

Thames Water Final Water Resources Management Plan 2019

Technical Appendices

Appendix P: Options list tables



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Appendix P.

Options list tables

A. Introduction

- P.1 Appendix P sets out the water resource options list (Section B) and the demand options list (Section C).

B. Water resource options list

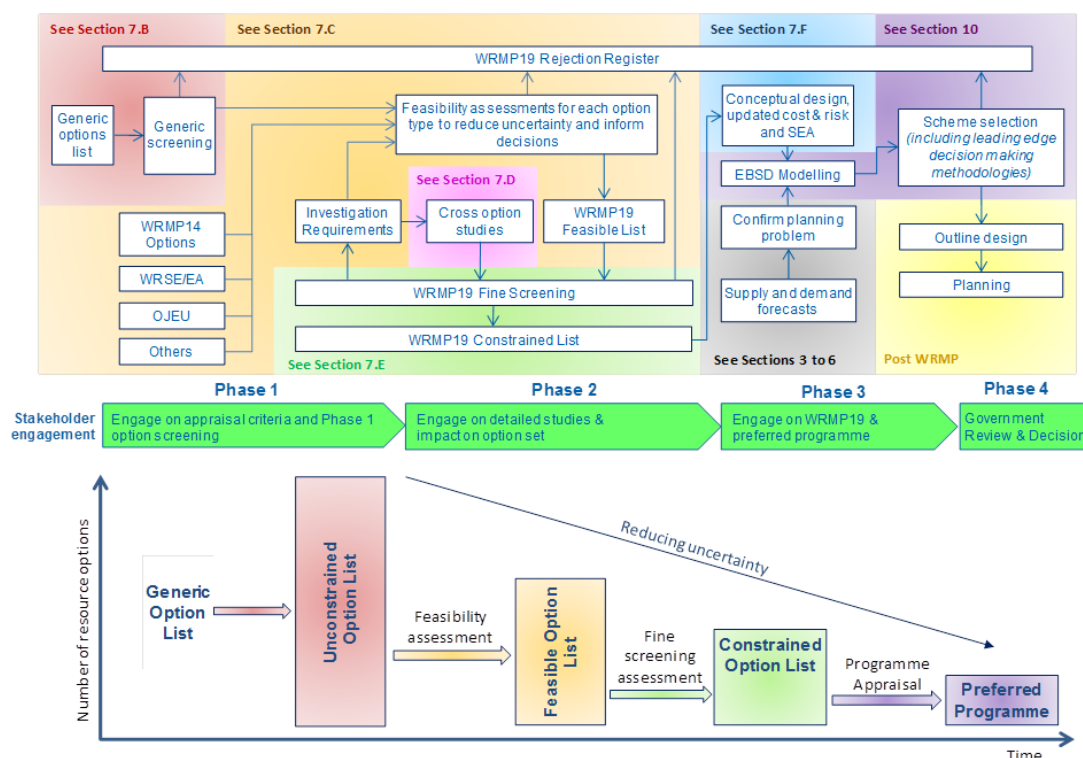
- P.2 Following the principles of the WRPG (04/2017) section 6, a phased approach to developing water resource options for our Water Resources Management Plan 2019 (has been undertaken so that effort on reducing uncertainties is focused on the issues that could influence option screening decisions. An overview of the four-phase approach to reviewing and assessing resource options in the preparation of the WRMP19 is shown in Figure P-1. The four phases comprised: option review and screening; detailed investigations; programme appraisal; and scheme selection design and planning. These are described in more detail below.
- P.3 **Phase 1 – Option review and screening:** The objective of Phase 1 was to review the options carried forward from our Water Resources Management Plan 2014 (WRMP14) and to enable better targeting of Phase 2 option assessments by focusing on uncertainties and risks that were fundamentally material to option selection. The outputs from Phase 1 were fine screening reports for large¹ and small² water resource options.
- P.4 **Phase 2 – Detailed investigations:** In Phase 2, targeted detailed investigations were undertaken to enable a clear explanation of how specific feasible options were identified and to reduce uncertainties concerning the identification of the best value options. The required investigations identified in Phase 1 were reported in a series of feasibility reports and cross-option studies listed in section 7.H.
- P.5 As these investigations were completed the fine screening process was re-applied to ensure that the new information that had been revealed on investigation was taken into account in the assessment and in screening decisions. The resulting output of this updated fine screening exercise, now reported in the updated fine screening report³, is the Constrained List of options that have then been carried forward for conceptual design and programme appraisal in Phase 3.

¹ Phase 1 Large Option Screening Report, Mott MacDonald, (May 2015)

² Phase 1 Small Option Screening Report, Mott MacDonald, (November 2015)

³ Fine Screening Report, Mott Macdonald, (September 2018)

Figure P-1: A phased approach to reviewing and assessing water resource options



Generic screening of resource options

- P.6 The option types considered in the generic screening exercise were those listed in the UKWIR Water Resources Planning Tools report⁴. The generic water resource options list and a summary of the results of the screening are shown in Table P-1.

⁴ UKWIR, Water Resources Planning Tools, EBSD Report, Ref. 12/WR/27/6. 2012.

Table P-1: Generic list of resource options

Generic resource management options [†]		Generic screening	Specific option identification	
1	Direct river abstraction	✓	Direct River Abstraction Feasibility Report	
2	New reservoir	✓	New Reservoirs Feasibility Report	
3	Groundwater sources	✓	Groundwater Feasibility Report	
4	Infiltration galleries	✓	Included in DRA/Desal as possible intake	
5	Aquifer storage and recovery	✓	Groundwater Feasibility Report	
6	Aquifer recharge	✓	Groundwater Feasibility Report	
7	Desalination	✓	Desalination Feasibility Report	
8a	Bulk transfers of raw water	✓	Raw Water Transfer Feasibility Report	
8b	Bulk inter/intra company transfers of treated water	✓	Inter-zonal Water Transfers Feasibility Report	
9	Tankering of water	✗		
10	Redevelopment of existing resources	✗		
11	Reuse of existing private supplies	✓	Third party options report	
12	Water re-use	✓	Water Reuse Feasibility Report	
13	Imports (icebergs)	✗		
14	Rain cloud seeding	✗		
15	Tidal barrage	✗		
16	Rainwater harvesting	✗		
17	Abstraction licence trading	✓	Third party options report	
18	Water quality schemes that increase DO	✓	Catchment Management Feasibility Report	
19	Catchment management schemes	✓	Catchment Management Feasibility Report	
20	Conjunctive use operation of sources	✓	Built into DOs through WARMS	
21	Joint ("shared asset") resource	✓	Included in feasibility reports where applicable	
22	Asset transfers	✓	Third party options report	
23	Options to trade other (infrastructure) assets	✓	Third party options report	

[†] Taken from UKWIR 2012, Water Resources Planning Tools, EBSD Report, Ref 12/WR/27/6

Unconstrained list of resource options

- P.7 For option types that passed the generic screening exercise, feasibility studies were conducted to identify an Unconstrained List of potential options and then to assess the feasibility of the options identified. These studies led to the production of the Feasible List of options of each resource type that has then been further evaluated at the fine screening stage, which compared options across the different types, to produce the Constrained List of specific options. The Unconstrained List is set out in Table P-2, indicating the screening status of each specific option identified.



Table P-2: Unconstrained list of resource elements

Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validation	Screening	
London WRZ		DYAA					
Water Reuse	Beckton Reuse - 380 MI/d	✓	✓	✓	✓	✓	336 MI/d (DO)
	Beckton Reuse - 300 MI/d	✓	✓	✓	✓	✓	268 MI/d (DO)
	Beckton Reuse - 200 MI/d	✓	✓	✓	✓	✓	183 MI/d (DO)
	Beckton Reuse - 150 MI/d	✓	✓	✓	✓	✓	138 MI/d (DO)
	Beckton Reuse - 100 MI/d	✓	✓	✓	✓	✓	95 MI/d (DO)
	Beckton Reuse - 50 MI/d	✓	✓	✓	✓	✗	49 MI/d (DO)
	Abbey Mills PS Sewer Mining (Luxborough Lane) - 300 MI/d	✓	✗				300 MI/d (NC)
	Abbey Mills PS Sewer Mining (Luxborough Lane) - 200 MI/d	✓	✗				200 MI/d (NC)
	Abbey Mills PS Sewer Mining (Luxborough Lane) - 150 MI/d	✓	✗				150 MI/d (NC)
	Abbey Mills PS Sewer Mining (Luxborough Lane) - 100 MI/d	✓	✗				100 MI/d (NC)
	Abbey Mills PS Sewer Mining (Luxborough Lane) - 50 MI/d	✓	✗				50 MI/d (NC)
	Abbey Mills PS Sewer Mining (Lower Hall) – 300 MI/d	✓	✓	✗			300 MI/d (NC)
	Abbey Mills PS Sewer Mining (Lower Hall) – 200 MI/d	✓	✓	✗			200 MI/d (NC)
	Abbey Mills PS Sewer Mining (Lower Hall) – 150 MI/d	✓	✓	✗			150 MI/d (NC)
	Abbey Mills PS Sewer Mining (Lower Hall) – 100 MI/d	✓	✓	✗			100 MI/d (NC)
	Abbey Mills PS Sewer Mining (Lower Hall) – 50 MI/d	✓	✓	✗			50 MI/d (NC)
	Mogden Reuse (Hydes Field)- 200 MI/d	✓	✓	✓	✓	✗	180 MI/d (DO)
	Mogden Reuse (Hydes Field) - 150 MI/d	✓	✓	✓	✓	✗	137 MI/d (DO)
	Mogden Reuse (Hydes Field) - 100 MI/d	✓	✓	✓	✓	✗	94 MI/d (DO)
	Mogden Reuse (Hydes Field) - 50 MI/d	✓	✓	✓	✓	✗	49 MI/d (DO)
Mogden Reuse (Mogden STW) – 212 MI/d	✓	✓	✗			191 MI/d (DO)	



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validati on	screen ing	
	Deephams Reuse – 46.5 MI/d	✓	✓	✓	✓	✓	45 MI/d (DO)
	Deephams Reuse – 25 MI/d	✓	✓	✗			25 MI/d (NC)
	Crossness Reuse - 190 MI/d	✓	✓	✓	✓	✗	174 MI/d (DO)
	Crossness Reuse - 150 MI/d	✓	✓	✓	✓	✗	138 MI/d (DO)
	Crossness Reuse - 100 MI/d	✓	✓	✓	✓	✗	95 MI/d (DO)
	Crossness Reuse - 50 MI/d	✓	✓	✓	✓	✗	49 MI/d (DO)
	Mogden South Sewer Reuse - 50 MI/d	✓	✓	✓	✓	✓	49 MI/d (DO)
	Greenwich PS Sewer Mining (Lower Hall) - 150 MI/d	✓	✗				150 MI/d (NC)
	Greenwich PS Sewer Mining (Lower Hall) – 100 MI/d	✓	✗				100 MI/d (NC)
	Greenwich PS Sewer Mining (Lower Hall) – 50 MI/d	✓	✗				50 MI/d (NC)
	Greenwich PS Sewer Mining (Hogsmill) – 150 MI/d	✓	✗				150 MI/d (NC)
	Greenwich PS Sewer Mining (Hogsmill) – 100 MI/d	✓	✗				100 MI/d (NC)
	Greenwich PS Sewer Mining (Hogsmill) – 50 MI/d	✓	✗				50 MI/d (NC)
	Millbrook Road PS Sewer Mining (Hogsmill) – 100 MI/d	✓	✓	✗			100 MI/d (NC)
	Millbrook Road PS Sewer Mining (Hogsmill) – 50 MI/d	✓	✓	✗			50 MI/d (NC)
	Wandle Valley PS Sewer Mining (Hogsmill) – 17 MI/d	✓	✓	✗			17 MI/d (NC)
	Long Reach STW Final Effluent Reuse (adjacent to site) – 80 MI/d	✓	✗				80 MI/d (NC)
	Long Reach STW Final Effluent Reuse (adjacent to site) – 50 MI/d	✓	✗				50 MI/d (NC)
	Riverside STW Final Effluent Reuse (adjacent to site) – 38 MI/d	✓	✗				38 MI/d (NC)
Desalination	Crossness Desalination (Unblended) - 65 MI/d	✓	✓	✓	✓	✗	60 MI/d (DO)
	Crossness Desalination (Blended) - 100 MI/d	✓	✓	✓	✓	✓	95 MI/d (DO)
	Crossness Desalination (Blended) - 200 MI/d	✓	✓	✓	✓	✓	189 MI/d (DO)
	Crossness Desalination (Blended) - 300 MI/d	✓	✓	✓	✓	✓	284 MI/d (DO)
	Beckton Desalination - 150 MI/d	✓	✓	✓	✓	✓	142 MI/d (DO)



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validation	Screening	
	River Lee, Coppermills WTW (blended)	✓	✗				150 MI/d (NC)
	Manor Road, Erith, Honor Oak, (blended)	✓	✗				150 MI/d (NC)
	Crossness (Erith Southern Grazing Marshes) -150 MI/d	✓	✓	✗			150 MI/d (NC)
	Crossness (Erith Southern Grazing Marshes) – 300 MI/d	✓	✓	✗			300 MI/d (NC)
	Tripcock Ness, Thamesmead Coppermills WTW (blended) - 150 MI/d	✓	✗				150 MI/d (NC)
	Tripcock Ness, Thamesmead Coppermills WTW (blended) – 300 MI/d	✓	✗				300 MI/d (NC)
Raw Water Transfer (Resource)	Kielder Reservoir	✓	✗				Not defined
	Great Spring	✗					Not defined
	CRT Bradley groundwater abstraction	✗					15 MI/d (NC)
	CRT BCN Surplus (options for SWOX, SWA and LON)	✓	✓	✓	✓	✓	11 MI/d (DO)
	Minworth STW effluent and pipe to the River Avon	✓	✓	✓	✓	✓	58 MI/d (DO)***
	Minworth STW effluent for transfer through existing canal network	✗					75 MI/d (NC)
	Mythe WTW unused part of licence	✓	✓	✓	✓	✓	12 MI/d (DO)***
	Netheridge STW effluent	✓	✓	✓	✓	✓	18 MI/d (DO)***
	River Wye to Deerhurst – 60.3 MI/d	✓	✓	✓	✓	✓	37 MI/d (DO)***
	Redeployment of ST abstractions at Shrewsbury – 12 MI/d	✓	✓	✓	✓	✓	6 MI/d (DO)***
	Redeployment of ST abstractions at Shrewsbury – 30 MI/d	✓	✓	✓	✓	✓	15 MI/d (DO)***
	Lake Vyrnwy – 60 MI/d	✓	✓	✓	✓	✓	30 MI/d (DO)***
	Lake Vyrnwy – 148 MI/d	✓	✓	✓	✓	✓	74 MI/d (DO)***
	Lake Vyrnwy – 180 MI/d	✓	✓	✓	✓	✓	90 MI/d (DO)***
	Craig Goch Reservoir expansion	✗					Not defined
	River Severn (unsupported)	✓	✓	✓	✗		80 MI/d (DO)***
	Longdon Marsh reservoir to support River Severn abstraction – 50 Mm ³	✓	✗				50 Mm ³ (NC)
	Longdon Marsh reservoir to support River Severn abstraction – 89 Mm ³	✓	✗				89 Mm ³ (NC)



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validati on	screeni ng	
	Longdon Marsh reservoir to support River Severn abstraction – 125 Mm ³	✓	✗				125 Mm ³ (NC)
	Use of a new Thames reservoir (as in reservoir report, if successfully promoted) to support River Severn abstraction and transfer	✗					n/a
	Use of Farmoor Reservoir to support River Severn abstraction and transfer	✗					n/a
	Oxford Canal - Farmoor Reservoir (SWOX)	n/a	✓	✓	✓	✓	12 MI/d (DO)
Raw Water Transfer ** (Conveyance)	Oxford Canal – Farmoor reservoir	n/a	✓	✓	✓	✓	15 MI/d (NC)
	Canal transfer Minworth STW to River Thames	n/a	✗				75 MI/d (NC)
	Pipeline from Kielder Reservoir	n/a	✗	✗			Up to 300 MI/d to LON; 40 MI/d to SWOX (NC)
	Canals from Kielder Reservoir	n/a	✗				45 MI/d (NC)
	Pipeline Deerhurst to Culham for 100 MI/d transfer	n/a	✗				100 MI/d (NC)
	Deerhurst to Radcot 300 MI/d	n/a	✗				300 MI/d (NC)
	Deerhurst to Radcot 600 MI/d	n/a	✗				600 MI/d (NC)
	Pipeline Deerhurst to Culham for 300 MI/d transfer	n/a	✓	✓	✓	✓	300 MI/d (NC)
	Pipeline Deerhurst to Culham for 400 MI/d transfer	n/a	✓	✓	✓	✓	400 MI/d (NC)
	Pipeline Deerhurst to Culham for 500 MI/d transfer	n/a	✓	✓	✓	✓	500 MI/d (NC)
	Pipeline Deerhurst to Culham for 600 MI/d transfer	n/a	✓	✗			600 MI/d (NC)
	Pipeline Deerhurst to Lechlade for 100 MI/d transfer	n/a	✓	✓	✗		100 MI/d (NC)



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validation	Screening	
	Cotswold Canal 100 MI/d	n/a	✓	✗			100 MI/d (NC)
	Cotswold Canal 300 MI/d	n/a	✓	✗			300 MI/d (NC)
Reservoir†	Abingdon Reservoir 150Mm ³	✓	✓	✓	✓	✓	275 MI/d (DO) [#]
	Abingdon Reservoir 125Mm ³	✓	✓	✓	✓	✓	234 MI/d (DO) [#]
	Abingdon Reservoir 100Mm ³	✓	✓	✓	✓	✓	190 MI/d (DO) [#]
	Abingdon Reservoir 75Mm ³	✓	✓	✓	✓	✓	142 MI/d (DO) [#]
	Abingdon Reservoir 50Mm ³	✓	✓	✓	✓	✗	91 MI/d (DO) [#]
	Abingdon Reservoir 30Mm ³	✓	✓	✓	✓	✗	49 MI/d (DO) [#]
	Abingdon Reservoir Phased 80+42Mm ³	✓	✓	✓	✓	✓	151+83 MI/d (DO) [#]
	Abingdon Reservoir Phased 30+100Mm ³	✓	✓	✓	✓	✓	49+199 MI/d (DO) [#]
	Chinnor Reservoir 50Mm ³	✓	✓	✓	✓	✗	91 MI/d (DO) [#]
	Chinnor Reservoir 30Mm ³	✓	✓	✓	✓	✗	49 MI/d (DO) [#]
	Marsh Gibbon Reservoir 75 Mm ³	✓	✓	✓	✓	✗	142 MI/d (DO) [#]
	Marsh Gibbon Reservoir 50 Mm ³	✓	✓	✓	✓	✗	91 MI/d (DO) [#]
	Marsh Gibbon Reservoir 30 Mm ³	✓	✓	✓	✓	✗	49 MI/d (DO) [#]
	Site 1 – Minety	✓	✗				A
	Site 2 - Leigh	✓	✗				A
	Site 3 - Cricklade	✗					C
	Site 4 - Swindon	✗					A
	Site 5 – Broad Blunsdon	✓	✗				C
	Site 6 - Highworth	✓	✗				B
	Site 7 - Wanborough	✓	✓	✗			A
	Site 8 - Bishopstone	✓	✗				C



Option type	Name	Feasibility Stage					Capacity* (Ml/d)
		Stage 1	Stage 2	Stage 3	Validati on	screen ing	
	Site 9 - Lechlade	✗					B
	Site 10 - Shrivenham	✓	✗				B
	Site 11 – Clanfield	✓	✗				A
	Site 12 - Faringdon	✓	✗				C
	Site 13 - Uffington	✗					B
	Site 14 – Brize Norton	✓	✗				B
	Site 15 - Bampton	✓	✗				B
	Site 16 - Witney	✓	✗				B
	Site 17 – Stanford in the Vale	✓	✗				B
	Site 18 - Longworth	✓	✗				B
	Site 19 – South Leigh	✓	✗				A
	Site 20 – West Hanney	✗					B
	Site 21 – Stanton Harcourt	✓	✗				A
	Site 23 - Wantage	✓	✗				B
	Site 24 - Kidlington	✗					B
	Site 25 - Oxford	✓	✗				A
	Site 26 - Didcot	✓	✗				A
	Site 27 - Beckley	✗					C
	Site 28 – Brightwell cum Sotwell	✗					B
	Site 29 - Ambrosden	✗					A
	Site 30 – Drayton St Leonard	✓	✗				A
	Site 31 - Wheatley	✗					B
	Site 32 – Benson	✗					B
	Site 33 – Chalgrove	✓	✗				B



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validation	Screening	
	Site 34 - Bicester	×					B
	Site 35 – Chalgrove Airport	✓	×				B
	Site 37 - Ludgershall	✓	✓	×			B
	Site 38 – Great Haseley	✓	×				A
	Site 39 - Quainton	✓	×				B
	Site 40 - Postcombe	✓	✓	×			A
	Site 42 – Haddenham	✓	✓	×			A
	Site 43 - Aylesbury	✓	✓	×			B
	Site 44 - Stone	×					B
	Site 45 - Whitchurch	×					A
	Site 46 - Stewkley	×					B
	Site 47 - Bierton	×					B
	Site 48 - Wingrave	×					A
	Site 49 - Cheddington	✓	×				A
	Site 50 - Kintbury	✓	×				B
	Site 51 - Burghfield	×					A
	Site 52 – Beech Hill	✓	×				B
	Site 53 - Wokingham	×					A
	Site 54 - Bracknell	✓	✓	×			A
	Site 55 - Maidenhead	×					A
Direct River Abstraction	New river abstraction from River Lee at Three Mills Lock and transfer to Lockwood Thames-Lee Tunnel Extension	✓	✓	✓	✓	×	35 MI/d (NC)
	River Lee abstraction at Three Mills Lock, transfer to North Woolwich Road site for treatment to potable quality, followed by transfer to service reservoir	✓	×				35 MI/d (NC)



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validation	Screening	
	Mogden effluent transfer to Teddington and new river abstraction at Teddington connecting to Thames-Lee Tunnel	✓	✓	✓	✗		268 MI/d (DO)
	Mogden effluent transfer to Teddington and new river abstraction at Teddington with transfer to Queen Mother Reservoir	✓	✓	✗			300 MI/d (NC)
	Mogden effluent transfer to Teddington and new river abstraction and treatment at Teddington for direct supply	✓	✗				300 MI/d (NC)
	Mogden effluent transfer to Teddington and increase of existing river abstraction upstream at Surbiton	✗					300 MI/d (NC)
	Beckton effluent transfer to Teddington and new river abstraction at Teddington connecting to Thames-Lee Tunnel	✗					300 MI/d (NC)
	Becton effluent transfer to Teddington and new river abstraction at Teddington with transfer to Queen Mother Reservoir	✗					300 MI/d (NC)
	Beckton effluent transfer to Teddington and new river abstraction and treatment at Teddington for direct supply	✗					300 MI/d (NC)
	New river abstraction on Lower River Roding	✗					17.3 MI/d (NC)
	New river abstraction on River Mardyke	✗					3.7 MI/d (NC)
	New river abstraction on River Rom/Beam	✗					7.2 MI/d (NC)
	New river abstraction on River Ingrebourne	✗					4.2 MI/d (NC)
Raw Water Purchase	Didcot Raw Water Purchase	n/a	n/a	n/a	n/a	✓	18 MI/d (DO)
	Chingford Raw Water Purchase	n/a	n/a	n/a	n/a	✓	20 MI/d (DO)
Aquifer Recharge	Kidbrooke Aquifer Recharge/Aquifer Storage and Recovery (SLARS1)	✓	✓	✓	✓	✓	7 MI/d (DO)
	Merton Aquifer Recharge (SLARS3)	✓	✓	✓	✓	✓	5 MI/d (DO)
	Streatham Aquifer Recharge (SLARS2)	✓	✓	✓	✓	✓	4 MI/d (DO)
	AR - HARS (Hornsey)	Option not assessed as WARMS2 modelling indicated that there was no Deployable Output benefit for this option					



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validation	Screening	
Aquifer Storage and Recovery	South East London (Addington) Aquifer Storage and Recovery	✓	✓	✓	✓	✓	3 MI/d (DO)
	Thames Valley Central Aquifer Storage and Recovery	✓	✓	✓	✓	✓	3 MI/d (DO)
	ASR Horton Kirby	✓	✓	✓	✓	✓	5 MI/d (DO)
Groundwater	Addington	✓	✓	✓	✓	✓	1 MI/d (DO)
	London Confined Chalk (north)	✓	✓	✓	✓	✓	2 MI/d (DO)
	Southfleet/Greenhithe (new WTW)	✓	✓	✓	✓	✓	8 MI/d (DO)
	Merton Recommissioning	✓	✓	✓	✓	✓	2 MI/d (DO)
	North London Licence Trading	✗					1 MI/d (DO)
	GW – Honor Oak	✓	✓	✓	✓	✓	1 MI/d (DO)
	GW – Epsom	✗					3.3 MI/d (NC)
	Shortlands	✓	✗				4.2 MI/d (NC)
	London confined Chalk (north-east)	✓	✗				0.5 MI/d (NC)
Removal of Deployable Output Constraints	Epsom Removal of Constraints	✓	✓	✓	✓	✓	2 MI/d (DO)
	New River Head	✓	✓	✓	✓	✓	3 MI/d (DO)
	RC – Green St Green	Option not assessed as it is being delivered and therefore the additional deployable output will be included in the baseline.					
	Queen Mary Reservoir – Removal of Outlet Constraint	T	B	C			6 MI/d (NC)
	Queen Mary Reservoir – Removal of Low-level Constraint	T	B	C			8 MI/d (NC)
	Queen Mary Reservoir – Removal of Baffle	T	B	C			2 MI/d (NC)
Catchment Management	Bean Wellfield (Groundwater)	✓	✓	✗			0.1 MI/d (NC)



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validation	Screening	
	Brantwood Rd (Groundwater)	✓	✓	✗			<0.1 MI/d (NC)
	Nonsuch (Groundwater)	✓	✓	✗			<0.1 MI/d (NC)
	Wilmington (Groundwater)	✓	✓	✗			0.2 MI/d (NC)
	Southfleet (Groundwater)	✓	✓	✗			0.2 MI/d (NC)
	Green Street Green (Groundwater)	✓	✓	✗			0.3 MI/d (NC)
	North Orpington (Groundwater)	✓	✓	✗			0.4 MI/d (NC)
	Lower River Thames	✓	✓	✗			1.5 MI/d (NC)
	Lower River Lee	✓	✓	✗			1.0 MI/d (NC)
SWOX WRZ							ADPW
Raw Water Transfer	Severn Thames Transfer, Deerhurst – Culham: see London WRZs for sizes	✓	✓	✓	✓	✓	
	Oxford Canal (CRT BCN Surplus) - Farmoor Reservoir (SWOX)	✓	✓	✓	✓	✓	12 MI/d (DO)
New Reservoir	Abingdon Reservoir 150Mm ³	✓	✓	✓	✓	✓	294 MI/d (DO) [#]
	Abingdon Reservoir 125Mm ³	✓	✓	✓	✓	✓	253 MI/d (DO) [#]
	Abingdon Reservoir 100Mm ³	✓	✓	✓	✓	✓	210 MI/d (DO) [#]
	Abingdon Reservoir 75Mm ³	✓	✓	✓	✓	✓	161 MI/d (DO) [#]
	Abingdon Reservoir 50Mm ³	✓	✓	✓	✓	✗	111 MI/d (DO) [#]
	Abingdon Reservoir 30Mm ³	✓	✓	✓	✓	✗	69 MI/d (DO) [#]
	Abingdon Reservoir Phased 80+42Mm ³	✓	✓	✓	✓	✓	170+83 MI/d (DO) [#]
	Abingdon Reservoir Phased 30+100Mm ³	✓	✓	✓	✓	✓	69+199 MI/d (DO) [#]
	Chinnor Reservoir 50Mm ³	✓	✓	✓	✓	✗	111 MI/d (DO) [#]
	Chinnor Reservoir 30Mm ³	✓	✓	✓	✓	✗	69 MI/d (DO) [#]
	Marsh Gibbon Reservoir 75 Mm ³	✓	✓	✓	✓	✗	161 MI/d (DO) [#]
	Marsh Gibbon Reservoir 50 Mm ³	✓	✓	✓	✓	✗	111 MI/d (DO) [#]



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validation	Screening	
	Marsh Gibbon Reservoir 30 Mm ³	✓	✓	✓	✓	✗	69 MI/d (DO) [#]
Direct River Abstraction	River Thames Culham abstraction - Abstraction at Culham and transfer to Farmoor Reservoir via a new pumping main	✗					4.5 MI/d (NC)
	River Thames Days Weir Abstraction - River Thames abstraction at Days Weir and transfer to Farmoor	✗					40 MI/d (NC)
	Recommission existing Direct River Abstraction and treatment at Culham and directly supply to SWOX	✓	✓	✗			4.5 MI/d (NC)
Aquifer recharge	AR – Cricklade	✓	✗				10.0 MI/d (NC)
Groundwater	Moulsford 1	✓	✓	✓	✓	✓	3.5 MI/d (DO)
	Woods Farm licence increase	✗					3.5 MI/d (NC)
	GW - South Stoke 1	✓	✓	✓	✗		3.5 MI/d (DO)
	GW - South Stoke 2 (with treatment)	✗					10.0 MI/d (NC)
	GW - Moulsford 2 (with treatment)	✗					7.5 MI/d (NC)
	Bibury source enhancement	Option not assessed as the deployable output benefit has been delivered and incorporated into the baseline.					
	River Marden	✓	✗				0.5 MI/d (NC)
	Cotswold Edge	✗					1.0 MI/d (NC)
Removal of Constraints to DO	Ashton Keynes borehole pumps - Removal of Constraints to DO	✓	✓	✓	✓	✓	1.5 MI/d (DO)
	Witheridge Hill borehole pumps	✓	✗				0.6 MI/d (NC)
	Britwell Removal of Constraints	✓	✓	✓	✓	✓	1.3 MI/d (DO)
Catchment Management	Blockley (Groundwater)	✓	✓	✗			<0.1 MI/d (NC)
	Childrey Warren (Groundwater)	✓	✓	✗			0.2 MI/d (NC)
	Dovedale (Groundwater)	✓	✓	✗			<0.1 MI/d (NC)
	Gatehampton (Groundwater)	✓	✓	✗			1.0 MI/d (NC)
	Lower Swell (Groundwater)	✓	✓	✗			<0.1 MI/d (NC)



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validation	Screening	
	Manor Road (Groundwater)	✓	✓	✗			0.2 MI/d (NC)
	Ashdown Park (Groundwater)	✓	✓	✗			0.3 MI/d (NC)
	Upper Swell (Groundwater)	✓	✓	✗			0.2 MI/d (NC)
	Marlborough (Groundwater)	✓	✓	✗			0.2 MI/d (NC)
Internal Inter-Zonal Transfer	Henley to SWOX – 2.4 MI/d	✓	✓	✓	✓	✓	2.4 MI/d (DO)
	Henley to SWOX – 5 MI/d	n/a	n/a	n/a	n/a	✓	5 MI/d (DO)
	Kennet Valley to SWOX - 6.7 MI/d	✓	✓	✓	✓	✓	4.5 MI/d (DO)
	Kennet Valley to SWOX - 2.3 MI/d	✓	✓	✓	✓	✓	2.3 MI/d (DO)
	Transfer from Hambleden WTW to Long Crendon SR to an existing pipeline at Milton	✗					Not defined
	Transfer from Hambleden WTW to Long Crendon SR to an existing service reservoir at Shotover.	✗					Not defined
	Transfer from Hambleden WTW to Long Crendon SR to an existing pipeline at Marston	✗					Not defined
	Transfer from Hambleden WTW to Nettlebed service reservoir to Beggarsbush service reservoir at South Oxford area.	✗					Not defined
Inter-Company Transfers	Wessex to SWOX Charlton WTW to Minety SR and from there to Flaxlands SR in South Swindon	✓	✓	✓	✓	✓	2.9 MI/d (DO)
	Wessex to SWOX Charlton WTW to Minety SR and from there to Blunsdon SR in South Swindon	✓	✗				2.9 MI/d (NC)
	Wessex to SWOX Charlton WTW to Minety SR and from there to Ashton Keynes WTW in South Swindon	✓	✓	✗			2.9 MI/d (NC)
SWA WRZ							ADPW
Aquifer storage and recovery	Hampden Bottom-Wendover	✓	✗				7.5 MI/d (NC)
Raw Water Transfer	Severn Thames Transfer, Deerhurst – Culham: see London WRZs for sizes	✓	✓	✓	✓	✓	
	Oxford Canal (CRT BCN Surplus)	✓	✓	✓	✓	✓	12 MI/d (DO)
New Reservoir	Abingdon Reservoir: see SWOX WRZs for sizes and DO	✓	✓	✓	✓	✓	
	Chinnor Reservoir: see SWOX WRZs for sizes and DO	✓	✓	✓	✓	✗	



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validation	Screening	
	Marsh Gibbon Reservoir: SWOX WRZs for sizes and DO	✓	✓	✓	✓	✗	
Groundwater	Datchet	✓	✓	✓	✓	✓	5.4 MI/d MI/d (DO)
	Remenham	✗					10.0 MI/d (NC)
	GW – West Marlow	✗					15.0 MI/d (NC)
	Bourne End (Marlow East)	✗					9.3 MI/d (NC)
	Medmenham	✗					0.0 MI/d (NC)
	Taplow	✗					5.1 MI/d (NC)
Removal of Constraints to DO	Hampden Disinfection Upgrade	✗					0.8 MI/d (NC)
Internal Inter-Zonal Transfer	Henley to SWA - 2.4 MI/d	✓	✓	✓	✓	✓	2.4 MI/d (DO)
	Henley to SWA – 5 MI/d	n/a	n/a	n/a	n/a	✓	5 MI/d (DO)
	Export from SWOX to SWA	✗					Not defined
Raw Water Purchase	Didcot Raw Water Purchase						18 MI/d (DO)
Guildford WRZ							ADPW
Aquifer storage and recovery	ASR - Guildford (Abbotswood)	✓	✗				4.5 MI/d (NC)
Groundwater	Dapdune Licence Disaggregation	✓	✓	✓	✓	✓	2.2 MI/d (DO)
	Mousehill & Rodborough Rehab	✗					0.18 MI/d (NC)
Removal of Constraints to DO	Dapdune Removal of constraints to DO	✓	✓	✓	✓	✓	1 MI/d (DO)
	Ladymead WTW Removal of Constraints to DO	✓	✓	✓	✓	✓	4.6 MI/d (DO)
	RC - Ladymead borehole pumps	Investigations show that DO is constrained by the licence, not pump capacity so the resultant DO increase has been incorporated into the baseline.					
	RC - Sturt Road Spring Capture	✓	✗				0.25 MI/d (NC)
Inter-Company Transfers	SEW to Guildford Surrey Hills SR (SEW) to Hogsback SR (TW- Guildford)	✓	✗				10 MI/d (NC)



Option type	Name	Feasibility Stage					Capacity* (MI/d)
		Stage 1	Stage 2	Stage 3	Validation	Screening	
	SEW to Guildford Hogsback SR (SEW) to Mount SR (TW- Guildford)	✓	✓	✓	✓	✓	10 MI/d (DO)
Henley WRZ							
Groundwater	Sheeplands licence disaggregation	✗					13.3 MI/d (NC)
Catchment management	Sheeplands (Groundwater)	✓	✓	✗			0.3 MI/d (NC)
Kennet Valley WRZ							
							ADPW
Groundwater	Mortimer Disused Source (Recommission)	✓	✓	✓	✓	✓	4.5 MI/d (DO)
	GW – Purley	✗					15 MI/d (NC)
	GW - Mapledurham	✗					15 MI/d (NC)
	GW - Mortimer (transfer peak licence from Arborfield)	✓	✗				6.8 MI/d (NC)
	GW – Hungerford	✗					1.4 MI/d (NC)
	GW - Playhatch (increased licence)	✗					1.3 MI/d (NC)
Removal of Constraints to DO	East Woodhay borehole pumps Removal of Constraints to DO	✓	✓	✓	✓	✓	2.1 MI/d (DO)
Catchment Management	Fognam Down (Groundwater)	✓	✓	✗			0.2 MI/d (NC)
	Speen (Groundwater)	✓	✓	✗			0.2 MI/d (NC)
	Playhatch (Groundwater)	✓	✓	✗			0.4 MI/d (NC)
Internal inter-zonal transfers	SWA to Kennet Valley	✗					N/A
	Sheeplands WTW to Early SR	✓	✗				2.4 MI/d (NC)

Table Notes (PTO):

* For resource elements on the Constrained List Deployable Outputs (DOs) are provided. For the London WRZ DOs are for the Dry Year Annual Average (DYAA) condition, whereas for the Thames Valley WRZs the DOs are for the Average Day Peak Week (ADPW) condition. For resource elements that are not on the Constrained List Nominal Capacities (NCs) are provided.

** For raw water transfers the raw water support and conveyance elements are provided separately in the table. The actual DO of transfer options will depend upon combinations of resource and conveyance elements.

*** DOs for the Severn Thames Transfer (STT) are based upon stochastic modelling including climate change, other abstractors using licenced amounts and assumed 20% losses in River Severn (where applicable). DOs presented in the table are for a 300 MI/d capacity Deerhurst transfer pipeline; DOs will in some cases be higher for larger capacity transfers. Although the entirely unsupported STT option has been rejected, the DO benefit of the unsupported resource needs to be added to the DO benefit of the support elements to provide the overall DO benefit of the partially supported STT under the DYAA condition, but the unsupported benefit is not included within the DO for the ADPW condition as its availability during the peak week cannot be assured.



Abingdon Reservoir DOs used at programme appraisal are based upon the two zone DOs from WARMS2 analysis, reduced by 3% to account for stochastic analysis. For the London WRZ the DOs are capped at the two zone London DO, being the lower of the two zone London DO and the single zone London DO .

† Reservoir options rejected prior to Stage 3 have not been assessed based on possible capacities but rather on land areas (size bands A,B,C).

- Band A: sites with a development area between 200 and 399 hectares
- Band B: sites with a development area between 400 and 699 hectares
- Band C: sites with a development area of 700 hectares and greater

Apart from raw water transfer conveyance elements, the register does not include system elements (e.g. water treatment, raw water system or network reinforcement elements).

C. Demand options list tables

- P.8 The unconstrained demand options list was comprised of all possible demand options that are considered technically feasible but which may have not been free of environmental or planning constraints issues. The unconstrained demand options list was developed through the screening of options from the generic list of options identified by UKWIR in its Water Resources Planning Tools 2012 Report.⁵
- P.9 The generic water demand options identified by UKWIR are grouped into five categories:
- leakage
 - metering
 - water efficiency
 - tariffs and
 - non-potable (termed 'Water Recycling' in the UKWIR document)
- P.10 Using these five categories as a base, we developed each generic option to include multiple potential sub-options and specific options. For example, the generic option, leakage, was broken into three sub-options, mains replacement, pressure management and active leakage control (ALC) and district meter area (DMA) enhancement. These three sub-options were then classified further as specific options that could be assessed in the screening process.
- P.11 In drawing-up the list of sub-options and specific options, we identified three sources of demand management options:
- WRMP14 accepted options: these options passed the screening process in WRMP14 to make the feasible options list (Table P-3)
 - WRMP14 rejected options: these options did not pass the screening process in WRMP14 and were recorded on the Rejection Register (Table P-4)
 - Revised draft WRMP19 new options: these options were not considered in WRMP14 (Table P-5)
- P.12 The sub-options and specific options identified under each generic option category formed the unconstrained options List. In total, there were 135 demand management options for the revised draft WRMP19 that made up the full unconstrained options list. This list comprised the options in The 'WRMP14 Outcome' column in Table P-3 refers to options that were either accepted or rejected in WRMP14. To clarify, the options listed in this table have been re-evaluated for the revised draft WRMP19. The outcome of this re-evaluation is presented in the 'Demand Management Options Screening Report, March 2017'.
- P.13 Table P-3, Table P-4 and Table P-5.

⁵ UKWIR (2012), Water Resources Planning Tools 2012, Economics of Balancing Supply and Demand Report

P.14 The 'WRMP14 Outcome' column in Table P-3 refers to options that were either accepted or rejected in WRMP14. To clarify, the options listed in this table have been re-evaluated for the revised draft WRMP19. The outcome of this re-evaluation is presented in the 'Demand Management Options Screening Report, March 2017'.

Table P-3: Unconstrained demand management options sourced from WRMP14 accepted options

Generic option	Sub option	Specific option	WRMP14 outcome
Leakage (see combined options for mains replacement)	ALC	ALC + 10% - Enhanced levels of 'Find and Fix' over and on top of that already being undertaken to maintain current levels of leakage to achieve a further 10% reduction in leakage	Accepted WRMP14
	Pressure management	Pressure management 3 - install new pressure management schemes in individual DMAs	Accepted WRMP14
Metering	Houses only	Meter all houses (advanced metering infrastructure (AMI) technology) and repair CSLs found	Accepted WRMP14
		Meter all houses (automatic meter reading (AMR) technology) and repair CSLs found	Accepted WRMP14
		Meter all houses (dumb technology) and repair CSLs found	Accepted WRMP14
	Houses and bulks	Meter all houses and bulk meter (external) blocks of flats (AMI technology) and repair CSLs found	Accepted WRMP14
		Meter all houses and bulk meter (external) blocks of flats (AMR technology) and repair CSLs found	Accepted WRMP14
		Meter all houses and bulk meter (external) blocks of flats (dumb technology) and repair CSLs found	Accepted WRMP14
	Houses, bulks and individual flats	Meter all houses (including CSL repair), individual flats (internal, no CSL repair) and bulk meter (including CSL repair) blocks of flats (AMI technology)	Accepted WRMP14
		Meter all houses (including CSL repair), individual flats (internal, no CSL repair) and bulk meter (including CSL repair) blocks of flats (AMR technology)	Accepted WRMP14
		Meter all houses (including CSL repair), individual flats (internal, no CSL repair) and bulk meter (including CSL repair) blocks of flats (dumb technology)	Accepted WRMP14
Water efficiency	Advice and guidance	Benchmark to help drive water efficient behaviours (domestic)	Accepted WRMP14
		Free water efficiency goods and advice to all newly metered customers	Accepted WRMP14
	Direct efficient goods plumber installation	Smarter Home Vists (SHVs) (called 'Plumber assisted domestic audit' in WRMP14) to current measured residential properties - involves water efficiency devices, water audit and water savings plan with customer (non-LAHAs ⁶ only)	Accepted WRMP14
		SHVs (called 'Plumber assisted domestic audit' in WRMP14) to current unmeasured residential properties - involves water efficiency devices, water audit and water savings plan with customer (non-LAHAs only)	Accepted WRMP14
	Partner efficiency goods and installation	Partnership projects with public and third sector organisations	Accepted WRMP14
	Non-domestic advice and assistance	Benchmark to help drive water efficient behaviours (non-domestic)	Accepted WRMP14
		Smarter Business Visits (SBVs) (called 'commercial water audits' in WRMP14) to business properties	Accepted WRMP14

⁶ LAHA – local authority and housing association



Generic option	Sub option	Specific option	WRMP14 outcome
Combined options	AMI meter (houses, flats, bulks) + CSL repair + SHV (non LAHA properties)	Meter all houses (including CSL repair), individual flats (internal, no CSL repair) and bulk meter (including CSL repair) blocks of flats (AMI technology). Includes an SHV to a proportion of newly metered non-LAHA properties that take up the SHV offer. Includes wastage fix to a proportion of newly metered non-LAHA properties that have a wastage issue identified.	Accepted WRMP14
	AMI meter (houses, flats, bulks) + CSL repair + SHV (non LAHA properties) +SBV	Meter all houses (including CSL repair), individual flats (internal, no CSL repair) and bulk meter (including CSL repair) blocks of flats (AMI technology). Includes SHV and/or SBV to a proportion of newly metered non-LAHA properties that take up the SHV offer. Includes wastage fix to a proportion of newly metered non-LAHA properties that have a wastage issue identified.	Accepted WRMP14
	AMR meter (houses, flats, bulks) + CSL repair + SHV (non-LAHA properties)	Meter all houses (including CSL repair), individual flats (internal, no CSL repair) and bulk meter (including CSL repair) blocks of flats (AMR technology). Includes SHV to a proportion of newly metered non-LAHA properties that take up the SHV offer. Includes wastage fix to a proportion of newly metered non-LAHA properties that have a wastage issue identified.	Accepted WRMP14
	Mains replacement (Full DMA replacement) + CSL + AMI metering (houses, flats)	Full DMA mains replacement with bulk meters, boundary boxes and CSL repairs plus metering all houses and flats with AMI technology	Accepted WRMP14
	Mains replacement (Full DMA replacement) + CSL + AMI metering (houses, flats) + SHV	Full DMA mains replacement with bulk meters, boundary boxes and CSL repairs plus metering all houses and flats with AMI technology followed by an SHV	Accepted WRMP14
	Mains replacement (Full DMA replacement) + CSL + AMI metering (houses, flats) + SHV + SBV	Full DMA mains replacement with bulk meters, boundary boxes and CSL repairs plus metering all houses and flats with AMI technology followed by an SHV and/or SBV	Accepted WRMP14
	Mains replacement (Full DMA replacement) + CSL + AMR metering (houses, flats) + SHV	Full DMA mains replacement with bulk meters, boundary boxes and CSL repairs plus metering all houses and flats with AMR technology followed by an SHV	Accepted WRMP14
	Mains replacement (Full DMA replacement) + CSL + full DMA replacement metering (houses, flats)	Full DMA mains replacement including the connecting communication pipes, the installation/replacement of boundary boxes, the installation of connection meters (Full DMA replacement meters) and the replacement of supply pipes where CSL is detected	Accepted WRMP14

P.15 The 'WRMP14 Outcome' column in Table P-4 refers to options that were either accepted or rejected in WRMP14. To clarify, the options listed in this table have been reevaluated for the revised draft WRMP19. The outcome of this reevaluation is presented in the 'Demand Management Options Screening Report, March 2017'.

Table P-4: Unconstrained demand management options sourced from WRMP14 rejected options

Generic option	Sub option	Specific option	WRMP14 outcome
Leakage	ALC	ALC + 20% - Enhanced levels of 'Find and Fix' over and on top of that already being undertaken to maintain current levels of leakage to achieve a further 20% reduction in leakage.	Rejected (Q.10)
	Pressure management	Pressure management 4 - further reduction of pressure on existing schemes that are made up of multiple DMAs. Requires the installation of additional tall building boosters.	Rejected (Q.10)
	Mains replacement	Asset replacement - replace individual pipes that have high burst rates	Rejected (Q.11)
		Asset replacement 100m - replace individual pipes that have high burst rates and must be above 100m in length	Rejected (Q.11)
		Communication pipes only - replace communication pipes only	Rejected (Q.11)
Water efficiency	Advice and guidance	Call Centre contact to customers giving water efficiency advice	Rejected (Q.11)
		Intensive area based promotional campaigns (referred to as company-wide promotional campaigns in WRMP14)	Rejected (Q.11)
		Develop an AMR interface tool to help drive water efficiency behaviours	Rejected (Q.11)
		Develop water certificates for customer properties	Rejected (Q.11)
		Development and promotion of an online water use calculator	Rejected (Q.11)
		Development of smart phone applications	Rejected (Q.11)
		Distribution of advice and guidance via Water Regulations visits	Rejected (Q.11)
		Distribution of self-audit packs	Rejected (Q.11)
		Distribution of water saving information in customers' bills	Rejected (Q.11)
		Distribution of water saving information via leaflet distribution	Rejected (Q.11)
		Education in schools and provision of educational material	Rejected (Q.11)
		Events and road shows	Rejected (Q.11)
		Offer free water efficiency goods online	Rejected (Q.11)
		Promotions via newspapers	Rejected (Q.11)
		Water efficiency advice via an internet promotion	Rejected (Q.11)
	Self -installation	Distribution of aerated shower head	Rejected (Q.11)
		Distribution of cistern displacement devices	Rejected (Q.11)
		Distribution of hose guns for self-installation	Rejected (Q.11)
		Distribution of Shower Timers	Rejected (Q.11)



Generic option	Sub option	Specific option	WRMP14 outcome
		Distribution of tap inserts for self-installation	Rejected (Q.11)
		Distribution of water gels to gardeners for self-installation	Rejected (Q.11)
		Distribution of water saving devices to businesses via Water Regulations visits	Rejected (Q.11)
		Subsidy for water efficient white goods	Rejected (Q.11)
	Direct efficient goods plumber installation	Installation of water butt	Rejected (Q.11)
		Plumber assisted installation of tap inserts	Rejected (Q.11)
		Replacement - installation of a dual flush toilet	Rejected (Q.11)
		Replacement - installation of a low flush toilet	Rejected (Q.11)
	Partner efficiency goods and installation	Retrofit - installation of a duel flush toilet device	Rejected (Q.11)
		Partner controlled domestic plumbing installs	Rejected (Q.11)
		Partnership projects with national organisations	Rejected (Q.11)
		Partnership projects with utility companies	Rejected (Q.11)
	Non-domestic advice and assistance	Partnership working benefits	Rejected (Q.11)
		Exploit retail and loan funding opportunities for non-domestic water saving	Rejected (Q.11)
		Free water efficiency goods and advice to all newly metered businesses	Rejected (Q.11)
		Introduce training for non-domestic customers about wise water use	Rejected (Q.11)
	Research	Non-domestic water saving advice and assistance	Rejected (Q.11)
		Optimising water using processes	Rejected (Q.11)
		Continue to support ongoing research projects	Rejected (Q.11)
		Ofwat water efficiency research fund	Rejected (Q.11)
	Regulation	'Save Water Swindon' and other flagship research projects	Rejected (Q.11)
		Support the leak toilet valves project phase 2	Rejected (Q.11)
		Support the research undertaken by UKWIR	Rejected (Q.11)
		Support the Waterwise evidence base	Rejected (Q.11)
Combined options	AMR Meter (houses, flats, bulks) + CSL repair + SHV (non-LAHA properties) +SBV	Enforce use of water efficient fittings in new buildings	Rejected (General)
		Flow restrictor charging	Rejected (General)
		Ban high water use devices	Rejected (General)
		Preventing new development	Rejected (General)
		Legislate on water use	Rejected (General)
		Meter all houses (including CSL repair), individual flats (internal, no CSL repair) and bulk meter (including CSL repair) blocks of flats (AMR technology). Includes SHV and/or SBV to a proportion of newly metered non-LAHA properties that take up the SHV offer. Includes wastage fix to a proportion of newly metered non-LAHA properties that have a wastage issue identified.	Rejected (Risk and Resilience)



Generic option	Sub option	Specific option	WRMP14 outcome
	Dumb meter (houses, flats, bulks) + CSL repair + SHV (non-LAHA properties)	Meter all houses (including CSL repair), individual flats (internal, no CSL repair) and bulk meter (including CSL repair) blocks of flats (dumb technology). Includes SHV to a proportion of newly metered non-LAHA properties that take up the SHV offer. Includes wastage fix to a proportion of newly metered non-LAHA properties that have a wastage issue identified.	Rejected (Risk and Resilience)
	Dumb meter (houses, flats, bulks) + CSL repair + SHV (non-LAHA properties) +SBV	Meter all houses (including CSL repair), individual flats (internal, no CSL repair) and bulk meter (including CSL repair) blocks of flats (dumb technology). Includes SHV and or SBV to a proportion of newly metered non-LAHA properties that take up the SHV offer. Includes wastage fix to a proportion of newly metered non-LAHA properties that have a wastage issue identified.	Rejected (Risk and Resilience)
	Mains replacement (Full DMA replacement) + CSL + AMR metering (houses, flats)	Full DMA mains replacement with bulk meters, boundary boxes and CSL repairs plus metering all houses and flats with AMR technology	Rejected (Risk and Resilience)
	Mains replacement (Full DMA replacement) + CSL + AMR metering (houses, flats) + SHV + SBV	Full DMA mains replacement with bulk meters, boundary boxes and CSL repairs plus metering all houses and flats with AMR technology followed by a SHV and/or SBV	Rejected (Risk and Resilience)
	Mains replacement (Full DMA replacement) + CSL + dumb metering (houses, flats)	Full DMA mains replacement with bulk meters, boundary boxes and CSL repairs plus metering all houses and flats with dumb technology	Rejected (Risk and Resilience)
	Mains replacement (Full DMA replacement) + CSL + dumb metering (houses, flats) + SHV	Full DMA mains replacement with bulk meters, boundary boxes and CSL repairs plus metering all houses and flats with dumb technology followed by a SHV	Rejected (Risk and Resilience)
	Mains replacement (Full DMA replacement) + CSL + dumb metering (houses, flats) + SHV + SBV	Full DMA mains replacement with bulk meters, boundary boxes and CSL repairs plus metering all houses and flats with dumb technology followed by a SHV and/or SBV	Rejected (Risk and Resilience)
	Partial DMA mains replacement + AMR metering (houses, flats)	Partial DMA mains replacement - replacement of groups of connecting mains within a DMA including the connecting communication pipes, the installation/replacement of boundary boxes and the installation of connection meters (AMR meters)	Rejected (Q.11)
	Partial DMA mains replacement + CSL + AMR metering (houses, flats)	Partial DMA mains replacement - Partial DMA level mains replacement including the connecting communication pipes, the installation/replacement of boundary boxes, the installation of connection meters (full DMA replacement meters) and the replacement of supply pipes where customer side leakage is detected	Rejected (Q.11)
	Mains replacement (Full DMA replacement) + Full DMA replacement metering (houses, flats)	Full DMA mains replacement including the connecting communication pipes, the installation/replacement of boundary boxes and the installation of connection meters (full DMA replacement meters)	Rejected (Q.10)



Generic option	Sub option	Specific option	WRMP14 outcome
Incentive schemes	Innovative Tariffs	Financial tariff implementation - only feasible post smart metering. In WRMP14, this included Commercial Tariffs.	Rejected (General)

P.16 The 'WRMP19' column in Table P-5 refers to options that are new for WRMP19.

Table P-5: Unconstrained demand management options sourced for revised draft WRMP19 new options

Generic option	Sub option	Specific option	WRMP19
Leakage	DMA enhancement	Enhanced ALC - network reconfiguration to enable more leakage detection from 'Find and Fix' activities. Includes splitting large DMAs, installing new district meters, installing new valves and washouts and enabling activities to operate difficult to access valves.	New for WRMP19
	Mains replacement	DMA mains replacement of at least 90% of DMA - includes mains replacement, communication pipe replacement and boundary box install (does not include CSL repair)	New for WRMP19
		Partial DMA mains replacement of 25% of DMA - includes mains replacement, communication pipe replacement and boundary box install (does not include CSL repair)	New for WRMP19
		Partial DMA mains replacement of 50% of DMA - includes mains replacement, communication pipe replacement and boundary box install (does not include CSL repair)	New for WRMP19
		Partial DMA mains replacement of 75% of DMA - includes mains replacement, communication pipe replacement and boundary box install (does not include CSL repair)	New for WRMP19
Metering	Blocks of flats (bulks) only	Bulk metering flats (AMI technology) and repair CSLs found	New for WRMP19
		Bulk metering flats (AMR technology) repair CSLs found	New for WRMP19
	Houses, bulks and individual flats	Meter all houses (including CSL repair) and individual flats (internal, no CSL repair) with dumb technology and bulk metering (including CSL repair) blocks of flats with AMR technology	New for WRMP19
Water efficiency	Direct efficient goods plumber installation	Housing Association fixes problems found at residential properties (LAHAs only)	New for WRMP19
		Wastage fixes - free internal leak fixes (i.e. leaky-loos and leaking taps)	New for WRMP19
Combined options	AMI Meter (houses, flats, bulks) + CSL repair + SHV (LAHA properties)	Metering all houses and bulk metering (external) blocks of flats (AMI technology). Includes SHV to a proportion of newly metered non-LAHA properties that take up the SHV offer. Includes wastage fix to a proportion of newly metered non-LAHA properties that have a wastage issue identified.	New for WRMP19
	AMI Meter (houses) + CSL repair + SHV (non LAHA properties)	Metering all houses (AMI technology). Includes SHV to a proportion of newly metered non-LAHA properties that take up the SHV offer. Includes wastage fix to a proportion of newly metered non-LAHA properties that have a wastage issue identified.	New for WRMP19
Incentive schemes	Targeted incentives scheme	Customers are incentivised through non-financial offers (vouchers, prize draws, community rewards) to be more efficient with their water consumption.	New for WRMP19
Non-potable	Rainwater harvesting	Individual buildings (Typology 1) - commercial only. Individual commercial buildings throughout our supply area that are being redeveloped contain a non-potable treatment system.	New for WRMP19



Generic option	Sub option	Specific option	WRMP19
		Individual buildings (Typology 1) - residential only. Individual residential buildings throughout our supply area that are being redeveloped contain a non-potable treatment system.	New for WRMP19
		Individual buildings (Typology 1) - commercial and residential. Individual commercial and residential buildings throughout our supply area that are being redeveloped contain a non-potable treatment system.	New for WRMP19
		Individual buildings within a development (Typology 2) - commercial only. A non-potable treatment system is delivered to individual commercial buildings on a new development.	New for WRMP19
		Individual buildings within a development (Typology 2) - residential only. A non-potable treatment system is delivered to individual residential buildings on a new development.	New for WRMP19
		Individual buildings within a development (Typology 2) - commercial and residential. A non-potable treatment system is delivered to individual commercial and/or residential buildings on a new development.	New for WRMP19
		Multiple buildings within a development (Typology 3) - commercial only. A non-potable treatment system and network is delivered that serves multiple commercial buildings on new developments, i.e. multiple non-potable system can be delivered on the one development.	New for WRMP19
		Multiple buildings within a development (Typology 3) - residential only. A non-potable treatment system and network is delivered that serves multiple residential buildings on new developments, i.e. multiple non-potable system can be delivered on the one development.	New for WRMP19
		Multiple buildings within a development (Typology 3) - commercial and residential. A non-potable treatment system and network is delivered that serves multiple commercial buildings on new developments, i.e. there could be a number of these non-potable systems delivered on the one development.	New for WRMP19
		All buildings within a development (Typology 4) - commercial and residential. A non-potable central system and network is delivered that serves all buildings on a new development.	New for WRMP19
	Stormwater harvesting	Individual buildings (Typology 1) - commercial only. Individual commercial buildings throughout our supply area that are being redeveloped contain a non-potable treatment system.	New for WRMP19
		Individual buildings (Typology 1) - residential only. Individual residential buildings throughout our supply area that are being redeveloped contain a non-potable treatment system.	New for WRMP19
		Individual buildings (Typology 1) - commercial and residential. Individual commercial and residential buildings throughout our supply area that are being redeveloped contain a non-potable treatment system.	New for WRMP19
		Individual buildings within a development (Typology 2) - commercial only. A non-potable treatment system is delivered to individual commercial buildings on a new development.	New for WRMP19
		Individual buildings within a development (Typology 2) - residential only. A non-potable treatment system is delivered to individual residential buildings on a new development.	New for WRMP19
		Individual buildings within a development (Typology 2) - commercial and residential. A non-potable treatment system is delivered to individual commercial and/or residential buildings on a new development.	New for WRMP19
		Multiple buildings within a development (Typology 3) - commercial only. A non-potable treatment system and network is delivered that serves multiple commercial buildings on new developments, i.e. multiple non-potable system can be delivered on the one development.	New for WRMP19
		Multiple buildings within a development (Typology 3) - residential only. A non-potable treatment system and network is delivered that serves multiple residential buildings on new developments, i.e. multiple non-potable system can be delivered on the one development.	New for WRMP19



Generic option	Sub option	Specific option	WRMP19
	Greywater recycling	Multiple buildings within a development (Typology 3) - commercial and residential. A non-potable treatment system and network is delivered that serves multiple commercial buildings on new developments, i.e. there could be a number of these non-potable systems delivered on the one development.	New for WRMP19
		All buildings within a development (Typology 4) - commercial and residential. A non-potable central system and network is delivered that serves all buildings on a new development.	New for WRMP19
		Individual buildings (Typology 1) - commercial only. Individual commercial buildings throughout our supply area that are being redeveloped contain a non-potable treatment system.	New for WRMP19
		Individual buildings (Typology 1) - residential only. Individual residential buildings throughout our supply area that are being redeveloped contain a non-potable treatment system.	New for WRMP19
		Individual buildings (Typology 1) - commercial and residential. Individual commercial and residential buildings throughout our supply area that are being redeveloped contain a non-potable treatment system.	New for WRMP19
		Individual buildings within a development (Typology 2) - commercial only. A non-potable treatment system is delivered to individual commercial buildings on a new development.	New for WRMP19
		Individual buildings within a development (Typology 2) - residential only. A non-potable treatment system is delivered to individual residential buildings on a new development.	New for WRMP19
		Individual buildings within a development (Typology 2) - commercial and residential. A non-potable treatment system is delivered to individual commercial and/or residential buildings on a new development.	New for WRMP19
		Multiple buildings within a development (Typology 3) - commercial only. A non-potable treatment system and network is delivered that serves multiple commercial buildings on new developments, i.e. multiple non-potable system can be delivered on the one development.	New for WRMP19
		Multiple buildings within a development (Typology 3) - residential only. A non-potable treatment system and network is delivered that serves multiple residential buildings on new developments, i.e. multiple non-potable system can be delivered on the one development.	New for WRMP19
		Multiple buildings within a development (Typology 3) - commercial and residential. A non-potable treatment system and network is delivered that serves multiple commercial buildings on new developments, i.e. there could be a number of these non-potable systems delivered on the one development.	New for WRMP19
		All buildings within a development (Typology 4) - commercial and residential. A non-potable central system and network is delivered that serves all buildings on a new development.	New for WRMP19
	Wastewater (blackwater) recycling	Blackwater recycling at new developments	New for WRMP19

- P.17 For the revised draft WRMP19 two additional new options have been included;
- AMP6 Leakage Reduction Carry Over; and
 - Innovation (Leakage Reduction).
- P.18 These options have been evaluated for the revised draft WRMP19 based on the criteria presented in the Demand Management Options Screening Report, March 2017’.
- P.19 AMP6 Leakage Reduction Carry Over refers to the benefit applicable to 2020/21 across London, SWOX and Guildford. This is a new option for the revised draft WRMP19 as it is due to the significant volume of work scheduled to achieve our AMP6 leakage target. A detailed explanation of the AMP6 Leakage Reduction Carry over is provided in Section 8: Appraisal of Demand Management Options.
- P.20 Innovation (Leakage Reduction) is a future demand management option that refers to enhanced leakage reduction activity achieved using innovative methods. Innovation in leakage reduction will be developed based on the lessons from implementing Mains Replacement, DMA Enhancement, CSL Repair and Pressure Management in AMP7 and early in AMP8. This option is not applicable until at least AMP9.

D. EA Table Notes

Table 5 – Demand management programmes

- P.21 The demand management programmes (DMPs) developed for the revised draft WRMP19 are published in the Environment Agency tables. Specifically, Table 5 details the demand reductions and costs for each demand management option in the preferred plan (Section 11: Preferred Plan) and the total demand reduction and total cost of a selection of the range of demand management programmes (Section 8: Appraisal of Demand Options).
- P.22 The attachment to this appendix summarises four clarifications to the population of Table 5:
- DMP Programmes with an n/a
 - Financing for CAPEX
 - USPL Impact
 - Demand Management Programme Detail

DMP programmes with an N/A

- P.23 For the range of demand management programmes, column, ‘Type of Option’ has been populated with N/A. This is because it was agreed with the Environment Agency that only the preferred demand management plan would be split into each individual intervention, and the alternative programmes could be included as an integrated plan (see Demand Management Programme Detail subsection).
- P.24 Consequently, the alternative demand management programmes have been included as the total demand and total cost of the programme. Since these programmes are a combination of

demand management options, they do not fit into any of the prescribed option types categories for Table 5. Therefore, the 'Type of Option' has been populated as N/A.

Financing for CAPEX

- P.25 The finance capex approach for the revised draft WRMP19 has been aligned with the WRMP19 guidance. This means a fixed interest is paid on the capital borrowed across the planning period and the full capital borrowed is paid back in the final year of the planning period. This approach is reflected in cells relating to 'Fixed Capex' and 'Financing Costs'.

USPL saving

- P.26 Lines 61.8a and 61.9a of Table 5 refer to 'Options impacting measured and unmeasured USPL' respectively.
- P.27 'USPL impact' reflects the way USPL is apportioned between measured and unmeasured property types. That is, USPL is originally calculated as part of the baseline (Table 3) as being a percentage of total leakage. A 4:1 weighting is then used for the different property types to allow USPL to be split into the different measured and unmeasured categories required for Table 3.
- P.28 However, Table 3 also includes the benefits from the optant metering programme. The optant metering programme impacts the distribution of USPL between unmeasured and measured property types. Primarily, by increasing the total volume of USPL leakage attributed to measured households and decreasing the volume attributed to unmeasured households and also factoring in the original 4:1 weighting applied between measured and unmeasured property types.
- P.29 In Table 5, the distribution of USPL between measured and unmeasured property types is changed by the rollout of the progressive metering programme. That is, the rollout of the PMP results in USPL being redistributed to measured properties more quickly than occurred in the baseline (Table 3). To avoid double counting in the final plan, the impact of the baseline optant metering on the measured property types is removed in Table 5.

DMP options with zero savings

- P.30 For some water resource zones, such as SWA, Kennet Valley and Henley, the demand management options included in Table 5 reference 0 MI/d savings. For example, SBVs in SWA have been included for 0 MI/d.
- P.31 This has been done as a placeholder to clarify that there is potential use for these demand management options but they are not part of the preferred programme.

Demand management programme detail

- P.32 In August 2018, it was agreed with the Environment Agency that, in Table 5, only the preferred demand management plan would be split into each individual intervention, and the alternative demand management programmes could be included as an integrated plan. This was due to the significant volume of cells required to break down each demand management programme by demand management option in each WRZ.



- P.33 Consequently, for the revised draft WRMP19, Table 5 includes a range of alternative demand management programmes detailed by total programme demand reduction and cost.
- P.34 To facilitate the comparison of the different alternative demand management programmes, Table 5 presents the AIC (p/m³) of each demand management option within the preferred programme. The reasons behind the different costs and benefits for each demand management option are detailed in Section 8: Appraisal of Demand Options.