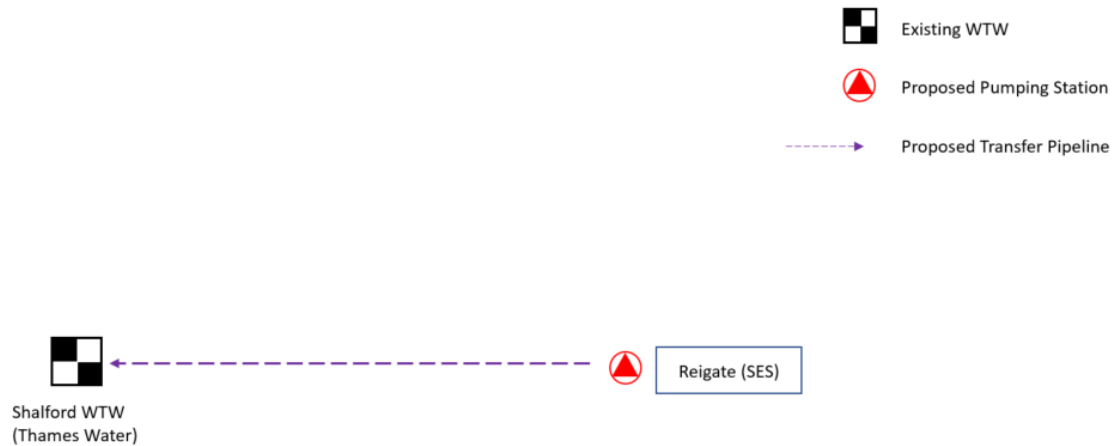
Name	Woodmansterne WTW to Epsom Downs (10 MI/d) – Inter-zonal (inter-company) transfer
Engineering Components	<ul style="list-style-type: none"> A treated water pipeline from Woodmansterne to Epsom Downs A new pump station
Phases/Benefits	This option would be developed in a single phase. DO benefits: 10 MI/d (TBC)
Lead Time	5 Years
Mutual exclusivities	None
Interdependencies/ Exclusivity	No interdependency with other WRMP elements.



Reigate to Guildford Transfer (5 MI/d or 20 MI/d)

Name	Transfer – Reigate (SES) to Guildford 5 MI/d – Inter-zonal (inter-company) transfer Transfer – Reigate (SES) to Guildford 20 MI/d – Inter-zonal (inter-company) transfer
WRSE ID	TWU_GUI_HI-TFR_SES_ALL_reigatetoguildford5 TWU_GUI_HI-TFR_SES_ALL_reigatetoguildford20
WRMP19 Reference	n/a new option at WRMP24 WRMP19_ML_ Reigate to Guildford 5 MI/d WRMP19_ML_ Reigate to Guildford 20 MI/d
Element Type	Resource
WRZ	Guildford
Engineering Scope	Inter-zonal (inter-company) transfer of 5 MI/d or 20 MI/d from SES at Reigate to Thames Water Guildford WRZ.
Engineering Components	<ul style="list-style-type: none"> A treated water pipeline from Reigate to Guildford A new pump station
Phases/Benefits	This option would be developed in a single phase. DO benefits of: <ul style="list-style-type: none"> 5 MI/d (TBC)or 20 MI/d (TBC)
Lead Time	5 Years

Name	Transfer – Reigate (SES) to Guildford 5 MI/d – Inter-zonal (inter-company) transfer
	Transfer – Reigate (SES) to Guildford 20 MI/d – Inter-zonal (inter-company) transfer
Mutual exclusivities	None
Interdependencies/Exclusivity	No interdependency with other WRMP elements. the 5 M/d and 20 MI/d options are mutually exclusive.



Thames to Affinity Transfer – Conjunctive Use Benefit

Name	Thames to Affinity Transfer
WRSE ID	T2AT option codes: AFW_AZ3_HI-TFR_KGV_CNO_beckton_conv100 AFW_RA4_HI-TFR_UTC_CNO_ltr_2a_conv100 Conjunctive use codes: AFW_KEM_HI-OTH_ALL_ALL_con_lon_50_ph1 AFW_KEM_HI-OTH_ALL_ALL_con_lon_50_ph2
WRMP19 Reference	Affinity Water Option
Element Type	Conjunctive Use
WRZ	NA
Engineering Scope	A modelling study carried out as part of the Thames to Affinity Transfer (T2AT) SRO scheme has shown that T2AT brings conjunctive use benefits to Thames Water. Refer to Thames to Affinity Transfer SRO Gate 1 and Gate 2 submissions for more information.
Engineering Components	None
Phases/Benefits	Conjunctive Use Benefit for Thames Water: 25 MI/d per 50 MI/d of transfer up to a maximum of 50 MI/d.
Lead Time	11 years (T2AT conveyance). Delivery programmes have been developed for Gate 2 which show an earliest operational date of

Name	Thames to Affinity Transfer
	2034/5; however this is dependent on the availability of resource to support the transfer.
Mutual exclusivities	None
Interdependencies/ Exclusivity	<p>The Lower Thames Reservoir (LTR) option is dependent on additional water resource being made available for abstraction from the River Thames. SESRO is a pre-requisite for the LTR scheme because without the new reservoir, the scheme would leave Thames Water with an unacceptable reduction in the volume of strategic raw water storage available to supply London. Should the supported STT option be implemented instead of or ahead of SESRO, then one of the alternative feasible configurations for T2AT from the River Thames could apply.</p> <p>The Beckton Recycling (BRI) option is dependent on additional water resource being made available for abstraction from the River Lee from Beckton Recycling.</p>

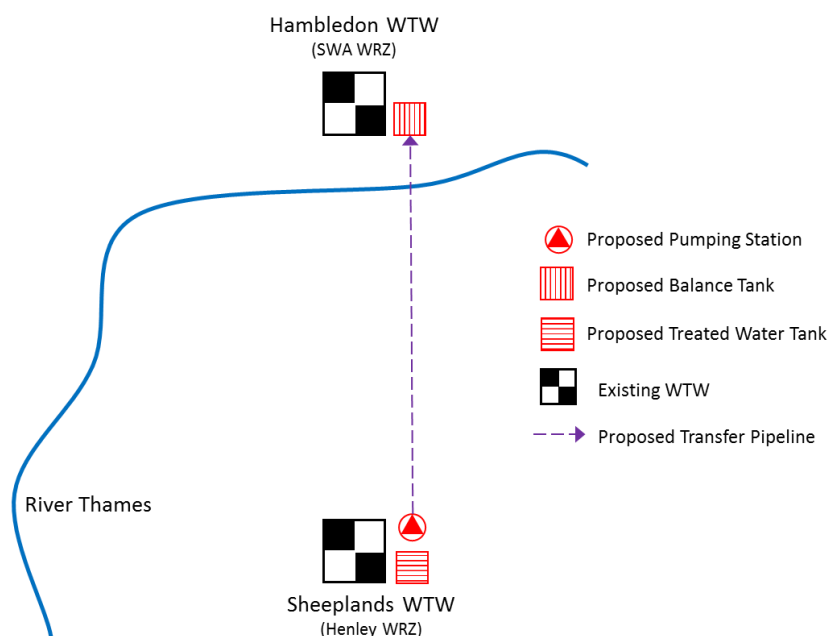
SESRO / STT interconnector – Conjunctive Use Benefit

Name	SESRO / STT interconnector
WRSE ID	TWU_STT_HI-TFR_STT_ALL_stt-sesro
WRMP19 Reference	New option to WRMP24
Element Type	Conjunctive Use
WRZ	London
Engineering Scope	SESRO SRO has modelled the potential DO benefit that could be achieve by providing a link between SESRO and STT. Refer to SESRO SRO Gate 2 submission for more information.
Engineering Components	Provision for STT to be able to discharge into SESRO
Phases/Benefits	DO for connection with STT (Deerhurst pipeline) is 3.6-10.8 MI/d, depending on pipeline capacity and reservoir size
Lead Time	TBC
Mutual exclusivities	None
Interdependencies/ Exclusivity	This option is dependent on both SESRO / Abingdon Reservoir and STT options being selected.

Inter Zonal Transfers

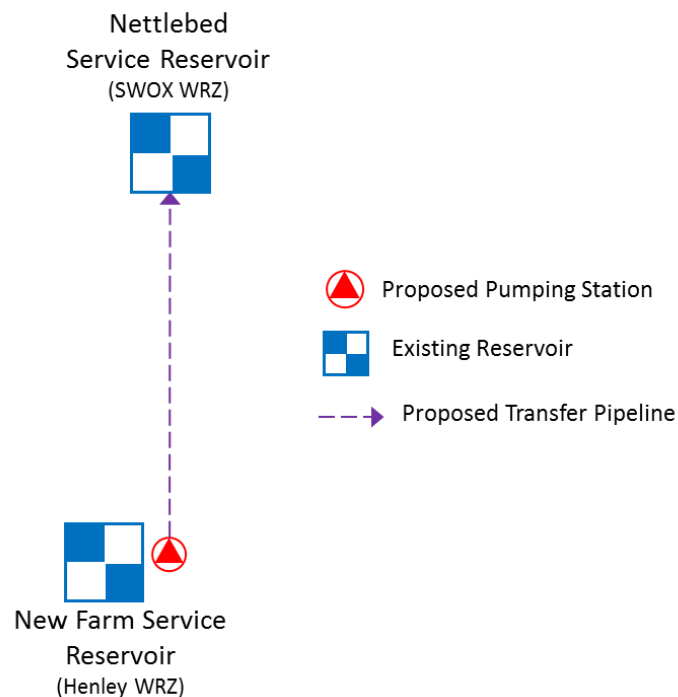
Henley to SWA Transfer (2.4 MI/d or 5 MI/d)

Name	Henley to SWA 2.4 MI/d – Inter-zonal transfer
	Henley to SWA 5 MI/d – Inter-zonal transfer
WRSE ID	TWU_SWA_HI-TFR_HEN_ALL_henley-swa2.4 TWU_SWA_HI-TFR_HEN_ALL_henley-swa5
WRMP19 Reference	RES-IZT-HEN-SWA-HAM- 2.37 RES-IZT-HEN-SWA-HAM-5
Element Type	Resource
WRZ	SWA
Engineering Scope	Inter-zonal transfer of 2.4 MI/d or 5 MI/d from Sheeplands WTW in Henley WRZ to Hambleden WTW in SWA WRZ.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New treated water pipeline from Sheeplands WTW to Hambleden WTW • Orthophosphate treatment at Hambleden WTW • A treated water tank and pumping station at Sheeplands WTW • A balance tank at Hambleden WTW
Phases/Benefits	This option would be developed in a single phase. DO benefit: n/a
Lead Time	5 Years
Mutual Exclusivities	The transfer options are mutually exclusive to each other and also Henley to SWOX Transfer (2.4 MI/d or 5 MI/d) .
Interdependencies/ Exclusivity	No interdependency with other WRMP elements.



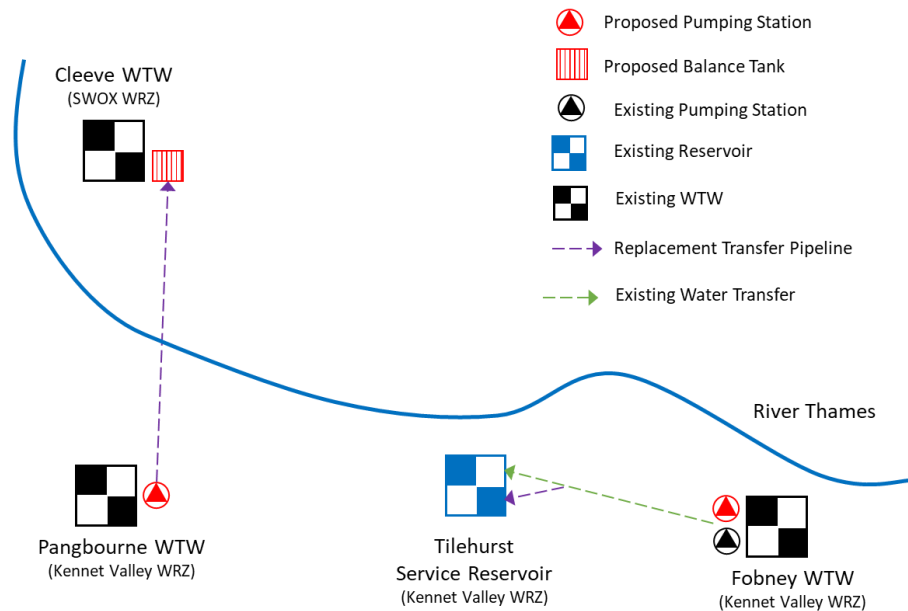
Henley to SWOX Transfer (2.4 MI/d or 5 MI/d)

Name	Henley to SWOX 2.4 MI/d – Inter-zonal transfer Henley to SWOX 5 MI/d – Inter-zonal transfer
WRSE ID	TWU_SWX_HI-TFR_HEN_ALL_henley-swox2.4 TWU_SWX_HI-TFR_HEN_ALL_henley-swox5
WRMP19 Reference	RES-IZT-HEN-SWX-NET-2.37 RES-IZT-HEN-SWX-NET-5
Element Type	Resource
WRZ	SWOX
Engineering Scope	Inter-zonal transfer of 2.4 MI/d or 5 MI/d from New Farm SR in Henley WRZ to Nettlebed SR in SWOX WRZ.
Engineering Components	The components for this scope are as follows: <ul style="list-style-type: none"> • A treated water pipeline to transfer water from New Farm SR to Nettlebed SR • New pumping station at New Farm SR
Phases/Benefits	This option would be developed in a single phase. DO benefit: n/a
Lead Time	5 Years
Mutual Exclusivities	Both transfer options are mutually exclusive to each other and also Henley to SWA Transfer (2.4 MI/d or 5 MI/d)
Interdependencies/Exclusivity	No interdependency with other WRMP elements.



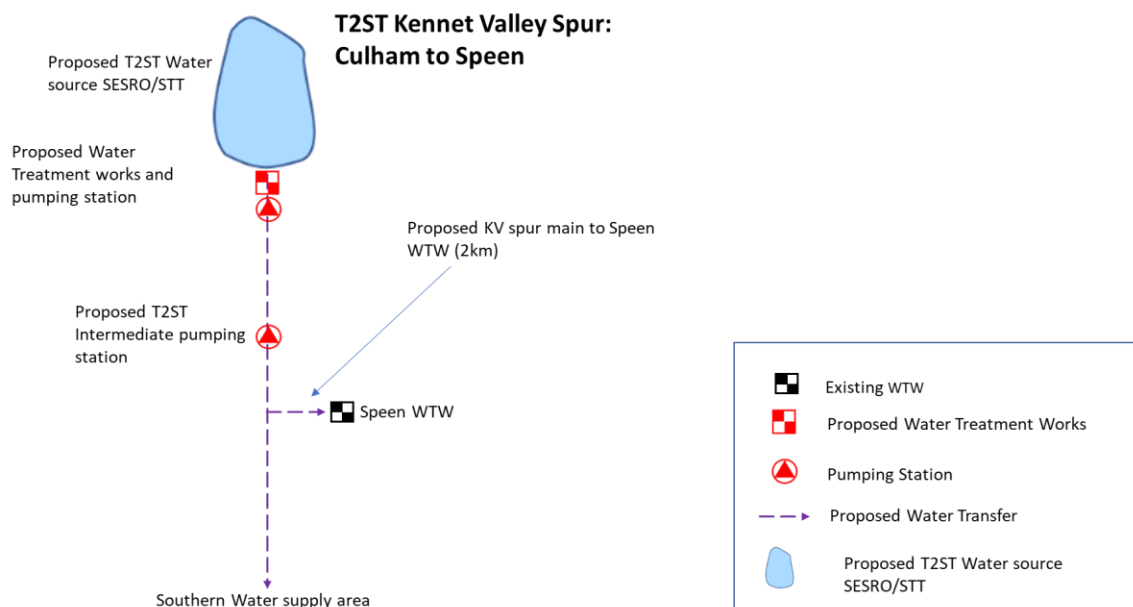
Kennet Valley to SWOX Transfer (2.3 MI/d or 6.7 MI/d)

Name	Kennet Valley to SWOX 2.3 MI/d – inter-zonal transfer
	Kennet Valley to SWOX 6.7 MI/d – inter-zonal transfer
WRSE ID	TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox2.3 TWU_SWX_HI-TFR_KVZ_ALL_kennet-swox6.7
WRMP19 Reference	RES-IZT-KEN-SWOX-CLV-2.3 RES-IZT-KEN-SWOX-CLV-6.7
Element Type	Resource
WRZ	SWOX
Engineering Scope	<p>Phased construction of a new pipeline from Pangbourne WTW to Cleeve WTW to transfer 2.3 MI/d or 6.7 MI/d of treated water and a new pumping station at Pangbourne WTW.</p> <p>Additionally, a new potable water pipeline is required for the end section of the existing main from Fobney WTW to Tilehurst SR, to enable an increase in flow in the pipeline.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New treated water pipeline from Pangbourne WTW to Cleeve WTW • New treated water pipeline for the end section from Fobney WTW to Tilehurst SR • New pumping station at Pangbourne WTW • Balance tank at Cleeve WTW • Additional pumps at the existing pumping station building at Fobney WTW
Phasing/Benefits	<p>This option would be developed in a single phase.</p> <p>DO benefit: n/a</p>
Lead Time	5 Years
Mutual exclusivities	Both transfer options are mutually exclusive to each other.
Interdependencies/Exclusivity	<p>To provide an additional resource to SWOX WRZ the following system element is also required:</p> <p>An additional 4.5 MI/d from Mortimer Recommissioning to enable the release of 4.5 MI/d supply capacity from Fobney WTW.</p>



T2ST KV Spur: Culham to Newbury (Potable)

Name	T2ST KV Spur: Culham to Newbury (Potable)
WRSE ID	TWU_KVZ_HI-TFR_T2S_ALL_t2st cul to speen
WRMP19 Reference	n/a option new to WRMP24
Element Type	Network Reinforcement
WRZ	Kennet Valley
Engineering Scope	Treated water spur 10 Ml/d connection from Thames to Southern Transfer (T2ST) pipeline to Speen WTW within the Kennet Valley water resource zone. Pumping head is provided by T2ST pumping station.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • 1.6km long potable spur connection from T2ST pipeline to Speen WTW • Break pressure tank at Speen WTW
Phases/benefits	n/a
Lead Time	12 Years (as lead time for T2ST scheme)
Mutual exclusivities	None
Interdependencies/ Exclusivity	This option is dependent on Thames to Southern Transfer being selected.

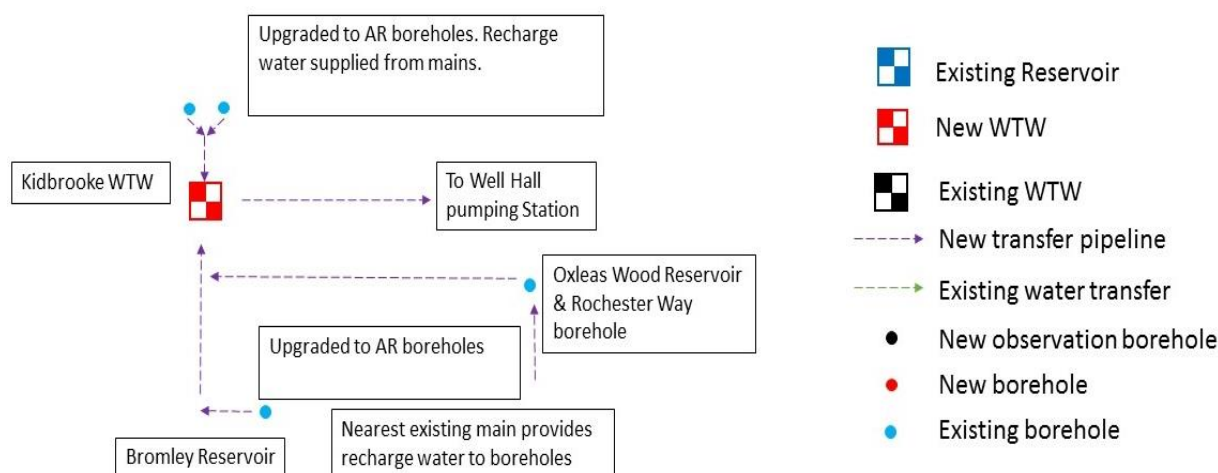


Groundwater

South London Artificial Recharge Scheme – Kidbrooke

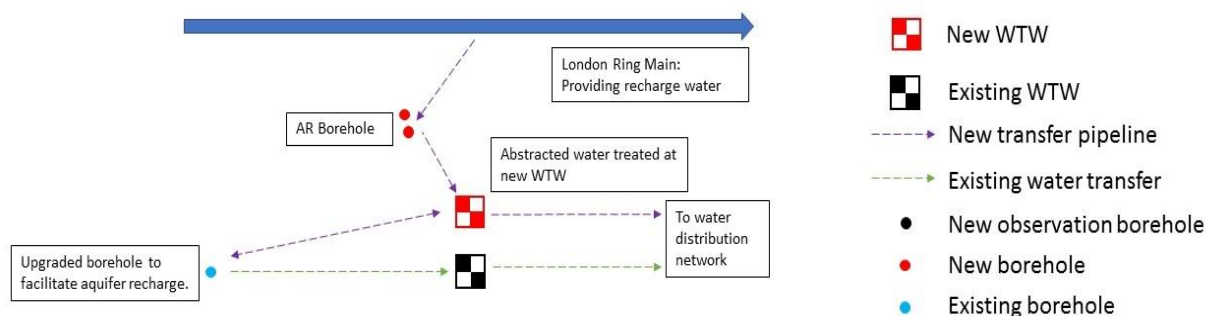
Name	South London Artificial Recharge Scheme (SLARS) – Kidbrooke
WRSE ID	TWU_LON_HI-GRW_ALL_XXX_kidbrooke slars
WRMP19 Reference	RES-AR-SLARS1-7
Element Type	Resource
WRZ	LONDON
Engineering Scope	<p>Upgrading four existing boreholes for Artificial Recharge (one at the Rochester Way site, two at Kidbrooke and another at the Bromley Reservoir site and construction of a new 8.1 MI/d WTW at the Kidbrooke borehole site to serve all the boreholes. Recharge water for the Kidbrooke boreholes will be provided from the local distribution main and will be recharged into the confined Chalk aquifer under mains pressure. Recharge water for Bromley Reservoir borehole and Rochester Way borehole will be provided via supply mains.</p> <p>Water abstracted from the AR boreholes will be treated at the new Kidbrooke WTW. Treated water from the Kidbrooke WTW will be returned to supply via the Well Hall Pumping station when an additional resource for the London Water Resource Zone is required. A discharge consent for recharge of the Chalk aquifer permit will be required from the Environment Agency for recharge of the Chalk aquifer.</p>
Engineering Components	The components for this scope are as follows:

Name	South London Artificial Recharge Scheme (SLARS) – Kidbrooke
	<ul style="list-style-type: none"> Construction of a new 8.1 Ml/d treatment works at the Kidbrooke New headworks and submersible abstraction pump with variable speed drives (VSD) for the existing Kidbrooke boreholes Existing Bromley reservoir borehole will have an abstraction pump installed Existing Rochester Way borehole will have an abstraction pump installed A VSD booster pump will be installed at Oxleas Wood reservoir to pump recharge water to Rochester Way A new connection for recharge water to be constructed at the existing mains Bromley Reservoir site, transfer pipe will be constructed for raw water being pumped from Bromley to Kidbrooke WTW Construction of a main from Rochester Way borehole to transfer abstracted water to Kidbrooke WTW A main to be installed from Oxleas Wood to provide recharge water for Rochester Way
Phases/Benefits	This option would be developed in a single phase. DO benefits of 8Ml/d.
Lead Time	6.5 Years
Mutual exclusivities	None
Interdependencies/ Exclusivity	The scheme is independent of the other sub-components of the larger SLARS project: Streatham (SLARS) and Merton (SLARS)



South London Artificial Recharge Scheme – Streatham

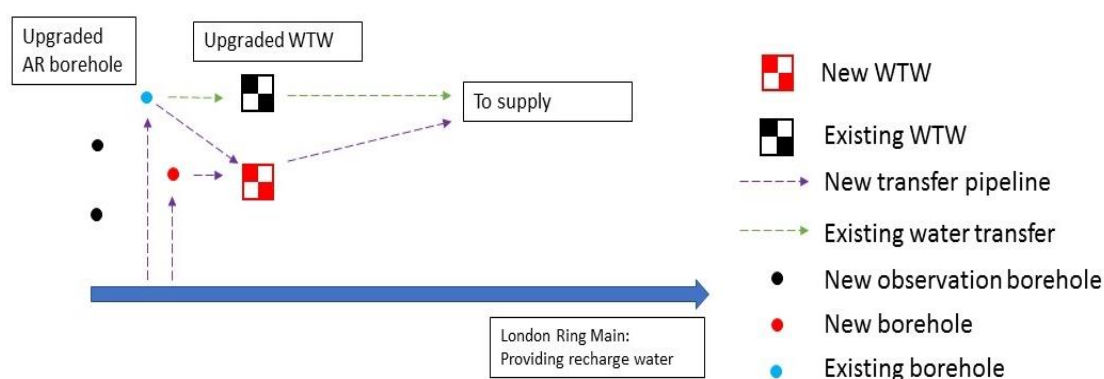
Name	South London Artificial Recharge Scheme (SLARS) – Streatham
WRSE ID	TWU_LON_HI-GRW_ALL_ALL_streatham ar
WRMP19 Reference	RES-AR-SLARS2
Element Type	Resource
WRZ	LONDON
Engineering Scope	<p>Component of the larger SLARS project based on the development of boreholes for recharge/abstraction purposes in the confined Chalk. Upgrade of existing borehole at Streatham WTW and construction of new artificial recharge (AR) borehole on-site at the existing Streatham WTW. Construction of a new 17 MI/d WTW located on the existing WTW site. Recharged water is treated at the new WTW.</p> <p>A new licence and discharge consent will be required from the Environment Agency to allow abstraction/recharge from the Chalk. A winter licence from the River Thames will also be required to supply water during the recharge phase of the AR scheme.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Construction of a new 17 MI/d treatment works on the existing site • New recharge/abstraction borehole • Variable speed drive (VSD) pump for new borehole • Redevelopment of existing borehole to become a recharge/abstraction borehole • New recharge water connection to the existing main in Conyers Road • Connection from treated water main to distribution network • New run-to-waste sewer connection
Phases/Benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 5 MI/d • 1 in 500 average: 5 MI/d • 1 in 500 peak: 7 MI/d
Lead Time	4 Years
Mutual exclusivities	None
Interdependencies/Exclusivity	The scheme is independent of the other sub-components of the larger SLARS project: Kidbrooke (SLARS) and Merton (SLARS) .



South London Artificial Recharge Scheme Merton Abbey

Name	South London Artificial Recharge Scheme (SLARS) – Merton Abbey
WRSE ID	TWU_LON_HI-GRW_ALL_XXX_merton ar
WRMP19 Reference	RES-AR-SLARS3
Element Type	Resource
WRZ	LONDON
Engineering Scope	<p>This option involves upgrading the existing well and adit system at the Merton Abbey Water Treatment Works (WTW) for artificial recharge (AR) and the construction of a new AR borehole with two observations boreholes. A new WTW will be constructed at Merton Abbey to serve the Byegrove Road AR borehole. Recharge water for the Merton Abbey and Byegrove Road AR boreholes will be provided via the London Ring Main and will be recharged to the confined Chalk aquifer. Abstracted water from the AR boreholes will be treated at the new and upgraded WTWs. Treated water from the Merton Abbey WTW will be returned to local distribution mains when an additional resource is needed for the London WRZ.</p> <p>A new licence and discharge consent will be required from the Environment Agency to allow abstraction/recharge from the Chalk. A winter licence from the River Thames will also be required to supply water during the recharge phase of the AR scheme.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Installation of new submersible pump, in the existing abstraction well, at Merton Abbey WTW, capable of pumping 8 MI/d • Construction of a new 4.5 MI/d treatment works at the Merton Abbey WTW site • Installation of a new submersible pump, in the existing abstraction well, at Merton Abbey WTW • Construction of a connection to existing main in Fortescue Road, to provide recharge water • Construction of a new housing for the wellhead at Merton Abbey WTW • Construction of a new WTW to treat water from the new AR borehole at the Byegrove Rd site

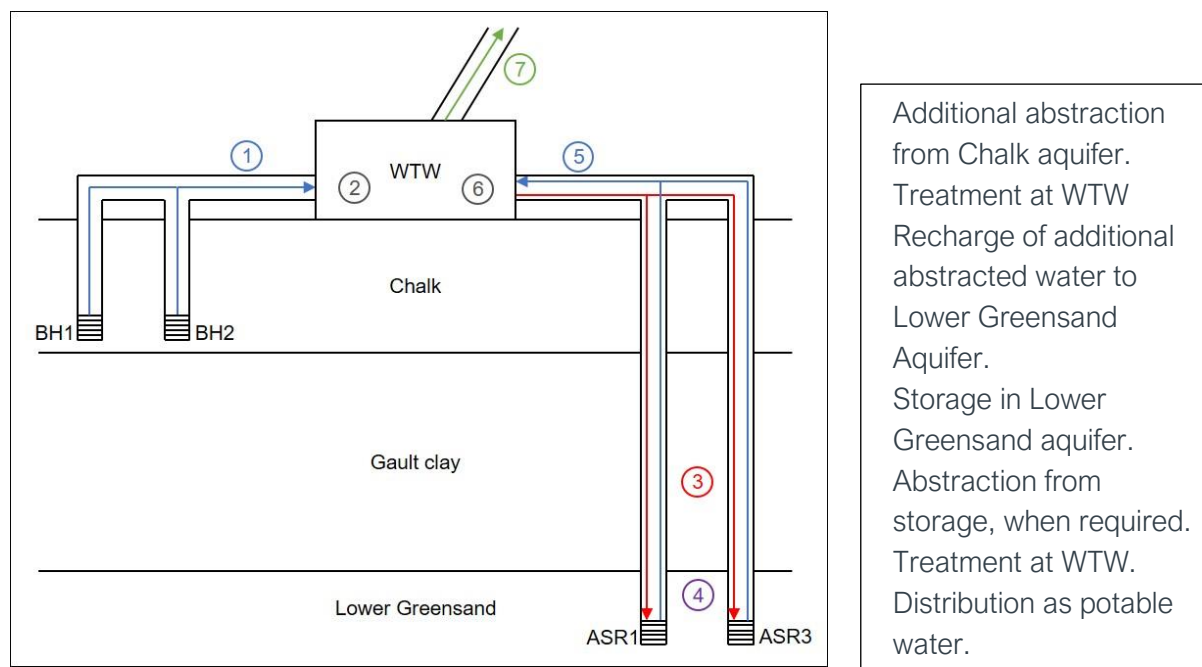
Name	South London Artificial Recharge Scheme (SLARS) – Merton Abbey
	<ul style="list-style-type: none"> Construction of a new connection from the new WTW to a local distribution main. A run to waste connection will be provided to the existing site drain Construction of an AR borehole at Byegrove Road Two observation boreholes for the AR borehole at Byegrove Road Construction of a new connection pipeline to the distribution main in Byegrove road to provide recharge water Construction of pipeline for water transfer from Byegrove AR borehole to new WTW Additional pumps are required at Byegrove Road AR borehole and the new WTW
Phases/Benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> 1 in 2 average: 6 MI/d 1 in 500 average: 6 MI/d 1 in 500 peak: 5 MI/d
Lead Time	6.5 Years
Mutual exclusivities	None
Interdependencies/ Exclusivity	<p>This option is independent of the other sub-components of the larger SLARS project: Kidbrooke (SLARS) and Streatham (SLARS)</p> <p>This option cannot be delivered without Merton Recommissioning</p>



Horton Kirby Aquifer Storage and Recovery

Name	Horton Kirby Aquifer Storage and Recovery ⁹
WRSE ID	TWU_LON_HI-GRW_RE1_ALL_asrhortonkirby
WRMP19 Reference	RES-ASR-HOR
Element Type	Resource
WRZ	LONDON
Engineering Scope	<p>Construction of pipelines between two existing Aquifer Storage and Recovery (ASR) boreholes in the Lower Greensand aquifer to an existing WTW (water treatment works) at Horton Kirby in Kent. Water abstracted from existing Chalk aquifer boreholes (via the mains supply) will be recharged into the two ASR boreholes during periods of water surplus and abstracted when needed and treated at the WTW.</p> <p>A new licence and discharge consent will be required from the Environment Agency to allow abstraction/recharge from the Lower Greensand aquifer.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Raw water pipeline to connect existing ASR3 borehole to existing Horton Kirby WTW • Upgrade to Horton Kirby WTW treatment • New control infrastructure to recharge the aquifer • New ASR borehole kiosk • Two borehole abstraction pumps at the ASR boreholes • Two booster pumps for recharge to ASR boreholes • Two borehole pumps for abstraction from Chalk boreholes • Two force pumps to management control of Horton Kirby WTW output to Farningham storage reservoir • Install turbidity meters at ASR boreholes • New run-to-waste pipelines from ASR (1 and 3) boreholes to River Darent <p>New raw water pipelines between the existing ASR (1 and 3) boreholes and the WTW</p>
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of 5 MI/d</p>
Lead Time	5 Years
Mutual Exclusivities	None
Interdependencies/Exclusivity	This option is not dependent on other options.

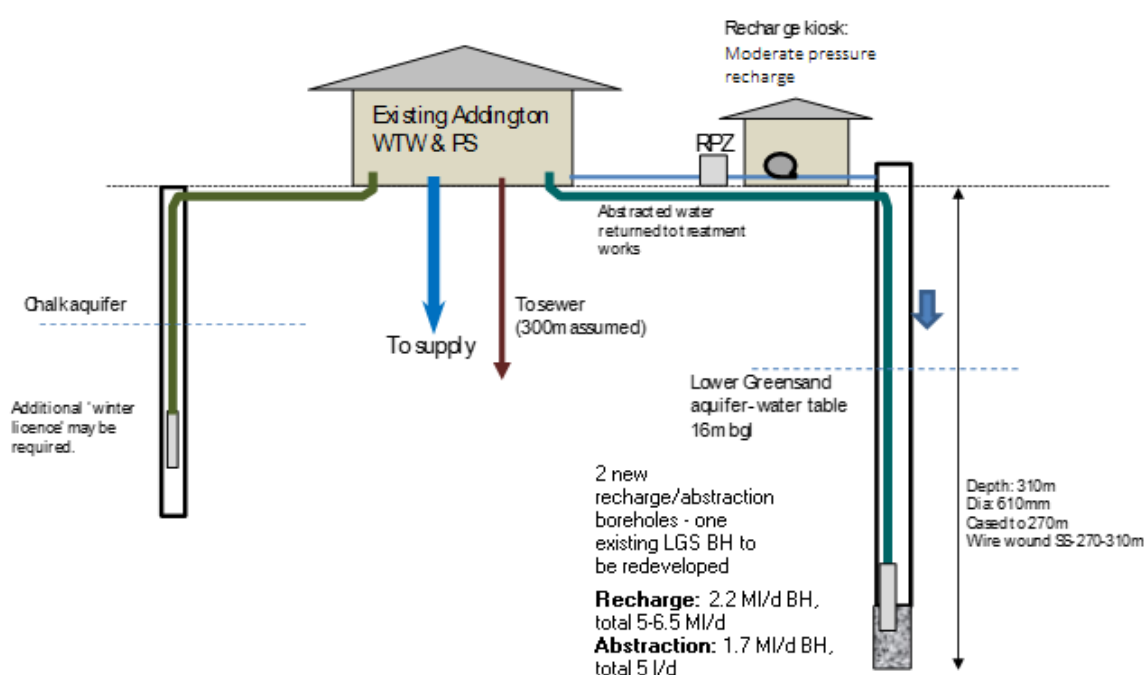
⁹ ASR Horton Kirby and Southfleet & Greenhithe Groundwater schemes were included in the WRMP19 Preferred Programme for London for delivery in AMP7 (2020-25). Since WRMP19 the delivery of these options has been deferred beyond the end of AMP7 as the supply demand balance in the London WRZ is in surplus. They are therefore included as WRMP24 Options



ASR South East London (Addington)

Name	ASR South East London (Addington)
WRSE ID	TWU_LON_HI-GRW_ALL_XXX_addington asr
WRMP19 Reference	RES-ASR-SEL
Element Type	Resource
WRZ	LONDON
Engineering Scope	<p>Development of the existing Lower Greensand (LGS) borehole for recharge/abstraction purposes. Construction of two new recharge/abstraction boreholes in the LGS aquifer to provide a total of three operational ASR boreholes. Recharge water will be provided via the Addington supply main and abstracted water will be treated at the existing WTW. Waste and sludge discharges drain to an existing sewer connection and treated water will be returned to the Addington supply main when an additional resource for the London Water Resource Zone is required.</p> <p>A new licence and discharge consent will be required from the Environment Agency to allow abstraction/recharge from the Lower Greensand aquifer. As part of the application for consent, an understanding of potential impacts of the proposed option on water level (including nearby abstractors) and water quality will be prepared.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Two new abstraction/recharge boreholes • Three new borehole pumps • New moderate pressure recharge building • Upgrade of Addington WTW to treat additional peak supply • New pipelines from WTW to the two new off-site abstraction/recharge boreholes

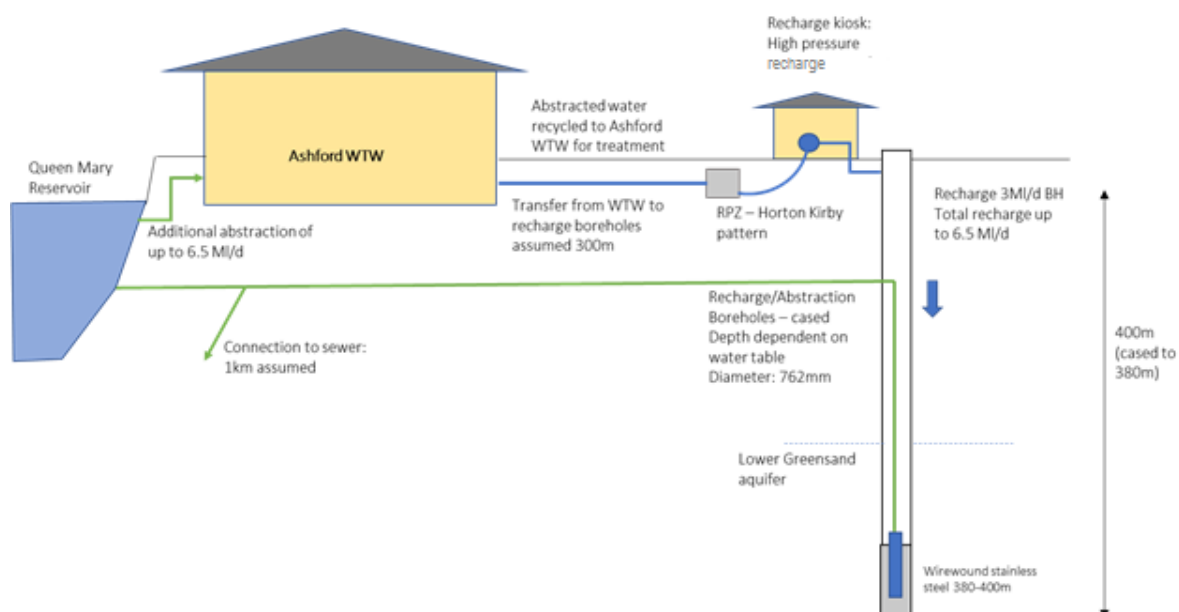
Name	ASR South East London (Addington)
Phases/Benefits	This option would be developed in a single phase. DO benefits of: <ul style="list-style-type: none"> • 1 In 2 average: 3 MI/d • 1 In 500 average: 3 MI/d • 1 In 500 peak: 5 MI/d
Lead Time	10 Years
Mutual Exclusivities	None
Interdependencies/Exclusivity	Delivery of this option in addition to Addington (GW) will require a capacity upgrade of the Addington WTW to treat the additional peak supply. This is included in the Addington new borehole option Addington (GW) .



Thames Valley Central ASR

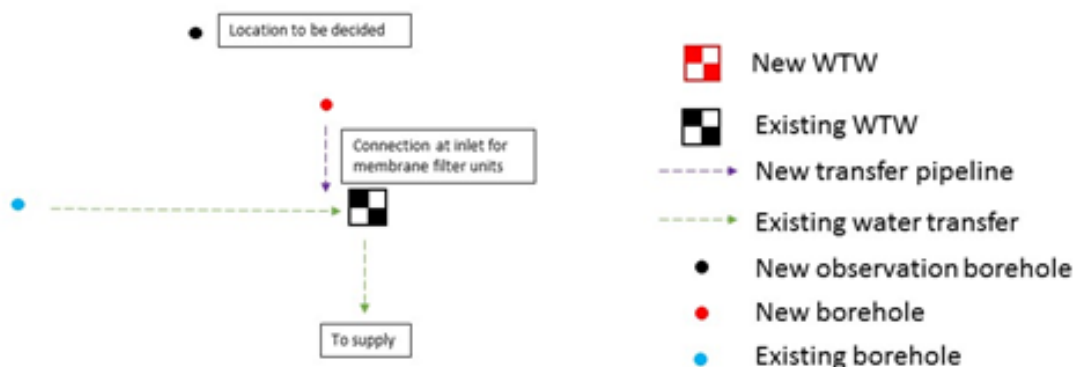
Name	Thames Valley/Thames Central ASR
WRSE ID	TWU_LON_HI-GRW_ALL_ALL_thames valley asr
WRMP19 Reference	RES-ASR-TV
Element Type	Resource
WRZ	LONDON
Engineering Scope	Construction of two new recharge/abstraction boreholes in the Lower Greensand aquifer (LGS) on-site at the existing Ashford water treatment works. Recharge water will be provided via the transfer main from the existing WTW. Water abstracted from ASR boreholes will be pumped to the Queen Mary Reservoir adjacent to the WTW. All waste and sludge discharge will be pumped to the local sewer via a new sewer connection. Treated water will be

Name	Thames Valley/Thames Central ASR
	<p>returned to the supply main as an additional resource for the London Water Resource Zone, when required.</p> <p>A new licence and discharge consent will be required from the Environment Agency to allow abstraction/recharge from the Lower Greensand aquifer.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Two new ASR boreholes to be developed. Initially, first borehole will be treated as pilot borehole to test yield and assess scheme viability. Second borehole will then be drilled if tests are successful • One duty pump per borehole • New recharge pumping building • New pipeline to sewer • Construction of pipe to return water to Queen Mary Reservoir • Construction of pipe to transfer water under mains pressure to recharge building
Phases/Benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 In 2 average: 3 MI/d • 1 In 500 average: 3 MI/d • 1 In 500 peak: 5 MI/d
Lead Time	10 Years
Mutual Exclusivities	None
Interdependencies/Exclusivity	This option is not dependant on other system elements.



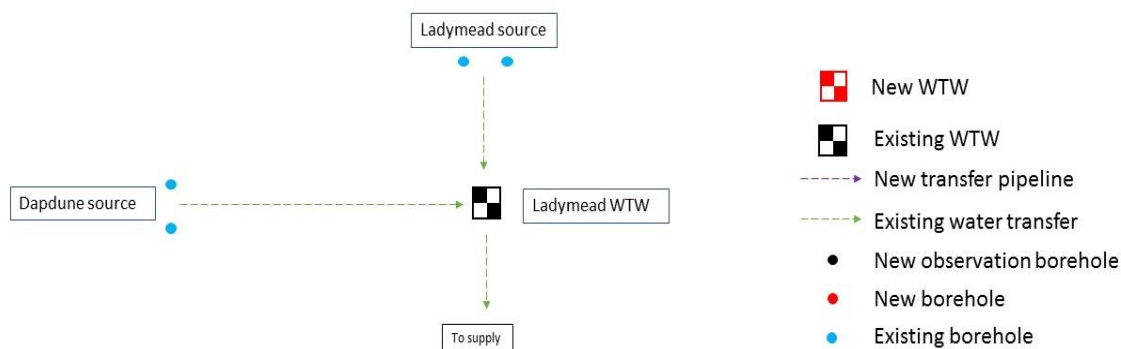
Groundwater Addington

Name	Groundwater Addington
WRSE ID	TWU_LON_HI-GRW_ALL_ALL_addington gw
WRMP19 Reference	RES-GW-ADD
Element Type	Resource
WRZ	LONDON
Engineering Scope	The option comprises the construction of a new borehole at Addington WTW, the improvement of existing WTW capacity by additional sodium bisulphate and phosphoric acid dosing capacity and the development of a new run to waste connection. Treated water will be an additional resource for the London Water Resource Zone.
Engineering Components	<p>The components for this scope are as follows</p> <ul style="list-style-type: none"> • New abstraction borehole • Abstraction pipework • A new run-to-waste connection to the existing drain. • Upgrade of chemical dosing (sodium hypochlorite, sodium bisulphate and phosphoric acid) to provide an additional 5 MI/d treatment capacity • New observation borehole
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 In 2 average: 2.7 MI/d • 1 In 500 average: 2.7 MI/d • 1 In 500 peak: 5.7 MI/d
Lead Time	3 Years
Mutual Exclusivities	None
Interdependencies/Exclusivity	<p>This option is not dependent on any other works.</p> <p>The Addington WTW does not have the capacity to treat the additional supply from the combined output of this option and the South East London ASR (Addington (ASR)). If the option Addington (ASR) is not taken forward then the proposed upgrades to Addington WTW will not be required.</p>



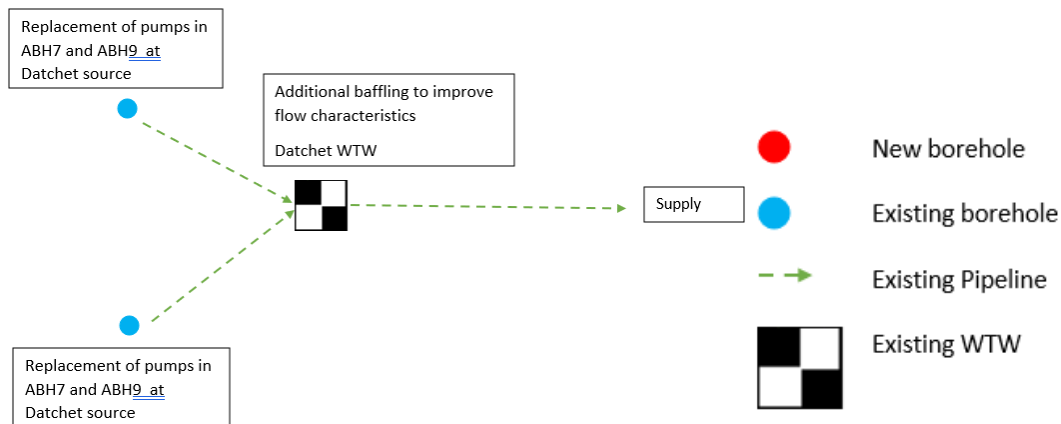
Dapdune Licence Disaggregation

Name	Dapdune licence disaggregation
WRSE ID	TWU_GUI_HI-GRW_ALL_ALL_dapdune lic disagg
WRMP19 Reference	RES-GW-DAP
Element Type	Resource
WRZ	Guildford
Engineering Scope	This option comprises the disaggregation of the group Dapdune – Ladymead – Millmead borehole abstraction licence group for peak licensed quantities only. No change to the average aggregate licence is proposed. The benefit from this option will provide an additional resource to the Guildford water resource zone.
Engineering Components	No additional works will need to be performed. This option will require approval from the Environment Agency (EA).
Phases/benefits	This option would be developed in a single phase. DO benefits of: <ul style="list-style-type: none"> • 1 in 2 average: 0 MI/d • 1 in 500 average: 0 MI/d • 1 in 500 peak: 2.2 MI/d
Lead Time	1 Year
Mutual Exclusivities	None
Interdependencies/ Exclusivity	This option is dependent on the delivery of the Dapdune (ROC) option and Ladymead removal of constraints option (ROC) which has been progressed in AMP7.



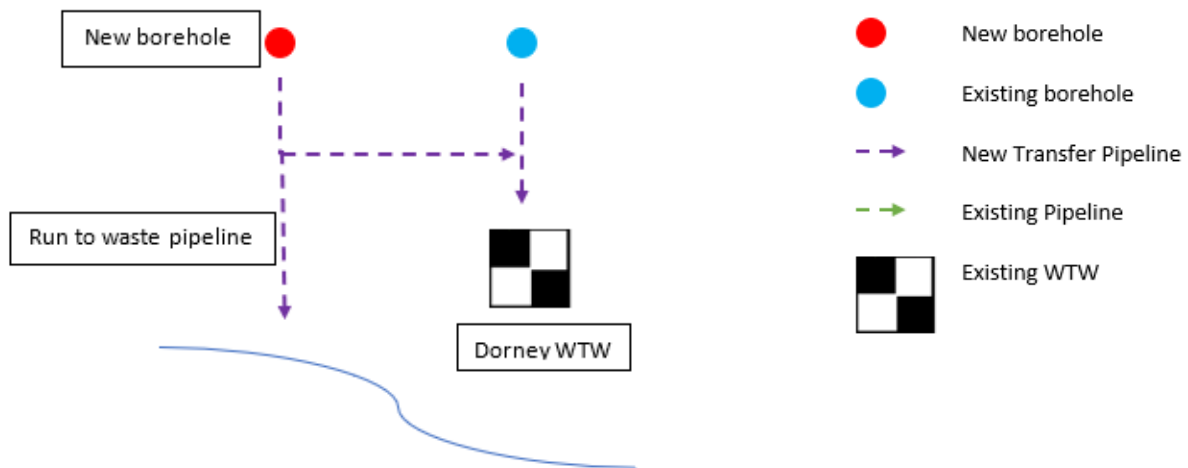
Datchet Increase DO

Name	Datchet Increase Do
WRSE ID	TWU_SWA_HI-GRW_ALL_ALL_datchet do
WRMP19 Reference	New option to WRMP24
Element Type	Resource
WRZ	Slough, Wycombe & Aylesbury (SWA)
Engineering Scope	The WRMP24 Datchet increase DO option aims to increase current DO limited by pump capacity to the annual average licence limit. This would be an increase of 1.6 MI/d.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Installation of additional baffling to improve the plug flow characteristics of the Datchet WTW contact tank • 1 no. new borehole pump for ABH7 • 1 no. new borehole pump for ABH9 installed at a deeper level • Main MCC with busbar • Cable trenches/ducting between the old and new MCC, communications link to be established with existing ICA panel • Replacement transformer • Temporary works – Duty/standby diesel generators and ICA panel
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 1.6 MI/d • 1 in 500 average: 1.6 MI/d • 1 in 500 peak: 6.21 MI/d
Lead Time	3.5 Year
Mutual Exclusivities	None
Interdependencies/Exclusivity	This option is not dependent on any other works.



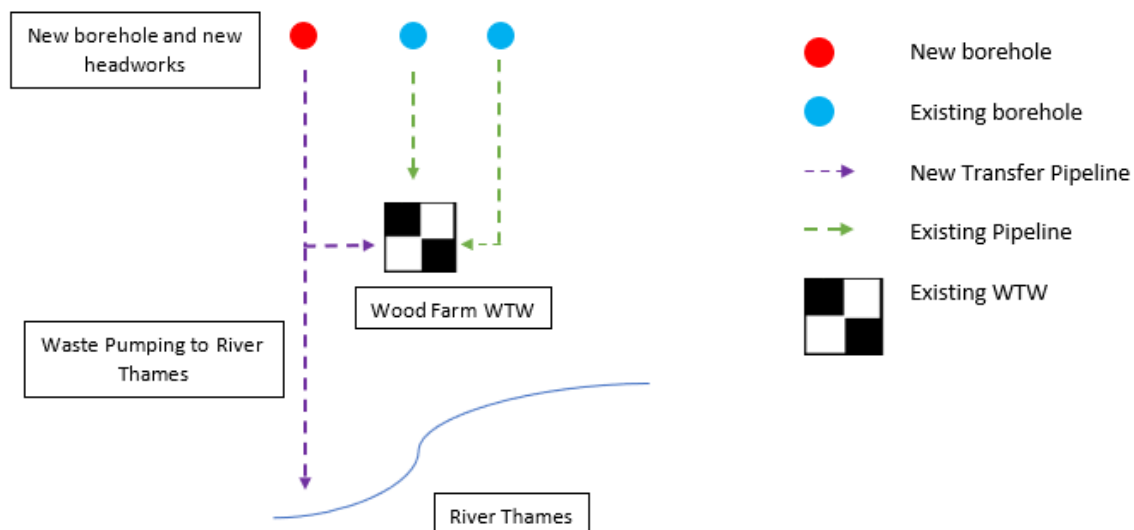
Dorney Increase DO

Name	Dorney increase DO
WRSE ID	TWU_SWA_HI-GRW_ALL_ALL_dorney DO
WRMP19 Reference	n/a – new option to WRMP24
Element Type	Resource
WRZ	Slough, Wycombe & Aylesbury (SWA)
Engineering Scope	Increase abstraction to peak license at Dorney WTW by constructing a new abstraction borehole in the gravel aquifer at the existing Dorney Reach raw water site. The borehole will be operated within the existing abstraction licence. The water abstracted from the proposed borehole will be treated at the existing Dorney WTW site.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> New borehole to be drilled at the Dorney Reach Two pumps (duty and standby) New pipeline connecting raw feed to WTW New run-to-waste pipeline
Phases/benefits	<p>DO benefits of:</p> <ul style="list-style-type: none"> 1 in 2 average: 0 MI/d 1 in 500 average: 0 MI/d 1 in 500 peak: 4.3 MI/d
Lead Time	4 Years
Mutual Exclusivities	None
Interdependencies/Exclusivity	The size of the disinfection upgrade in the Taplow Increase DO scheme is dependent on whether the Dorney Increase DO option is selected.



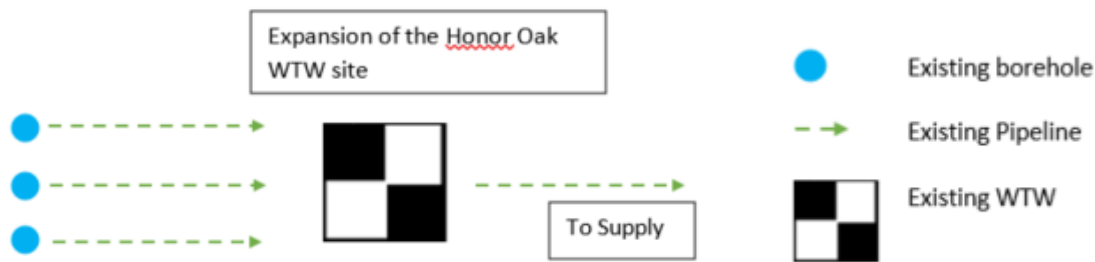
Wood Farm Increase DO

Name	Woods Farm increase DO
WRSE ID	TWU_SWX_HI-GRW_ALL_ALL_woods farm do
WRMP19 Reference	n/a – new option to WRMP24
Element Type	Resource
WRZ	Swindon and Oxford (SWOX)
Engineering Scope	Increase abstraction to peak license and the average DO at Woods Farm WTW. The objective is to recover DO to licensed quantity by drilling a new borehole to make up for the lost output due to turbidity in ABH3.
Engineering Components	<p>The components are as follows:</p> <ul style="list-style-type: none"> • One new borehole in the Chalk aquifer outside existing site • One duty pump • New raw water pipeline from borehole to WTW • New waste from Wood Farm WTW to the River Thames. This includes three minor crossings
Phases/benefits	<p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 2.4 MI/d • 1 in 500 average: 2.4 MI/d • 1 in 500 peak: 2.9 MI/d
Lead Time	4 Years
Mutual Exclusivities	None
Interdependencies/Exclusivity	This option is not dependent on any other works.



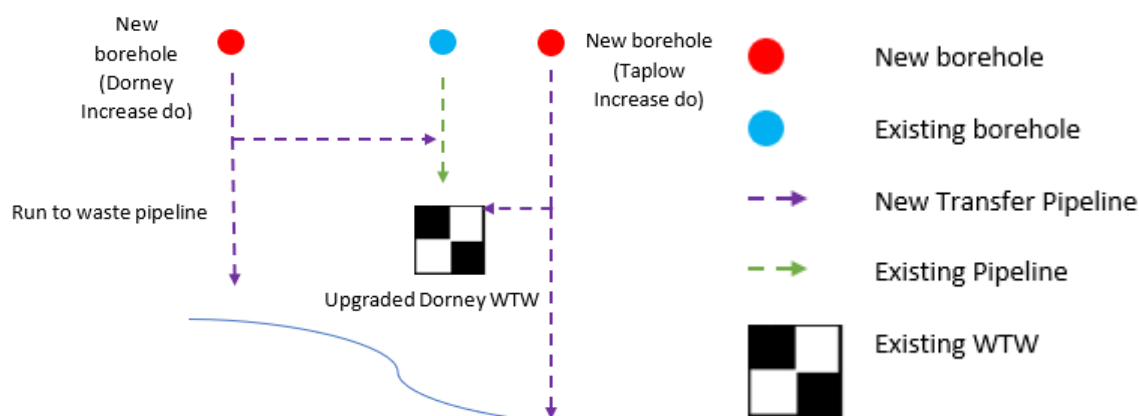
Honor Oak Increase DO

Name	Honor Oak increase DO
WRSE ID	TWU_LON_HI-GRW_ALL_ALL_honoroak do
WRMP19 Reference	n/a – new option to WRMP24
Element Type	Resource
WRZ	London
Engineering Scope	Restore Honor Oak well and WTW back into service by refurbishing the treatment works and replacing the pump. This option would utilise the existing license.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Well refurbishment; including replacement well pump • Coagulation and flocculation system including re-lift pumping station • Re-lift pumps from new flocculation tank to downstream process units • Replacement of sand filters • Replacement of disinfection + dichlorination equipment • Ammonisation • Orthophosphoric acid
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 1.7 MI/d • 1 in 500 average: 1.7 MI/d • 1 in 500 peak: 1.7 MI/d
Lead Time	5 Years
Mutual exclusivities	None
Interdependencies/Exclusivity	Work on this option must be completed before the Honor Oak (GW) option work can take place.



Taplow Increase DO

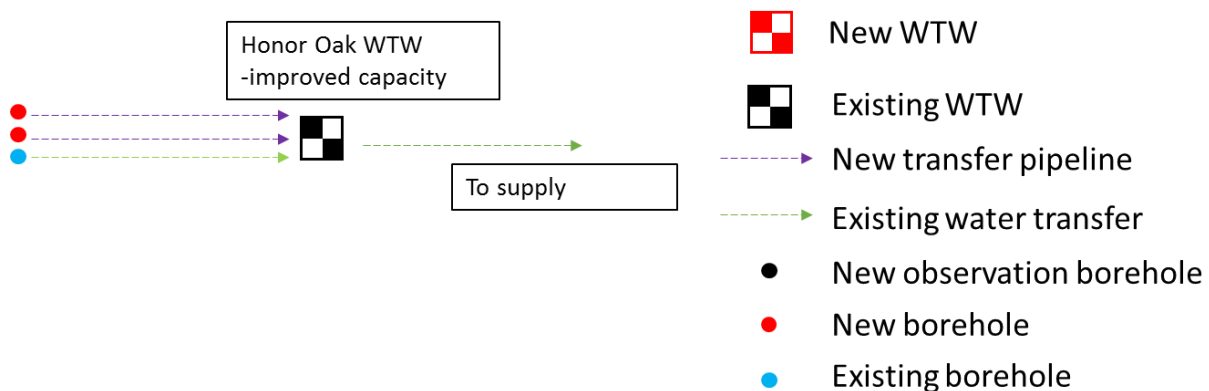
Name	Taplow increase DO
WRSE ID	TWU_SWA_HI-GRW_ALL_ALL_taplowincreasedo
WRMP19 Reference	n/a – new option to WRMP24
Element Type	Resource
WRZ	Slough, Wycombe & Aylesbury (SWA)
Engineering Scope	<p>The WRMP24 Taplow option aims to increase DO up to the licenced quantities. The option includes new chalk abstraction borehole including pumps and variable speed drives (VSD's) at Dorney WTW site but added to the Taplow abstraction licence.</p> <p>Upgrade at Dorney WTW is required if both Taplow Increase DO and Dorney Increase DO options are selected.</p>
Engineering Components	<p>The components for the scope are as follows:</p> <ul style="list-style-type: none"> • New chalk abstraction borehole at the Dorney WTW site • New duty pump • New rising main and a run to waste pipeline. • Disinfection upgrade at Dorney WTW is required to increase treatment capacity to 77 MI/d. (See Interdependencies)
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 0 MI/d • 1 in 500 average: 0 MI/d • 1 in 500 peak: 5.7 MI/d
Lead Time	4 Years
Mutual Exclusivities	None
Interdependencies/Exclusivity	The disinfection upgrade scope will only be included if – Dorney Increase DO option is selected as well as Taplow increase DO.



Groundwater Honor Oak

Name	Groundwater Honor Oak
WRSE ID	TWU_LON_HI-GRW_ALL_ALL_honor oak gw
WRMP19 Reference	RES-GW-HON
Element Type	Resource
WRZ	LONDON
Engineering Scope	<p>This option comprises construction of one or two new abstraction boreholes close to the existing Honor Oak site to increase output within existing licence limits. The option also includes associated headworks and abstraction pumps, and the installation of a new pipeline to transfer the water from the new borehole(s) to the existing WTW. The water abstracted from the proposed borehole(s) will be treated at the existing WTW.</p> <p>The capacity of the existing WTW will be improved by installing new pressure sand filters for iron and manganese removal, and new Granular activated carbon (GAC) adsorbers for pesticide removal. The existing contact tanks have sufficient capacity to treat the total abstraction volume.</p> <p>The treated water will be used to provide additional resource for the London Water Resource Zone (WRZ).</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New abstraction boreholes with associated headworks near the existing WTW site • Run to waste facility for boreholes • Two new pipelines to transfer water from the new boreholes to the existing WTW • New abstraction pump in each new borehole • Transfer from the new boreholes to the existing WTW • New pressure sand filter and new GAC absorbers at Honor Oak WTW
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 1.4 MI/d

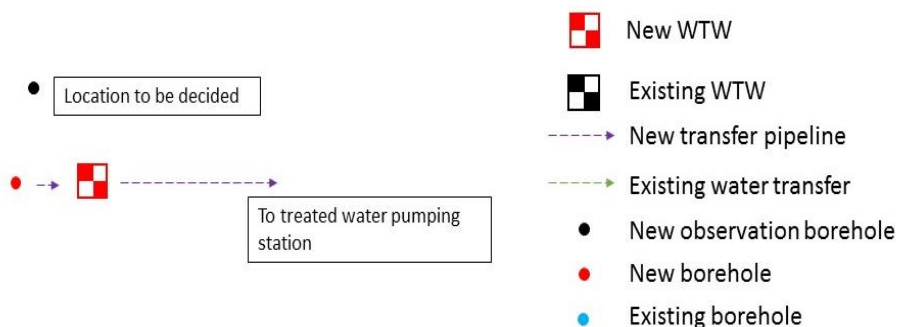
Name	Groundwater Honor Oak
	<ul style="list-style-type: none"> 1 in 500 average: 1.4 MI/d 1 in 500 peak: 2.7 MI/d
Lead Time	3 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	This option is not dependent on any other works.



London Confined Chalk (north)

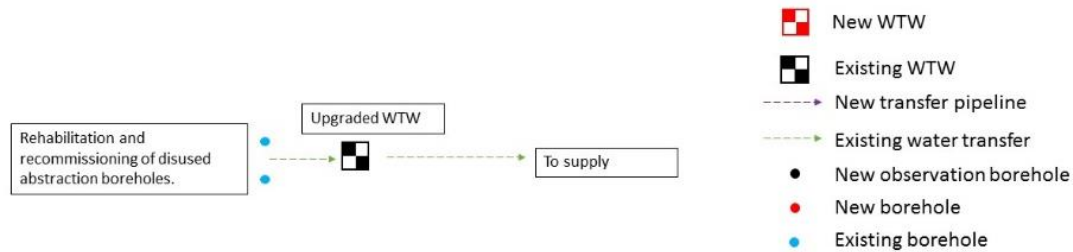
Name	London Confined Chalk (north)
WRSE ID	TWU_LON_HI-GRW_ALL_ALL_london conchalk
WRMP19 Reference	RES-GW-LCC
Element Type	Resource
WRZ	LONDON
Engineering Scope	Construction of one new abstraction borehole in the confined Chalk aquifer in London and one new water treatment works (WTW). Treatment assumed to include ultrafiltration, reverse osmosis, super-chlorination and dichlorination. Test pumping will be required to support the application for a new abstraction licence.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> A new abstraction borehole Observation borehole New WTW containing; Ultrafiltration, reverse osmosis, super-chlorination, dichlorination
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> 1 in 2 average: 2 MI/d 1 in 500 average: 2 MI/d 1 in 500 peak: 2 MI/d
Lead Time	5 Years
Mutual Exclusivities	None

Name	London Confined Chalk (north)
Interdependencies/ Exclusivity	This option is not dependent on any other option.



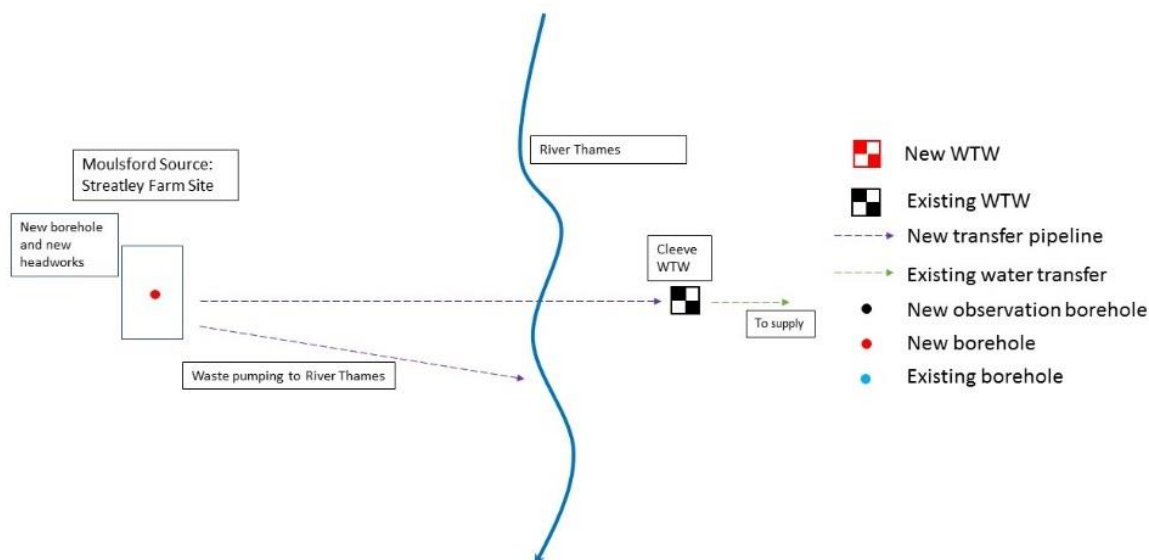
Mortimer Disused Source Recommissioning

Name	Mortimer Disused Source Recommissioning
WRSE ID	TWU_KVZ_HI-GRW_ALL_ALL_mortimer recomm
WRMP19 Reference	RES-GW-MOR1
Element Type	Resource
WRZ	Kennet Valley
Engineering Scope	<p>Rehabilitation and recommissioning of two abstraction boreholes (Borehole A and Borehole B) on the disused Mortimer water treatment works (WTW). The WTW will be upgraded to include treatment for ammonia and iron removal. Test pumping of the boreholes will be required to confirm groundwater quality. Treated water will provide an additional resource for the Kennet Valley Water Resource Zone.</p> <p>An investigation to understand the potential impacts of the proposed option on the Water Framework Directive status of the water body will be carried out in AMP7.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> Refurbishment of the existing boreholes Upgrading the existing WTW for ammonia and iron removal
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> 1 in 2 average: 4.5 MI/d 1 in 500 average: 4.5 MI/d 1 in 500 peak: 4.5 MI/d
Lead Time	2 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	This option is not dependent on other options.



Moulsford 1 groundwater option

Name	Moulsford 1 groundwater option
WRSE ID	TWU_SWX_HI-GRW_ALL_ALL_moulsford gw
WRMP19 Reference	RES-GW-MOU
Element Type	Resource
WRZ	SWOX
Engineering Scope	<p>Construction of an abstraction borehole in the unconfined Chalk north of Streatley, on the west bank of River Thames. Abstracted water will be treated at existing Cleeve WTW. Test pumping to support the new abstraction licence will be carried out. Treated water will provide an additional resource for the Swindon and Oxford Water Resource Zone.</p> <p>An abstraction licence will be required. The potential impact of the Moulsford abstraction will be reviewed as part of any licence application, including a review of the impact of the Chiltrey Warren sustainability reduction in AMP7.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • A new abstraction borehole and associated headworks, • Installation of pumps • Potential of a new observation borehole • A new transfer pipeline between the abstraction borehole and the WTW <p>A new raw water run to waste pipeline.</p>
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 2 MI/d • 1 in 500 average: 2 MI/d • 1 in 500 peak: 3.5 MI/d
Lead Time	3 Years
Mutual Exclusivities	None
Interdependencies/Exclusivity	This option is not dependent on other options.

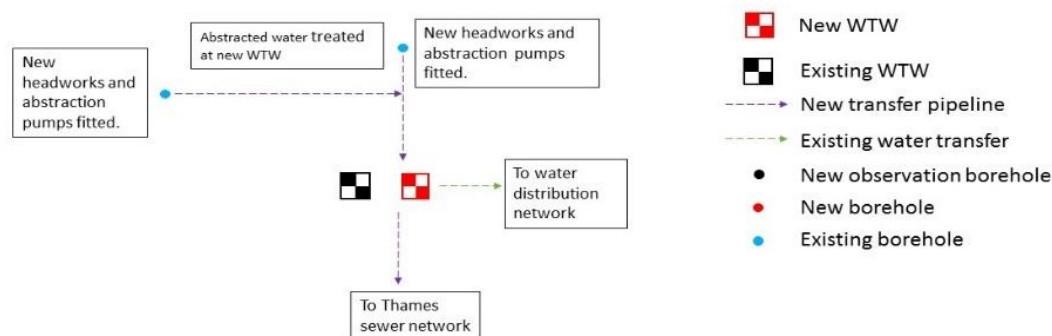


Southfleet/Greenhithe Licence Disaggregation

Name	Southfleet-Greenhithe Licence Disaggregation ¹⁰
WRSE ID	TWU_LON_HI-GRW_ALL_ALL_s'fleet lic disagg
WRMP19 Reference	RES-GW-SOU
Element Type	Resource
WRZ	LONDON
Engineering Scope	<p>This option comprises the disaggregation of the group Bean-Southfleet-Greenhithe borehole abstraction licence to a group Southfleet-Greenhithe abstraction licence to allow operation of both sources as per their combined licence amounts. A new water treatment works (WTW) will be constructed at the existing Southfleet WTW. Abstracted water from the two boreholes (one at Southfleet and one at Greenhithe) will be treated at the new WTW. Treated water will provide an additional resource for the London Water Resource Zone.</p> <p>An investigation into potential water quality issues in the catchment will be carried out as part of the delivery of the option and the feasibility of mitigation measures such as catchment management will be investigated.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New headworks and pumps for the existing boreholes • Replacement of borehole buildings at Southfleet and Greenhithe EPM borehole location • Construction of a new WTW in land adjacent to the existing Southfleet WTW

¹⁰ ASR Horton Kirby and Southfleet & Greenhithe Groundwater schemes were included in the WRMP19 Preferred Programme for London for delivery in AMP7 (2020-25). Since WRMP19 the delivery of these options has been deferred beyond the end of AMP7 as the supply demand balance in the London WRZ is in surplus. They are therefore included as WRMP24 Options

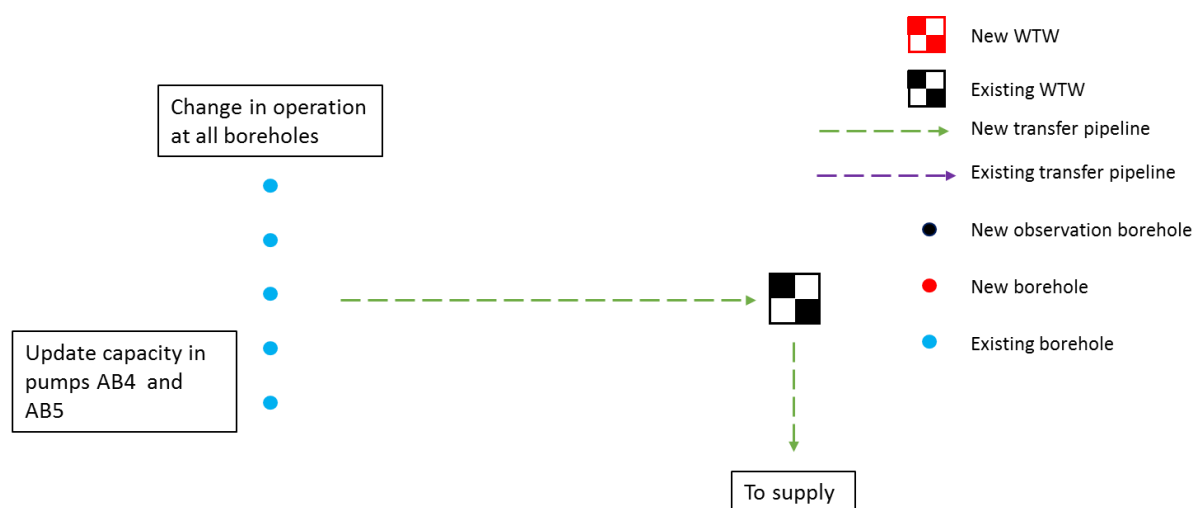
Name	Southfleet-Greenhithe Licence Disaggregation ¹⁰
	<ul style="list-style-type: none"> Raw water transfer mains will be constructed from Greenhithe borehole and Southfleet borehole New pipeline connecting Southfleet EPM WTW to local TWUL sewer network
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> 1 in 2 average: 8.8 MI/d 1 in 500 average: 8.8 MI/d 1 in 500 peak: 8.8 MI/d
Lead Time	4 Years
Mutual Exclusivities	None
Interdependencies/Exclusivity	This option is not dependent on other elements.



Ashton Keynes borehole pumps Removal of Constraints

Name	Ashton Keynes borehole pumps Removal of Constraints
WRSE ID	TWU_SWX_HI-GRW_ALL_ALL_ashton keynes roc
WRMP19 Reference	RES-RC-ASH
Element Type	Resource
WRZ	SWOX
Engineering Scope	<p>To replace two existing borehole pumps (ABH4 and ABH5) at Ashton Keynes with higher capacity pumps at a lower intake level to increase the peak abstraction.</p> <p>Change in operational abstraction philosophy to spread abstraction across the 5 boreholes to increase the peak abstraction to the licensed quantity of 11.6 MI/d.</p> <p>An investigation to understand the potential impacts of the proposed option on the Water Framework Directive status of the water body will be carried out in AMP7.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> New pump for existing abstraction borehole ABH4 and ABH5
Phases/benefits	This option would be developed in a single phase.

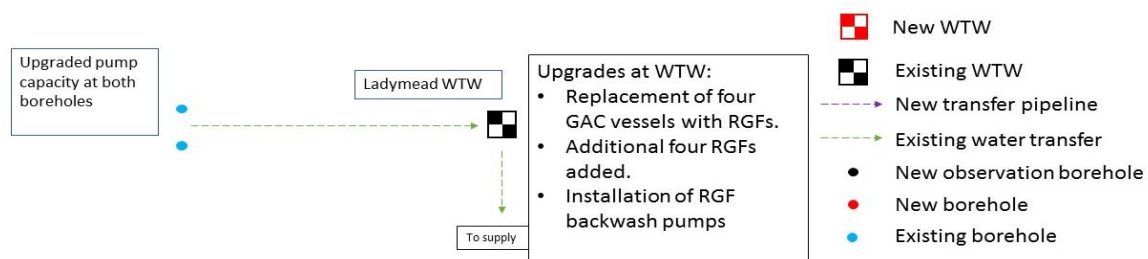
Name	Ashton Keynes borehole pumps Removal of Constraints
	DO benefits of: <ul style="list-style-type: none"> • 1 in 2 average: 0 MI/d • 1 in 500 average: 0 MI/d • 1 in 500 peak: 2.04 MI/d
Lead Time	1 Year
Mutual Exclusivities	None
Interdependencies/ Exclusivity	This option is not dependent on any other options.



Dapdune removal of constraints to DO

Name	Dapdune removal of constraints to DO
WRSE ID	TWU_GUI_HI-GRW_ALL_ALL_dapdune roc
WRMP19 Reference	RES-RC-DAP
Element Type	Resource
WRZ	Guildford
Engineering Scope	This option consists of the removal of the current constraints on the DO at the Dapdune source. This groundwater source consists of two operational boreholes which abstract from a confined Chalk aquifer. Raw water is treated at Ladymead WTW. To remove the DO constraints pump capacity will be increased at the Dapdune boreholes and rapid gravity filters (RGF) will be used to treat the periodic microbial contamination at Ladymead WTW. Treated water will provide an additional resource for the Guildford Water Resource Zone.
Engineering Components	The components for this scope are as follows: <ul style="list-style-type: none"> • Replacement of both borehole pumps at Dapdune • Replacement of four GAC vessels with RGFs by filling GAC vessels with pumice media • Additional four RGF vessels to meet TWUL standard

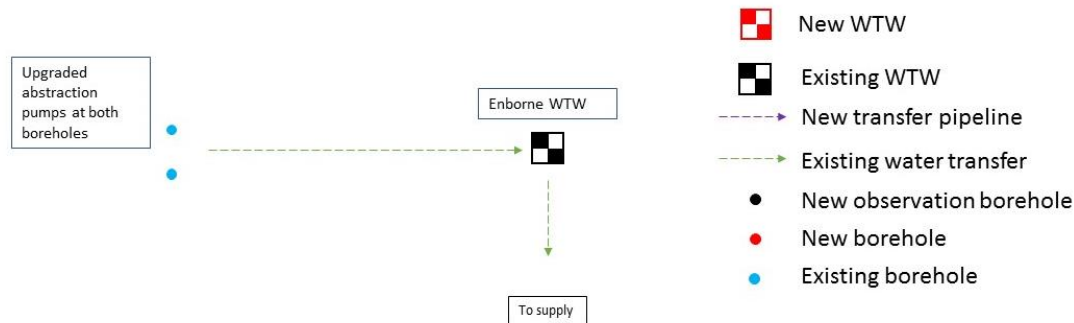
Name	Dapdune removal of constraints to DO
	<ul style="list-style-type: none"> • Installation of RGF backwash pumps • One standby generator required at Dapdune site
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 0 MI/d • 1 in 500 average: 0 MI/d • 1 in 500 peak: 1 MI/d
Lead Time	2 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	<p>Delivery of the Dapdune removal of constraints option is dependent on the delivery of the Ladymead ROC which has been progressed in AMP7.</p> <p>Additionally, the delivery of the Dapdune Lic (DISAGG) is dependent on the delivery of both the Ladymead ROC and Dapdune (ROC) options.</p>



East Woodhay borehole pumps Removal of Constraints to DO

Name	East Woodhay borehole pumps Removal of Constraints to DO
WRSE ID	TWU_KVZ_HI-GRW_ALL_ALL_east woodhay roc
WRMP19 Reference	RES-RC-EWO
Element Type	Resource
WRZ	Kennet Valley
Engineering Scope	Upgrade of the two borehole abstraction pumps to increase the peak abstraction within the existing licence.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Replacement of both existing borehole pumps with larger units • Potential upgrade of mains power distribution system after new pumps are installed
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 0 MI/d • 1 in 500 average: 0 MI/d • 1 in 500 peak: 2.1 MI/d

Name	East Woodhay borehole pumps Removal of Constraints to DO
Lead Time	2 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	This option is not dependent on any other option.

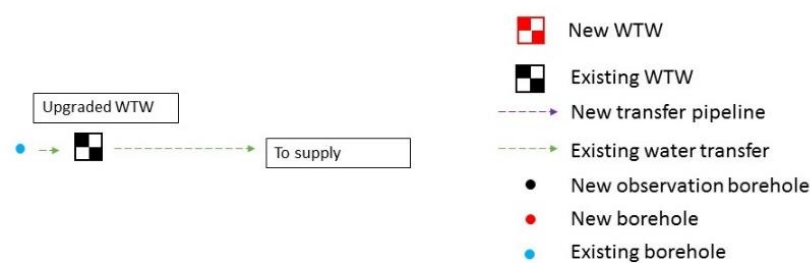


Merton Recommissioning

Name	Merton Recommissioning
WRSE ID	TWU_LON_HI-GRW_ALL_ALL_merton recommission
WRMP19 Reference	RES-RC-MTN
Element Type	Resource
WRZ	LONDON
Engineering Scope	This option consists of the recommissioning of the currently disused Merton Abbey groundwater source and water treatment works (WTW) to address water quality issues.
Engineering Components	<p>Providing that the Merton Abbey well and the WTW are operational the components for this scope are to make the following upgrades at the WTW:</p> <ul style="list-style-type: none"> • Removal of existing GAC adsorbers • Installation of the coagulant dosing plant and flocculation retention tanks in the location of the removed GAC plant • Replacement of the four existing pressure sand filter vessels with six new dual media filter vessels • Replacement of the chlorine contact tanks with larger units • Replacement of the dosing plant for sodium hypochlorite • Replacement of the dosing plant for sodium bisulphate and orthophosphoric acid • Replacement of the chemical storage facilities • Upgrade of the electrical, motoring and control systems • Upgrade of treated water pump station to pump into the local distribution mains
Phases/benefits	<p>This option would be developed in a single phase.</p> <p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 2 MI/d • 1 in 500 average: 2 MI/d

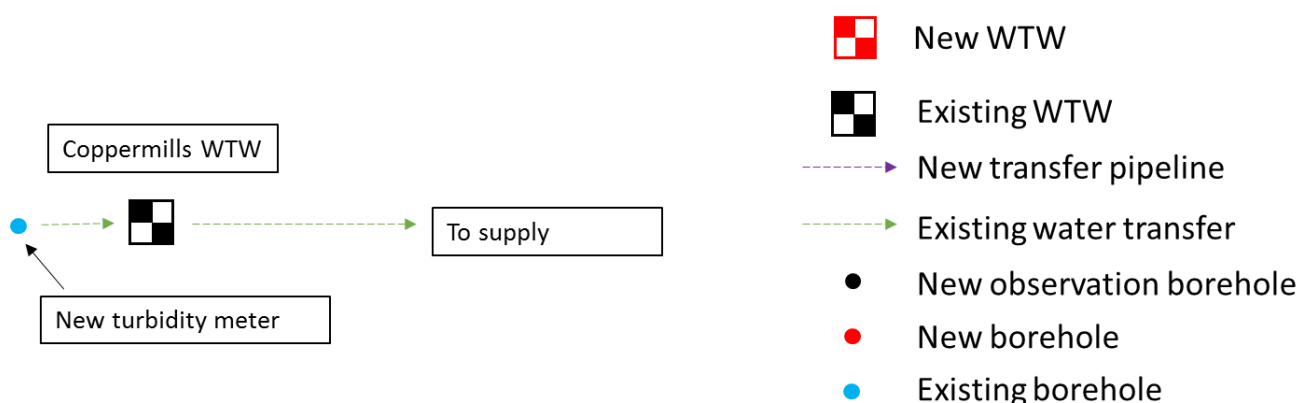


Name	Merton Recommissioning
	<ul style="list-style-type: none">1 in 500 peak: 6 MI/d
Lead Time	2 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	The Merton (SLARS) option is dependent on the delivery of this option as the former includes the adaptation of the well and WTW for a recharge and abstraction scheme. If the Merton Recommissioning option is deemed unfeasible, then the SLARS Merton option cannot go ahead.



New River Head Removal of Constraints – RES-RC-NRV

Name	New River Head Removal of Constraints
WRSE ID	TWU_LON_HI-TFR_LON_ALL_nrv-groundimprov
WRMP19 Reference	RES-RC-NRV
Element Type	Resource
WRZ	LONDON
Engineering Scope	The New River Head Source is currently non-operational. Implementation of proposed ground stabilisation works within the borehole will allow abstraction at the source up to the existing abstraction licence limit.
Engineering Components	<p>This option comprises:</p> <ul style="list-style-type: none"> • Ground stabilisation around the New River Head borehole (comprising grouting of the potential voids created by sand migration) • Installation of four near surface ground anchors (1m deep) at convenient locations around the borehole • Installation of a turbidity meter • Recommissioning of the licensed but currently disused groundwater source • Installation of the 75kW borehole pump in the New River Head borehole
Benefit	DO benefit of 3.0 MI/d
Lead Time	1 Year
Mutual exclusivities	n/a
Interdependencies/ Exclusivity	n/a



Reservoirs

South East Strategic Reservoir Option (SESRO)

Name	South East Strategic Reservoir Option (SESRO)
WRSE ID	TWU_STR_HI-RSR_RE1_XXX_abingdon150(lon) TWU_STR_HI-RSR_RE1_XXX_abingdon125(lon) TWU_STR_HI-RSR_RE1_XXX_abingdon100(lon) TWU_STR_HI-RSR_RE1_XXX_abingdon75(lon) TWU_STR_HI-RSR_RE1_XXX_abingdon30+100 ¹¹ TWU_STR_HI-RSR_RE1_XXX_abingdon80+42
WRMP19 Reference	RES-RRR-ABI-150Mm ³ , RES-RRR-ABI-125Mm ³ , RES-RRR-ABI-100Mm ³ , RES-RRR-ABI-30+100Mm ³ , RES-RRR-ABI-75Mm ³ , RES-RRR-ABI-80+42Mm ³
Element Type	Resource
WRZ	London/SWOX/SWA
Engineering Scope	<p>Provision of a new fully bunded reservoir with live capacity of: 150Mm³, 125Mm³, 100Mm³, 75Mm³, 30Mm³ (phase 1) with 100Mm³ (phase 2), or 80Mm³ (phase 1) with 42Mm³ (phase 2).</p> <p>Associated conveyance tunnel and intake/discharge structure at Culham on the River Thames to (i) fill reservoir by abstracting raw water from the River Thames, and (ii) support flows in River Thames by discharging water stored in the reservoir.</p>
Engineering Components	<ul style="list-style-type: none"> • Provision of a fully bunded reservoir with storage capacity between 75Mm³ and 150Mm³ (note that there is a Phased option of 30 + 100 Mm³) • Pumping station for filling the reservoir, including turbines for energy recovery during periods when water is released to the River Thames • A conveyance tunnel to transfer flows via the pumping station to/from an intake/outfall structure on the bank of the River Thames • Auxiliary drawdown channel aligned with a proposed alignment of the Wilts & Berks Canal to allow release of water from the reservoir in emergency scenarios • Main access road (from A415) and a road diversion to the south of the reservoir • Rail siding to facilitate delivery of construction materials by freight train • Recreation facilities, landscaping and creation of aquatic/grassland habitats

¹¹ Note the SESRO Phase 1 30 MI/d option can be selected without Phase 2 100 MI/d, this differs from the 30 MI/d rejected options as it sets up the site to allow further expansion. The single phase 30 MI/d option would block future expansion. The single-phase option is rejected on the basis that the site is the only location suitable for a larger reservoir, it would therefore not be appropriate to block this site with a small reservoir preventing any future development.

Phases/benefits	Phase 1	Phase 2	DO benefit (Ml/d)	
	150Mm ³	N/A	271	
	125Mm ³	N/A	230	
	100Mm ³	N/A	185	
	75Mm ³	N/A	149	
	30Mm ³	100Mm ³	66 (p1)	173 (p2)
	80Mm ³	42Mm ³	155 (p1)	69 (p2)
DO benefits above apply for 1 in 2 average, 1 in 500 average and 1 in 500 peak values				
Lead Times	Phase 1	Phase 2	Lead Time (years)	
	150Mm ³	N/A	15	
	125Mm ³	N/A	15	
	100Mm ³	N/A	14	
	75Mm ³	N/A	14	
	30Mm ³	100Mm ³	14	14
	80Mm ³	42Mm ³	14	13
Mutual exclusivities	<p>The SESRO size variants are mutually exclusive (only one could be taken forward).</p> <p>There is a limit on the amount of additional water that can be discharged into River Thames. This limit will apply to options discharging into the River Thames, including new reservoirs and Severn Thames Transfer (STT).¹²</p>			
Interdependencies	<p>For SESRO to deliver a benefit, the water that is released into the River Thames will need to be re-abstracted. There are other water resource options being considered in WRMP24 and/or WRSE regional planning that would either benefit, or be dependent on, water supply from SESRO directly or from water provided into, and conveyed by, the River Thames (whether this be via SESRO, STT or a combination of both), these include:</p> <ul style="list-style-type: none"> • Thames to Affinity Transfer (T2AT) SRO • Thames to Southern Transfer (T2ST) SRO • Thames Water non-SRO options to supply the SWOX or SWA Water Resource Zones <p>To provide an additional resource to London WRZ the following system elements may also be required:</p> <ul style="list-style-type: none"> • Additional capacity in the raw water systems to allow the water to be abstracted from the River Thames into the west London reservoirs and from there conveyed to Kempton WTW • Additional treatment capacity in Kempton WTW expansion (800 Ml/d) • Additional capacity in the Thames Water ring main. 			

¹² Further work is ongoing to review the limit on the amount of additional water that can be discharged into River Thames

To provide an additional resource to SWOX WRZ the following system elements are required:

- [Abingdon WTW new 24 Ml/d \(SWOX\)](#)
- [Abingdon to Farmoor](#)
- [Transfer](#)

To provide an additional resource to SWA WRZ the following system elements may also be required:

- [Abingdon WTW new 24 Ml/d \(SWOX\)](#) and [SWOX to SWA \(48/72\) Ml/d](#) or
- [Raw Water System – New Medmenham Intake](#) and [Medmenham WTW \(72 Ml/d\)](#)

Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents and requirements to supply Southern Water WRZs are described in the Thames to Southern Water Transfer Gate 2 documents.



Marsh Gibbon Reservoir – 75 Mm³ / 50 Mm³ / 30 Mm³

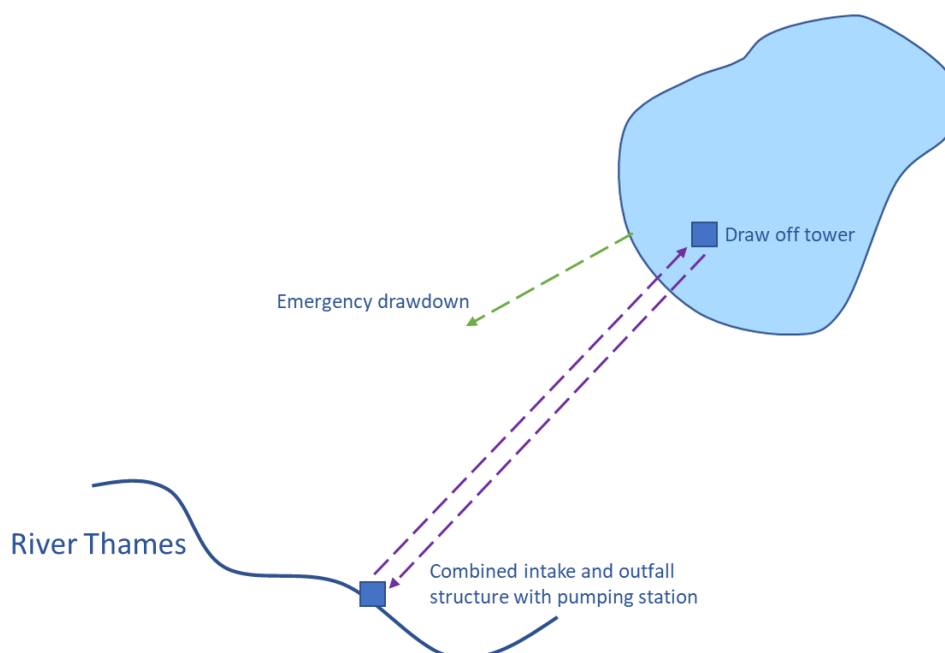
Name	Marsh Gibbon Reservoir – 75Mm ³
WRSE ID	TWU_STR_HI-RSR_RE1_XXX_res_marshgibbon_1 TWU_STR_HI-RSR_RE1_XXX_res_marshgibbon_2 TWU_STR_HI-RSR_RE1_XXX_res_marshgibbon_3
WRMP19 Reference	RES-RRR-MAR-75Mm ³ RES-RRR-MAR-50Mm ³ RES-RRR-MAR-30Mm ³
Element Type	Resource
WRZ	LONDON / SWOX / SWA
Engineering Scope	Provision of a new 75 Mm ³ / 50 Mm ³ / 30 Mm ³ non-impounding banded reservoir located near the Oxford/Buckinghamshire

Name	Marsh Gibbon Reservoir – 75Mm ³		
	border. Associated conveyance and intake/discharge structure upstream of the Oxford sewage works (i) fill reservoir by abstracting raw water from the River Thames, and (ii) support flows in River Thames by discharging water stored within the reservoir.		
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New 75 Mm³ / 50 Mm³ / 30 Mm³ storage reservoir located in Oxford / Buckinghamshire border • River intake and outfall Structure. • Inlet and outlet tower • Conveyance from river to Marsh Gibson Reservoir • A new pumping station • A main water draw off tower and secondary draw off tower <p>For Marsh Gibbon 75Mm³ and 50Mm³, two minor local access roads would need to be diverted around the site. Marsh Gibbon 30Mm³ would require just a single road to be diverted.</p> <p>For Marsh Gibbon 75Mm³ two watercourses would need to be diverted around the site.</p>		
Phases/benefits	Capacity	DO Benefits (Ml/d)	
	75Mm ³	149	
	50Mm ³	103	
	30Mm ³	66	
	DO benefits above apply for 1 in 2 average, 1 in 500 average and 1 in 500 peak values.		
Lead Time	14 – 15 Years (varies based on capacity).		
Mutual exclusivities	The three reservoir capacities are mutually exclusive with each other, however there is a limit on the amount of additional water that can be discharged into River Thames. This limit will apply to options discharging into the River Thames, including new reservoirs and Severn Thames Transfer (STT). ¹³		
Interdependencies/ Exclusivity	<p>This option is not dependent on any other option.</p> <p>For the reservoir to deliver a benefit, the water that is released into the River Thames will need to be re-abstracted. There are other water resource options being considered in WRMP24 and/or WRSE regional planning that could benefit water supply from Marsh Gibbon Reservoir or water provided into and conveyed by River Thames, these include:</p> <ul style="list-style-type: none"> • Thames to Affinity Transfer (T2AT) SRO • Thames to Southern Transfer (T2ST) SRO • London WRZ 		

¹³ Further work is ongoing to review the limit on the amount of additional water that can be discharged into River Thames

Name	Marsh Gibbon Reservoir – 75Mm ³
	To provide an additional resource to London WRZ the following system elements may also be required: <ul style="list-style-type: none"> • Additional capacity in the raw water systems to allow the water to be abstracted from the River Thames into the west London reservoirs and from there conveyed to a Water Treatment Works in west London • Additional treatment capacity in west London • Additional capacity in the Thames Water ring main

Proposed Marsh Gibbon Reservoir



Chinnor Reservoir – 30Mm³

Name	Chinnor Reservoir – 30Mm ³
WRSE ID	TWU.UTC_HI-RSR_RE1_XXX_res_chinnor
WRMP19 Reference	RES-RRR-CHI-30Mm ³
Element Type	Resource
WRZ	LONDON / SWOX / SWA
Engineering Scope	Provision of a new 30Mm ³ non-impounding bunded reservoir located in Oxfordshire 5km south east of Thame. Associated conveyance and intake/discharge structure to (i) fill reservoir by abstracting raw water from the River Thames, and (ii) support flows in River Thames by discharging water stored within the reservoir.
Engineering Components	The components for this scope are as follows: <ul style="list-style-type: none"> • New 30Mm³ storage reservoir located in Oxfordshire • A borrow pit

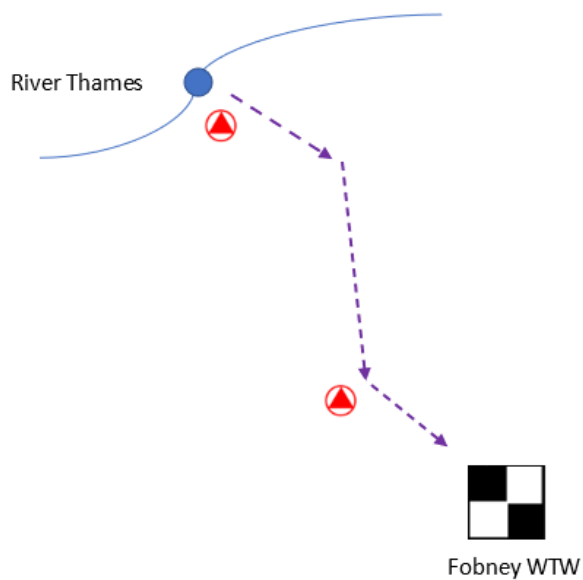
Name	Chinnor Reservoir – 30Mm ³
	<ul style="list-style-type: none"> • An abstraction intake on the River Thames. Flow regulation discharges back to the River Thames for the regulating reservoir option at the same location • Combined intake and outfall structure situated on the River Thames just upstream of Benson Weir • A new pumping station at the intake, to pump flows directly to the new reservoir • A main water draw off tower and secondary draw off tower • Diversion of the National Cycle Route 57 • River diversion works for the Cattle Brook and a drain running north of the site • Emergency drawdown via syphons
Phases/benefits	<p>DO benefits of:</p> <ul style="list-style-type: none"> • 1 in 2 average: 66 MI/d • 1 in 500 average: 66 MI/d • 1 in 500 peak: 66 MI/d
Lead Time	14 – 15 Years (varies based on capacities)
Mutual exclusivities	No other options on the constrained list are mutually exclusive with this option; however there is a limit on the amount of additional water that can be discharged into River Thames. This limit will apply to options discharging into the River Thames, including new reservoirs and Severn Thames Transfer (STT). ¹⁴
Interdependencies/ Exclusivity	<p>This option is not dependent on any other option.</p> <p>For the reservoir to deliver a benefit, the water that is released into the River Thames will need to be re-abstracted. There are other water resource options being considered in WRMP24 and/or WRSE regional planning that would either benefit, or be dependent on, water supply from water supply from Chinnor Reservoir or water provided into and conveyed by River Thames, these include:</p> <ul style="list-style-type: none"> • Thames to Affinity Transfer (T2AT) SRO • Thames to Southern Transfer (T2ST) SRO • London WRZ <p>To provide an additional resource to London WRZ the following system elements may also required:</p> <ul style="list-style-type: none"> • Additional capacity in the raw water systems to allow the water to be abstracted from the River Thames into the west London reservoirs and from there conveyed to a Water Treatment Works in west London • Additional treatment capacity in west London • Additional capacity in the Thames Water ring main

¹⁴ Further work is ongoing to review the limit on the amount of additional water that can be discharged into River Thames

Raw Water Conveyance

Raw Water System Conveyance – Thames to Fobney 40 MI/d

Name	Thames to Fobney
WRSE ID	TWU_KVZ_HI-TFR_UTC_ALL_thamestofobney
WRMP19 Reference	n/a – new option to WRMP24
Element Type	Conveyance
WRZ	Kennet Valley
Engineering Scope	40 MI/d raw water transfer option from River Thames to Fobney WTW to supply Kennet Valley WRZ.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New Raw water conveyance to Fobney WTW • New Intake at River Thames • New Pumping stations
Phasing /benefit	n/a
Lead Time	5 Years
Mutual exclusivities	None
Interdependencies/ Exclusivity	This option is not dependent on any other option.

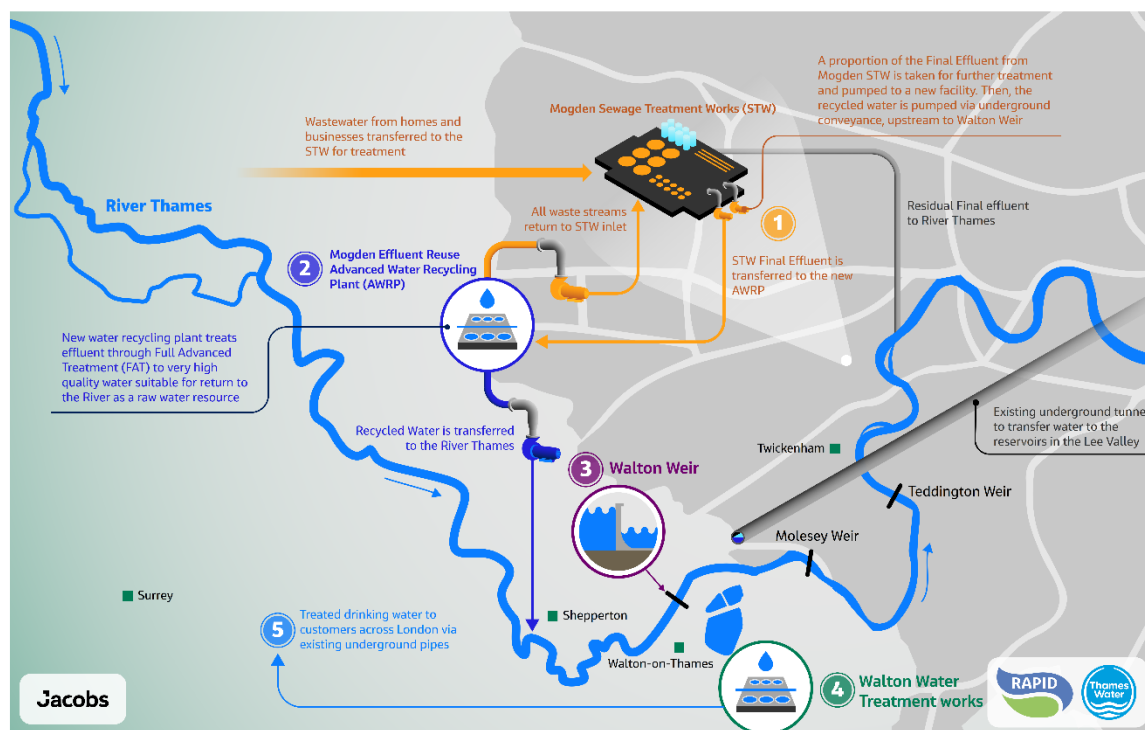


Recycling Mogden to Walton 150 MI/d – Conveyance for Mogden Effluent Recycling Treatment

Name	Recycling Mogden to Walton 150 MI/d – Conveyance for Mogden Effluent Recycling Treatment
WRSE ID	TWU_WLJ_HI-TFR_WLJ_ALL_reuse mogden/walton
WRMP19 Reference	CON-RU-MOG-WAL-200
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	<p>All conveyancing scope for the proposed Mogden Effluent Reuse scheme, consisting of four transfers: Final Effluent transfer (1), RO Concentrate return (4) and waste streams return (2) from Mogden STW to AWRP treatment site & Recycled Water from the AWRP treatment site to River Thames at Walton (3):</p> <p>(1), (2) & (4): 2No pipe jacked tunnels in parallel. Pipes (2) & (4) to be pressurised pipes inside one of the pipe jack tunnels.</p> <p>(3): Recycled Water pipeline is largely open-cut with 2 major trenchless crossings.</p>
Engineering Components	<ul style="list-style-type: none"> • Pipeline, pipe-jacking and all associated conveyancing scope for the four transfers noted above for the Mogden Effluent Recycling scheme • Pipe-jacked tunnel to transfer final effluent (FE) from Mogden STW to the treatment site, suitable for the maximum capacity of all phases of treatment • Pipe-jacked tunnel from the treatment site to Mogden STW to return the waste streams and RO concentrate. 2No. internal pressurised pipes within the pipejack tunnel • Pipe-jack tunnel shafts for the 2No. pipejacks above between Mogden STW and the treatment site • Trenched pipeline from the treatment site to the River Thames at Walton for the recycled water transfer, including trenchless crossings and associated shafts • New river outfall consisting of below ground velocity-reduction chamber, weir, discharge chamber and piping to river
Phases/Benefits	The above conveyance elements are sized to have sufficient capacity for all phasing options of Mogden Effluent Recycling and do not need to be duplicated for phase 2 or phase 3.
Lead Time	Alternative delivery programmes have been developed for Gate 2 which show a lead time of 9 years (per phase) and an earliest operational date of 2031.
Mutual Exclusivities	n/a
Interdependencies/ Exclusivity	<p>To provide an additional resource to London WRZ, the following elements may also be required:</p> <ul style="list-style-type: none"> • Upgrades to the west London raw water system • Additional treatment capacity at Kempton WTW • Network reinforcements, potentially including extensions to the London ring main

Name	Recycling Mogden to Walton 150 MI/d – Conveyance for Mogden Effluent Recycling Treatment
	Mogden Effluent Recycling has the potential to support the Thames to Affinity Transfer (T2AT) SRO as T2AT SRO may abstract raw water from the River Thames. Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents.

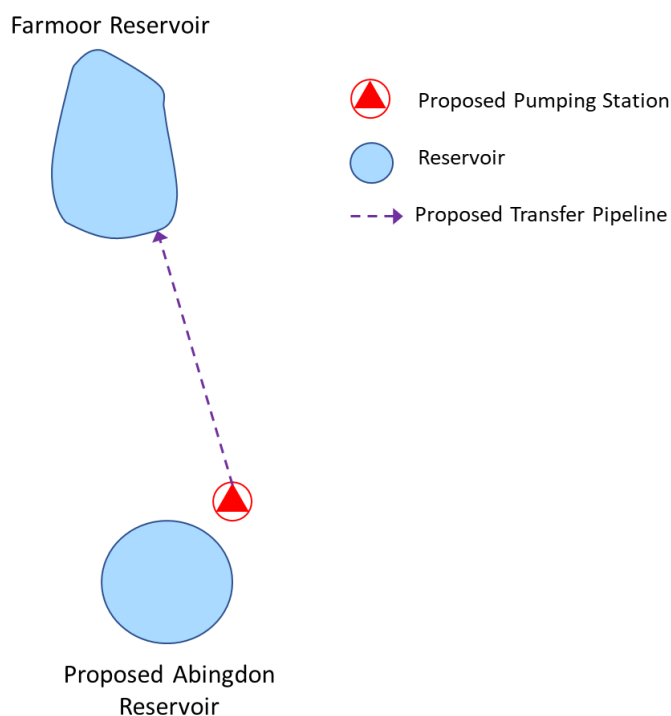
Mogden Effluent Reuse Schematic



Abingdon to Farmoor Transfer

Name	Abingdon to Farmoor Transfer
WRSE ID	TWU_SWX_HI-TFR_STR_ALL_abing-farmoor pipe
WRMP19 Reference	CON-RWS-ABI-FMR
Element Type	Conveyance
WRZ	SWOX
Engineering Scope	Construction of a transfer pipeline to convey 24 MI/d of raw water between a proposed reservoir at Abingdon and the existing Farmoor reservoir, in the SWOX WRZ. The engineering scope includes the provision of a booster pump station at the proposed Abingdon Reservoir site to facilitate the transfer.
Engineering Component	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> Raw water pipeline from proposed reservoir at Abingdon to Farmoor Reservoir Raw water pumping station

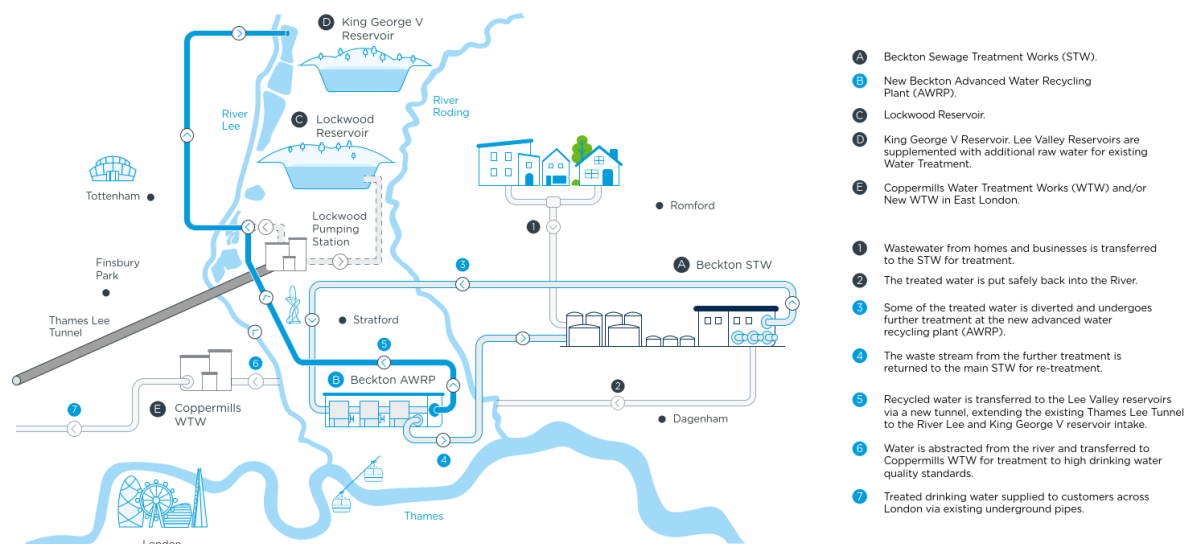
Name	Abingdon to Farmoor Transfer
	<ul style="list-style-type: none"> Raw water screens at Abingdon Reservoir intake New break pressure tank at or near high point of transfer route
Phases/benefits	n/a
Lead Time	5 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	This element would transfer raw water from the new Abingdon Reservoir resource elements to the existing Farmoor reservoir. Treatment would be provided at the existing WTW.



Beckton to Lockwood Conveyance

Name	Beckton to Lockwood Tunnel Conveyance
WRSE ID	TWU_KGV_HI-TFR_KGV_ALL_beckton to lockwood
WRMP19 Reference	CON-RU-BEC-LCK-300
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	Conveyance of recycled water from Beckton to Lockwood pumping station, as part of the Beckton Effluent Recycling scheme. A portion of the Beckton STW final effluent is to be subjected to a full advanced treatment process and pumped to location next to Lockwood Reservoir for onward conveyance to the River Lee diversion through TLT extension from Lockwood PS to King George V Reservoir intake to supplement raw water supply to the Lee Valley reservoirs. Conveyance will be via a new raw water tunnel from Beckton to Lockwood.

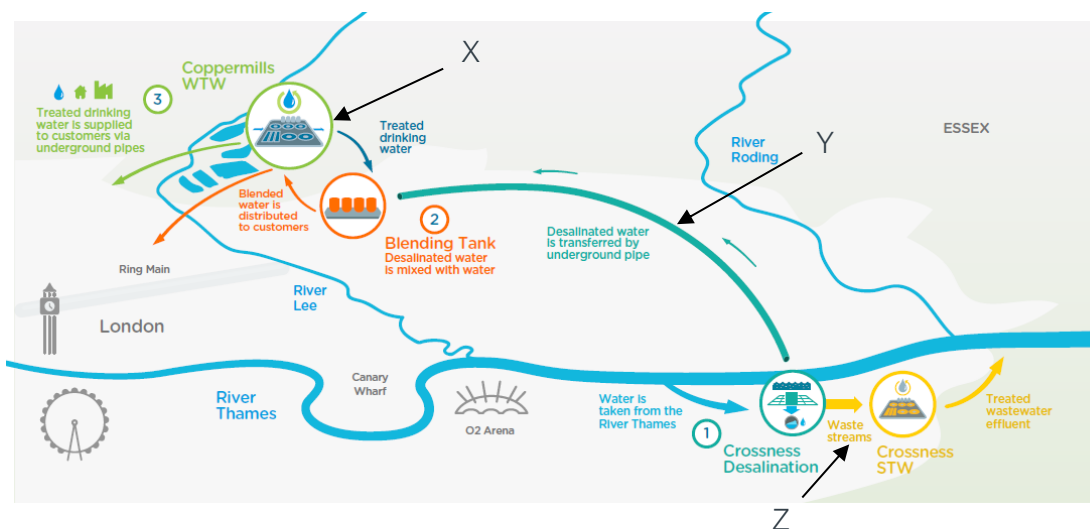
Name	Beckton to Lockwood Tunnel Conveyance
Engineering Components	<ul style="list-style-type: none"> • Bulk raw water transfer tunnel for a connection from Beckton STW to the Thames Lee Tunnel (TLT) termination at Lockwood Pump Station • Tunnel from north of Beckton STW to Lockwood pumping station • 7No. tunnel shafts for the tunnel construction • Submersible pumps within final shaft to discharge the water • Connection between the final shaft of this tunnel and the first shaft of the TLT extension from Lockwood PS to King George V Reservoir intake
Phases/benefits	The above conveyance elements are sized to have sufficient capacity for all phasing options of Beckton Effluent Recycling and do not need to be duplicated for phase 2 or phase 3.
Lead Time	Alternative delivery programmes have been developed for Gate 2 which show a lead time of 9 years and an earliest operational date of 2031.
Mutual Exclusivities	n/a
Interdependencies/ Exclusivity	<p>The Beckton Effluent Reuse option comprises treatment and conveyance elements. The conveyance elements include: Beckton to Lockwood Conveyance); and the TLT extension from Lockwood PS to KG reservoir intake . Treatment can be phased via all three capacities under Beckton Effluent Reuse option.</p> <p>To provide an additional resource to London WRZ the following system elements are may also be required:</p> <ul style="list-style-type: none"> • Additional capacity in the raw water systems to allow the water to be abstracted from the River Lee Diversion into the Lee Valley Reservoirs and from there conveyed to a Water Treatment Works in east London • Additional treatment capacity in East London • Additional capacity in the Thames Water ring main <p>Beckton Recycling has the potential to support the Thames to Affinity Transfer (T2AT) SRO as T2AT SRO may abstract raw water from the River Lee. Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents.</p>



Desalination – Beckton to Crossness tunnel

Name	Desalination – Beckton to Crossness tunnel
WRSE ID	TWU_LON_HI-TFR_LON_XXX_beckton-crossness
WRMP19 Reference	CON-RWS-BEC-CRO-300
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	Raw estuarine Thames River water is to be abstracted at Beckton for Crossness desalination treatment plant. The estuarine water is to be conveyed under the River Thames via a tunnel to the Crossness desalination treatment site.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • The tunnel under the River Thames to the Crossness desalination plant • 1 No drive shaft • 1 No intermediate shaft • 1 No reception shaft • High Integrity Gate valve
Phases/benefits	n/a
Lead Time	10.5 Years
Mutual Exclusivities	No other options on the constrained list are mutually exclusive with this option.
Interdependencies/Exclusivity	<p>The Crossness Desalination option comprises conveyance, treatment and treated water network reinforcement. Treatment is phased in 50ML/d or 100ML/d increments) The conveyance elements (required for first phase of desalination) include:</p> <ul style="list-style-type: none"> • Beckton to Crossness Tunnel • Crossness to Beckton Tunnel Beckton to Coppermills Tunnel <p>To provide an additional resource to London WRZ the following system elements are also required:</p>

Name	Desalination – Beckton to Crossness tunnel
	<ul style="list-style-type: none"> Additional blending capacity at Coppermills WTW and capacity to discharge into the local water supply network or into the TWRM New Header Tank and Pumping Station at Coppermills WTW Additional capacity in the Thames Water ring main

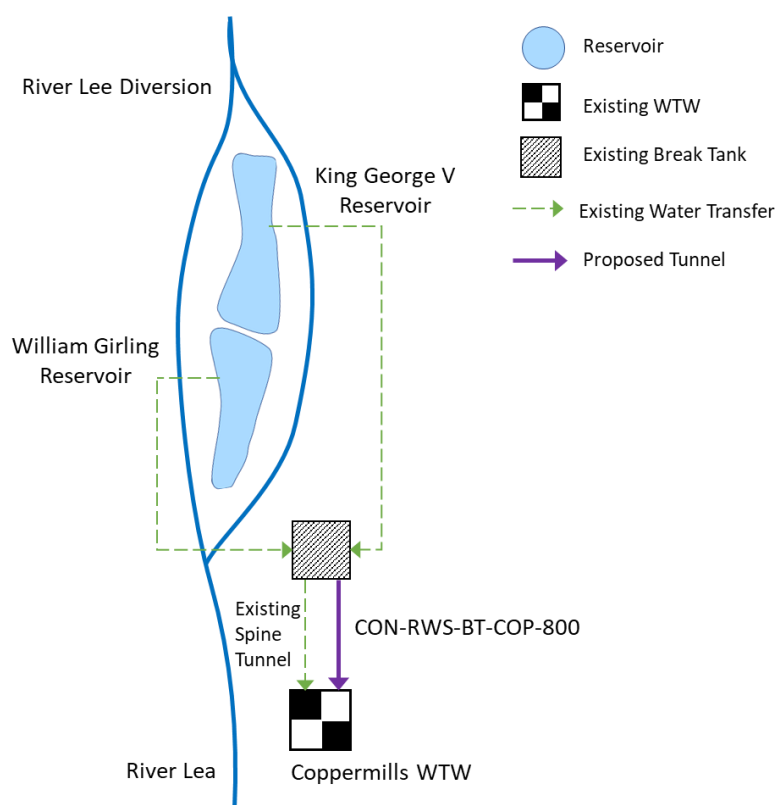


X	New Header Tank and Pumping Station at Coppermills WTW
Y	Beckton to Coppermills Tunnel
Z	Crossness to Beckton Tunnel

Raw Water System – Conveyance from Break Tank to Coppermills

Name	Raw Water System – Conveyance from Break Tank to Coppermills
WRSE ID	TWU_LON_HI-TFR_LON_XXX_second spine tunnel
WRMP19 Reference	CON-RWS-BT-COP-800
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	Transfer of raw water from the break tank in the east London raw water system to Coppermills WTW.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> Tunnel from Break Tank to Coppermills WTW via Reservoir 5 1 No drive shaft 1 No diameter intermediate shaft 1 No reception shaft High Integrity Gate Valves
Phases/benefits	n/a
Lead Time	8 Years

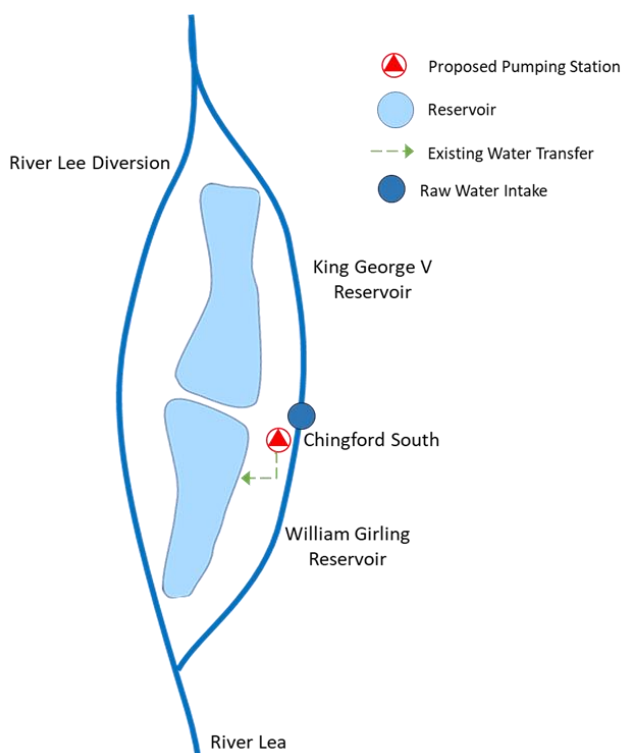
Name	Raw Water System – Conveyance from Break Tank to Coppermills
WRSE ID	TWU_LON_HI-TFR_LON_XXX_second spine tunnel
Mutual exclusivities	No other options on the constrained list are mutually exclusive with this option.
Interdependencies/ Exclusivity	May be required to support additional raw water resources in East London: <ul style="list-style-type: none"> Beckton Effluent Reuse Deephams Recycling (46.5) - deephams reuse 46.5 Deephams Recycling (46.5b) - deephams_reuse_46.5b



Raw Water System – Chingford South intake increase

Name	Raw Water System – Chingford South intake increase
WRSE ID	TWU_LON_HI-TFR_LON_ALL_ch'ford s intake
WRMP19 Reference	CON-RWS-CHS-100
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	Increase capacity of the Chingford south intake by 100 MI/d This option is limited to providing benefit up to 2060.
Engineering Components	The components for this scope are as follows: <ul style="list-style-type: none"> New pumping station Two new pumps Screens
Phases/benefits	n/a

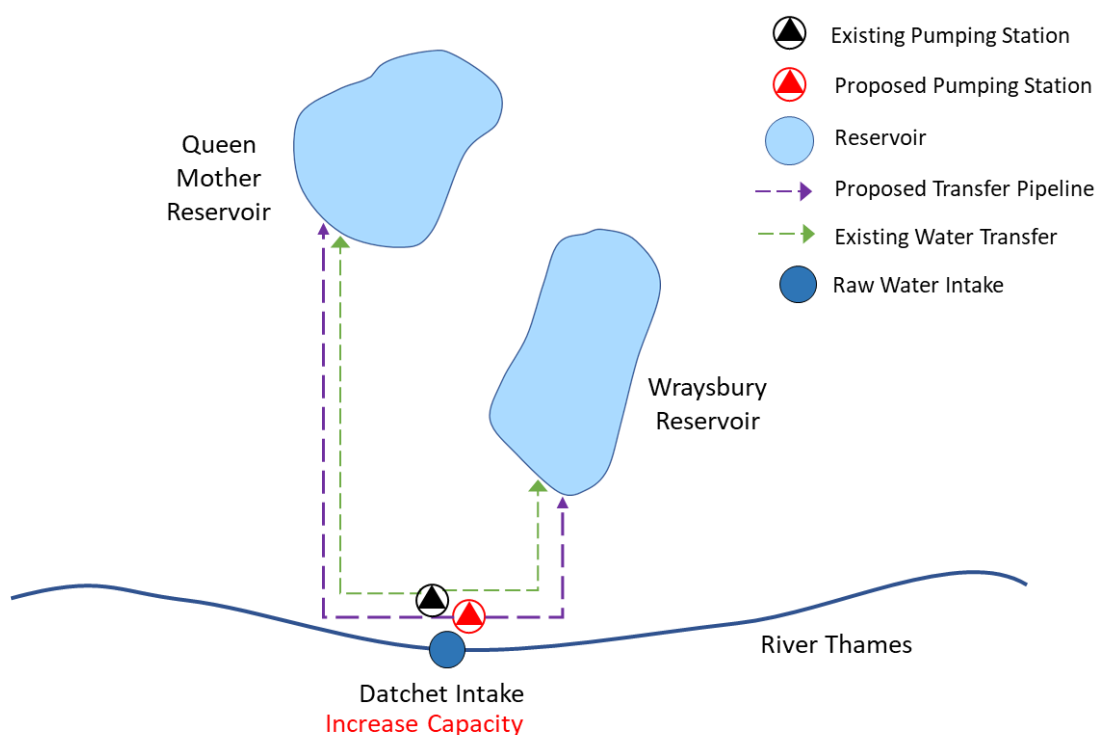
Name	Raw Water System – Chingford South intake increase
Benefit	n/a
Lead Time	4 Years
Mutual Exclusivities	No other options on the constrained list are mutually exclusive with this option.
Interdependencies/ Exclusivity	May be required to support additional raw water resources in East London: <ul style="list-style-type: none"> • Beckton Effluent Reuse • Deepphams Recycling (46.5) - deepphams reuse 46.5 • Deepphams Recycling (46.5b) - deepphams reuse 46.5b



Raw Water System – Datchet intake increase

Name	Raw Water System – Datchet intake increase
WRSE ID	TWU_LON_HI-TFR_LON_ALL_datchet int-qm
WRMP19 Reference	CON-RWS-DAT-300
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	Increase capacity of the existing River Thames Datchet intake.
Engineering Components	The components for this scope are as follows: <ul style="list-style-type: none"> • New Pumping Station • New Ductile Iron (DI) pipe to Queen Mother • New DI pipe to Wraysbury • Above ground pipelines to feed into Wraysbury and Queen Mother - twin pipes at each reservoir

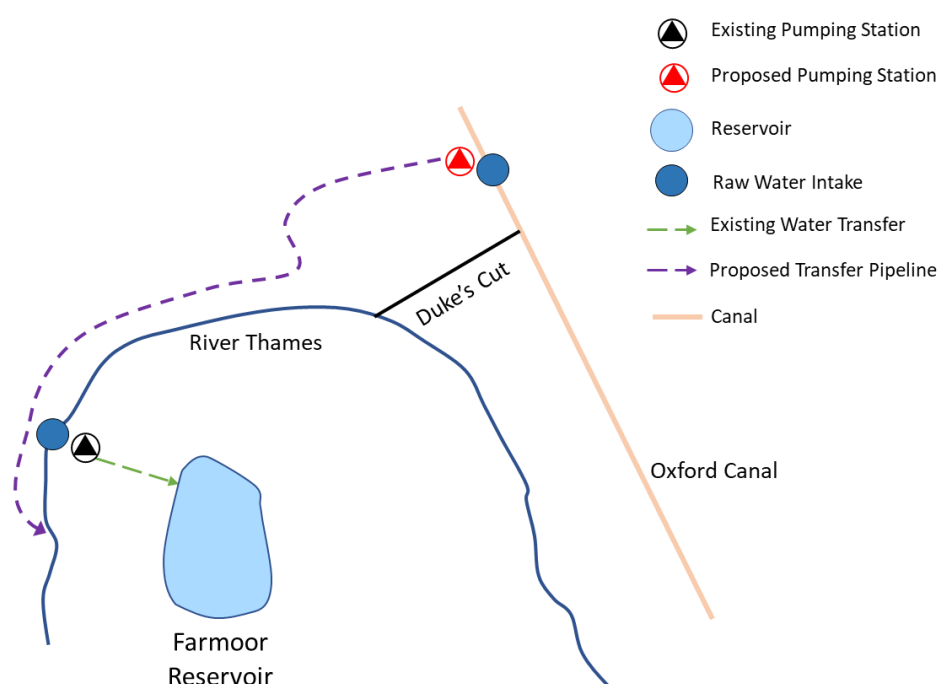
Name	Raw Water System – Datchet intake increase
Phases/benefits	n/a
Benefit	n/a
Lead Time	5 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	Required to support additional raw water resources in West London All reservoir sizes under SESRO , Marsh Gibbon Reservoir , Chinnor Reservoir , Ludgershall Reservoir , Aylesbury Reservoir Haddenham Reservoir , Deerhurst to Culham pipeline and transfer additional water to new treatment at Kempton WTW .



Raw Water System - Oxford Canal – Duke's Cut to Farmoor 15 MI/d Pipeline

Name	Oxford Canal – Duke's Cut to Farmoor 15 MI/d Pipeline
WRSE ID	TWU_SWX_HI-TFR_SWX_ALL_dukescut-farmoor
WRMP19 Reference	CON-RWS-DKC-FMR
Element Type	Conveyance
WRZ	SWOX
Engineering Scope	A supported conveyance pipeline option from Duke's Cut on the Oxford Canal to the River Thames upstream of the existing Farmoor intake. The element includes all engineering works required to transfer the flow to the River Thames.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • A river intake structure at Duke's Cut with inlet screens • A raw water low lift pump station • Rising main

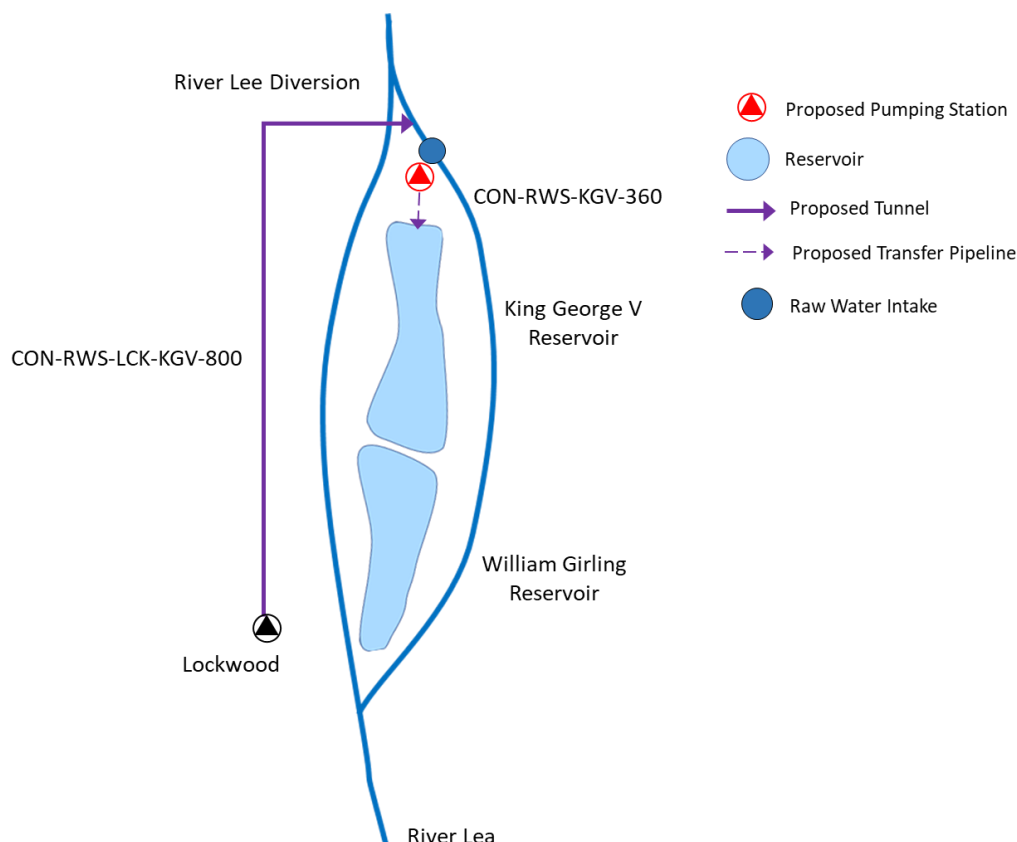
Name	Oxford Canal – Duke's Cut to Farmoor 15 MI/d Pipeline
	<ul style="list-style-type: none"> Outfall to the River Thames just upstream of the existing Farmoor intake
Phases/benefits	n/a
Benefit	n/a
Lead Time	5 Years
Mutual Exclusivities	This option is mutually exclusive with Oxford Canal to Cropredy option.
Interdependencies/ Exclusivity	This element is dependent on surplus in the canal network that will be provided by 3rd parties (Canal and River Trust) as well as Oxford Canal to Duke's Cut element.



Raw Water System – KGV Reservoir intake increase

Name	Raw Water System – KGV Reservoir intake increase
WRSE ID	TWU_KGV_HI-TFR_KGV_ALL_kgv res intake
WRMP19 Reference	CON-RWS-KGV-360
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	360MI/d increase of capacity at existing King George V reservoir intake.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> New Pumping Station Above ground pipelines to KGV
Phases/benefits	n/a
Benefit	n/a

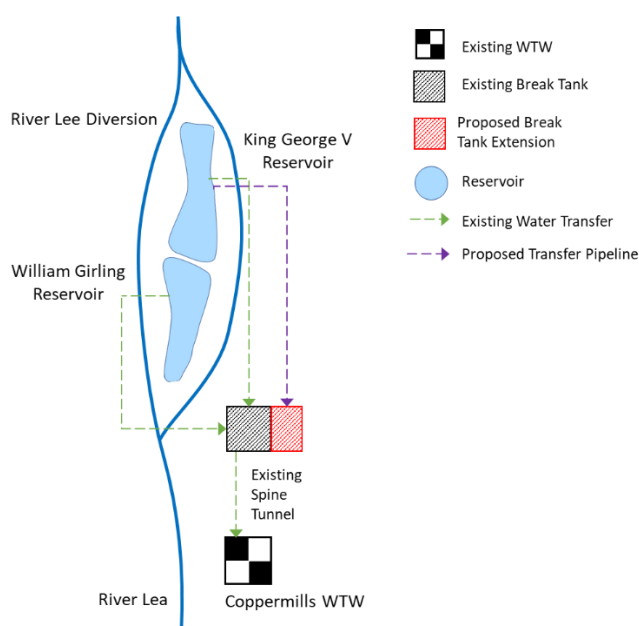
Name	Raw Water System – KGV Reservoir intake increase
Lead Time	5 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	May be required to support additional raw water resources in East London: All sizes under Beckton Reuse , Deephams Reuse and transfer additional water to new treatment at a East London WTW .



Raw Water System – KGV Reservoir to Break Tank

Name	Raw Water System – KGV Reservoir to Break Tank
WRSE ID	TWU_KGV_HI-TFR_KGV_ALL_kgv res to bt
WRMP19 Reference	CON-RWS-KGV-BT-300
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	New 300 Ml/d capacity pipeline to allow transfer of raw water from King George V reservoir to the existing break tank at the south of William Girling reservoir.
Engineering Components	<p>The components for the scope are as follows:</p> <ul style="list-style-type: none"> Pipeline from KGV reservoir to the break tank at the south of William Girling reservoir New/increased capacity of the break tank include valves and fittings

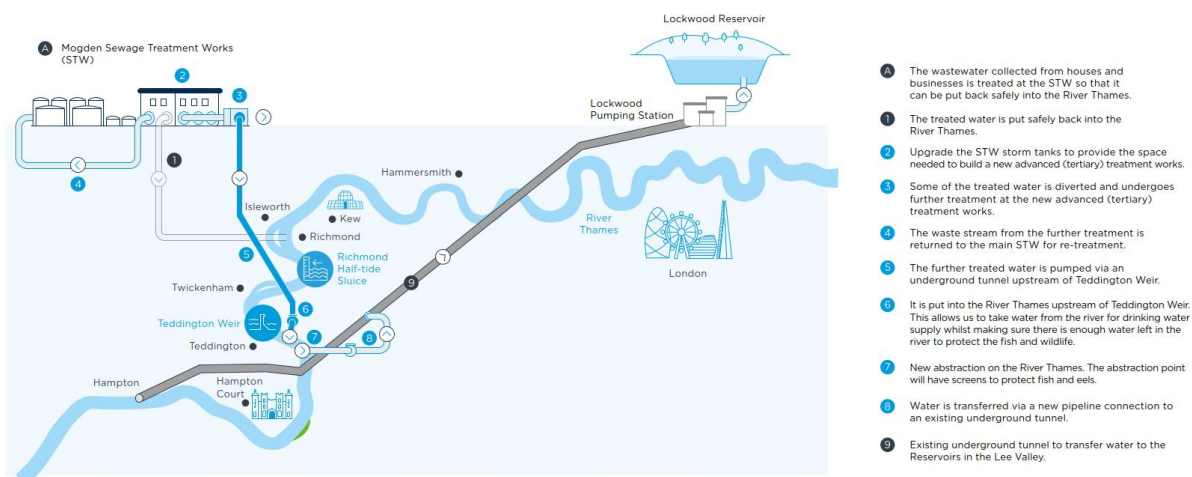
Name	Raw Water System – KGV Reservoir to Break Tank
	<ul style="list-style-type: none"> New break tank
Phases/benefits	n/a
Benefit	n/a
Lead Time	5 Years
Mutual Exclusivities	No other options on the constrained list are mutually exclusive with this option.
Interdependencies/Exclusivity	May be required to support additional raw water resources in East London: <ul style="list-style-type: none"> Beckton Effluent Reuse Deephams Reuse Transfer additional water to new treatment at an East London WTW



Direct River Abstraction – Teddington to Thames Lee Tunnel

Name	Direct River Abstraction – Teddington to Thames Lee Tunnel
WRSE ID	TWU_KGV_HI-TFR_TED_ALL_teddingtondrated/tlt
WRMP19 Reference	CON-RA-TED-TLT
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	Raw water from the River Thames at Teddington is abstracted for transfer into the Thames Lee Tunnel to supplement raw water flows in the tunnel. The capacity of the abstraction will match an input of water to River Thames from the Teddington DRA Tertiary Treatment Plant .

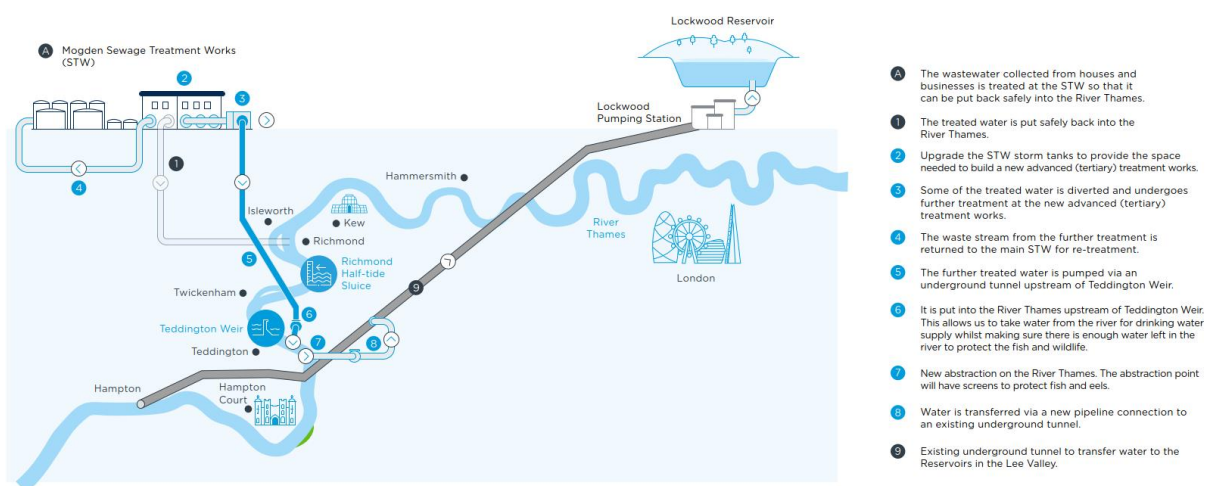
Name	Direct River Abstraction – Teddington to Thames Lee Tunnel
Engineering Components	<p>Abstraction intake, pump station, pipeline and TLT connection scope for abstracting raw water from the River Thames at Teddington into the TLT.</p> <ul style="list-style-type: none"> • Abstraction intake structure incl. coarse screens, eel-friendly band screens, settling chamber & pipeline to pump station • Abstraction Pump Station, including inline flowmeter • Transfer pipeline to TLT and connection shaft/adit • Power supply/transformer for pump station
Phases	n/a
Benefits	n/a – the DO benefits are included within Teddington DRA Tertiary Treatment Plant .
Lead Time	Alternative delivery programmes have been developed for Gate 2 which show a lead time of 9 years and an earliest operational date of 2031.
Mutual Exclusivities	None
Interdependencies/ Exclusivity	<p>The following elements are also required for the Teddington DRA option:</p> <ul style="list-style-type: none"> • Teddington DRA Tertiary Treatment Plant • Teddington Outfall <p>Teddington DRA scheme does not have dependencies on other options.</p> <p>To provide an additional resource to London WRZ, the following elements may also be required:</p> <ul style="list-style-type: none"> • Raw water system upgrades in east and west London • Additional treatment capacity at Water Treatment Works (WTWs) in both east and west London • Network reinforcements, potentially including extensions to the London ring main <p>In order to provide raw water to the full Lee Valley reservoirs, an additional transfer through TLT extension from Lockwood PS to King George V Reservoir Intake would be required.</p> <p>Teddington DRA scheme has the potential to support the Thames to Affinity Transfer (T2AT) SRO as T2AT SRO may abstract raw water from the River Thames. Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents.</p>



Teddington DRA Conveyance from Mogden to River Thames (Teddington Outfall)

Name	Teddington DRA Conveyance from Mogden to River Thames (Teddington Outfall)
WRSE ID	TWU_TED_HI-TFR_TED_ALL_teddingtondramog/ted
WRMP19 Reference	CON-RA-MOG-TED
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	Pipeline for transporting treated effluent from the Teddington DRA Tertiary Treatment Plant at Mogden STW to the River Thames at Teddington.
Engineering Components	<ul style="list-style-type: none"> • Pipeline for transporting treated effluent from the Teddington DRA Tertiary Treatment Plant at Mogden STW to the River Thames at Teddington • Pipe-jacked tunnel, with shafts, from Mogden STW to River Thames (Teddington) • Pipe for connection between the final shaft and the outfall structure • New river outfall consisting of below ground velocity-reduction chamber, weir, discharge chamber and piping to river
Phases	n/a
Benefits	n/a – the DO benefits are included within Teddington DRA Tertiary Treatment Plant .
Lead Time	Alternative delivery programmes have been developed for Gate 2 which show a lead time of 9 years and an earliest operational date of 2031.
Mutual Exclusivities	n/a

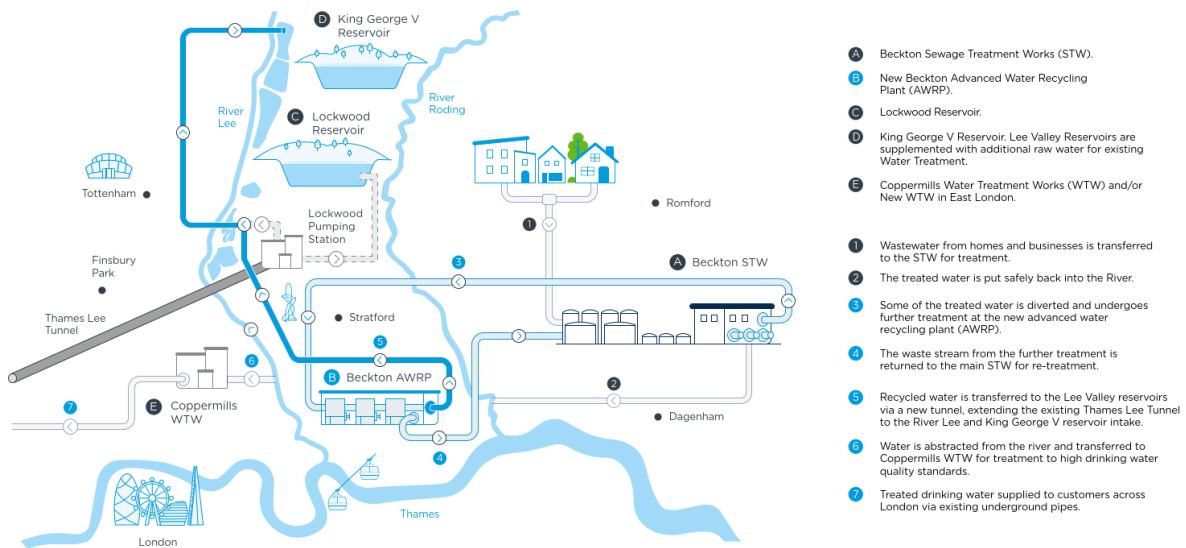
Name	Teddington DRA Conveyance from Mogden to River Thames (Teddington Outfall)
Interdependencies/ Exclusivity	<p>The following elements are also required for the Teddington DRA option:</p> <ul style="list-style-type: none"> • Teddington DRA Tertiary Treatment Plant • Direct River Abstraction – Teddington to Thames Lee Tunnel <p>To provide an additional resource to London WRZ, the following elements may also be required:</p> <ul style="list-style-type: none"> • Upgrades to raw water conveyance systems in both east and west London • Additional treatment capacity at Water Treatment Works (WTWs) in both east and west London • Network reinforcements, potentially including extensions to the London ring main <p>Teddington DRA scheme has the potential to support the Thames to Affinity Transfer (T2AT) SRO as T2AT SRO may abstract raw water from the River Thames. Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents.</p>



TLT extension from Lockwood PS to King George V Reservoir intake

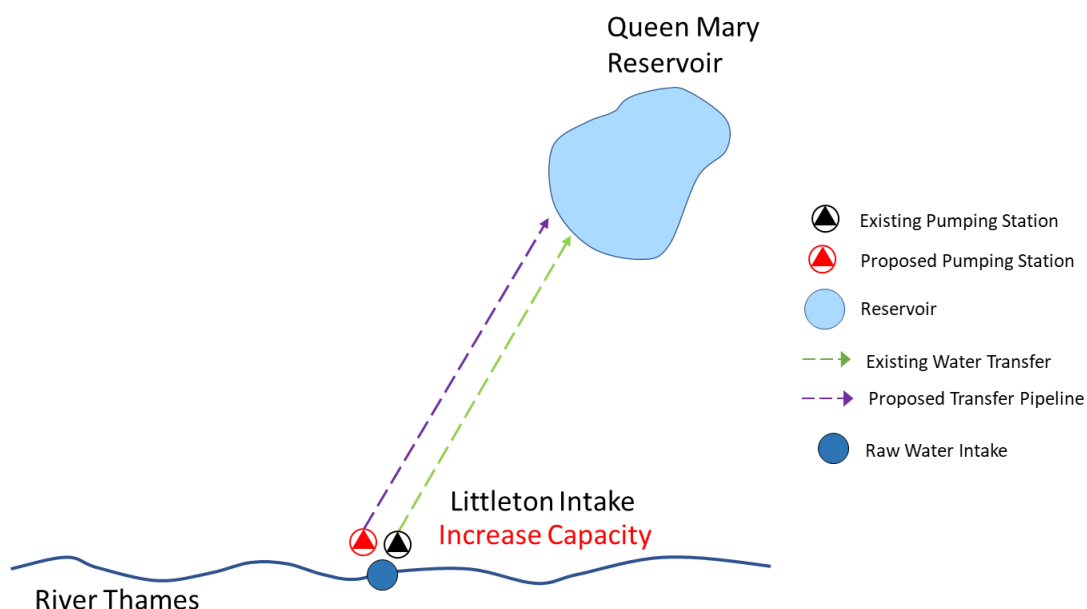
Name	TLT extension from Lockwood PS to King George V Reservoir intake
WRSE ID	TWU_KGV_HI-TFR_KGV_ALL_lockwood ps-kgv res
WRMP19 Reference	CON-RWS-LCK-KGV-800
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	A raw water tunnel from the existing Lockwood pumping station (end of Thames Lee Tunnel – TLT) to River Lee Diversion upstream of the King George V Reservoir intake. New connection from Lockwood PS to the new tunnel as well as provision for future connections.
Engineering Components	Bulk raw water transfer tunnel for an extension of the Thames Lee Tunnel (TLT) to take raw water and recycled water (from Beckton

Name	<p>TLT extension from Lockwood PS to King George V Reservoir intake Effluent Recycling and other options) from Lockwood Pump Station to the River Lee Diversion near King George V reservoir:</p> <ul style="list-style-type: none"> • Tunnel from Lockwood to KGV • 5No. tunnel shafts for the tunnel construction • Submersible pumps within final shaft to discharge the water to the River Lee Diversion outfall • Pipework, control valving arrangement and ancillaries for the connection to the existing TLT Lockwood Pumping Station • Sub-structures and in-river works for the outfall to River Lee diversion, upstream of KGV
Phases/Benefits	n/a. The tunnel would have sufficient capacity for the maximum flow from Beckton Effluent Recycling and additional capacity for other options if required.
Benefits	n/a
Lead Time	Alternative delivery programmes have been developed for Gate 2 which show a lead time of 9 years and an earliest operational date of 2031.
Mutual Exclusivities	n/a
Interdependencies/Exclusivity	<p>This option is required as part of the Beckton Effluent Reuse option</p> <p>To provide an additional resource to London WRZ the following system elements may also be required:</p> <ul style="list-style-type: none"> • Additional capacity in the raw water systems to allow the water to be abstracted from the River Lee Diversion into the Lee Valley Reservoirs and from there conveyed to a Water Treatment Works in east London • Additional treatment capacity in east London • Additional capacity in the Thames Water ring main <p>Beckton Recycling has the potential to support the Thames to Affinity Transfer (T2AT) SRO as T2AT SRO may abstract raw water from the River Lee. Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents.</p>



Raw Water System – Increase capacity of Littleton intake PS

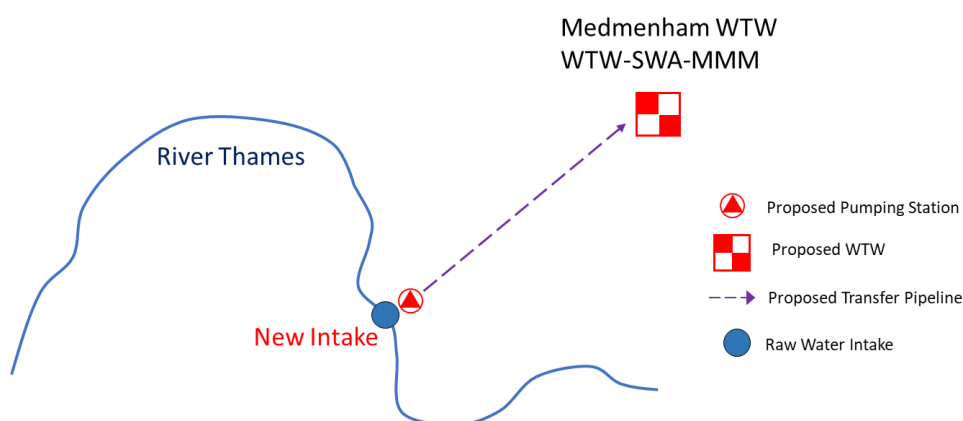
Name	Raw Water System – Increase capacity of Littleton intake PS
WRSE ID	TWU_LON_HI-TFR_LON_ALL_littleton int-qm
WRMP19 Reference	CON-RWS-LTN-300
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	Capacity increase of existing River Thames Littleton intake to 300 MI/d.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New Pumping station located at Littleton intake • Above ground pipelines to reservoir
Phases/benefits	n/a
Benefit	n/a
Lead Time	5 Years
Mutual exclusivities	No other options on the constrained list are mutually exclusive with this option.
Interdependencies/Exclusivity	May be required in order to deliver the benefit from the increase in raw water within the west London system from resource options.



Raw Water System – New Medmenham Intake

Name	Medmenham Intake
WRSE ID	TWU_SWA_HI-TFR.UTC_ALL_medmenham intake 53 TWU_SWA_HI-TFR.UTC_ALL_medmenham intake 80
WRMP19 Reference	CON-RWS-MMM-53 CON-RWS-MMM-80
Element Type	Conveyance
WRZ	SWA
Engineering Scope	Construction of 53 MI/d or 80 MI/d intake near Medmenham to abstract water from the River Thames including a 53 MI/d or 80 MI/d raw water pumping station to the new Medmenham WTW and raw water pipeline to transfer the water from the intake to the WTW.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New 53 MI/d / 80 MI/d raw water intake and screens • New gravity pipeline between intake and raw water pumping station • Raw water pumping station • Raw water pipeline from abstraction point to new Medmenham WTW
Phases/benefits	n/a
Benefit	n/a
Lead Time	5 Years
Mutual Exclusivities	The 53 MI/d and 80 MI/d capacity options are mutually exclusive to each other.
Interdependencies/ Exclusivity	Dependent on new Medmenham WTW and treated water pipeline to new Widdenton SR Medmenham WTW (72MI/d) .

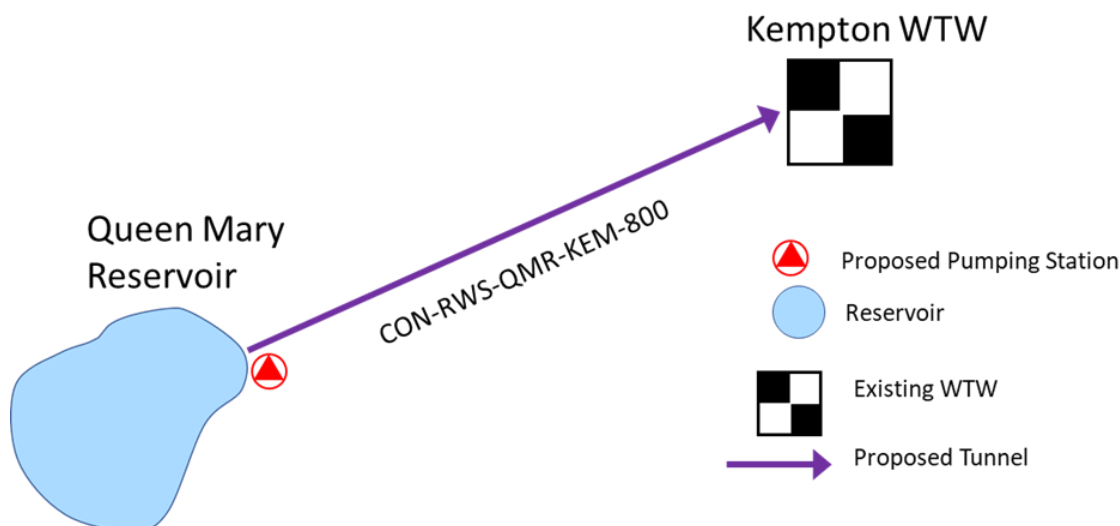
Name	Medmenham Intake
	<p>The intake will abstract from the River Thames, supported by one or more of the following options:</p> <ul style="list-style-type: none"> • Didcot Raw Water Purchase • SESRO • Marsh Gibbon Reservoir • Chinnor Reservoir • Deerhurst to Culham (300MI/d) pipeline Deerhurst to Culham (400MI/d) pipeline Deerhurst to Culham (500MI/d) pipeline • Oxford Canal to Cropredy



Raw Water System – Queen Mary Reservoir to Kempton WTW site

Name	Raw Water System – Queen Mary Reservoir to Kempton WTW site
WRSE ID	TWU_WLJ_HI-TFR_WLJ_XXX_qm res-kempton wtw
WRMP19 Reference	CON-RWS-QMR-KEM-800
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	New conveyance of raw water from Queen Mary Reservoir to new Kempton WTW.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Tunnel from Queen Mary to Kempton • 1 No drive shaft • 1 No intermediate shaft • 1 No reception shaft • High Integrity Gate Valve; 2 at the intermediate shaft. • Installation of jetty • Pumps installed in the reservoir including housing and control room for the pumps
Phases/benefits	n/a
Benefit	n/a
Lead Time	8 Years
Mutual Exclusivities	None

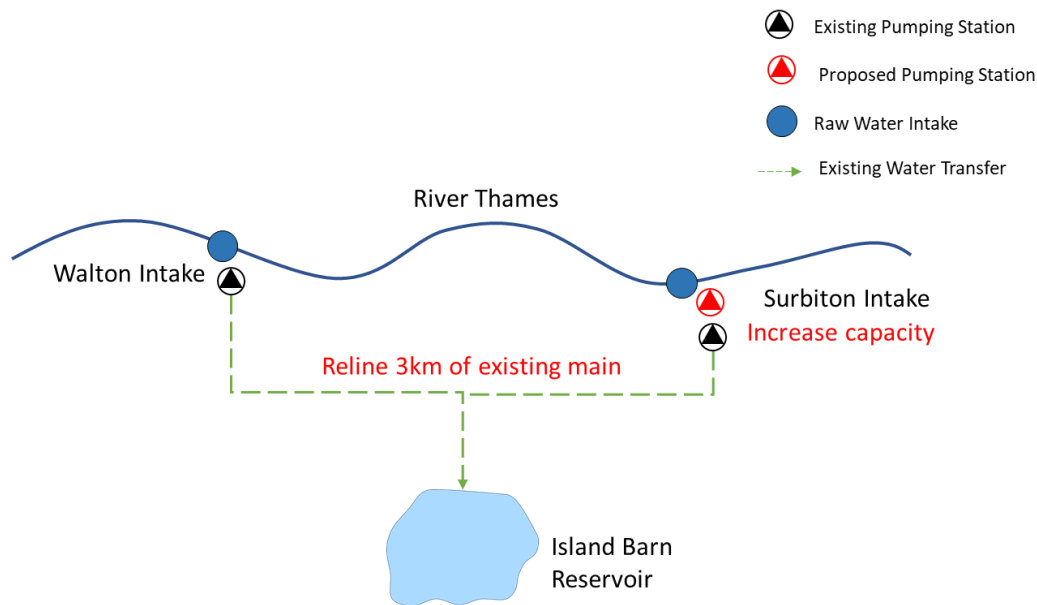
Name	Raw Water System – Queen Mary Reservoir to Kempton WTW site
Interdependencies/ Exclusivity	<p>May be required to support additional raw water resources in West London:</p> <ul style="list-style-type: none"> • SESRO • Marsh Gibbon Reservoir • Chinnor Reservoir • Deerhurst to Culham (300MI/d) pipeline, Deerhurst to Culham (400MI/d) pipeline, Deerhurst to Culham (500MI/d) pipeline • Oxford Canal to Cropredy • and transfer additional water to new treatment at Kempton WTW expansion



Raw Water System – Increase capacity of Surbiton intake

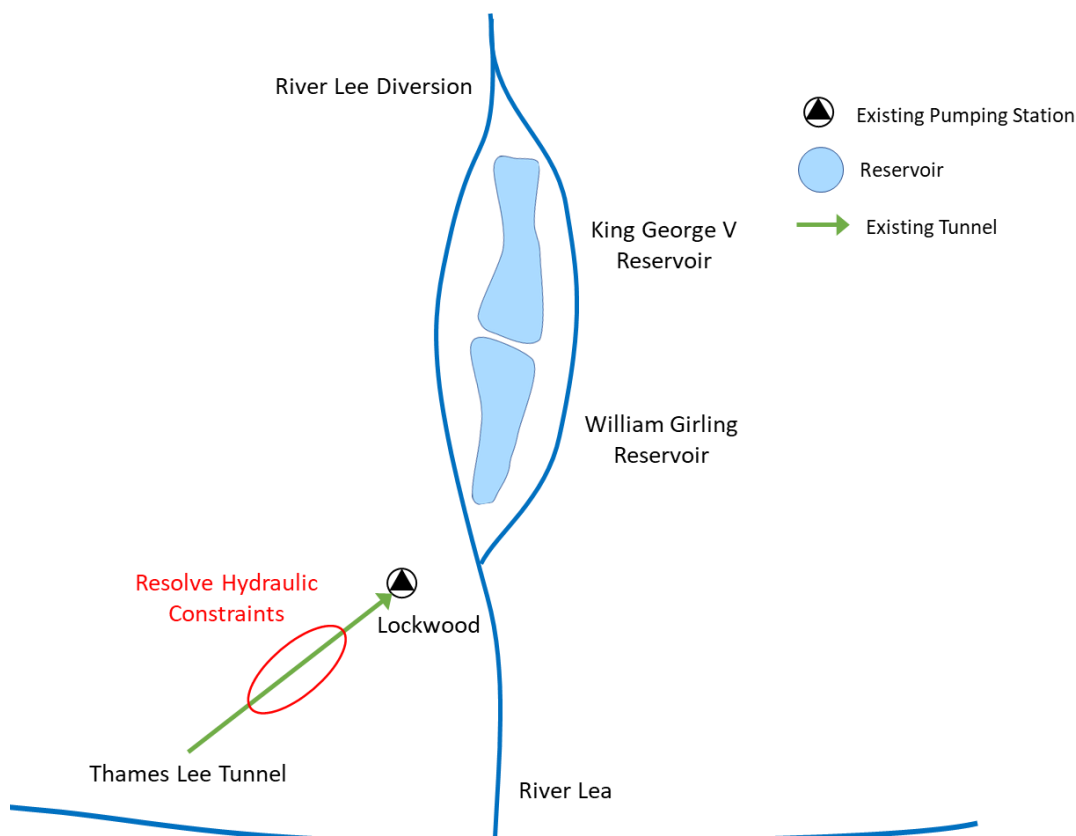
Name	Raw Water System – Increase capacity of Surbiton intake
WRSE ID	TWU_LON_HI-TFR_LON_XXX_surbiton int-walton
WRMP19 Reference	CON-RWS-SUR-100
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	Increase capacity of existing River Thames Surbiton intake by 100 MI/d. Includes additional pump at the intake and relining a section of the existing main between Surbiton and Walton intakes and Island Barn Reservoir.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Installation of an extra pump within the Surbiton Pumping station intake • Upgrade screens at Surbiton • Reline section of an existing main
Phases/benefits	n/a
Benefit	n/a
Lead Time	6 Years
Mutual Exclusivities	None

Name	Raw Water System – Increase capacity of Surbiton intake
Interdependencies/ Exclusivity	None



Raw Water System – TLT upgrade

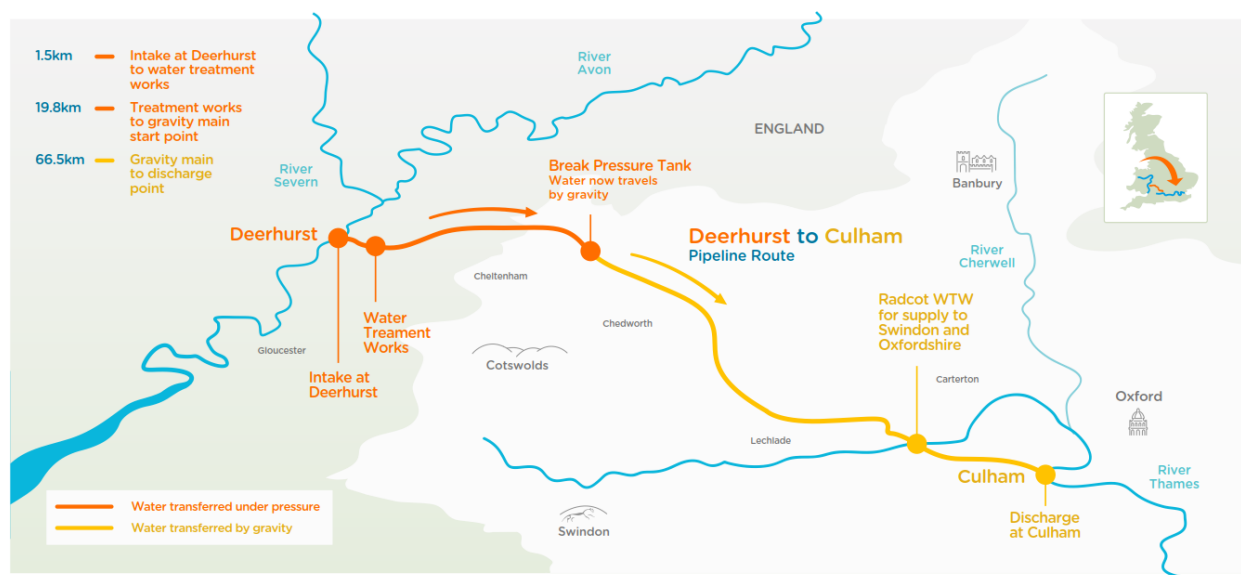
Name	Raw Water System – TLT upgrade
WRSE ID	TWU_LON_HI-TFR_LON_XXX_tlt upgrade - roc
WRMP19 Reference	CON-RWS-TLT-UPG-450
Element Type	Conveyance
WRZ	LONDON
Engineering Scope	Nominal 450 MI/d upgrade to the Thames Lee Tunnel to remove existing constraints.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> Reinforcing section of the tunnel New shaft New air valve
Phases/benefits	n/a
Benefit	n/a
Lead Time	6 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	Not dependent on other elements.



Severn Thames Transfer – Deerhurst to Culham (300MI/d) pipeline

Name	STT – Raw Water Transfer Deerhurst to Culham 300MI/d
WRSE ID	TWU_STT_HI-IMP_STT_XXX_sttpipe300(lon)
WRMP19 Reference	CON-RWT-DEH-CLM-300
Element Type	Conveyance
WRZ	LONDON / SWOX / SWA
Engineering Scope	A supported conveyance pipeline option from Deerhurst on the River Severn to Culham on the River Thames with a 300 MI/d capacity and a total length circa 88km. The element includes all engineering works required to transfer the flow to the River Thames.
Engineering Components	<p>A river intake structure at Deerhurst including inlet screens and a twin <u>pipeline</u> to a low lift pump station:</p> <ul style="list-style-type: none"> • A raw water low lift pump station and a twin pipeline to treatment works • Treatment works including inlet screens, coagulation and lamella clarifiers, rapid gravity filtration and sludge and washwater treatment • A treated water high lift pump station • A single rising main to a break pressure tank • A break pressure tank at the high point • A single gravity main to the outfall location

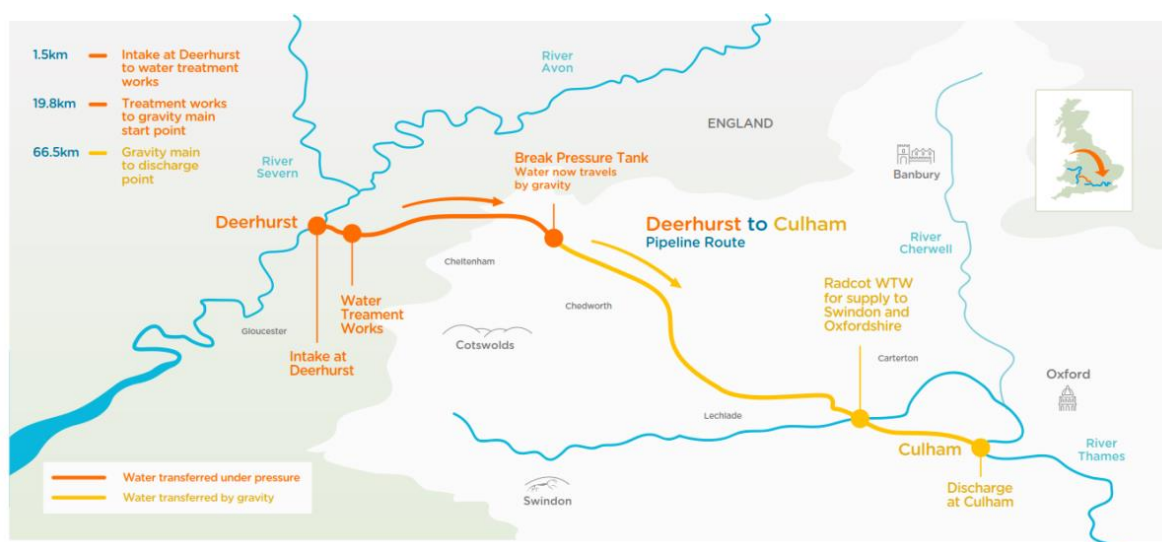
Name	STT – Raw Water Transfer Deerhurst to Culham 300MI/d <ul style="list-style-type: none"> An outfall at Culham with an actuated valve and an aeration cascade
Phases/Benefit	<p>The independent unsupported River Severn resource option, without support options was rejected at feasibility stage and is not included in the Constrained List; however unsupported River Severn water will be abstracted for transfer in the Deerhurst pipeline when available in combination with other resources.</p> <p>Stochastic modelling allowing for climate change and other abstractors indicates a benefit of 80 MI/d for the 300 MI/d pipeline option, from the unsupported flow in the River Severn.</p>
Lead Time	10 Years (to supply unsupported flow). The full SRO project delivery programme allows for an Earliest Operational Date of 2033
Mutual exclusivities	Mutually exclusive with Deerhurst to Culham (400MI/d) pipeline and Deerhurst to Culham (500MI/d) pipeline
Interdependencies/ Exclusivity	<p>This element is dependent on River Severn support elements that will be provided by third parties (Severn Trent Water and United Utilities):</p> <ul style="list-style-type: none"> Minworth STW to River Avon 115MI/d Netheridge STW to River Severn 35MI/d Lake Vyrnwy (United Utilities) – 180MI/d <p>Not all support options may be required, depending on the capacity of the STT that is selected.</p> <p>For STT to deliver a benefit, the water that is released into the River Thames will need to be re-abstracted. There are other water resource options being considered in WRMP24 and/or WRSE regional planning that would either benefit, or be dependent on, water supply from SESRO directly or from water provided into, and conveyed by, the River Thames (whether this be via SESRO, STT or a combination of both), these include:</p> <ul style="list-style-type: none"> Thames to Affinity Transfer (T2AT) SRO Thames to Southern Transfer (T2ST) SRO Thames Water non-SRO options to supply the SWOX or SWA Water Resource Zones <p>Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents and requirements to supply Southern Water WRZs are described in the Thames to Southern Water Transfer Gate 2 documents.</p> <p>To provide an additional resource to London WRZ the following system elements may also required:</p> <ul style="list-style-type: none"> Additional capacity in the raw water systems to allow the water to be abstracted from the River Thames into the west London reservoirs and from there conveyed to a Water Treatment Works in west London Additional treatment capacity in west London Additional capacity in the Thames Water ring main



Severn Thames Transfer – Deerhurst to Culham (400 MI/d) pipeline

Name	STT – Raw Water Transfer Deerhurst to Culham 400 MI/d
WRSE ID	TWU_STT_HI-IMP_STT_XXX_sttpipe400(lon)
WRMP19 Reference	CON-RWT-DEH-CLM-400
Element Type	Conveyance
WRZ	LONDON / SWOX / SWA
Engineering Scope	A supported conveyance pipeline option from Deerhurst on the River Severn to Culham on the River Thames with a 400 MI/d capacity and a total length circa 88km. The element includes all engineering works required to transfer the flow to the River Thames.
Engineering Components	<ul style="list-style-type: none"> • A river intake structure at Deerhurst including inlet screens and a twin <u>pipeline</u> to a low lift pump station • A raw water low lift pump and a twin pipeline to treatment works • Treatment works including inlet screens, coagulation and lamella clarifiers, rapid gravity filtration and sludge and washwater treatment • A treated water high lift pump station • A single rising main to a break pressure tank • A break pressure tank at the high point • A single gravity main to the outfall location • An outfall at Culham with an actuated valve and an aeration cascade
Phases/Benefits	<p>The independent unsupported River Severn resource option, without support options was rejected at feasibility stage and is not included in the Constrained List; however unsupported River Severn water will be abstracted for transfer in the Deerhurst pipeline when available in combination with other resources.</p> <p>Stochastic modelling allowing for climate change and other abstractors indicates a benefit of 107 MI/d from the River Severn for the 400 MI/d pipeline option, from the unsupported flow in the River Severn.</p>

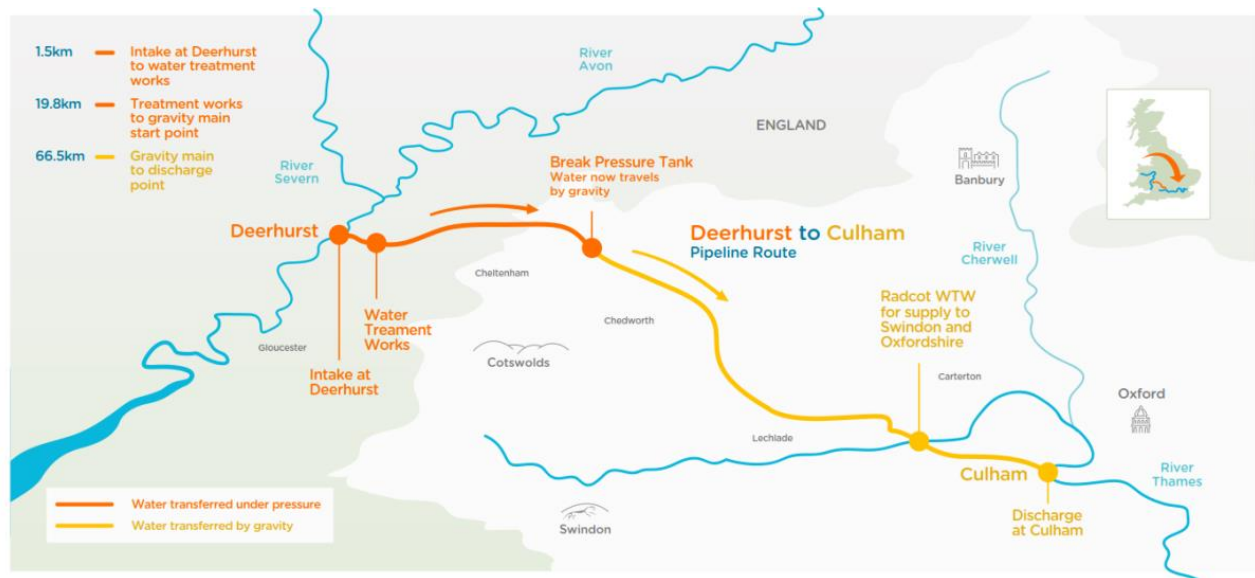
Name	STT – Raw Water Transfer Deerhurst to Culham 400 MI/d
Mutual exclusivities	Mutually exclusive with Deerhurst to Culham (300MI/d) pipeline and Deerhurst to Culham (500MI/d) pipeline
Lead Time	10 Years. The full SRO project delivery programme allows for an Earliest Operational Date of 2033.
Interdependencies/ Exclusivity	<p>This element is dependent on River Severn support elements that will be provided by third parties (Severn Trent Water and United Utilities).</p> <ul style="list-style-type: none"> • Minworth STW to River Avon 115MI/d • Netheridge STW to River Severn 35MI/d • Lake Vyrnwy (United Utilities) – 180MI/d <p>Not all support options may be required, depending on the capacity of the STT that is selected</p> <p>For STT to deliver a benefit, the water that is released into the River Thames will need to be re-abstracted. There are other water resource options being considered in WRMP24 and/or WRSE regional planning that would either benefit, or be dependent on, water supply from SESRO directly or from water provided into, and conveyed by, the River Thames (whether this be via SESRO, STT or a combination of both), these include:</p> <ul style="list-style-type: none"> • Thames to Affinity Transfer (T2AT) SRO • Thames to Southern Transfer (T2ST) SRO • Thames Water non-SRO options to supply the SWOX or SWA Water Resource Zones <p>Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents and requirements to supply Southern Water WRZs are described in the Thames to Southern Water Transfer Gate 2 documents.</p> <p>To provide an additional resource to London WRZ the following system elements may also required:</p> <ul style="list-style-type: none"> • Additional capacity in the raw water systems to allow the water to be abstracted from the River Thames into the west London reservoirs and from there conveyed to a Water Treatment Works in west London • Additional treatment capacity in west London • Additional capacity in the Thames Water ring main



Severn Thames Transfer – Deerhurst to Culham (500MI/d) pipeline

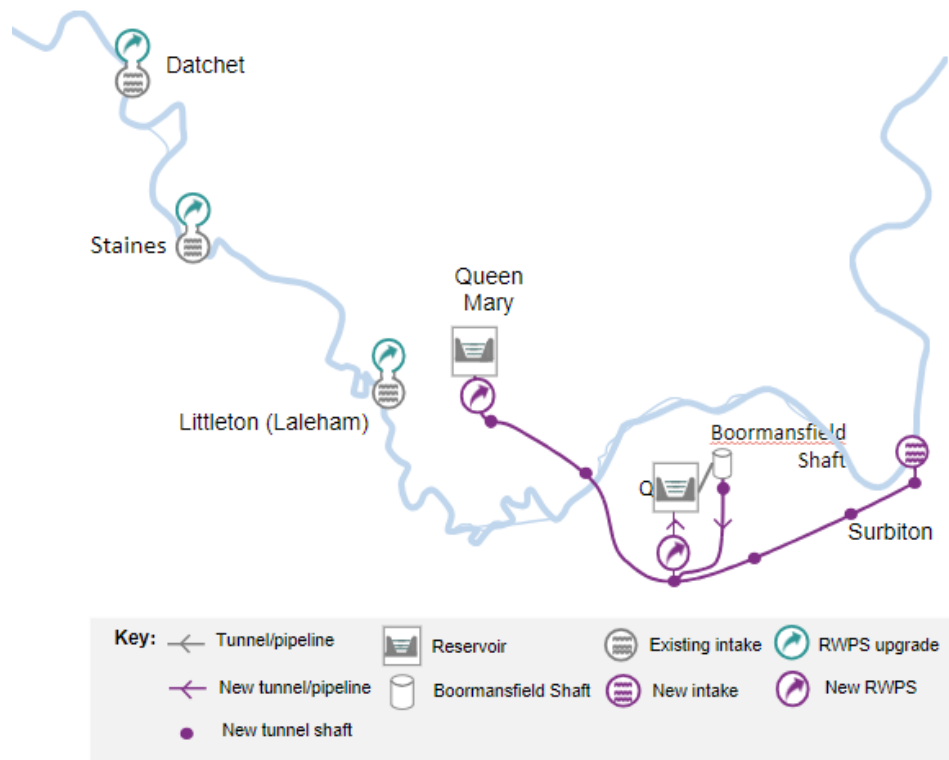
Name	STT – Raw Water Transfer Deerhurst to Culham 500 MI/d
WRSE ID	TWU_STT_HI-IMP_STT_XXX_sttpipe500(lon)
WRMP19 Reference	CON-RWT-DEH-CLM-500
Element Type	Conveyance
WRZ	LONDON / SWOX / SWA
Engineering Scope	A supported conveyance pipeline option from Deerhurst on the River Severn to Culham on the River Thames with a 500 MI/d capacity and a total length circa 88km. The element includes all engineering works required to transfer the flow to the River Thames.
Engineering Components	<ul style="list-style-type: none"> • A river intake structure at Deerhurst including inlet screens and a twin <u>pipeline</u> to a low lift pump station • A raw water low lift pump station and a <u>twin pipeline</u> to treatment works • Treatment works including inlet screens, coagulation and lamella clarifiers, rapid gravity filtration and sludge and washwater treatment • A treated water high lift pump station • A single rising main to a break pressure tank • A break pressure tank at the high point • A <u>single gravity main</u> to the outfall location • An outfall at Culham with an actuated valve and an aeration cascade
Phases/Benefit	<p>The independent unsupported River Severn resource option, without support options was rejected at feasibility stage and is not included in the Constrained List; however unsupported River Severn water will be abstracted for transfer in the Deerhurst pipeline when available.</p> <p>Stochastic modelling allowing for climate change and other abstractors indicates a benefit of 134 MI/d from the River Severn for the 500 MI/d pipeline option, from the unsupported flow in the River Severn.</p>

Name	STT – Raw Water Transfer Deerhurst to Culham 500 MI/d
Mutual exclusivities	Mutually exclusive with Deerhurst to Culham (300MI/d) and pipelineDeerhurst to Culham (400MI/d) pipeline
Lead Time	10 Years. The full SRO project delivery programme allows for an Earliest Operational Date of 2033.
Interdependencies/ Exclusivity	<p>This element is dependent on River Severn support elements that will be provided by third parties (Severn Trent Water and United Utilities):</p> <ul style="list-style-type: none"> • Minworth STW to River Avon 115MI/d • Netheridge STW to River Severn 35MI/d • Lake Vyrnwy (United Utilities) – 180MI/d <p>Not all support options may be required, depending on the capacity of the STT that is selected.</p> <p>For STT to deliver a benefit, the water that is released into the River Thames will need to be re-abstracted. There are other water resource options being considered in WRMP24 and/or WRSE regional planning that would either benefit, or be dependent on, water supply from SESRO directly or from water provided into, and conveyed by, the River Thames (whether this be via SESRO, STT or a combination of both), these include:</p> <ul style="list-style-type: none"> • Thames to Affinity Transfer (T2AT) SRO • Thames to Southern Transfer (T2ST) SRO • Thames Water non-SRO options to supply the SWOX or SWA Water Resource Zones <p>Additional requirements to supply water to Affinity Water WRZs are described in the Thames to Affinity Water Transfer Gate 2 documents and requirements to supply Southern Water WRZs are described in the Thames to Southern Water Transfer Gate 2 documents.</p> <p>To provide an additional resource to London WRZ the following system elements may also required:</p> <ul style="list-style-type: none"> • Additional capacity in the raw water systems to allow the water to be abstracted from the River Thames into the west London reservoirs and from there conveyed to a Water Treatment Works in west London • Additional treatment capacity in west London • Additional capacity in the Thames Water ring main



New Lower Thames Intake: Surbiton to Queen Mary reservoir

Name	New Lower Thames Intake: Surbiton to Queen Mary Reservoir	
WRSE ID	TWU_WLJ_HI-TFR_WLJ_ALL_lowerthamesintake	
WRMP19 Reference	New option to WRMP24	
Element Type	Conveyance	
WRZ	LONDON	
Engineering Scope	New raw water conveyance tunnel from an abstraction point on the River Thames near Surbiton to a discharge points into the existing Queen Mary Reservoir and Queen Elizabeth II Reservoir.	
Engineering Components	<ul style="list-style-type: none"> • Upgraded intake on the River Thames at Surbiton • Raw water screens • Tunnel from Surbiton to Queen Mary Reservoir • New pumping stations • Power supply for pumping stations • Connection to Queen Mary Reservoir • Connection to Queen Elizabeth II Reservoir • Pump modifications at existing Datchet, Staines and Littleton intakes 	
Benefit	Potential requirement to reinforce abstraction capability from the Lower Thames and improve reservoir connectivity	
Time Lead	10 years	
Mutual exclusivities	n/a	
Interdependencies/ Exclusivity	n/a	



Note that modelling to better understand requirements for raw water system reinforcement and associated options appraisal is ongoing. The above reflects the provisionally preferred solution at the current early stage of options appraisal. Please see annual reviews for ongoing progress reports.

Catchment Management

- R.20 Catchment options were compiled into catchment portfolios to compare the proposed options with regards to their contribution to current and future catchment challenges, targeting catchment deficits, catchment issues, problem characterisation and future problems. Standard options (Portfolio 1) were those identified to address the deficit issues and environmental need, both now and with any predicted changes in the future, and these portfolios of options were inputted into WRSE's investment model to develop to regional plan.
- R.21 We have identified three schemes (below) within our nature-based solutions programmes that may offer a deployable output benefit over the longer term. These schemes involve working with farmers to provide support and advice to implement environmental interventions, including measures to reduce the potential for nitrate to leach into groundwater. These schemes have been included within our catchment options longlist to be screened and modelled by WRSE to develop the draft Regional Plan. As with the other catchment options on our longlist, the information for these options is less mature and the option type itself generates less certain water resources benefits. This means that a high degree of uncertainty remains around the deliverability of the estimated deployable output benefits from these options. Through our existing programmes to improve the environment and our Water Industry National Environment Programme (WINEP) and Price Review 2024 (PR24) process we are working as a business to better understand the benefits of these options and support their implementation.

Bean Wellfield (Groundwater)

Name	
WRSE ID	CM_TWU_3
WRMP 19 Reference	n/a
Element Type	Catchment Management
WRZ	London
Engineering Scope	To carry out a programme of catchment management measures to reduce seasonal and long-term trend in nitrate.
Engineering Components	To be delivered as part of Portfolio 1 (Standard) Darent and Cray – see above.
Phases/benefits	0.1 Ml/d
Time Lead	To be delivered as part of a portfolio.
Mutual exclusivities	n/a
Interdependencies/ Exclusivity	n/a

Green Street Green (Groundwater)

Name	
WRSE ID	CM_TWU_14



Name	
WRMP 19 Reference	n/a
Element Type	Catchment Management
WRZ	London
Engineering Scope	To carry out a programme of catchment management measures to reduce seasonal and long-term trend in nitrate.
Engineering Components	To be delivered as part of Portfolio 1 (Standard) Darent and Cray – see above.
Phases/benefits	0.3 MI/d
Time Lead	To be delivered as part of a portfolio.
Mutual exclusivities	n/a
Interdependencies/ Exclusivity	n/a

Wilmington (Groundwater)

Name	
WRSE ID	CM_TWU_36
WRMP 19 Reference	n/a
Element Type	Catchment Management
WRZ	London
Engineering Scope	To carry out a programme of catchment management measures to reduce seasonal and long-term trend in nitrate.
Engineering Components	To be delivered as part of Portfolio 1 (Standard) Darent and Cray – see above.
Phases/benefits	0.2 MI/d
Time Lead	To be delivered as part of a portfolio.
Mutual exclusivities	n/a
Interdependencies/ Exclusivity	n/a

Drought Permit options

Drought permit options are concerned with abstraction from our existing sources, outside of the conditions stated in the individual licences. These drought permit options represent an important supply-side resource.

This section provides a summary of Drought Permit Options

Gatehampton

Name	Gatehampton Drought Permit
WRZ	SWOX
Scope	Suspension of abstraction licence flow constraint to allow an increase in abstraction of 3.5 MI/d.
Components	NA
Benefit	3.5MI/d
Time Lead	NA
Mutual exclusivities	NA
Interdependencies/ Exclusivity	NA

Playhatch

Name	Playhatch Drought Permit
WRZ	Kennet
Scope	Increased output from existing licensed borehole source.
Components	NA
Benefit	4.1MI/d
Time Lead	NA
Mutual exclusivities	NA
Interdependencies/ Exclusivity	Network restrictions on WTW output

Harpsden/Sheeplands

Name	Harpsden Sheeplands Drought Permit
WRZ	Henley
Scope	Removing the licence aggregation between Sheeplands and Harpsden sources to allow increased total abstraction from both sources
Components	NA
Benefit	5.6MI/d
Time Lead	NA
Mutual exclusivities	NA

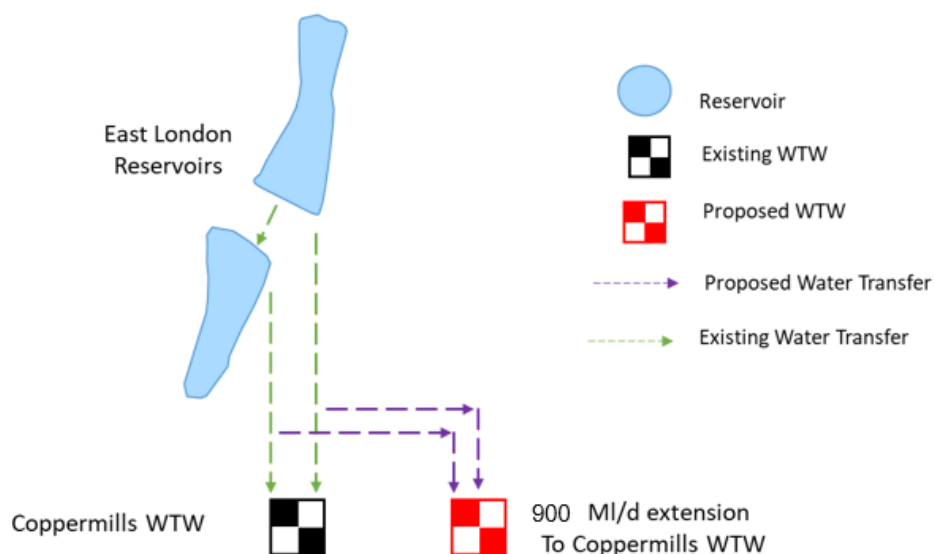
Name	Harpsden Sheeplands Drought Permit
Interdependencies/ Exclusivity	NA

Water Treatment Works

East London (600 MI/d)

Name	East London Water Treatment Works extension																																															
WRSE ID	TWU_LON_HI-ROC_WT1_XXX_eastlondonwtw100 TWU_LON_HI-ROC_WT1_XXX_eastlondonwtw150 TWU_LON_HI-ROC_WT1_XXX_eastlondonwtw200 TWU_LON_HI-ROC_WT1_XXX_eastlondonwtw300																																															
WRMP 19 Reference	WTW-LON-COP-100 WTW-LON-COP-150																																															
Element Type	Water Treatment																																															
WRZ	LONDON																																															
Engineering Scope	New WTW in East London to treat water from various water resource options such as: recycling and transfer.																																															
Engineering Components	The components for this scope are as follows: <ul style="list-style-type: none"> • New WTW to support required capacities • Inter-stage pumping station • Land purchase • New abstraction and conveyance pipelines 																																															
Phases/benefits	Option has a maximum capacity of 600 MI/d which can be achieved through phase options as set out below: <table border="1"> <thead> <tr> <th>Phase 1</th><th>Phase 2</th><th>Phase 3</th><th>Phase 4</th><th>Phase 5</th><th>Phase 6</th><th>Total</th></tr> <tr> <th>MI/d</th><th>MI/d</th><th>MI/d</th><th>MI/d</th><th>MI/d</th><th>MI/d</th><th>MI/d</th></tr> </thead> <tbody> <tr> <td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>600</td></tr> <tr> <td>150</td><td>100</td><td>100</td><td>100</td><td>100</td><td></td><td>550</td></tr> <tr> <td>200</td><td>100</td><td>100</td><td>100</td><td>100</td><td></td><td>600</td></tr> <tr> <td>300</td><td>100</td><td>100</td><td>100</td><td></td><td></td><td>600</td></tr> </tbody> </table>						Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Total	MI/d	MI/d	MI/d	MI/d	MI/d	MI/d	MI/d	100	100	100	100	100	100	600	150	100	100	100	100		550	200	100	100	100	100		600	300	100	100	100			600
Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Total																																										
MI/d	MI/d	MI/d	MI/d	MI/d	MI/d	MI/d																																										
100	100	100	100	100	100	600																																										
150	100	100	100	100		550																																										
200	100	100	100	100		600																																										
300	100	100	100			600																																										
Time Lead	9 Years for Phase 1 elements and 7 Years for subsequent phases.																																															
Mutual exclusivities	Phase 1 elements are mutually exclusive with each other.																																															
Interdependencies/ Exclusivity	This WTW would treat new raw water resources in East London including from: <ul style="list-style-type: none"> • Beckton Effluent Reuse • Deephams Reuse To provide an additional resource to London WRZ the following system elements may also be required: <ul style="list-style-type: none"> • Raw water system upgrades will be required to convey the raw water to the new WTW 																																															

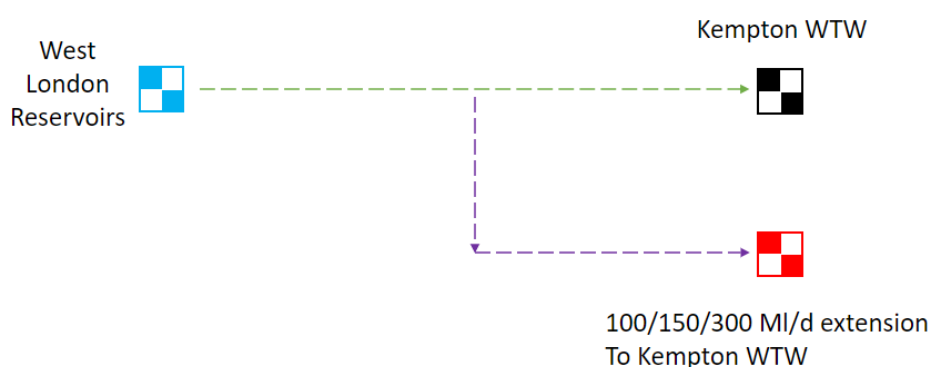
- Additional capacity in the Thames Water ring main



Kempton WTW expansion (800 MI/d)

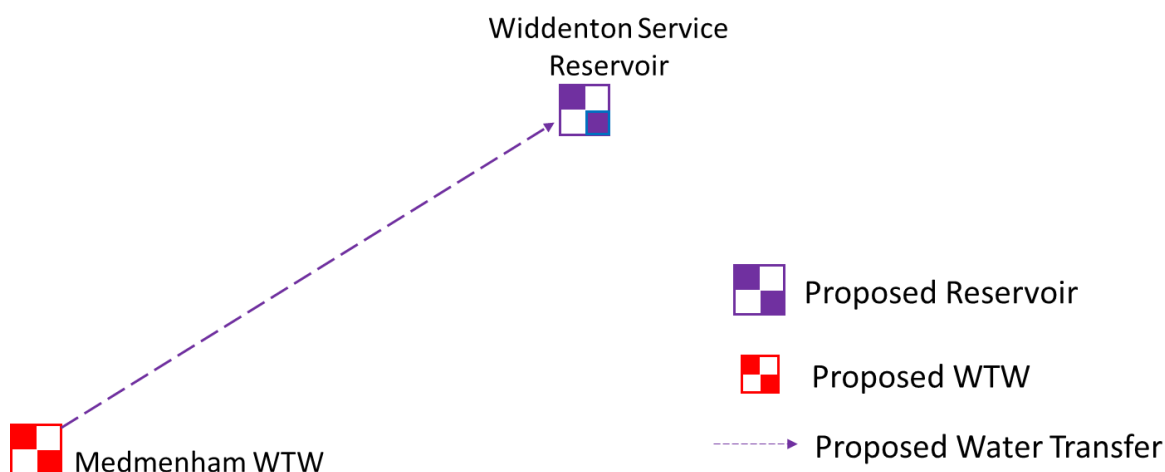
Name	Kempton Water Treatment Works expansion 800 MI/d
WRSE ID	TWU_LON_HI-ROC_WT1_XXX_kemptonwtw300 TWU_LON_HI-ROC_WT1_XXX_kemptonwtw100 TWU_LON_HI-ROC_WT1_XXX_kemptonwtw150
WRMP19 Reference	WTW-LON-KEM-300 WTW-LON-KEM-100 WTW-LON-KEM-150
Element Type	Water Treatment
WRZ	LONDON
Engineering Scope	Phased construction of new WTW with maximum capacity of 800 MI/d located at the existing Kempton WTW site to treat water from West London reservoirs. This could originate from various raw water option types including reservoir, recycling, and raw water transfers.
Engineering Components	The components for this scope are as follows: <ul style="list-style-type: none"> • Raw water pumping station • New Water Treatment Works • Interstage pumping station • Treated water pumping station

Name	Kempton Water Treatment Works expansion 800 MI/d																																																				
Phases/benefits	<p>Option is a phased option up to a maximum capacity of 800MI/d.</p> <p>Phased elements are as below:</p> <table border="1"> <thead> <tr> <th>Phase 1</th><th>Phase 2</th><th>Phase 3</th><th>Phase 3</th><th>Phase 4</th><th>Phase 5</th><th>Phase 6</th><th>Phase 7</th><th>Total</th></tr> <tr> <th>MI/d</th><th>MI/d</th><th>MI/d</th><th>MI/d</th><th>MI/d</th><th>MI/d</th><th>MI/d</th><th>MI/d</th><th>MI/d</th></tr> </thead> <tbody> <tr> <td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>800</td></tr> <tr> <td>150</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td></td><td>750</td></tr> <tr> <td>300</td><td>100</td><td>100</td><td>100</td><td>100</td><td>100</td><td></td><td></td><td>800</td></tr> </tbody> </table>								Phase 1	Phase 2	Phase 3	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Total	MI/d	MI/d	MI/d	MI/d	MI/d	MI/d	MI/d	MI/d	MI/d	100	100	100	100	100	100	100	100	800	150	100	100	100	100	100	100		750	300	100	100	100	100	100			800
Phase 1	Phase 2	Phase 3	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7	Total																																													
MI/d	MI/d	MI/d	MI/d	MI/d	MI/d	MI/d	MI/d	MI/d																																													
100	100	100	100	100	100	100	100	800																																													
150	100	100	100	100	100	100		750																																													
300	100	100	100	100	100			800																																													
Time Lead	8 Years for Phase 1 elements and 6 Years for subsequent phases.																																																				
Mutual Exclusivities	Phase 1 elements are mutually exclusive with each other.																																																				
Interdependencies/Exclusivity	<p>Dependent on Kempton WTW New shaft which would be constructed with Phase 1.</p> <p>This WTW would treat new water resources in west London including from:</p> <ul style="list-style-type: none"> Abingdon Reservoir(SESRO) Marsh Gibbon Reservoir Chinnor Reservoir <p>Severn Thames Transfer – Deerhurst to Culham 300MI/D, Deerhurst to Culham 400MI/d, Deerhurst to Culham 500MI/d).</p> <p>To provide an additional resource to London WRZ the following system elements may also be required:</p> <ul style="list-style-type: none"> Raw water system upgrades will be required to convey the raw water to the new WTW Additional capacity in the Thames Water ring main 																																																				



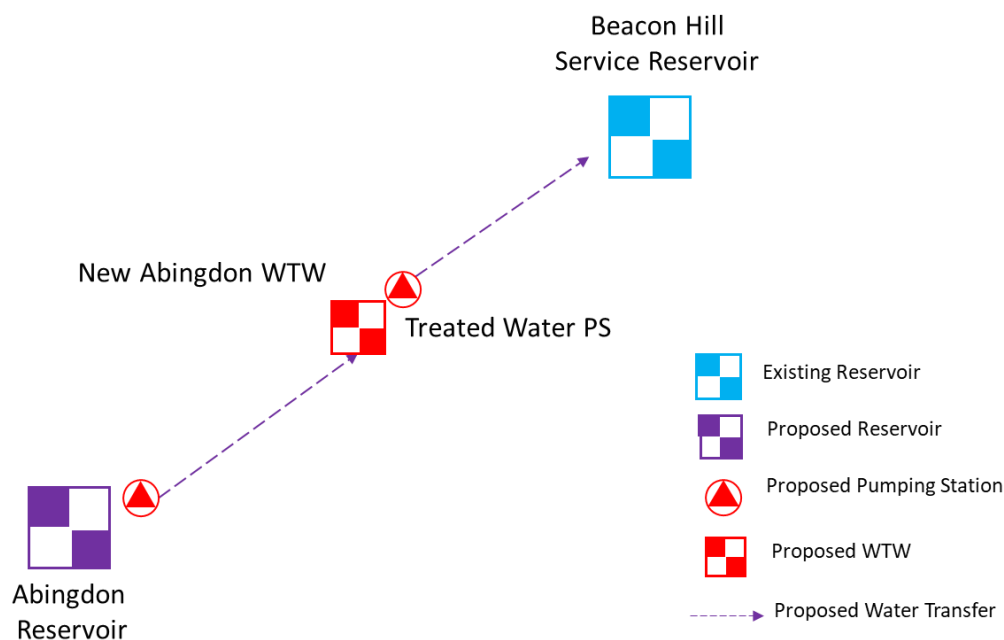
Medmenham WTW (72 MI/d)

Name	Medmenham Water Treatment Works
WRSE ID	TWU_SWA_HI-ROC_WT1_XXX_medmenhamwtw
WRMP19 Reference	WTW-SWA-MMM
Element Type	Water Treatment
WRZ	SWA
Engineering Scope	Construction of a new WTW, up to 72 MI/d capacity, near Medmenham to treat water abstracted from the River Thames.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New Water Treatment Works • Interstage pumping station • Treated water pumping station • New Service Reservoir near Widdenton • Treated water pipeline from WTW to new Widdenton Service Reservoir
Phases/benefits	Option has a maximum capacity of 72 MI/d which can be achieved through 3 phases for 24 MI/d.
Lead Time	5 Years (each phase)
Mutual Exclusivities	None
Interdependencies/Exclusivity	<p>Dependent on New Medmenham Intake and raw water pipeline</p> <p>This WTW would treat water abstracted from the River Thames, supported by one or more of the following elements:</p> <ul style="list-style-type: none"> • Didcot Raw Water Purchase • SESRO • Marsh Gibbon Reservoir • Chinnor Reservoir • Deerhurst to Culham (300MI/d) pipeline, Deerhurst to Culham (400MI/d) pipeline or Deerhurst to Culham (500MI/d) pipeline • Oxford Canal to Cropredy



Abingdon WTW new 24 MI/d (SWOX)

Name	Abingdon Water Treatment Works
WRSE ID	TWU_SWX_HI-ROC_WT1_XXX_abingdon wtw
WRMP19 Reference	WTW-SWOX-ABI WTW-SWOX-ABI-SWA
Element Type	Water Treatment
WRZ	SWOX
Engineering Scope	Construction of a WTW with maximum capacity of up to 72 MI/d adjacent to, and supplied by the new Abingdon reservoir, to supply parts of the SWOX WRZ. The Engineering scope includes the raw water pipeline from the reservoir to the treatment works and the treated water pipeline from the treatment works to Beacon Hill Service Reservoir.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Raw water pipeline from reservoir to water treatment works • Raw water pumping station • New 72MI/d Water Treatment Works comprising of multiple treatment steps (for more details please refer to the relevant CDR report) • Interstage pumping station • Treated water pumping station • Treated water pipeline from WTW to Beacon Hill Service Reservoir
Phases/benefits	Option has a maximum capacity of 72 MI/d which can be achieved through 3 phases for 24 MI/d.
Time Lead	5 Years (each phase)
Mutual exclusivities	This element is not mutually exclusive with the Radcot WTW (72MI/d) element as they serve two different options that may both be implemented. If both options were to be implemented including the treatment elements, then consideration would be needed around the timeframe in which the two treatment works would be built and this timeframe would mainly be driven by the SWOX WRZ supply/demand balance.
Interdependencies/Exclusivity	This WTW would treat water from options provided under SESRO to supply the SWOX WRZ. Water can also be supplied to SWA through the SWOX to SWA (48 MI/d and 72 MI/d).

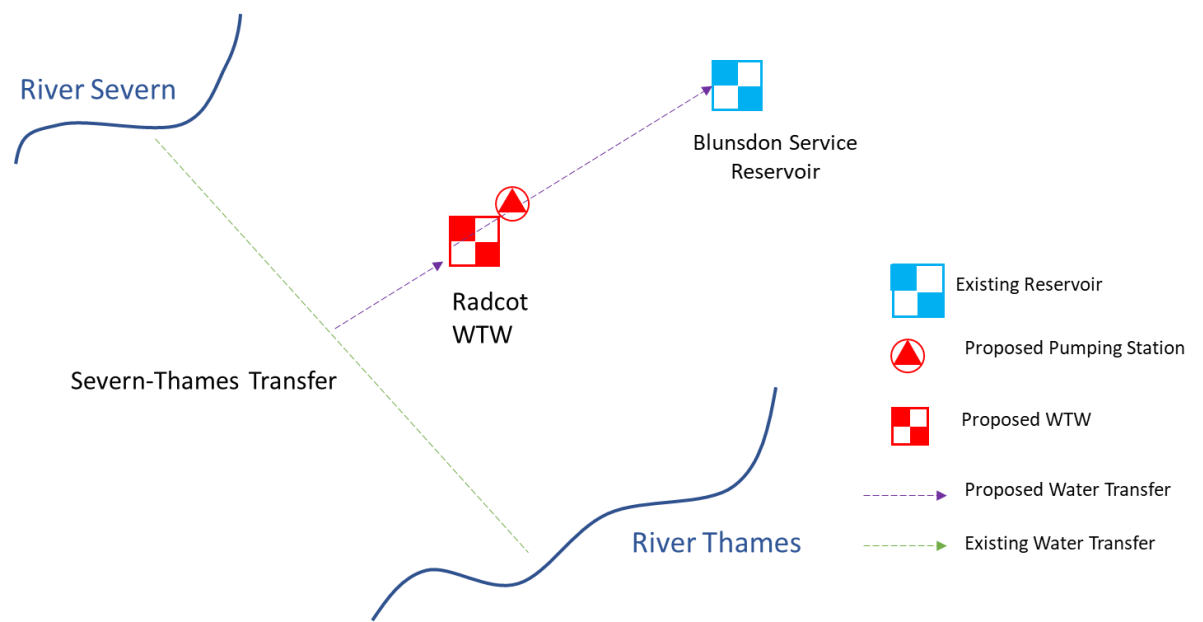


Radcot WTW (72 MI/d)

Name	Radcot Water Treatment Works
WRSE ID	TWU_SWX_HI-ROC_WT1_ALL_radcotwtw
WRMP19 Reference	WTW-SWOX-RAD
Element Type	Water Treatment
WRZ	SWOX
Engineering Scope	Phased construction of up to 72 MI/d water treatment works adjacent to the new main Severn Thames Transfer pipeline to supply parts of the SWOX WRZ. The Engineering scope includes the branch pipeline from the STT pipeline to the treatment works and the treated water pipeline from the treatment works to Blunsdon Service Reservoir.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • Raw water pipeline from the Deerhurst to Culham pipeline to water treatment works • New Water Treatment Works • Interstage pumping station • Treated water pumping station • Treated water pipeline
Phases/benefits	Option has a maximum capacity of 72 MI/d which can be achieved through 3 phases for 24 MI/d.
Time Lead	5 years (Each phase)
Mutual exclusivities	This element is not mutually exclusive with the Abingdon WTW element as they serve two different options that may both be implemented. If both options were to be implemented including the treatment elements, then consideration would be needed around the timeframe in which the two treatment works would be built and

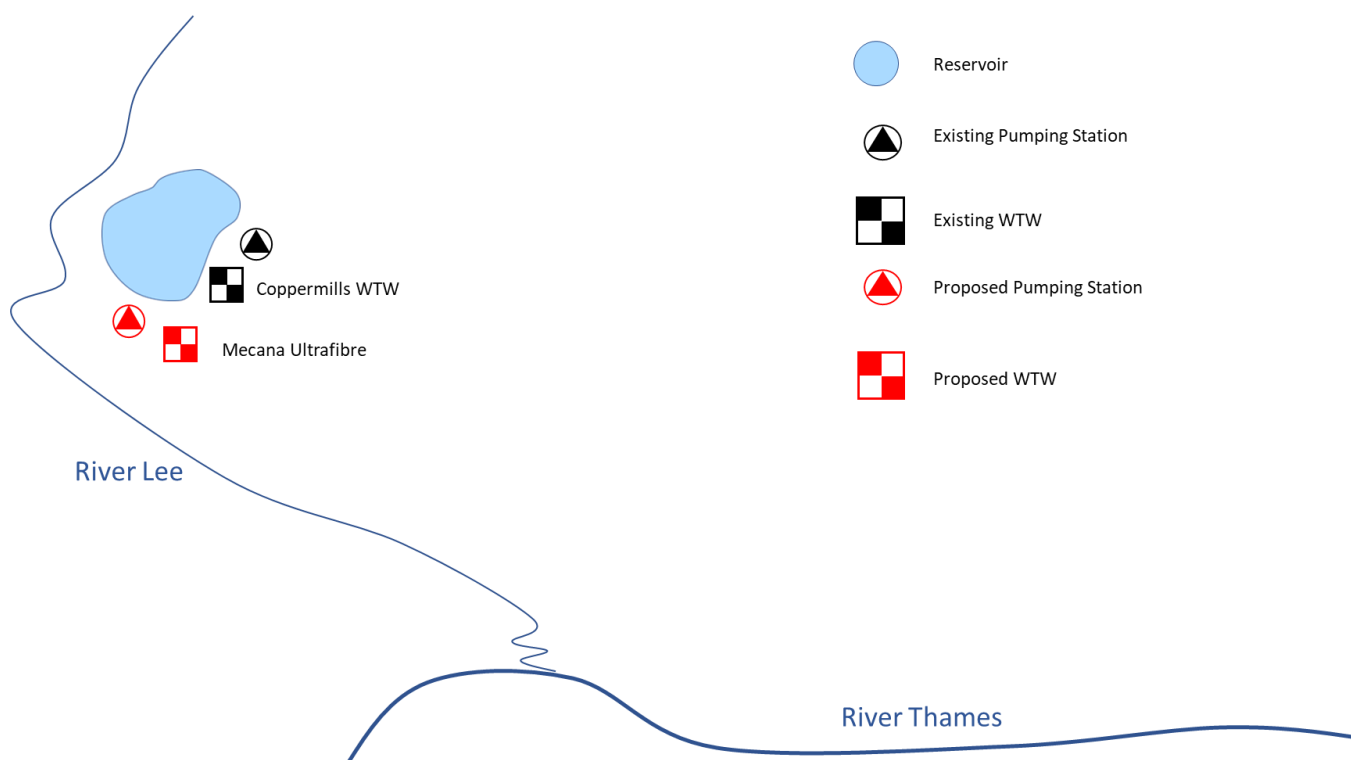


Name	Radcot Water Treatment Works
	this timeframe would mainly be driven by the SWOX WRZ supply/demand balance.
Interdependencies/ Exclusivity	To supply the SWOX WRZ this WTW would treat water from the Severn Thames Transfer: <ul style="list-style-type: none">• Deerhurst to Culham (300MI/d) pipeline• Deerhurst to Culham (400MI/d) pipeline• Deerhurst to Culham (500MI/d) pipeline



Coppermills WTW – Mecana Ultrafibre (200 MI/d, 480 MI/d or 680 MI/d)

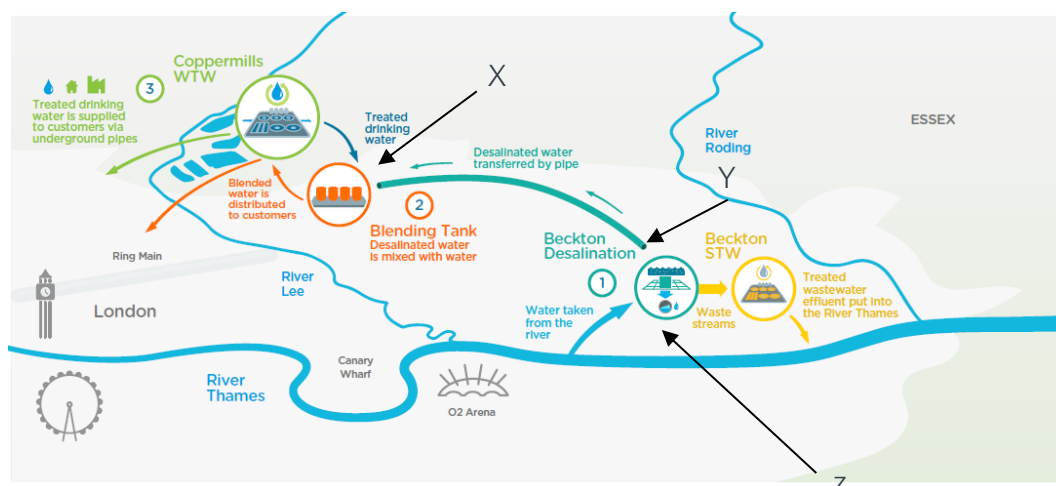
Name	Coppermills WTW – Mecana Ultrafibre (200 MI/d, 480 MI/d or 680 MI/d)
WRSE ID	TWU_LON_HI-LRE_WT1_ALL_copperwtwmecana200 TWU_LON_HI-LRE_WT1_ALL_copperwtwmecana480 TWU_LON_HI-LRE_WT1_ALL_copperwtwmecana680
WRMP19 Reference	New option to WRMP24
Element Type	Water Treatment
WRZ	LONDON
Engineering Scope	Proposing new filtration system using Mecana Ultrafibre on water treatment work for raw water filtration at the existing Coppermills WTW.
Engineering Components	<ul style="list-style-type: none"> • Pipework diversions, shafts and connection tunnels • New Inlet pumping station • Mecana filters • Above ground pipeline to return filtered water, including pipe
Benefit	n/a
Time Lead	7 years
Mutual exclusivities	Options have been developed for 200 MI/d, 480 MI/d and 680 MI/d and options are mutually exclusive to each other.
Interdependencies/ Exclusivity	n/a



Network reinforcement

Desalination Beckton to Coppermills tunnel

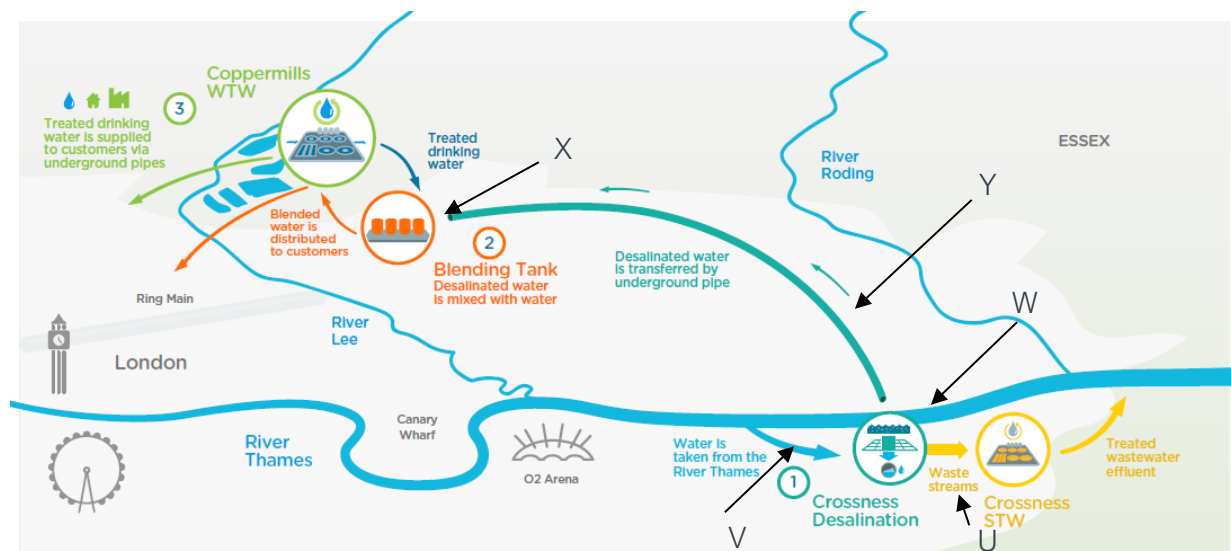
Name	Desalination – Beckton to Coppermills tunnel
WRSE ID	TWU_LON_HI-TFR_LON_XXX_beckton-coppermills
WRMP19 Reference	NET-DES-BEC-COP
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	Desalination plants at Beckton and Crossness are included on the Constrained List. The treated desalination water would be conveyed via tunnel from both Beckton and Crossness desalination works to Coppermills WTW for blending and distribution. This tunnel conveyance between Beckton desalination plant and Coppermills WTW has the capacity of over 450 MI/d (the combined Beckton and Crossness desalination plants output).
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • The treated water will be conveyed via a tunnel from Beckton STW site to Coppermills site • Six shaft locations • Paths/access for the permanent area for the six shafts
Phases/benefits	n/a
Lead Time	11 Years
Mutual exclusivities	None
Interdependencies/Exclusivity	<p>This is the treated water conveyance for Beckton Desalination. Additional blending capacity at Coppermills WTW New Header Tank and Pumping Station at Coppermills WTW.</p> <p>To provide an additional resource to London WRZ the following system elements may also be required:</p> <ul style="list-style-type: none"> • Capacity to discharge into the local water supply network or into the Thames Water Ring Main



X	New Header Tank and Pumping Station at Coppermills WTW
Y	Beckton to Coppermills Tunnel
Z	Beckton Desalination

Desalination – Crossness to Beckton tunnel

Name	Desalination – Crossness to Beckton tunnel
WRSE ID	TWU_LON_HI-ROC_NET_XXX_crossness-beckton
WRMP19 Reference	NET-DES-CRO-BEC
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	A desalination plant at Crossness. The treated desalination water would be conveyed via tunnel from the Crossness plant to the Beckton desalination plant and then via the Beckton to Coppermills tunnel for blending and distribution at Coppermills WTW.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • The treated water will be conveyed via a tunnel from the Crossness desalination site to Beckton • Three shaft locations • Paths/access for the permanent area for the three shafts
Phases/benefits	n/a
Lead Time	10.5 Years
Mutual Exclusivities	None
Interdependencies/Exclusivity	<p>This tunnel combined with Beckton to Crossness tunnel form the treated water conveyance for Crossness Desalination plant. Additional blending capacity at Coppermills WT provided through New Header Tank and Pumping Station at Coppermills WTW.</p> <p>To provide an additional resource to London WRZ the following system elements may also be required:</p> <ul style="list-style-type: none"> • Capacity to discharge into the local water supply network or into the TWRM

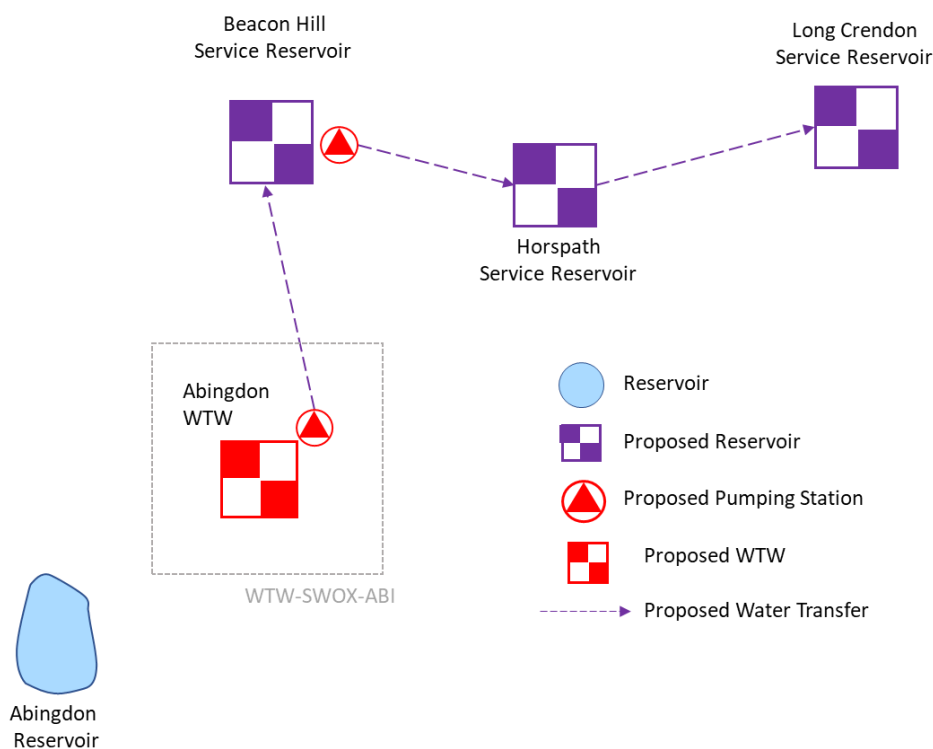


X	New Header Tank and Pumping Station at Coppermills WTW
Y	Beckton to Coppermills Tunnel
Z	Beckton Desalination
W	Crossness to Beckton tunnel
V	Beckton to Crossness tunnel
U	Crossness Desalination

SWOX to SWA (48/72) MI/d

Name	SWOX to SWA
WRSE ID	TWU_SWA_HI-TFR_SWX_ALL_swoxswa72 TWU_SWA_HI-TFR_SWX_ALL_swoxswa48
WRMP19 Reference	NET-IZT-AB-LC-72 NET-IZT-AB-BS-48
Element Type	Network Reinforcement
WRZ	SWA
Engineering Scope	The engineering scope includes either a 72 MI/d or 48 MI/d treated water pipeline from the new Abingdon WTW first to Beacon Hill, then to Horspath and finally to Long Crendon Service Reservoirs
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New treated water pipeline from the new Abingdon WTW to new Beacon Hill Service Reservoir • New treated water pipeline from new Beacon Hill Service Reservoir to new Horspath Service Reservoir • New treated water pipeline from new Horspath Service Reservoir to new Long Crendon Service Reservoir • New treated water pumping station for pumping water from Beacon Hill SR to Horspath SR

Name	SWOX to SWA <ul style="list-style-type: none"> A new service reservoir at each of Beacon Hill, Horspath and Long Crendon
Phases/benefits	n/a
Lead Time	5 Years
Mutual Exclusivities	The 48 MI/d and 72 MI/d options are mutually exclusive to each other.
Interdependencies/ Exclusivity	This element is interdependent with the Abingdon WTW new 24MI/d which would treat water from Abingdon Reservoir. ¹⁵



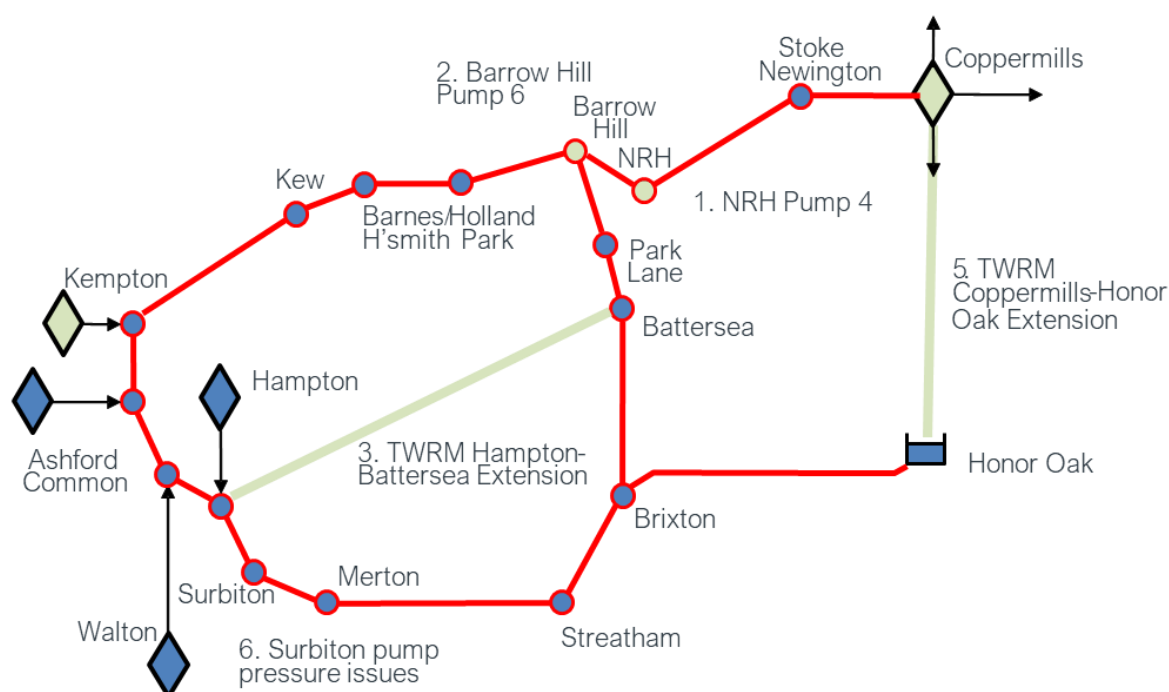
Network Reinforcement – Barrow Hill Pump 6 replacement

Name	Network Reinforcement – Barrow Hill Pump 6 replacement
WRSE ID	TWU_LON_HI-ROC_NET_ALL_barrowhillpump
WRMP19 Reference	NET-TWRM-BAR-PUM
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	Replacement of pump at Barrow Hill Shaft on the Thames Water Ring Main. The element will be required when additional resources from the west and/or east of the London water resource zone (WRZ) are increased reach a trigger value.

¹⁵ The works could also treat water from the Severn Thames transfer option. In this case a different raw water connection would be needed. There may also be differences in the treatment process.

Name	Network Reinforcement – Barrow Hill Pump 6 replacement
Engineering Components	The components for this scope are as follows: <ul style="list-style-type: none"> Replacement of existing pump with a larger pump
Phases/benefits	n/a
Lead Time	1 Year
Mutual exclusivities	None
Interdependencies/Exclusivity	The network reinforcement is required as new water resources are developed and treated for delivery into the London WRZ to meet demand growth. Additional treated water will be supplied from new WTW at East London and/or Kempton, depending on the resource options developed.

Network Reinforcement - Barrow Hill Pump 6 replacement

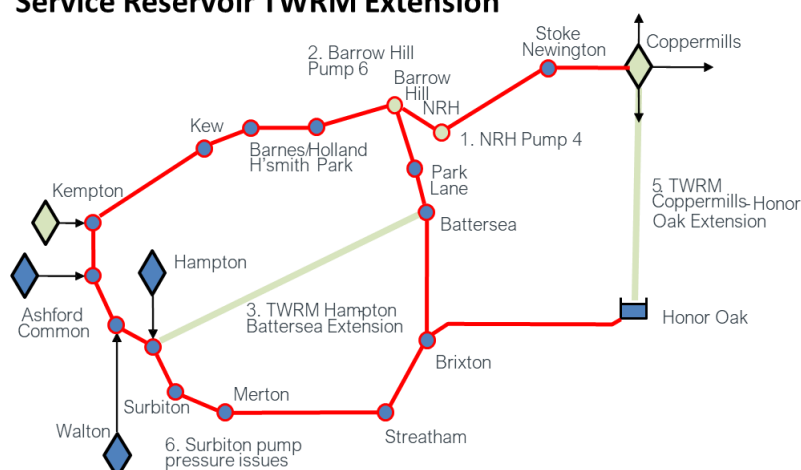


Coppermills WTW to New Honor Oak Service Reservoir TWRM Extension

Name	Coppermills WTW to New Honor Oak Service Reservoir TWRM Extension
WRSE ID	TWU_HON_HI-ROC_NET_XXX_cop'mills-honoroak
WRMP19 Reference	NET-TWRM-COP-HON
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	Thames Ring Main extension tunnel connecting existing shafts at Coppermills and Honor Oak.

Name	Coppermills WTW to New Honor Oak Service Reservoir TWRM Extension
	The Coppermills to Honor Oak TWRM extension will be required when additional resources from the west and/or east of the London water resource zone (WRZ) are increased reach a trigger value.
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New Tunnel from Coppermills to Honor Oak • 2 No drive shafts • 5 No intermediate shafts • Tunnel connections to existing TW Ring Main at Coppermills and Honor Oak • High Integrity Gate Valves (2 per intermediate shaft)
Phases/benefits	n/a
Lead Time	8 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	<p>The network reinforcement is required as new water resources are developed and treated for delivery into the London WRZ to meet demand growth.</p> <p>Additional treated water will be supplied from new WTW at East London and/or Kempton, depending on the resource options developed.</p>

Coppermills WTW to New Honor Oak Service Reservoir TWRM Extension

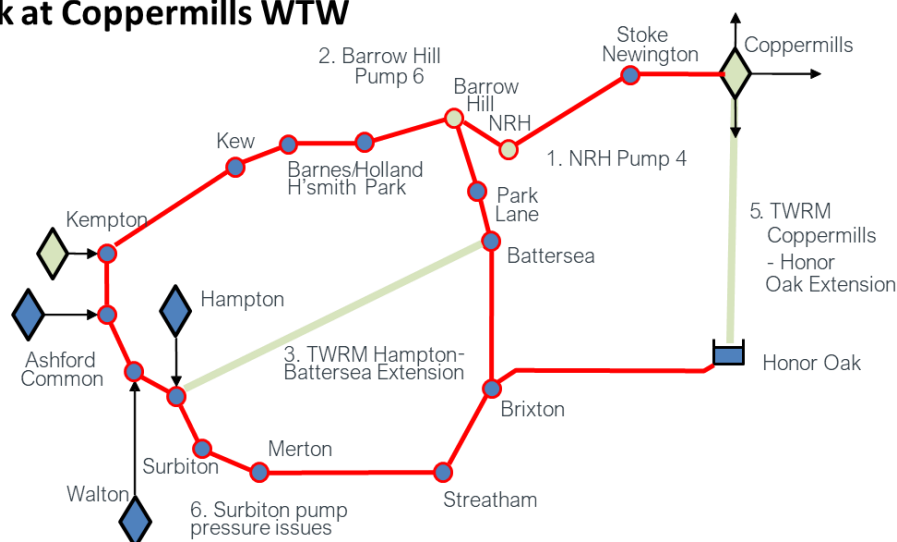


Network Reinforcement New Header tank and Pumping Station at Coppermills WTW

Name	Network Reinforcement – New header tank at Coppermills WTW
WRSE ID	TWU_LON_HI-ROC_NET_ALL_twrm ht-coppermills
WRMP19 Reference	NET-TWRM-COP-HEA NET-TWRM-COP-PS
Element Type	Network Reinforcement
WRZ	LONDON

Name	Network Reinforcement – New header tank at Coppermills WTW
Engineering Scope	The element will be required when additional resources from the west and/or east of the London water resource zone (WRZ) are increased reach a trigger value and/or when desalination options are developed. New low lift pump station to pump treated water from the existing Coppermills WTW contact tanks to the new blending/header tank and new header tank at Coppermills WTW to control the water levels in the Thames Water Ring Main.
Engineering Components	The components for this scope are as follows: <ul style="list-style-type: none"> • New header tank • New pumping station
Phases/benefits	n/a
Lead Time	5 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	The network reinforcement is required as new water resources are developed and treated for delivery into the London WRZ to meet demand growth. Additional treated water will be supplied from new WTW at East London and/or Kempton, depending on the resource options developed.

Network Reinforcement - New header tank at Coppermills WTW

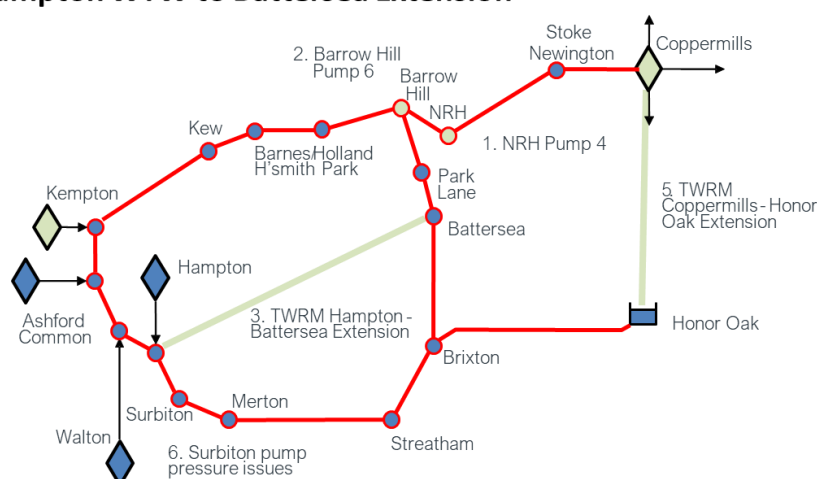


Hampton WTW to Battersea Extension

Name	Hampton WTW to Battersea Extension
WRSE ID	TWU_LON_HI-ROC_NET_XXX_hampton-battersea
WRMP19 Reference	NET-TWRM-HAM-BAT
Element Type	Network Reinforcement
WRZ	LONDON

Name	Hampton WTW to Battersea Extension
Engineering Scope	<p>Thames Ring Main extension tunnel joining existing shafts at Hampton WTW and Battersea.</p> <p>The Hampton Battersea TWRM extension will be required when additional resources from the west and/or east of the London water resource zone (WRZ) are increased reach a trigger value.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> • New Tunnel from Hampton to Battersea • 2 No drive shafts • 8 No intermediate shafts • Tunnel connections to existing TW Ring Main at Hampton and Battersea • High Integrity Gate Valves
Phases/benefits	n/a
Lead Time	9 Years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	<p>The network reinforcement is required as new water resources are developed and treated for delivery into the London WRZ to meet demand growth.</p> <p>Additional treated water will be supplied from new WTW at Coppermills and/or Kempton, depending on the resource options developed.</p>

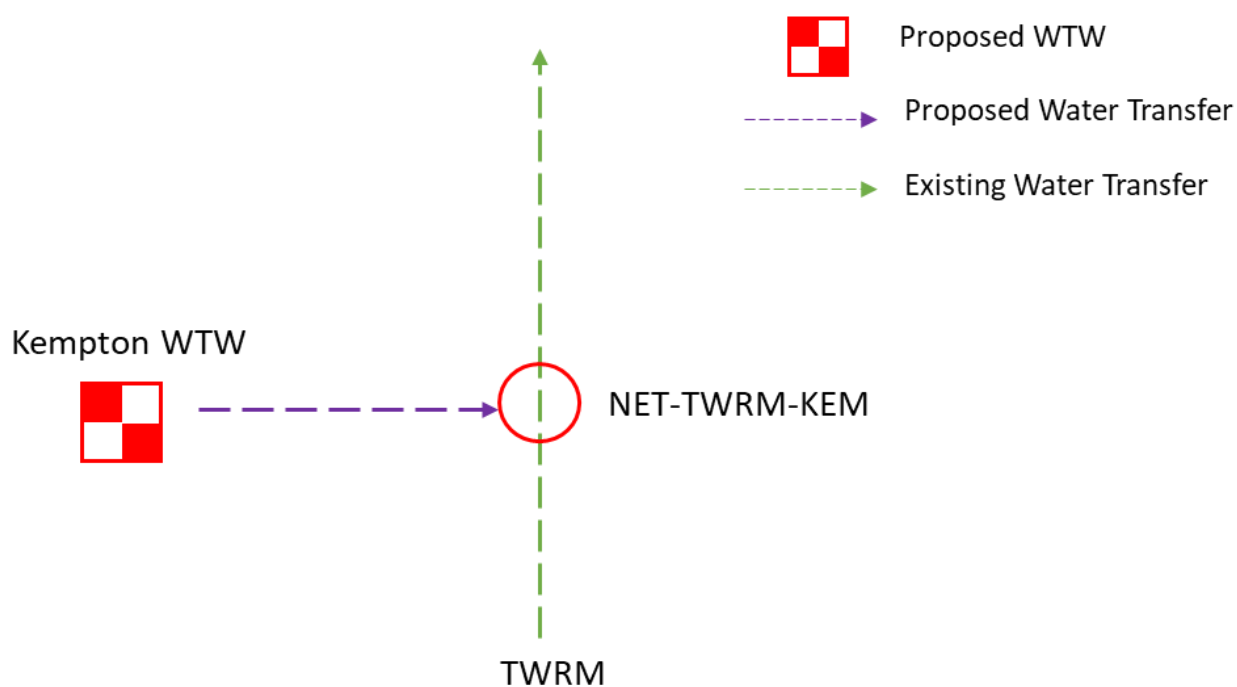
Hampton WTW to Battersea Extension



Network Reinforcement – Kempton WTW New shaft

Name	Network Reinforcement – Kempton WTW New shaft
WRSE ID	TWU_WLJ_HI-ROC_NET_XXX_twrm shaft kempton
WRMP19 Reference	NET-TWRM-KEM
Element Type	Network Reinforcement
WRZ	LONDON

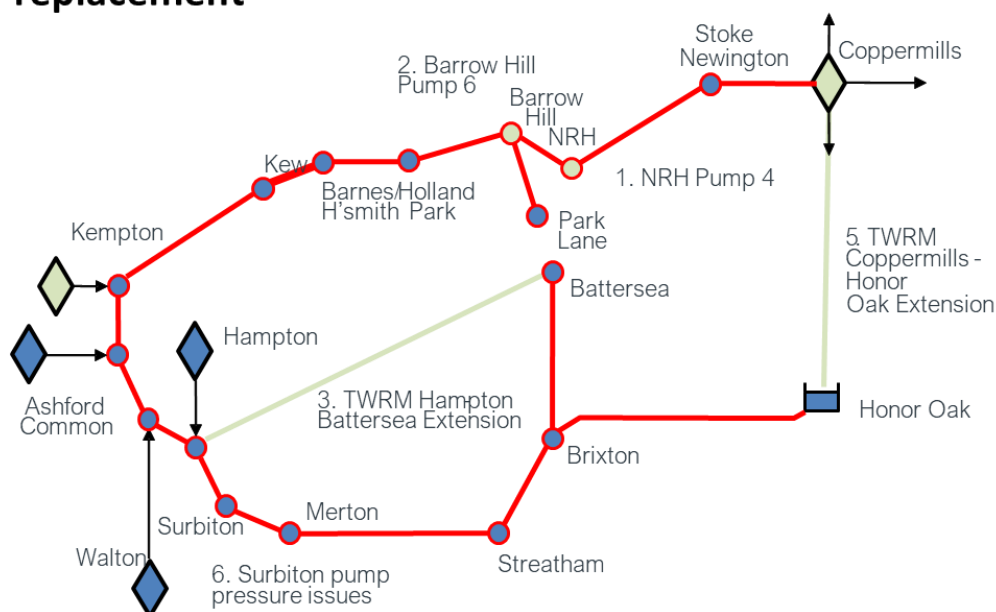
Name	Network Reinforcement – Kempton WTW New shaft
Engineering Scope	New shaft on the Thames Water Ring Main to accommodate up to 800 MI/d of treated water flow from the expanded Kempton WTW expansion (800MI/d) .
Engineering Components	The components for this scope are as follows: <ul style="list-style-type: none"> • New shaft on TWRM shaft
Phases/benefits	n/a
Lead Time	7 Years
Mutual exclusivities	No other options on the constrained list are mutually exclusive with this option.
Interdependencies/Exclusivity	This element is interdependent with the new WTW at Kempton (Kempton WTW expansion) and will be required at the time that the first additional treatment at Kempton is provided.



Network Reinforcement – New River Head Pump 4 replacement

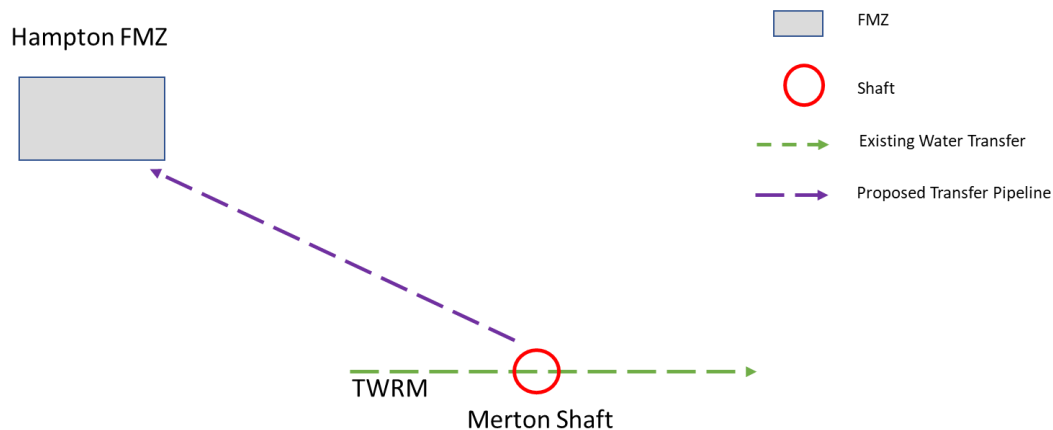
Name	Network Reinforcement – New River Head Pump 4 replacement
WRSE ID	TWU_LON_HI-TFR_LON_ALL_newriverhead pump 4
WRMP19 Reference	NET-TWRM-NRV-PUM
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	<p>Replacement of a pump at the New River Head Shaft on the Thames Water Ring Main with a larger and a suitable pump.</p> <p>The element will be required when additional resources from the west and/or east of the London water resource zone (WRZ) are increased reach a trigger value.</p>
Engineering Components	<p>The components for this scope are as follows:</p> <ul style="list-style-type: none"> Replacement of the old pump with a larger pump.
Phases/benefits	n/a
Lead Time	5 years
Mutual Exclusivities	None
Interdependencies/ Exclusivity	<p>The network reinforcement is required as new water resources are developed and treated for delivery into the London WRZ to meet demand growth.</p> <p>Additional treated water will be supplied from new WTW at East London and/or Kempton, depending on the resource options developed.</p>

Network Reinforcement – New River Head Pump 4 replacement



Merton TWRM Shaft to Hampton 36 Flow Monitoring Zone (FMZ)

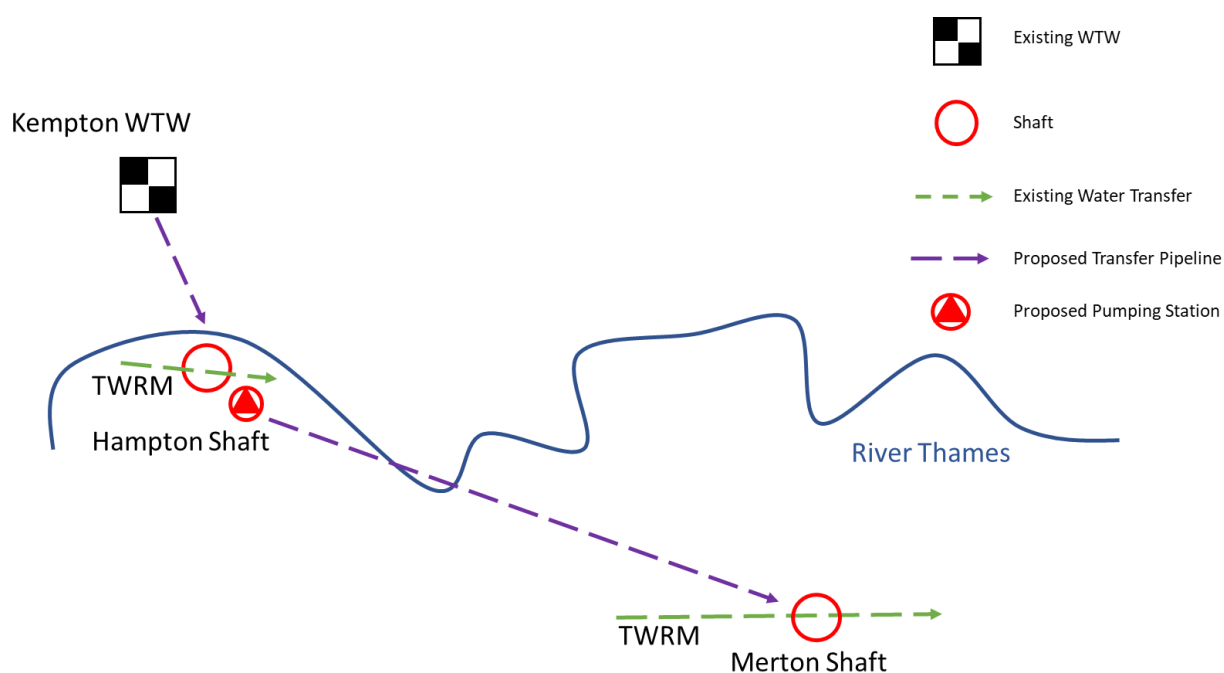
Name	Merton TWRM Shaft to Hampton 36 FMZ
WRSE ID	TWU_LON_HI-ROC_NET_ALL_merton-hampton
WRMP19 Reference	New option to WRMP24
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	New pipeline from Merton Thames Water Ring Main (TWRM) Shaft to Hampton 36 Flow Monitoring Zone.
Engineering Components	<ul style="list-style-type: none"> • New main from Merton Shaft to Hampton 36 FMZ • 3 No railway crossing
Benefit	n/a
Time Lead	7 years
Mutual exclusivities	n/a
Interdependencies/ Exclusivity	Dependent on Kempton WTW to Merton TWRM Shaft.



Kempton WTW to Merton TWRM Shaft

Name	Kempton WTW to Merton TWRM Shaft
WRSE ID	TWU_LON_HI-ROC_NET_ALL_kemptonwtw-merton
WRMP19 Reference	New option to WRMP24
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	New pipeline from Kempton Water Treatment Works (WTWs) to a discharge location at Merton Thames Water Ring Main (TWRM) Shaft.
Engineering Components	<ul style="list-style-type: none"> • New main from Kempton WTWs to Hampton TWRM Shaft

Name	Kempton WTW to Merton TWRM Shaft
	<ul style="list-style-type: none"> • New main from Hampton Shaft to Merton TWRM Shaft • One major road crossing, two rail and two river crossings • New Shaft to house Pumping Station (PS) and facilitate connecting new main to TWRM Hampton shaft • New pumping station in the vicinity of Hampton WTW • Power supply, standby generator and transformer for pumping station
Benefit	n/a
Time Lead	10 years
Mutual exclusivities	n/a
Interdependencies/ Exclusivity	n/a

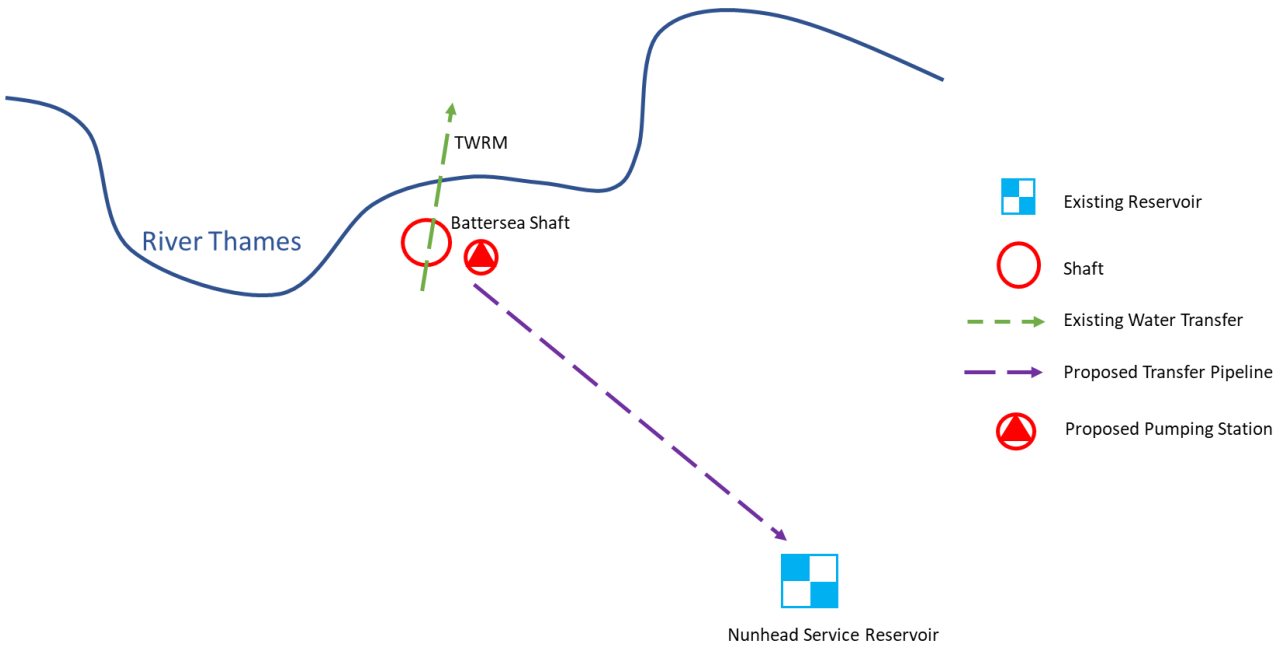


Battersea TWRM Shaft to Nunhead Service Reservoir

Name	Battersea Shaft to Nunhead Service Reservoir
WRSE ID	TWU_LON_HI-ROC_NET_ALL_battersea-nunhead
WRMP19 Reference	New option to WRMP24
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	New pipeline to convey drinking water from Battersea TWRM Shaft to a discharge location at Nunhead Service Reservoir (SR).
Engineering Components	<ul style="list-style-type: none"> • New main from Battersea TWRM Shaft to Nunhead SR • Four major road crossings • New pumping station at Battersea Shaft

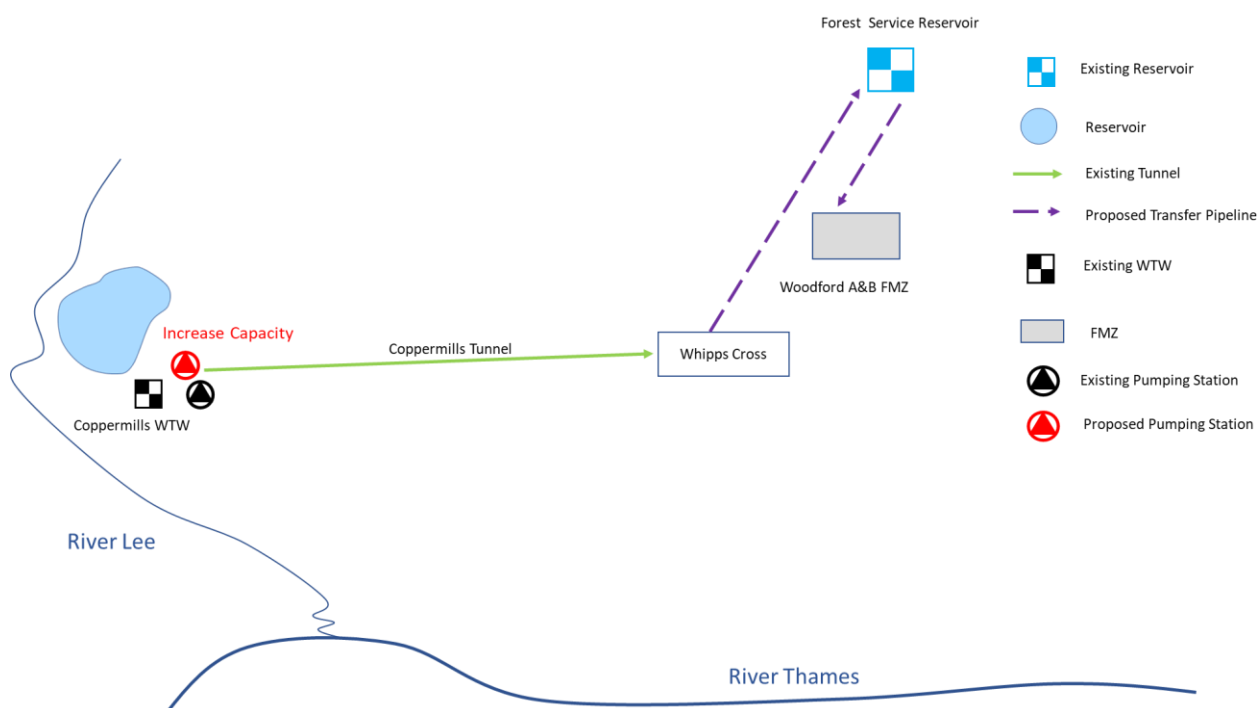


Name	Battersea Shaft to Nunhead Service Reservoir
	<ul style="list-style-type: none">Power supply, standby generator and transformer for pumping station
Benefit	n/a
Time Lead	7 years
Mutual exclusivities	n/a
Interdependencies/ Exclusivity	n/a



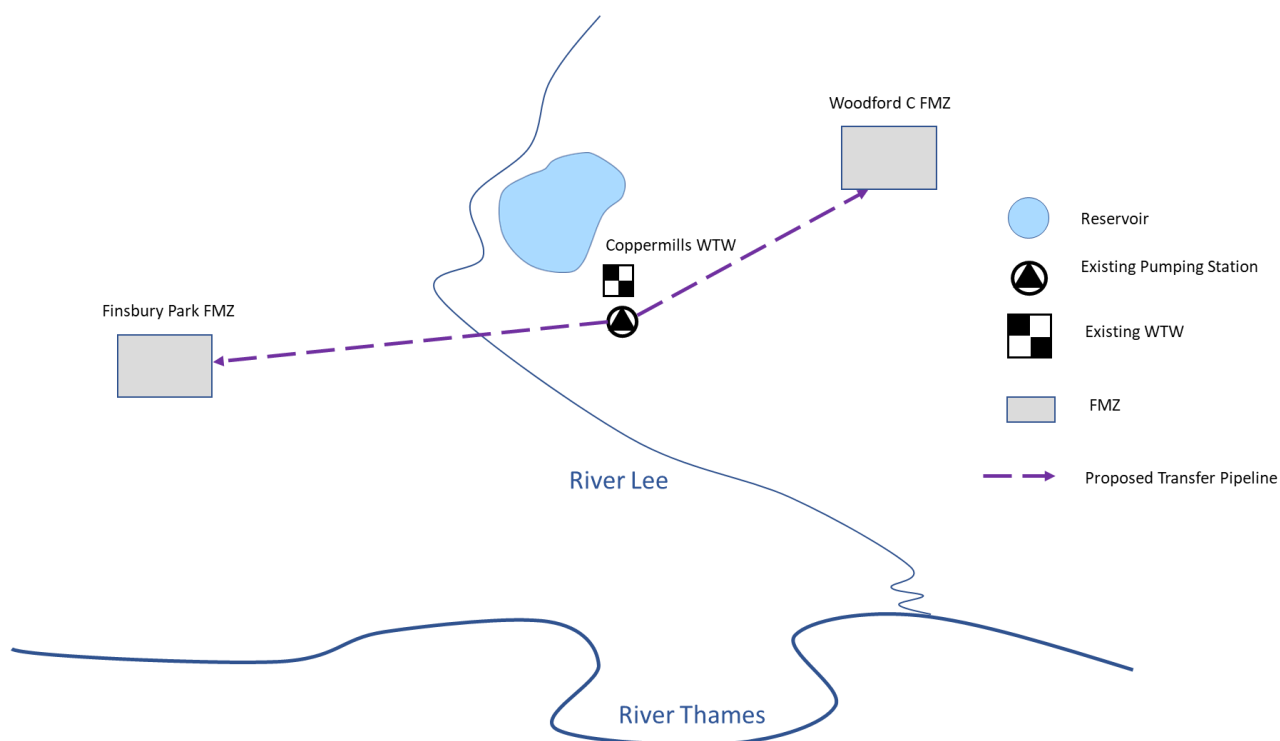
Coppermills 70" Tunnel to Woodford FMZ

Name	Coppermills 70" Tunnel to Woodford FMZ
WRSE ID	TWU_LON_HI-ROC_NET_ALL_copperwtw-woodford
WRMP19 Reference	New option to WRMP24
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	Enhanced pumps and pipeline(s) to convey drinking water from Coppermills WTW to a discharge location at Woodford (Forest) Service Reservoir (SR), then onto Woodford A&B FMZ. Upgrade of the existing Coppermills WTW pumps to provide an additional 100 MI/d from Coppermills to Woodford A&B FMZ.
Engineering Components	<ul style="list-style-type: none"> • New main from Whipps Cross to Forest SR • New main from Forest SR to Woodford A&B FMZ • Upgrade of existing pumping station at Coppermills WTW • Power supply, standby generator and transformer for Coppermills PS
Benefit	n/a
Time Lead	7 years
Mutual exclusivities	n/a
Interdependencies/ Exclusivity	n/a



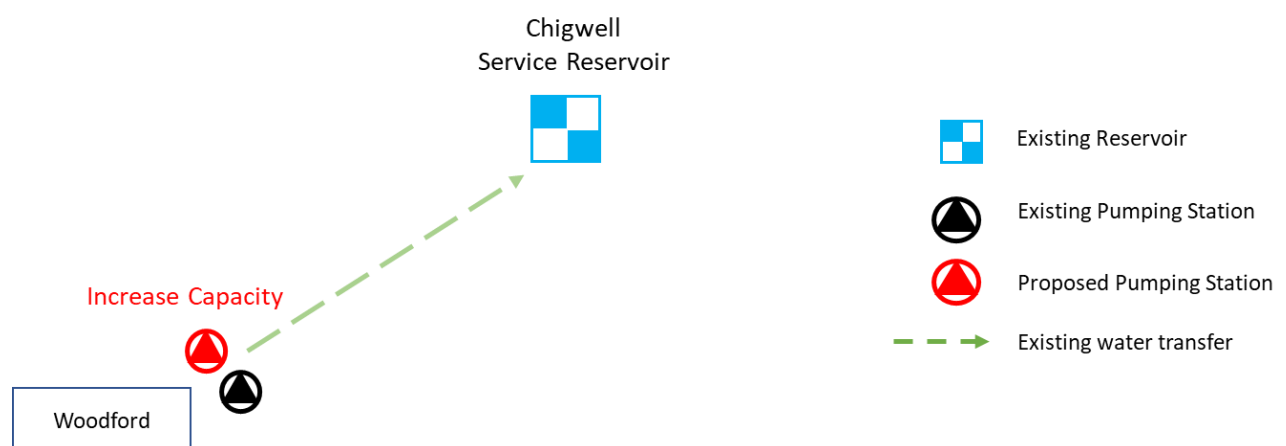
Coppermills WTW to Finsbury Park and Woodford C FMZs

Name	Coppermills WTW to Finsbury Park and Woodford C FMZ
WRSE ID	TWU_LON_HI-ROC_NET_ALL_coppertofinsparkfmz
WRMP19 Reference	New option to WRMP24
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	New pipelines to convey drinking water from Coppermills WTW to Finsbury Park and Woodford C FMZs.
Engineering Components	<ul style="list-style-type: none"> • New main from Coppermills WTW to Finsbury Park FMZ • New main from Coppermills WTW to Woodford FMZ
Benefit	n/a
Time Lead	7 years
Mutual exclusivities	n/a
Interdependencies/ Exclusivity	n/a



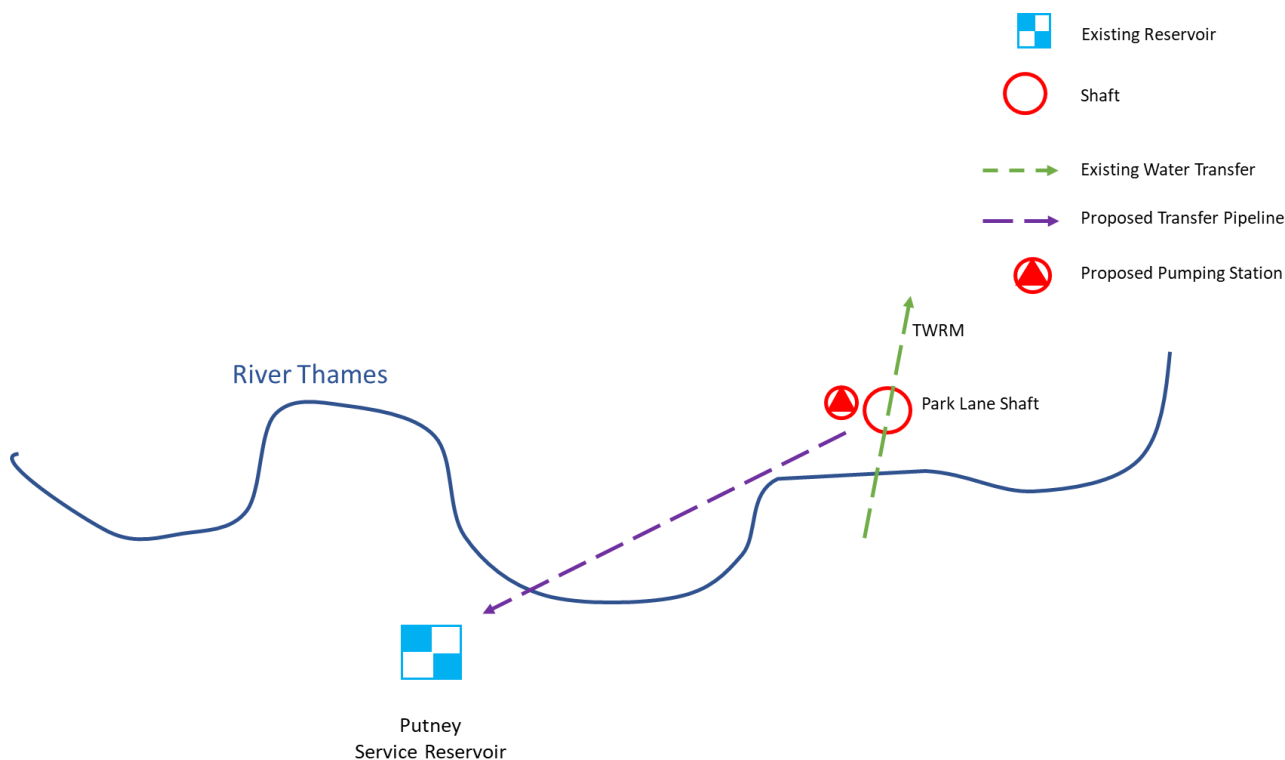
Woodford PS to Chigwell Service Reservoir

Name	Woodford PS to Chigwell Service Reservoir
WRSE ID	TWU_LON_HI-ROC_NET_ALL_woodford-chigwell
WRMP19 Reference	New option to WRMP24
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	Enhanced pumps and pipeline(s) to convey drinking water from Woodford (Forest) PS to Chigwell SR.
Engineering Components	<ul style="list-style-type: none"> • New main from Woodford (Forest) PS to Chigwell SR • Upgrade of existing pumping station at Woodford • Power supply, standby generator and transformer for Woodford PS
Benefit	n/a
Time Lead	7 years
Mutual exclusivities	n/a
Interdependencies/ Exclusivity	n/a



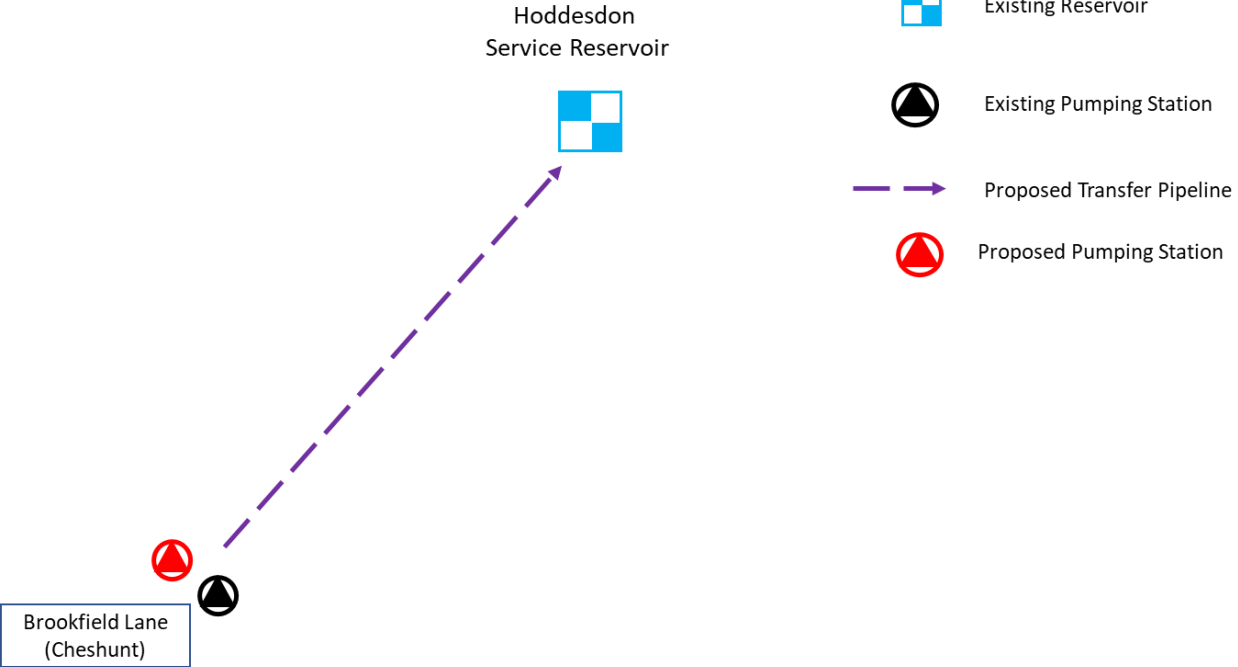
Park Lane TWRM Shaft to Putney Service Reservoir

Name	Park Lane TWRM Shaft to Putney Service Reservoir
WRSE ID	TWU_LON_HI-ROC_NET_ALL_parklanetoputney
WRMP19 Reference	New option to WRMP24
Element Type	Network Reinforcement
WRZ	LONDON
Engineering Scope	Enhanced pumps and pipeline(s) to convey drinking water from Park Lane TWRM Shaft to Putney SR.
Engineering Components	<ul style="list-style-type: none"> • New main from Woodford PS to Chigwell SR • Three major road crossing, three rail, one river (Thames) • New Shaft to house Pumping Station (PS) and facilitate connecting New pumping station at Park Lane • Power supply, standby generator and transformer for Park Lane PS
Benefit	n/a
Time Lead	7 years
Mutual exclusivities	n/a
Interdependencies/ Exclusivity	n/a



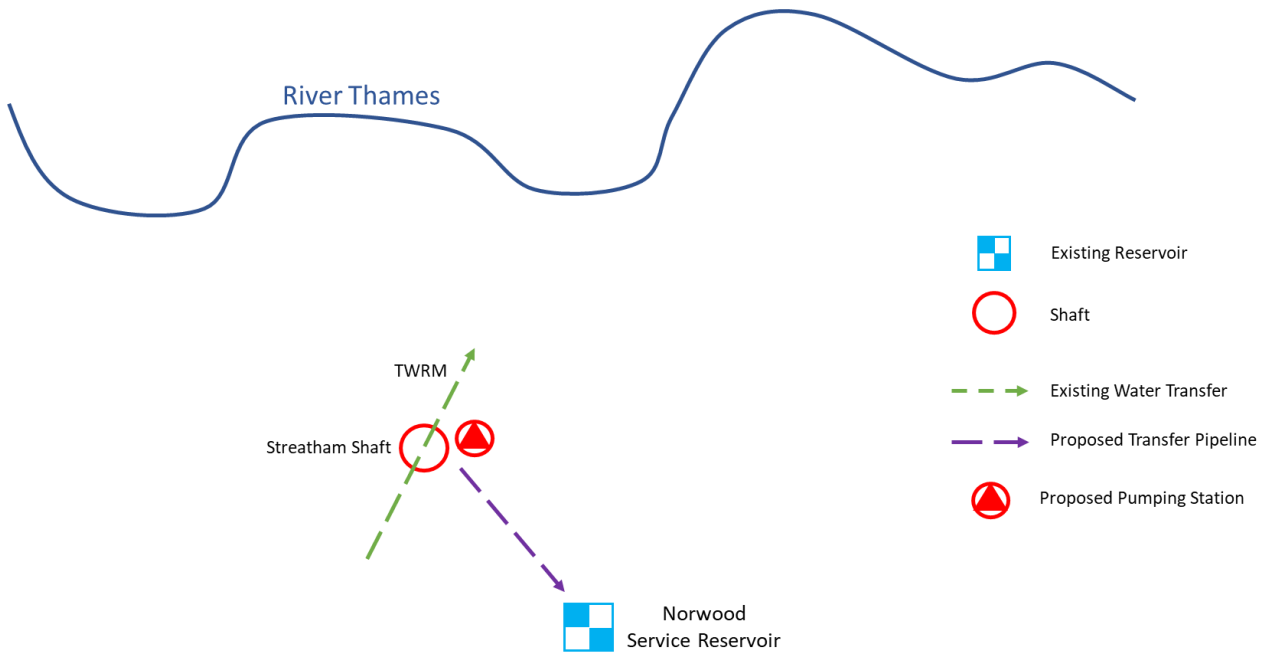
Brookfield Lane (Cheshunt) PS to Hoddesdon Service Reservoir

Name	Brookfield Lane (Cheshunt) PS to Hoddesdon Service Reservoir	
WRSE ID	TWU_LON_HI-ROC_NET_ALL_brookps-hoddeson	
WRMP19 Reference	New option to WRMP24	
Element Type	Network Reinforcement	
WRZ	LONDON	
Engineering Scope	Enhanced pumps and pipeline(s) to convey drinking water from Brookfield Lane (Cheshunt) PS to Hoddesdon SR.	
Engineering Components	<ul style="list-style-type: none"> • New main from Brookfield Lane PS to Hoddesdon SR • One major road crossing • New pumping station and standby generator at Brookfield Lane PS • Power supply and transformer for Brookfield Lane PS 	
Benefit	n/a	
Time Lead	7 years	
Mutual exclusivities	n/a	
Interdependencies/ Exclusivity	n/a	



Streatham TWRM Shaft to Norwood Service Reservoir

Name	Streatham TWRM Shaft to Norwood Service Reservoir	
WRSE ID	TWU_LON_HI-ROC_NET_ALL_streathamtonorwood	
WRMP19 Reference	New option to WRMP24	
Element Type	Network Reinforcement	
WRZ	LONDON	
Engineering Scope	Enhanced pumps and pipeline(s) to convey drinking water from Streatham TWRM Shaft to Norwood SR.	
Engineering Components	<ul style="list-style-type: none"> • New main from Streatham TWRM Shaft to Norwood SR • One major road crossing, one rail • New Shaft to house Pumping Station (PS) and facilitate connecting new pumping station at Streatham to TWRM • Power supply, standby generator and transformer for Streatham PS 	
Benefit	n/a	
Time Lead	7 years	
Mutual exclusivities	n/a	
Interdependencies/ Exclusivity	n/a	



Demand options: Scheme dossiers

- R.22 This section provides the demand options dossiers for options included in the WRSE investment modelling.
- R.23 These options were included in the optimisation stage, which resulted in development of demand reduction programmes; this is further described in Section 8 of our final WRMP24, Creating Demand Reduction Programmes.

Metering – Progressive Metering Programme (PMP)

Name	Progressive Metering Programme (PMP)
WRZ	All WRZs
Option Scope	<p>PMP is a compulsory programme of proactive meter installation for unmeasured household customers (customers who do not currently have a water meter).</p> <p>The PMP seeks to install a digital smart meter, which is either:</p> <ul style="list-style-type: none">Advanced Metering Infrastructure (AMI): commonly referred to as a 'smart meter', which sends readings automatically using a secure wireless network when Local Communication Equipment (LCE) and Wide Area Network (WAN) systems are availableAn Automatic Meter Reading (AMR): these meters are equipped with a short-range radio that communicates with a meter reading device, enabling a 'walk by' or 'drive by' reading. Referred to as 'smart enabled', they have the capability to be switched into AMI mode when LCE and a WAN are available <p>When a new smart meter is installed it will either be installed:</p> <ul style="list-style-type: none">Externally - a meter is fitted in the pavement at the stop tap position. This has the benefit that the meter will record

Name	Progressive Metering Programme (PMP)
	<p>leakage on the customer's supply pipe aiding quicker pipe repair and the meters are easier to install</p> <ul style="list-style-type: none"> • Where there is an existing sufficient sized standard boundary box a screw in meter can be installed • Where there is not a suitable boundary box, one must be excavated • Internally - a meter is fitted at the first stop tap inside the property. This location is used if the property does not have an individual supply pipe
Technical application	Households – all property types including detached, semi-detached and terraced houses and individual dwellings in Mini Bulk (small blocks of flats) and Bulk (large blocks of flats) properties.
Benefit	<p>Reduction in per capita consumption (PCC) through:</p> <ul style="list-style-type: none"> • Behavioural use change. Previously unmetered customers change water use behaviour after a meter is installed • Wastage reduction. Metering a previously unmeasured property makes it easier to identify any internal wastage (e.g. leaking toilets or taps)
Option Programme	The meter installation programme will be completed by 2025 (end of AMP8). There will be ongoing maintenance through AMP9 and AMP10 to sustain the level of demand reduction.
Constraints	<p>Meter installation is generally constrained by the location of the meter and the feasibility of installing one.</p> <ul style="list-style-type: none"> • Location of meter. The ratio of external/internal meter locations varies by property type. Internal meters will usually be installed where a property does not have an individual supply, e.g. dwellings in blocks of flats • Survey to fit ratio. Prior to meter any meter installation a survey is required to ascertain the most appropriate meter type and location for a property. It is not possible to install meters at all properties for variety of technical, economic and safety reasons

Metering – Progressive Smart Upgrade Programme Household (HH PSUP)

Name	Progressive Smart Upgrade Programme Household (HH PSUP)
WRZ	All WRZs
Option Scope	<p>The Progressive Smart Upgrade Programme Household (HH PSUP) is a proactive replacement/upgrade from basic meters to smart meters to reduce the total number of basic meters in the Thames Water area (basic meters are meters which require physical access and visual recording of the reading).</p> <p>The basic meters are replaced with smart (AMI) technology meters. When a new smart meter is installed, it will either be installed:</p> <ul style="list-style-type: none"> • Externally - a meter is fitted in the pavement at the stop tap position. This has the benefit that the meter will record

Name	Progressive Smart Upgrade Programme Household (HH PSUP)
	<p>leakage on the customer's supply pipe aiding quicker pipe repair and the meters are easier to instal</p> <ul style="list-style-type: none"> • Where there is an existing sufficient sized standard boundary box a screw in meter can be installed • Where there is not a suitable boundary box, one must be excavated • Internally - a meter is fitted at the first stop tap inside the property. This location is used if the property does not have an individual supply pipe
Technical application	Households – all property types which contain a basic meter including detached, semi-detached and terraced houses and individual dwellings in Mini Bulk (small blocks of flats) and Bulk (large blocks of flats) properties.
Benefit	Leakage reduction through reduced Customer Side Leakage (CSL) reduction. This only applies to externally fitted meters. An externally fitted meter can identify leakage of the supply pipe within a customer's property boundary.
Option Programme	The meter upgrade programme will be completed by 2030 (end of AMP9). There will be ongoing operational activity through AMP10 to sustain the level of demand reduction.
Constraints	<p>The number of basic meters which can be upgraded is dependent on:</p> <ul style="list-style-type: none"> • The number of existing basic meters and their location, broken down into internal and external meters <p>The year of reaching the end of their useful life for basic meters grouped into two categories:</p> <ul style="list-style-type: none"> • Due in AMP8. Includes both meters that will expire within AMP8 and those which have already expired such as basic meters that were installed more than 10 – 15 years ago • Due in AMP9 to 10 • Survey to fit ratio. The number of properties which are likely to have a successful exchange from a basic to AMI meter • The assumed progress of the HH PSUP meter installations

Metering – Bulk Metered Area (BMA)

Name	Bulk Metered Area (BMA)
WRZ	All WRZs
Option Scope	<p>Bulk Metered Area (BMA) may include a mix of household and non-household customers and:</p> <ul style="list-style-type: none"> • Feeds 25 or more properties • Can supply multiple buildings • Can have multiple supplies to the BMA • Involves longer and/or more complex pipework (>20m of pipe in London, >50m of pipe in Thames Valley) • Can include metered and unmeasured properties within the BMA

Name	Bulk Metered Area (BMA)
	<p>The meter fitted to a Bulk Metered Area (BMA) is non-revenue which means it will measure the water supplied but will not be used for billing. Individual premises within a BMA may have individual meters on which they are billed.</p> <p>A Bulk Metered Area (BMA) cannot be created if supplies into the area are already metered with meters used for billing or if the area is fed from more than one District Meter Area (DMA).</p>
Technical application	Bulks – 25 or more properties within multiple buildings and multiple sources. Includes metered, unmeasured, household and non-household.
Benefit	Leakage reduction through reduced Customer Side Leakage (CSL).
Option Programme	The meter installation programme will be completed by the end of AMP9. There will be ongoing operational activity through AMP10 to sustain the level of demand reduction.
Constraints	Bulk meter installation is constrained by the technical limitations of installing such meters.

Metering – Mini Bulk Metered Area (mBMA)

Name	Mini Bulk Metered Area (mBMA)
WRZ	All WRZs
Option Scope	<p>Mini Bulk Metered Area (mBMA) includes a mix of household and non-household customers (particularly sites with flats over a business premises) and;</p> <ul style="list-style-type: none"> • Feeds up to 25 properties • Supplies one building only • Has a single supply to the mBMA only • Has simple pipe work feeding multiple dwellings in one building (<20m of pipe in London, <50m of pipe in Thames Valley) <p>Can include metered and unmeasured properties within the mBMA.</p> <p>The meter fitted to a mBMA is non-revenue which means it will measure the water supplied but will not be used for billing. Individual premises within a mBMA may have individual meters on which they are billed.</p> <p>A mBMA cannot be created if supplies into the area are already metered with meters used for billing or if the area is fed from more than one DMA.</p>
Technical application	Mini Bulks – a single building with up to 25 properties within, with only a single supply to the mBMA. This includes metered, unmeasured household and non-household properties.
Benefit	Leakage reduction through reduced Customer Side Leakage (CSL).
Option Programme	The meter installation programme is ongoing through AMP8, AMP9 and AMP10.

Name	Mini Bulk Metered Area (mBMA)
Constraints	Mini Bulk meter installation is constrained by the technical limitations of installing such meters.

Metering – Progressive Smart Upgrade Programme Non-Household (NHH PSUP)

Name	Progressive Smart Upgrade Programme Non-Household (NHH PSUP)
WRZ	All WRZs
Option Scope	Proactive programme to upgrade basic meters with smart or AMI technology meters. Where the Wide Area Network (WAN) is unavailable for non-household properties, an AMI meter shall be fitted.
Technical application	Non-household properties
Benefit	Non Household Consumption (NHH Consumption) reduction and Customer Side Leakage (CSL) reduction.
Option Programme	The meter upgrade programme will be completed by the end of AMP9. There will be ongoing operational activity through AMP10 to sustain the level of demand reduction.
Constraints	Age of meter. Less than 14 years old, 71.58% are basic and should be upgraded. 100% of meters older than 14 years, both internal and external, will be upgraded in AMP8. Location of external meters. It is assumed 10% will require digs to install.

Metering – Metering Innovation – PMP

Name	Metering Innovation – PMP
WRZ	All WRZs
Option Scope	<p>Metering Innovation has two workstreams; Metering Innovation - PMP for properties that have not been metered following PMP and Metering Innovation - PSUP for properties that have not been metered following PSUP.</p> <p>Meter installations are constrained in two areas:</p> <ul style="list-style-type: none"> • No Access: properties where the customer is not available or will not provide permission for access to install a meter (either internally or externally) • Unmeterable: properties where it is impractical, too expensive or a health and safety risk to provide an installation <p>Metering Innovation will reduce the number of No Access and Unmeterable properties in the TW area by:</p> <ul style="list-style-type: none"> • No Access: Metering properties when customers vacate or move into a property • Extend access to customer support for making meter installation appointments

Name	Metering Innovation – PMP
	<ul style="list-style-type: none"> Extend operating hours to customers for meter installation appointments i.e., evenings and weekends Cover a portion of costs of reinstatement works where external meter impacts a customer drive or garden Investigate use of higher tariff for ‘no access’ customers <p>Unmeterable Innovation:</p> <ul style="list-style-type: none"> Use innovative and emerging technologies, such as smaller meters Seek funding from regulators to increase limit for meter installs deemed to be expensive
Technical application	Households – all property types which contain a basic meter including detached, semi-detached and terraced houses and individual dwellings in Mini Bulk (small blocks of flats) and Bulk (large blocks of flats) properties.
Benefit	<p>Reduction in per capita consumption (PCC) through:</p> <ul style="list-style-type: none"> Behavioural use change. Previously unmetered customers change water use behaviour after a meter is installed Wastage reduction. Metering a previously unmeasured property makes it easier to identify any internal wastage (e.g. leaking toilets or taps) <p>Leakage reduction through reduced Customer Side Leakage (CSL). This only applies to externally fitted meters. An externally fitted meter can identify leakage of the supply pipe within a customer’s property boundary.</p>
Option Programme	The programme is ongoing through AMP8, AMP9 and AMP10.
Constraints	The number of total properties, which cannot be metered under the PMP programme, which are either unmeterable due to technical/safety constraints or no access which can be successfully metered under the Metering Innovation - PMP programme.

Metering – Metering Innovation – PSUP

Name	Metering Innovation – PSUP
WRZ	All WRZs
Option Scope	<p>Metering Innovation has two workstreams; Metering Innovation - PMP for properties that have not been metered following PMP and Metering Innovation - PSUP for properties that have not been metered following PSUP.</p> <p>Meter installations are constrained in two areas:</p> <ul style="list-style-type: none"> No Access: properties where the customer is not available or will not provide permission for access to install a meter (either internally or externally) Unmeterable: properties where it is impractical, too expensive or a health and safety risk to provide an installation for upgrading a meter

Name	Metering Innovation – PSUP
	<p>Metering Innovation will reduce the number of No Access and unmeterable properties in the TW area by:</p> <p>No Access:</p> <ul style="list-style-type: none"> • Metering properties when customers vacate or move into a property • Extend access to customers for making meter installation appointments • Extend operating hours to customers for meter installation appointments i.e. evenings and weekends • Cover a portion of costs of reinstatement works where external meter impacts a customer drive or garden • Investigate use of higher tariff for ‘no access’ customers <p>Unmeterable Innovation:</p> <ul style="list-style-type: none"> • Use innovative and emerging technologies, such as smaller meters • Seek funding from regulators to increase limit for meter installs deemed to be expensive
Technical application	Households – all property types which contain a basic meter including detached, semi-detached and terraced houses and individual dwellings in Mini Bulk (small blocks of flats) and Bulk (large blocks of flats) properties.
Benefit	<p>Reduction in per capita consumption (PCC) through:</p> <ul style="list-style-type: none"> • Behavioural use change • Wastage reduction
Option Programme	Programme is planned to start in AMP9 and continue throughout AMP10.
Constraints	The number of currently considered no access installs (properties currently considered to be unsuitable for installation of a smart meter) that can have a smart meter installed due to innovations.

Water Efficiency – Digital Engagement

Name	Digital Engagement
WRZ	All WRZs
Option Scope	<p>Through digital engagement, smart metered customers will have continuous access to their own water consumption data.</p> <p>Digital Engagement has two parts:</p> <p>Digital Engagement Portal:</p> <ul style="list-style-type: none"> • Enables customers to log on and access their smart meter data at their convenience • Allows customers to track both their water consumption and cost throughout each day • Allows customers to identify areas where they could save water or money on their bills <p>Digital Engagement Advice:</p>

Name	Digital Engagement
	<ul style="list-style-type: none"> Assists customers with the interpretation of their smart meter data, including: Identifying which proportion of consumption may be a leak or internal wastage issue Identifying peak periods of behavioural usage and recommend water saving tips Providing context of a customer's consumption impact on the environment and context for the environmental benefits for water saved Providing advice to find and fix leakage or wastage issues within the home Encouraging customers to maintain their previous water savings by highlighting any subsequent increase Alerting customers when they are entering the 'high use' category of consumption
Technical application	Households – all property types including detached, semi-detached and terraced houses and individual dwellings in Mini Bulk (small blocks of flats) and Bulk (large blocks of flats) properties.
Benefit	Reduction in Household Consumption (HH consumption) which includes HH behavioural use reduction and HH wastage reduction.
Option Programme	Programme to be completed by the end of AMP9 and will become a component of the household innovation and tariffs option from AMP10.
Constraints	<p>Number of customers who engage with digital engagement.</p> <p>Digital Engagement will build upon the benefits provided by smart metering (Progressive Metering Programme, Progressive Smart Upgrade Programme and those customers who have opted to have a meter installed). The access to continuous water consumption data is an improvement on what is currently available for customers.</p> <p>The Digital Engagement programme will become a component of the household innovation and tariffs option.</p>

Water Efficiency – Household Innovation and Tariffs

Name	Household Innovation and Tariffs
WRZ	All WRZs
Option Scope	<p>Household Innovation and Tariffs encompasses innovative household activity and future tariffs. From all the options, the critical solution is AMP8 Water Efficiency Innovation Trials as the viability and practicality of other solutions depends on AMP8 investment in trials.</p> <p>AMP8 Water Efficiency Innovation Trials (new).</p> <p>Investment in trials of emerging approaches and technology to establish the most cost efficient and viable solutions to achieve long-term, sustainable reductions in household Per Capita Consumption (PCC). Specific investment will be made in a trial of non-potable solutions.</p>

Name	Household Innovation and Tariffs
	<p data-bbox="523 241 839 275">Eliminate Wastage (new)</p> <p data-bbox="523 286 1342 607">Smart meter data from Progressive Metering Programme (PMP) shows that a greater proportion of consumption is wastage compared with the volume assumed in WRMP19. Even after Progressive Metering Programme (PMP), Smarter Home Visits (SHVs), Wastage Fixes and conducted Digital Engagement programs are completed, some customers will still have internal wastage issues. This option will explore innovative ways to understand and approach the customers to repair any remaining internal wastage issues.</p> <p data-bbox="523 618 884 651">Non-Potable Water Supplies</p> <p data-bbox="523 663 1374 875">Non-potable water is water that is not of drinking water quality, but that can be used for other purposes such as toilet flushing, laundry and garden watering to reduce the total demand on potable supply. Schemes which are a combination of rainwater harvesting, stormwater harvesting, and greywater recycling are considered here.</p> <p data-bbox="523 887 1310 954">Water Efficiency on Bulk Metered Areas (BMAs) and Mini Bulk Metered Areas (mBMAs) (new).</p> <p data-bbox="523 965 1382 1032">Bulk Metered Areas (BMAs) and Mini Bulk Metered Areas (mBMAs) may be non-revenue or revenue.</p> <p data-bbox="523 1043 1347 1155">Non-revenue Bulk Metered Areas (BMAs) are smart metered for leakage detection and may include individually metered dwellings within the Bulk Metered Area (BMA).</p> <p data-bbox="523 1167 1358 1447">Revenue Bulk Metered Areas (BMAs) meter the supply to a multi occupancy building for the purposes of billing the building landlord or managing agent and do not have meters installed on individual premises within that building. This solution involves conducting a smarter home visit and, where required, a wastage repair on dwellings within revenue and non-revenue Bulk Metered Areas (BMAs). This solution will specifically focus on those dwellings without a meter.</p> <p data-bbox="523 1458 751 1491">Media campaigns</p> <p data-bbox="523 1503 1358 1715">Media campaigns will be designed with overarching messages to provide more focus to link water savings with environmental value and protection in the local area and include the promotion of local activities to help save water. Media campaigns in the shorter term will raise awareness of all Water Efficiency activities and assist to increase the take up of specific water saving initiatives.</p> <p data-bbox="523 1727 935 1760">New Water Efficiency Innovation</p> <p data-bbox="523 1771 1334 1951">Although there are indications of the types of future household innovation, there are solutions that are yet to be conceptualised. The New Water Efficiency Innovation category includes these solutions and makes an allowance for solutions that will be discovered and developed in the future.</p> <p data-bbox="523 1962 608 1995">Tariffs</p>

Name	Household Innovation and Tariffs
	Tariff charging to encourage water conservation can be implemented by reforming water rates, introducing surcharges, or establishing penalties to deter high water or wasteful water practices. Tariffs are planned to be introduced in 2035, once meter penetration is sufficiently high to ensure fairness in billing to customers.
Technical application	Households – all property types including detached, semi-detached and terraced houses and individual dwellings in Mini Bulk (small blocks of flats) and Bulk (large blocks of flats) properties.
Benefit	Reduction in Household Consumption (HH consumption) which includes HH behavioural use reduction and HH wastage reduction.
Option Programme	Innovate solution trials to take place throughout AMP8. Tariffs are planned to be introduced from 2035, once meter penetration is sufficiently high to ensure fairness in billing to customers.
Constraints	<p>All the innovation methods are constrained by the types of and success of the innovative methods that are trialled. Some of these are not yet conceptualised.</p> <p>Tariffs are constrained by meter penetration being sufficiently high to ensure fairness in billing to customers.</p>

Water Efficiency – Smarter Home Visit – Progressive Metering Programme (PMP)

Name	Smarter Home Visit – Progressive Metering Programme (PMP)
WRZ	All WRZs
Option Scope	<p>This option offers a Smarter Home Visit (SHV) to customers who are newly smart metered through the Progressive Metering Programme (PMP). Smarter Home Visits offered to those who have requested a smart meter from Thames Water (Optants) and those who have been metered through the Progressive Smart Upgrade Programme Household (HH PSUP) programme are separate options.</p> <p>A Smarter Home Visit (SHV) includes a free home visit by qualified staff to install water saving devices and provide personalised water saving advice to households. It includes an App which is used to produce a tailored water savings report for every customer.</p> <p>This report helps customers to quantify their potential water, energy, and money savings from changing their water use behaviour in the home.</p>
Technical application	Households – all property types including detached, semi-detached and terraced houses and individual dwellings in Mini Bulk (small blocks of flats) and Bulk (large blocks of flats) properties.
Benefit	<p>Reduction in per capita consumption (PCC) through behavioural use change.</p> <p>Smarter Home Visits can also identify wastage fixes, the benefits of which are described in Wastage Fix Demand Option.</p>

Name	Smarter Home Visit – Progressive Metering Programme (PMP)
Option Programme	The Smarter Home Visits be completed by the end of AMP8. There will be ongoing maintenance through AMP9 and AMP10 to sustain the level of demand reduction achieved from the visits.
Constraints	<ul style="list-style-type: none"> • The Smarter Home Visit - Progressive Metering Programme (PMP) builds upon the Progressive Metering Programme (PMP) • The ratio of high (more than 500 l/d) and normal (less than 500 l/d) households. Higher use households are particularly targeted as part of the programme • The uptake rate of Smarter Home Visits among eligible households

Water Efficiency – Smarter Home Visit – Optants

Name	Smarter Home Visit – Optants
WRZ	All WRZs
Option Scope	<p>This option offers a Smarter Home Visit (SHV) to customers who are newly smart metered after requesting a meter from Thames Water. Optants are customers who request a meter from Thames Water. Smarter Home Visits offered to those who have been metered through the Progressive Metering Programme (PMP) and Progressive Smart Upgrade Programme Household (HH PSUP) programme are separate options.</p> <p>A Smarter Home Visit (SHV) includes a free home visit by qualified staff to install water saving devices and provide personalised water saving advice to households. It includes an App which is used to produce a tailored water savings report for every customer.</p> <p>This report helps customers to quantify their potential water, energy, and money savings from changing their water use behaviour in the home.</p>
Technical application	Households – all property types including detached, semi-detached and terraced houses and individual dwellings in Mini Bulk (small blocks of flats) and Bulk (large blocks of flats) properties.
Benefit	<p>Reduction in per capita consumption (PCC) through behavioural use change.</p> <p>Smarter Home Visits can also identify wastage fixes, the benefits of which are described in Wastage Fix Demand Option.</p>
Option Programme	The Smarter Home Visits be completed by the end of AMP8. There will be ongoing maintenance through AMP9 and AMP10 to sustain the level of demand reduction achieved from the visits.
Constraints	The Smarter Home Visit – Optants builds upon the base of customers who have requested a meter from Thames Water (Optants).

Water Efficiency – Smarter Home Visit – Progressive Smart Upgrade Programme (PSUP)

Name	Smarter Home Visit – Progressive Smart Upgrade Programme (PSUP)
WRZ	All WRZs
Option Scope	<p>This option offers a Smarter Home Visit (SHV) to customers who are newly smart metered through the Progressive Metering Programme (PSUP). Smarter Home Visits offered to those who have requested a smart meter from Thames Water (Optants) and those who have been metered through the Progressive Metering Programme (PMP) are separate options.</p> <p>A Smarter Home Visit (SHV) includes a free home visit by qualified staff to install water saving devices and provide personalised water saving advice to households. It includes an App which is used to produce a tailored water savings report for every customer.</p> <p>This report helps customers to quantify their potential water, energy, and money savings from changing their water use behaviour in the home.</p>
Technical application	Households – all property types including detached, semi-detached and terraced houses and individual dwellings in Mini Bulk (small blocks of flats) and Bulk (large blocks of flats) properties.
Benefit	<p>Reduction in per capita consumption (PCC) through behavioural use change.</p> <p>Smarter Home Visits can also identify wastage fixes, the benefits of which are described in Wastage Fix Demand Option.</p>
Option Programme	The Smarter Home Visits be completed by the end of AMP9. There will be ongoing maintenance through AMP10 to sustain the level of demand reduction achieved from the visits.
Constraints	The Smarter Home Visit – Progressive Smart Upgrade Programme (PSUP) builds upon the Progressive Smart Upgrade Programme Household (HH PSUP) Metering Option.

Water Efficiency – Wastage Fix

Name	Wastage Fix
WRZ	All WRZs
Option Scope	Wastage Fixes are offered to customers following a Smarter Home Visit (SHV) if they are found to have a leaking toilet or tap.
Technical application	Households – all property types including detached, semi-detached and terraced houses and individual dwellings in Mini Bulk (small blocks of flats) and Bulk (large blocks of flats) properties.
Benefit	Reduction in Household Consumption (HH Consumption) through wastage reductions.
Option Programme	The Wastage fixes be completed by the end of AMP9. There will be ongoing maintenance through AMP10 to sustain the level of demand reduction achieved from the fixes.

Name	Wastage Fix
Constraints	<p>Wastage Fixes result from repairs of leaks on toilets and taps identified through Smarter Home Visits and dependent on the number of Smarter Home Visits through the following Water Efficiency options:</p> <ul style="list-style-type: none"> • Smarter Home Visit – Progressive Metering Programme (PMP) • Smarter Home Visit – Optants • Smarter Home Visit – Progressive Smart Upgrade Programme (PSUP)

Water Efficiency – Green Redeem

Name	Green Redeem
WRZ	All WRZs
Option Scope	<p>Customers are incentivised to use less water through awarding points that can be exchanged for money off vouchers, charity donations, prize draw entries and days out.</p> <p>Customers are given water reduction targets based on their current usage and are awarded points if they can reach their water saving target, sustain the reduction in water usage and if they exceed their reduction targets.</p>
Technical application	Households – all property types including detached, semi-detached and terraced houses and individual dwellings in Mini Bulk (small blocks of flats) and Bulk (large blocks of flats) properties.
Benefit	Reduction in per capita consumption (PCC) through behavioural use change resulting in lower water consumption.
Option Programme	The programme will be completed by the end of AMP9. There will be ongoing operational activity through AMP10 to sustain the level of demand reduction.
Constraints	<p>Green Redeem is offered to customers who have had a Smarter Home Visit and/or a Smart Meter installed and is therefore dependent on the following other Water Efficiency options:</p> <ul style="list-style-type: none"> • Smarter Home Visit – Progressive Metering Programme (PMP) • Smarter Home Visit – Optants • Smarter Home Visit – Progressive Smart Upgrade Programme (PSUP) <p>And the following metering options (as well as those who have requested a meter from Thames Water (Optants)):</p> <ul style="list-style-type: none"> • Progressive Metering Programme (PMP) • Progressive Smart Upgrade Programme Household (HH PSUP)

Water Efficiency – Smarter Business Visits (SBVs)

Name	Smarter Business Visits (SBVs)
WRZ	All WRZs
Option Scope	A free visit by a qualified member of staff to install water saving devices and provide personalised water saving advice to non-households.
Technical application	Non-household properties (businesses)
Benefit	Reduction in non-household consumption (NHH consumption) which is the sum of two subcomponents which includes NHH behavioural use reduction and NHH wastage reduction.
Option Programme	The Smarter Business Visits be completed by the end of AMP8. There will be ongoing operational through AMP9 and AMP10 to sustain the level of demand reduction achieved from the visits.
Constraints	Smarter Business Visits are offered to businesses both through lettering and more targeted groundwork by Thames Water.

Water Efficiency – Non-Household Continuous Flow Fixes

Name	Non-Household Continuous Flow Fixes
WRZ	All WRZs
Option Scope	Fixes are offered to non-household properties (businesses) which are identified as having a continuous flow (where the flow rate does not drop below a minimum consistently for several days). Continuous flows can be targeted distinct from Smarter Business Visits (SBVs) and metering. It is envisioned that a dedicated element of the SBV team would be added to prioritise the identification and reduction of continuous flow elements.
Technical application	Non-household properties (businesses)
Benefit	Reduction in non-household consumption (NHH consumption).
Option Programme	Through AMP8 and AMP9 a dedicated element of the Smarter Business Visit (SBV) team will target priority Non-Household Continuous Flow Fixes. From AMP10 onwards smart meter data will be used to target sites.
Constraints	The option is constrained by the ability to identify continuous flows at non-household properties. This ability will be enhanced from AMP10 onwards with the use of Smart Metering data to target the properties.

Water Efficiency – Non-Household New Tariff Structure

Name	Non-Household New Tariff Structure
WRZ	All WRZs
Option Scope	In the non-household sector, water usage tariffs are envisioned to be brought in from AMP10 and onwards. These tariffs would look to

Name	Non-Household New Tariff Structure
	implement higher cost rates for overuse of water in the commercial sector, in order to drive down demand.
Technical application	Non-household properties (businesses)
Benefit	Reduction in non-household consumption (NHH consumption).
Option Programme	It is envisaged that the tariff structure will be implemented from AMP10 onwards.
Constraints	The option is contingent upon Smart Metering Data being available.

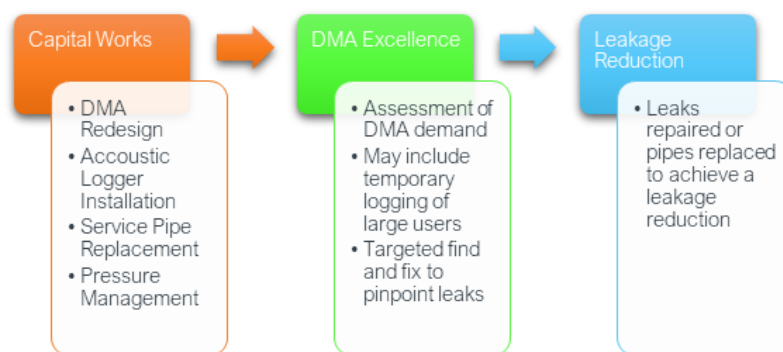
Water Efficiency – Non-Household Retailer Activity

Name	Non-Household Retailer Activity
WRZ	All WRZs
Option Scope	<p>Communication with non-household water retailers to further reduce business use by incentivising change. This will likely be a combination of:</p> <ul style="list-style-type: none"> • A retailer-led water efficiency scheme which, similar to tariffs, would target overuse of water. It is expected that this would be more in-depth than the tariffing option would be, with coordination between retailers and NHH users allowing for further savings • A revised retail exit code, which could better enable NHH retailer demand reduction activity
Technical application	Non-household properties (retailers)
Benefit	Reduction in non-household retailer consumption (NHH consumption).
Option Programme	The Programme will run through AMP8 to AMP12.
Constraints	This option may be constrained by the need to expand the objectives of the REC by using it to incentivise water efficiency amongst business customers.

Leakage Reduction – Advanced District Metered Area Intervention (DMAi)

Name	Advanced District Metered Area Intervention (DMAi)
WRZ	All WRZs excl. Henley WRZ as the network is in a good condition such that it is possible to detect and understand where leakage is occurring.
Option Scope	<p>Advanced DMAi – Capital Works:</p> <ul style="list-style-type: none"> • DMA Redesign – involves splitting and reconfiguring DMAs to make it more efficient to pinpoint leaks i.e., ensure there is an appropriate property count, length of pipework and number of meters in each DMA. This will help resolve longstanding network issues and ensure leakage detection and repair can be undertaken • Acoustic logger installation • Service pipe replacement

Name	Advanced District Metered Area Intervention (DMAi)
	<ul style="list-style-type: none"> Pressure Management: install new pressure management schemes within individual DMAs at sub-DMA level
	Advanced DMAi – Operational Works/DMA Excellence:
	<ul style="list-style-type: none"> DMA Excellence: operational component of the work following DMA Redesign This includes an assessment of demand in the DMA that looks at the assets, properties, and customer water demand. This may include temporary logging of large customers Traditional or innovative find and fix activity is employed to pinpoint leaks
	Advanced DMAi – Final Works/Leakage Reduction:
	<ul style="list-style-type: none"> The final stage of Advanced DMAi is to fix the leaks identified to realise the leakage reduction



Technical application	Network
Benefit	Reduction in leakage
Option Programme	The capital programme will be completed throughout AMP8-AMP10. There will be ongoing maintenance and operational activity through AMP11 and AMP12 to sustain the level of leakage reduction achieved.
Constraints	The Advanced DMAi option involves a range of measures which are closely interlinked to create holistic strategies specific to individual DMAs. The availability and suitability of measures in particular DMAs will affect the implementation of others. The three high level work streams of Capital Works, DMA Excellence and Leakage Reduction, all influence and are dependent upon each other.

Leakage Reduction – Leakage Innovation

Name	Leakage Innovation
WRZ	All WRZs
Option Scope	Leakage Innovation includes: <ul style="list-style-type: none"> Advanced technologies for precise and accurate leakage detection – artificial intelligence and machine learning applied to pattern recognition Adoption of keyhole repair techniques

Name	Leakage Innovation
	<ul style="list-style-type: none"> • Advanced technologies for precise and accurate leak location – acoustics • Advanced technologies for precise and accurate leakage location – tracer gases • New quality or design of joints so they are leak free – product development • Using technologies for repairing pipes from the inside • Enhanced detection equipment or innovation in detection • Enhanced repair methods or innovation in repair methods

AMP8 Investment in Innovation Trials

In AMP8, investment in trials of innovative technology and leakage reduction and repair trials are foreseen. This investment is crucial to test and demonstrate the most cost-effective innovative solutions prior to their full implementation in later AMPs.

- The technology and approach to achieve long-term leakage reduction ambitions is either emerging or is yet to be developed.
- It is therefore critical to understand the emerging technology and approaches to ensure the deliverability of Leakage innovation.

Technical application	Network
Benefit	Reduction in leakage
Option Programme	The programme is expected to capital works only (which will have a life of greater than 60 years). The programme will run through AMP8 to AMP12. There are no operational maintenance costs associated with this option.
Constraints	<p>The technology and approach required to achieve the long-term leakage reduction ambition is either emerging or is yet to be developed.</p> <ul style="list-style-type: none"> • The success of innovative techniques that we are currently aware of but have not yet implemented • The successful development of new innovative techniques that we are currently not aware of and the degree of leakage reduction benefit that they return once implemented

Leakage Reduction – Mains Rehabilitation

Name	Mains Rehabilitation
WRZ	All WRZs
Option Scope	<p>Water mains rehabilitation is a traditional and long-term sustainable option to reduce leakage from the distribution mains network - which includes over 31,000km of water mains across London and Thames Valley.</p> <p>A lot of London's water mains are between 100 and 150 years old and more likely to leak or burst than modern water supplies, due to</p>

Name	Mains Rehabilitation
	<p>increase in road traffic, corrosive soil conditions and ground movement.</p> <p>This option focuses on water mains rehabilitation of the 100–150-year-old Victorian mains in a phased manner. This includes mains replacement, relining and repair.</p>
Technical application	Network
Benefit	Reduction in leakage volume from mains
Option Programme	The programme will run through AMP8-AMP12.
Constraints	<p>Particular rehabilitation methods are specific to the situation in each DMA.</p> <p>Appropriate where water mains that require either renovating or replacement where leakage issues cannot be addressed by either Advanced DMAi or Leakage Innovation.</p>

Annex A: Changes Made Between Plan Iterations

In this Annex, we set out the main changes made to our plan that were made between the draft WRMP24 and the revised draft WRMP24, and between the revised draft WRMP24 and final WRMP24.

Changes between draft WRMP24 and revised draft WRMP24:

Following feedback from Environment agency, we have included Drought Permit Scheme Dossiers.

Changes between revised draft WRMP24 and Final WRMP24:

In this section, between the revised draft WRMP and the Final WRMP, we have included one new option that emerged as the preferred solution in our preliminary options appraisal study for the Lower Thames Options Development.

