Thames Water

Final Water Resources Management Plan 2019

Technical Appendices

Appendix D: Water resource zone integrity

Table of contents

Figures

Tables

Appendix D.

Water resource zone integrity

- In this appendix we present our assessment of the integrity of our Water Resource Zones (WRZs), the building blocks of a Water Resources Management Plan (WRMP).
- Our WRZ boundaries are unchanged from WRMP14.
- In the Swindon and Oxfordshire (SWOX) and Kennet Valley WRZs, areas of isolated supply do exist. However, they are relatively small and around the de-minimis threshold and suitable contingency plans are in place should the supply infrastructure fail.
- Guildford WRZ is made up of two distinct sub-areas that are above the de-minimis threshold. However, our assessment is that the supply demand situation is sufficient that customers in both areas share the same level of service. Options to improve the interconnectivity are known but not required at the present time.
- WRZ integrity will continue to be reviewed on a routine basis.

A. Introduction

D.1 A WRMP is built up of assessments undertaken at the WRZ level. A WRZ provides a water company with a strategic framework for managing water resources supply and demand management and investment.

D.2 The WRZ describes an area within which the management of supply and demand is largely self-contained (apart from agreed bulk transfers of water). Within the WRZ, supply infrastructure and demand centres are generally integrated to the extent that customers in the WRZ experience the same risk of supply failure. Consequently, all customers share the same level of service. There will be limitations in achieving these requirements within a distribution network but significant numbers of customers should not experience different risks of supply failure within a single WRZ.

D.3 The Water Resource Planning Guidelines (WRPG)[1] definition of a WRZ is:

> *"The largest possible zone in which all resources, including external transfers, can be shared and, hence, the zone in which all customers will experience the same risk of supply failure from a resource shortfall."*

[1] Environment Agency and Natural Resources Wales produced in collaboration with Defra, the Welsh Government, and Ofwat, Water Resources Planning Guideline: Interim update, April 2017

D.4 The Thames Water supply area comprises six WRZs: London; SWOX; Henley; Kennet Valley; Slough, Wycombe and Aylesbury (SWA); and Guildford (Section 1: Introduction and Background)

D.5 Following assessment and discussion with the Environment Agency, it has been agreed that our WRZ boundaries were suitable for use in the draft WRMP19 and are in keeping with the above definition.

D.6 The remainder of this appendix is structured as follows:

- A description of each WRZ
- The WRZ integrity process

B. WRZ description

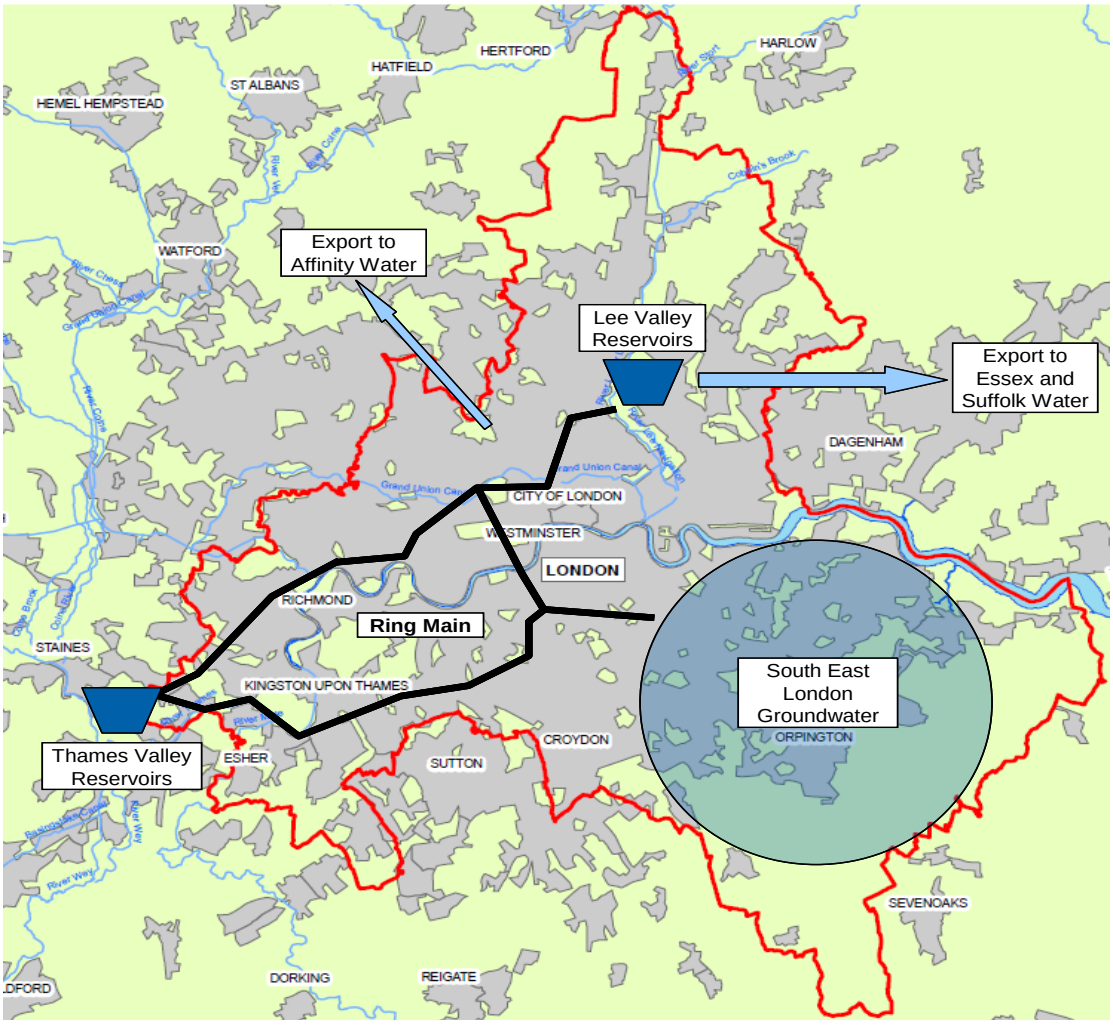
London

D.7 The London WRZ is supplied primarily (80%) from surface water resources of the River Thames and River Lee, either directly or via storage reservoirs. The remainder of the supply is made up of groundwater abstractions, particularly from the chalk aquifer under south east London. We are also able to abstract and treat brackish estuarine water at our desalination plant at Beckton.

D.8 The water is transported to water treatment works and then treated water is conveyed to an integrated distribution system, a key feature of which is the Thames Water Ring Main (TWRM). This is a large diameter pipe that runs underneath central London and connects the Thames and Lee systems and allows us to supply the London WRZ flexibly.

D.9 London is a net exporter of water, with large bulk supplies provided to Essex and Suffolk Water and Affinity Water (Section 4: Current and future water supply).

Figure D-1: Principal features of the London WRZ



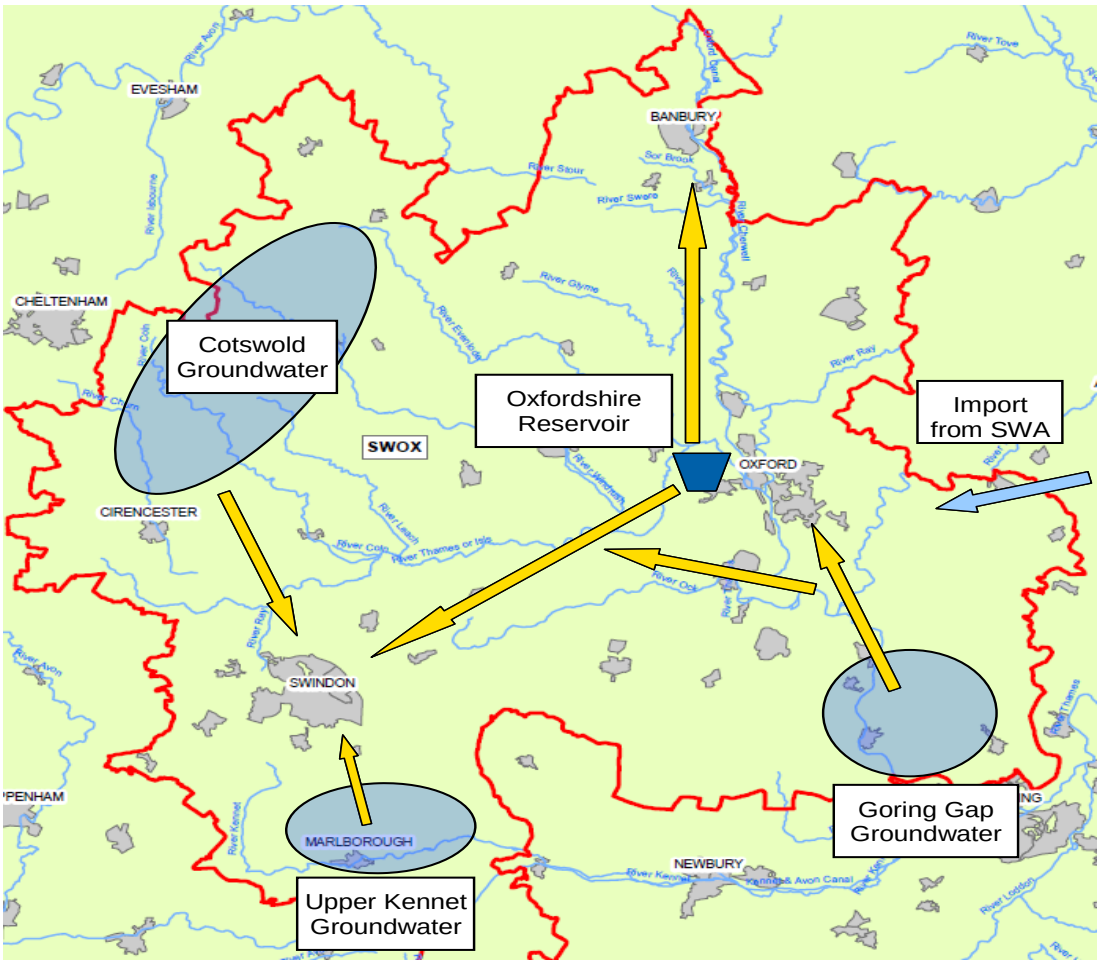
Swindon and Oxfordshire

D.10 The SWOX WRZ is supplied primarily from groundwater (60%), supported by surface water abstractions and the Oxfordshire reservoir, near Oxford. A number of distribution improvements have been made in recent years and the main movement of treated water is northwards and westwards. Key sources and distribution are as follows:

- The 'Gatox' mains transfer water from the chalk in the Goring Gap towards Oxford and Swindon
- Oxfordshire reservoir provides water north to Bicester and Banbury and west to Swindon
- The Oolites of the Cotswolds serve the local demand to the west of the WRZ
- Chalk groundwater serves the Upper Kennet Valley
- Water is received from the SWA WRZ to serve local demands on the eastern border

D.11 At the extremities of the zone there remain areas with isolated networks i.e. they are not connected into the wider distribution network. These areas are often rural and have needed relatively little investment to balance supply and demand.

Figure D-2: Principal features of the SWOX WRZ

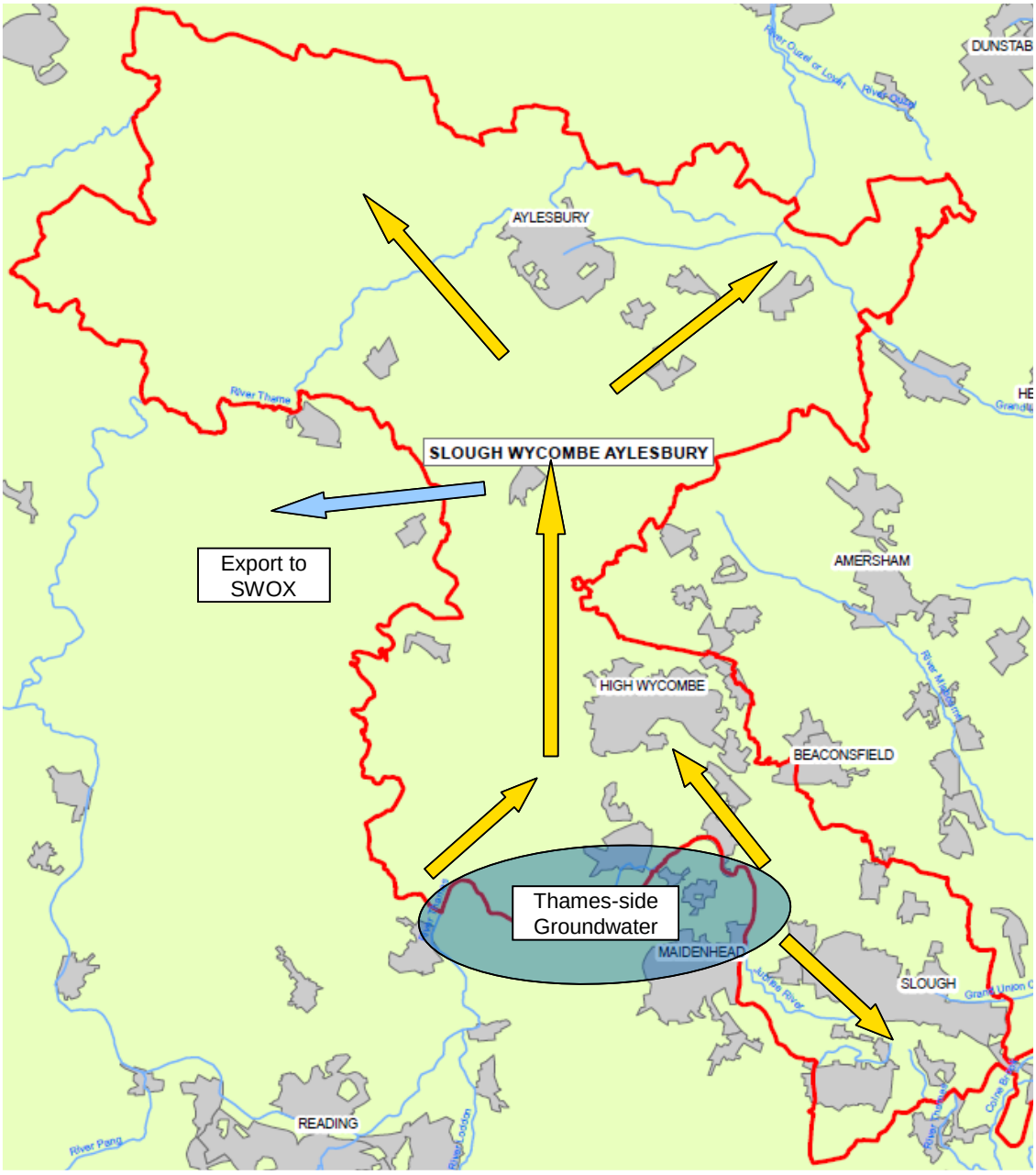


Slough, Wycombe and Aylesbury

D.12 The SWA WRZ is supplied entirely from groundwater. There are no raw water reservoirs. The vast majority of the supply is from Thames-side groundwater to the south of the zone, the distribution system then transfers the water to Windsor and north to Aylesbury through Slough and Wycombe via large 'Mid Bucks' mains.

D.13 The zone supports a regular transfer to SWOX in the west of the zone.

Figure D-3: Principal features of the SWA WRZ



Kennet Valley

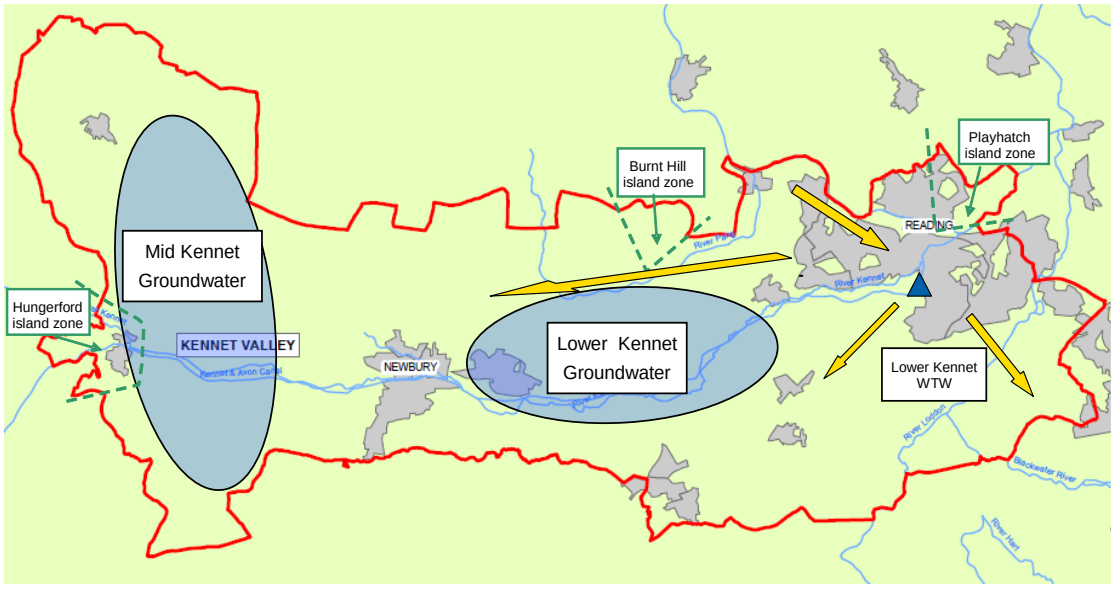
D.14 The Kennet Valley zone is primarily supplied from groundwater (60%) supported by a surface water abstraction from the River Kennet at Lower Kennet water treatment works. There are no raw water reservoirs.

D.15 The zone does not cover the whole of the catchment of the River Kennet. The upper Kennet, upstream of Hungerford, is part of the SWOX WRZ which historically has developed to serve the needs of the local area and to support the growth in Swindon.

D.16 The Kennet Valley WRZ is primarily made up of two large sub-areas (Reading and Newbury) and smaller island zones. Connections between the sub-area and island zones are limited.

D.17 There is minor interconnectivity with both South East Water and Southern Water to the south and east of the zone. There are also connections to Henley and SWOX, but no water is transferred under normal operation.

Figure D-4: Principal features of the Kennet Valley WRZ



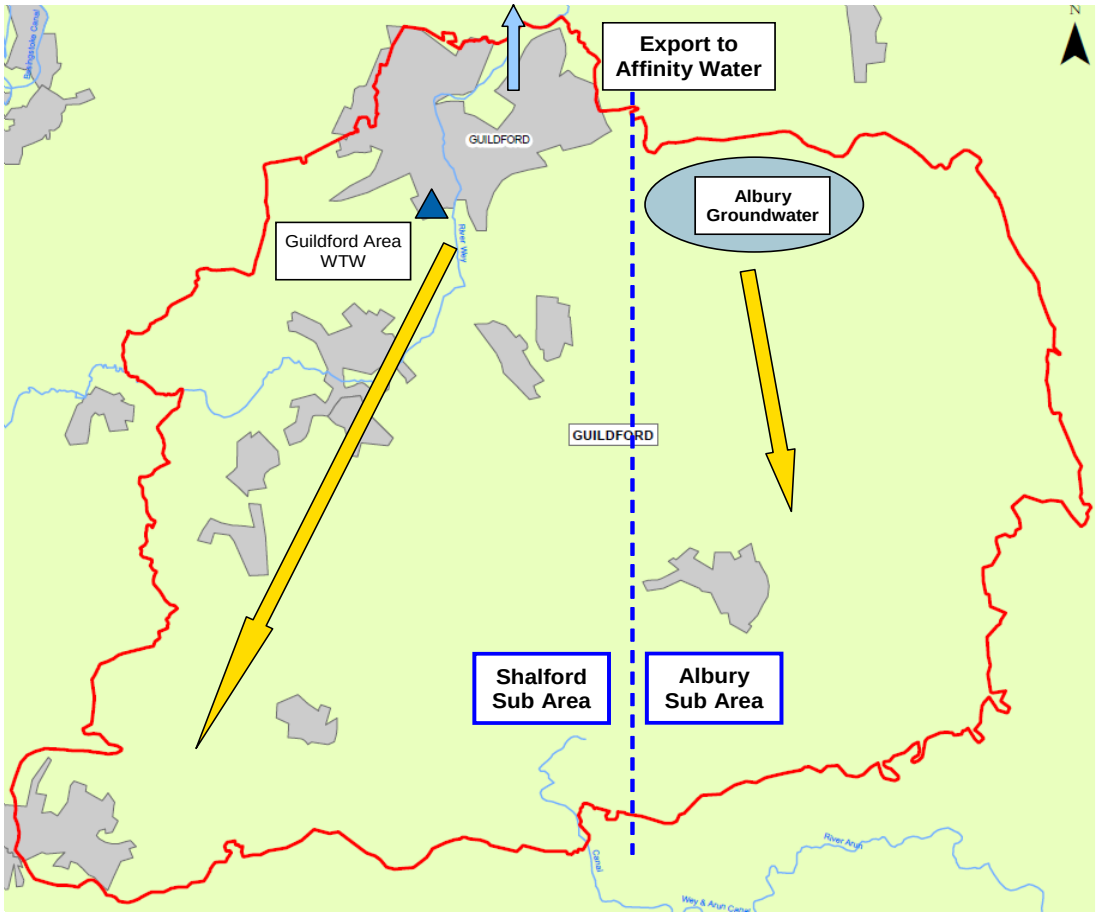
Guildford

D.18 The Guildford WRZ is supplied from groundwater (50%) and surface water (50%). The water treatment works at Shalford abstracts water from the Rivers Wey and Tillingbourne. Groundwater is abstracted from the chalk aquifer in the east of the zone (Albury) and also at other small sites, supporting the surface abstractions. There are no raw water reservoirs.

D.19 The zone is operated as two distinct sub-areas, Shalford and Albury. There is limited movement of water between the two areas.

D.20 The zone has connectivity with Affinity Water to the north. A bulk supply agreement exists to export treated water through this connection. There is also connectivity with South East Water to the south west of the zone, near Haslemere, but this is not used under normal operation.

Figure D-5: Principal features of the Guildford WRZ

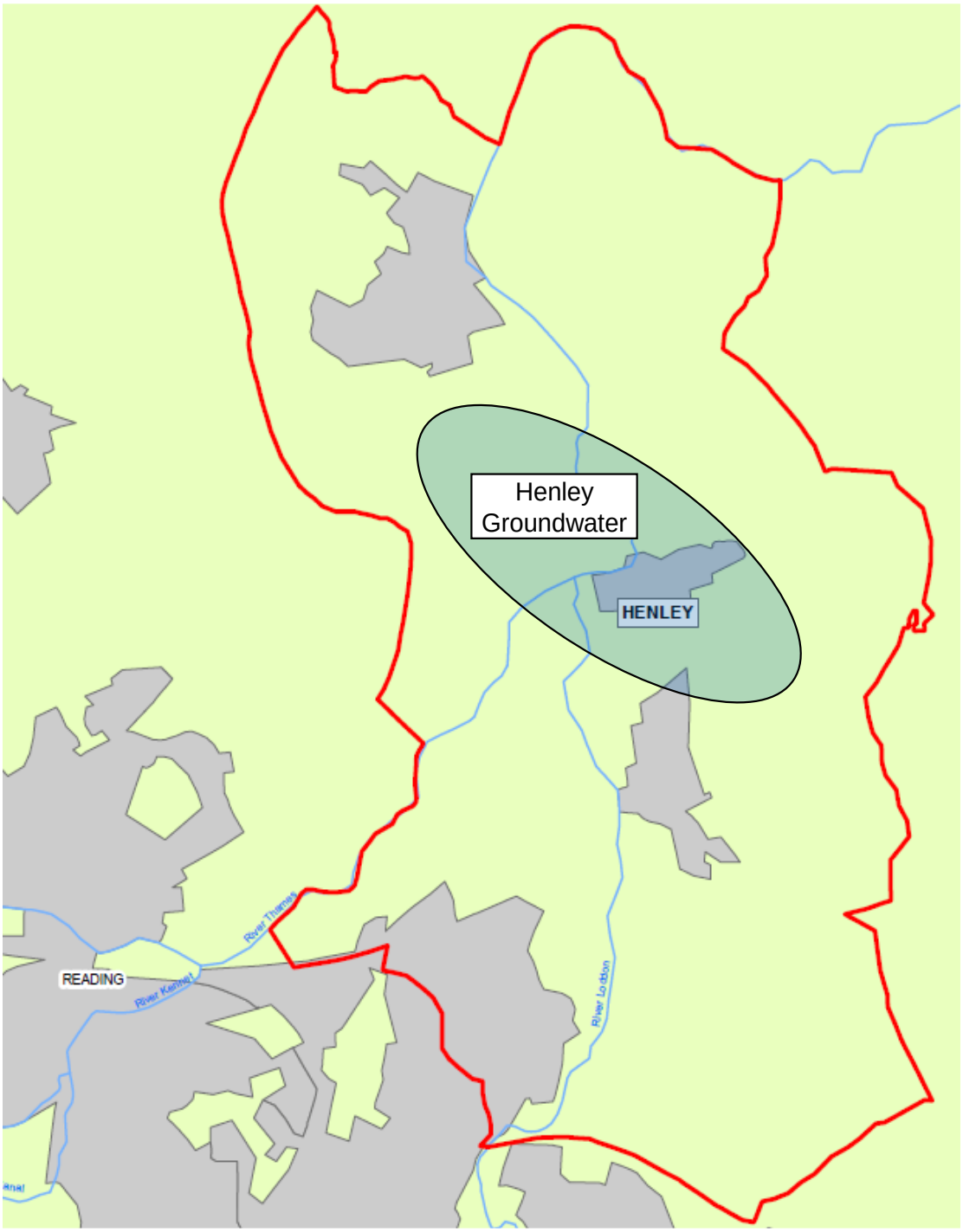


Henley

D.21 The Henley WRZ is supplied entirely from groundwater and has a relatively simple distribution network.

D.22 There is interconnectivity with both Kennet Valley (to the south) and SWOX (to the west), but under normal operation there is no movement of water across the WRZ boundary.

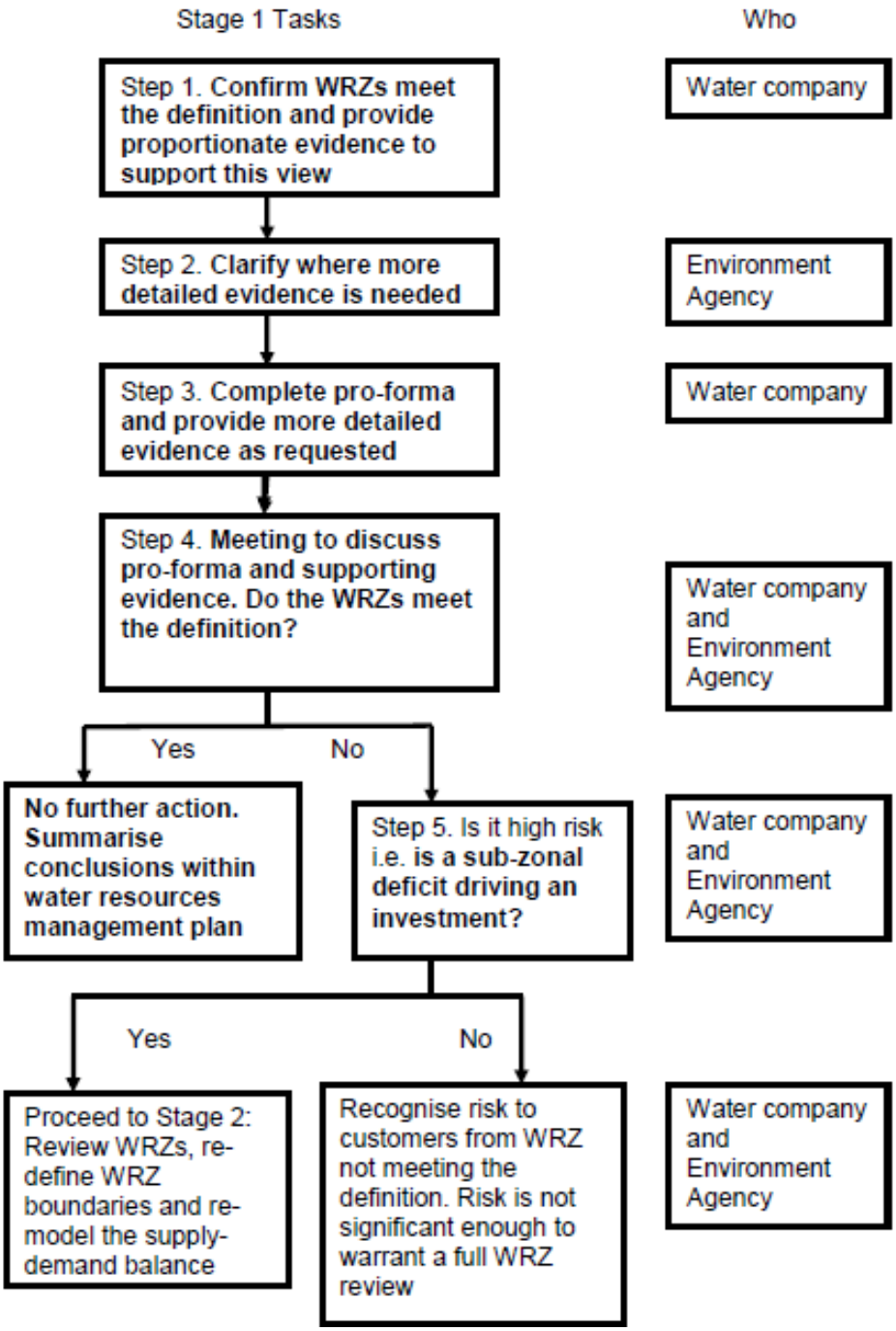
Figure D-6: Principal features of the Henley WRZ



C. Integrity assessment process

D.23 We have followed the WRZ assessment process and liaison method set out in Appendix 1 of the WRPG 2017 and summarised below.

Figure D-7: WRZ integrity process diagram



Step 1

D.24 We discussed supply-side methodologies, including WRZ integrity at a liaison meeting with the Environment Agency on 20 February 2017. We tabled that we completed an assessment which concluded that the London and SWA WRZs had integrated networks and met the definition for a WRZ fully; SWOX and Kennet Valley WRZ boundaries remain unchanged from WRMP14.

Step 2

D.25 The Environment Agency responded to our methodology on 26 April 2017.

Step 3

D.26 We completed the WRZ integrity proforma (Table D-2) and noted the following sub-areas within our supply system (Table D-1).

Table D-1: Identified WRZ sub-areas with property numbers

WRZ	Areas	Prop Nos.	% of zone	Status
GUI	Albury	7,622	14%	Regularly reviewed, solution option established
	Shalford	47,730	86%	
SWOX	Stow Hill	1,705	0.4%	Around de-minimus threshold. Considered as a resilience rather than WRZ integrity issue
	Clatford	837	0.2%	
	Bedwyn	1,246	0.3%	
KV	Playhatch	8,577	5.9%	
	Hungerford	2,466	1.7%	
	Burnt Hill	495	0.3%	

Steps 4 and 5

D.27 Meeting held 29 September 2017.

D.28 It was agreed at the meeting that the areas identified that were not fully meeting the WRZ definition were low risk and that formal splitting of resource zones was not required for the draft WRMP19.

D.29 However, it was additionally agreed that the sub-area supply demand balances in Guildford should be regularly reviewed and discussed with the Environment Agency in future WRMPs.

Table D-2: WRZ integrity proforma

	Questions	London	SWOX	SWA	Kennet Valley	Guildford	Henley
1	Are there any isolated sources and demand centres that are not connected to the supply network? What is the population estimate for these demand centres? What constraints are there to supply (for example, peak demands, capacity of service reservoirs)? How are these constraints managed (for example, tankering supplies into service reservoirs).	No	Yes, there are isolated or 'single feed' zones. Stow Hill Clatford Bedwyn	No	Yes, there are isolated or 'single feed' zones. Hungerford Playhatch Burnt Hill	Yes, the zone has two sub-areas: Shalford Albury	No
2	How do the sources of supply (including transfers) link to the demand centres?	Complex inter-connecting supply system, best exemplified by schematic.					
3	What internal transfers of water take place within the WRZ?	Major transfers: TWRM NW London pipe-track	Major transfers: GATOX Oxfordshire Reservoir Latton to Swindon Upper Kennet Valley to Swindon	Major transfers: Mid-Bucks mains	Reading and Newbury areas have integrated networks	Shalford to Blackdown	Small WRZ, with three sources and three service reservoirs.
4	How has the water company developed its WRZ boundaries? What, if any, smaller water balance units have companies combined to produce WRZs?	WRZ boundaries are primarily historic and relate to the boundaries of former smaller water companies. All WRZs are built up from District Metering Areas amalgamated to Flow Monitoring Zones.					
5	What are the network constraints within the system that affect deployable output (for example, pipe diameter, pump capacity etc)? Where are the absolute infrastructure connectivity limits and what are the constraints (for example, end of pipe run)?	Any constraints on DO are reported by source in the WRMP tables					

	Questions	London	SWOX	SWA	Kennet Valley	Guildford	Henley
6	Are there groups of customers within the WRZ that could, given drought impacts/hydrological stress be at a different supply risk compared to the rest of the WRZ? Where these groups exist, how significant is the difference to the risks of supply failure? What is the constraining factor(s) that causes these differences?	No	Yes, risk of supply failure is low as isolated areas are in surplus and contingency plans are in place. Solutions to connect the areas into the wider network are understood and costed.	No	Yes, risk of supply failure is low as isolated areas are in surplus and contingency plans are in place. Solutions to connect the areas into the wider network are understood and costed.	Yes, risk of supply failure is low as isolated areas are in surplus and contingency plans are in place. Solutions to connect the areas into the wider network are understood and costed.	No