Draft Water Resources Management Plan

Technical Appendix A –

Water Resource Zone Integrity

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Background and Introduction

Water Resource Zones (WRZs) are the building blocks of our Water Resources Management Plan (WRMP).

In this appendix we present our assessment of the integrity of our WRZs. We do this by examining the interconnectivity of the assets in each zone to ensure all customers within a WRZ share the risk of supply failure and thus same level of service.

Our WRZ boundaries are unchanged from WRMP19.

We have also assessed future WRZ integrity risks, primarily from future sustainability reductions.

Introduction

A.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.

A.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.

A.3 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.

A.4 As shown in Main Report Section 1, our supply area comprises six WRZs: London; Swindon and Oxfordshire (SWOX); Slough, Wycombe and Aylesbury (SWA); Kennet Valley; Guildford and Henley.

A.5 Following assessment and discussion with the Environment Agency, it has been agreed that these WRZ boundaries remain suitable for use in the draft WRMP24 and are in keeping with the above definition.

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

- A description of each WRZ
- The WRZ integrity process

Water Resource Zone Description

London

A.7 The London WRZ is supplied primarily (c.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.

A.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.

A.9 London is currently a net exporter of water, with large bulk supplies provided to Essex and Suffolk Water and Affinity Water.

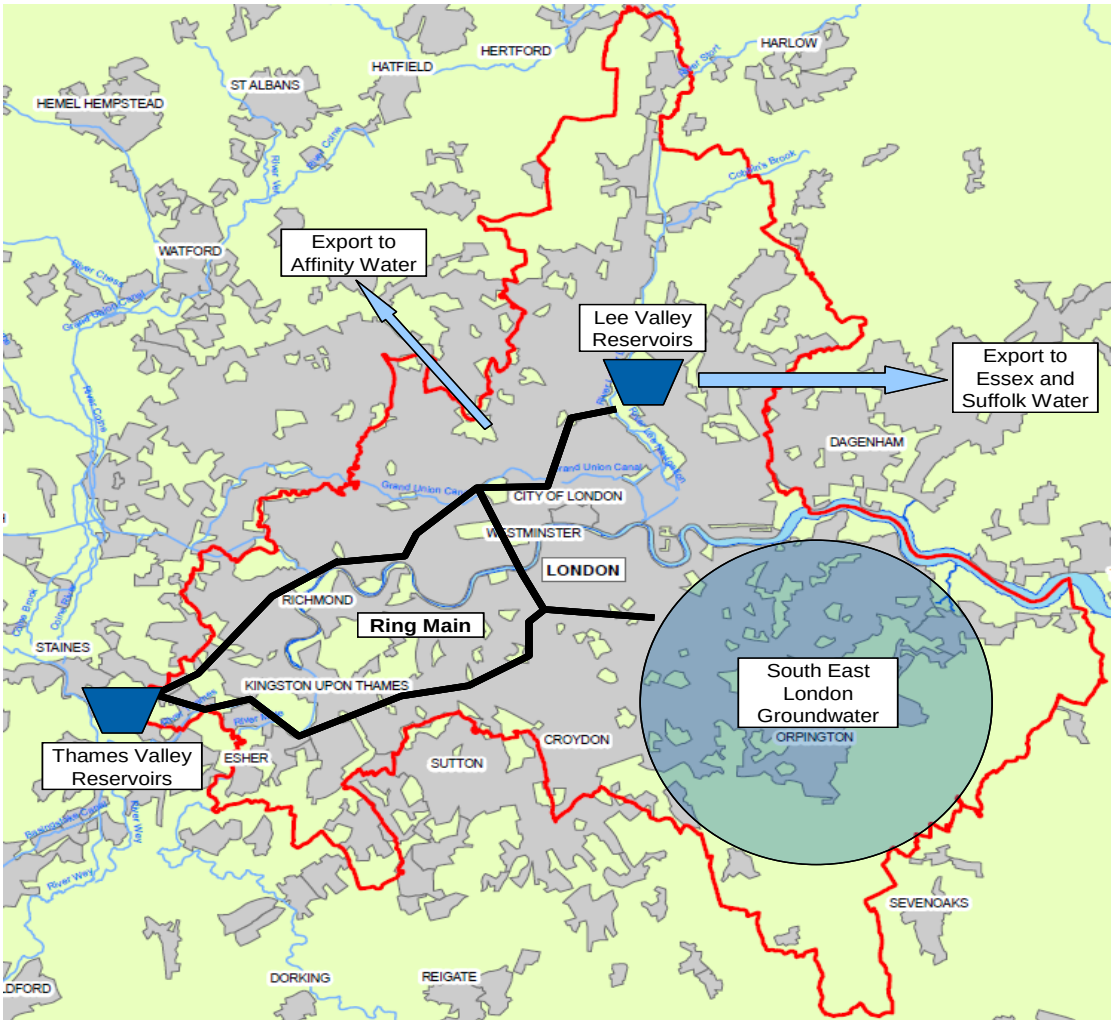

Figure A - 1: Principal features of the London WRZ

Swindon and Oxfordshire (SWOX)

A.10 The SWOX WRZ is supplied primarily from groundwater (c.60%), supported by surface water abstractions and Farmoor 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
- Farmoor 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

A.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.

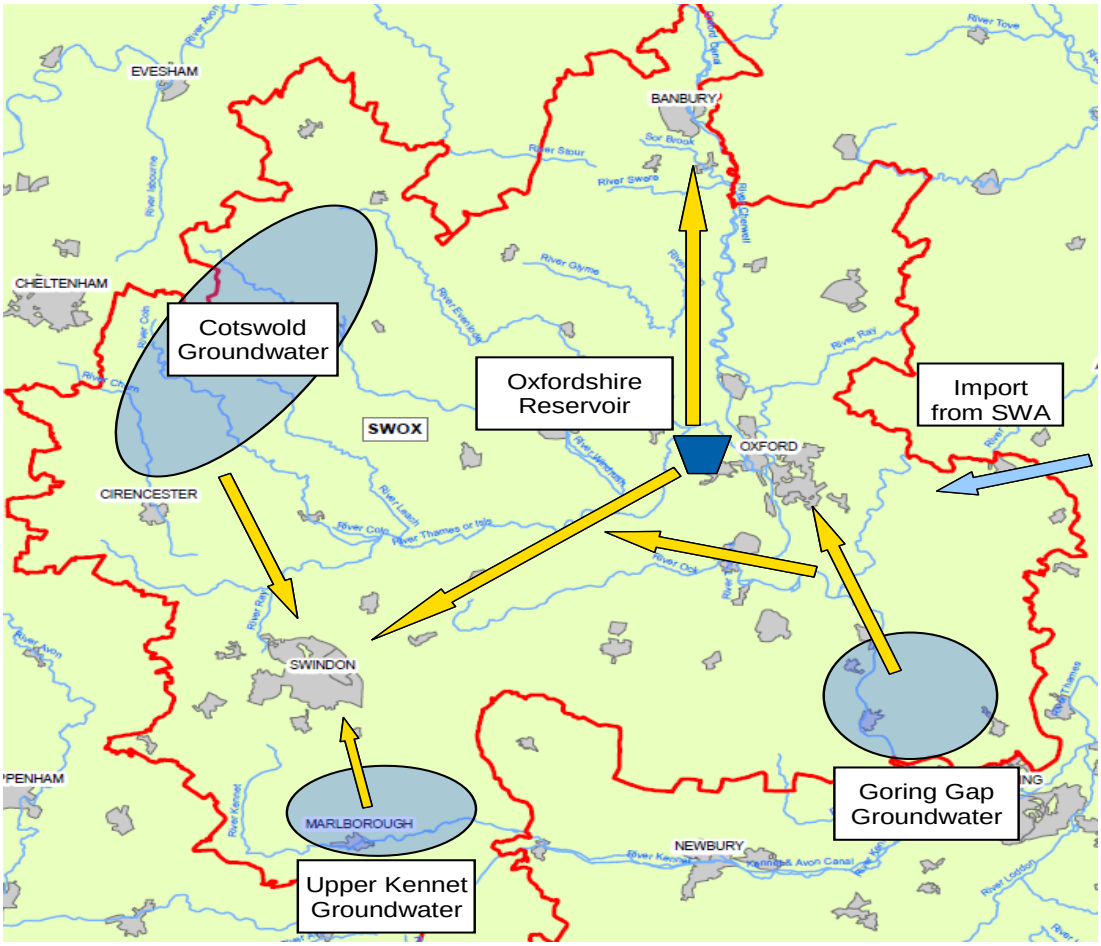

Figure A - 2: Principal features of the SWOX WRZ

Slough, Wycombe and Aylesbury (SWA)

A.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.

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

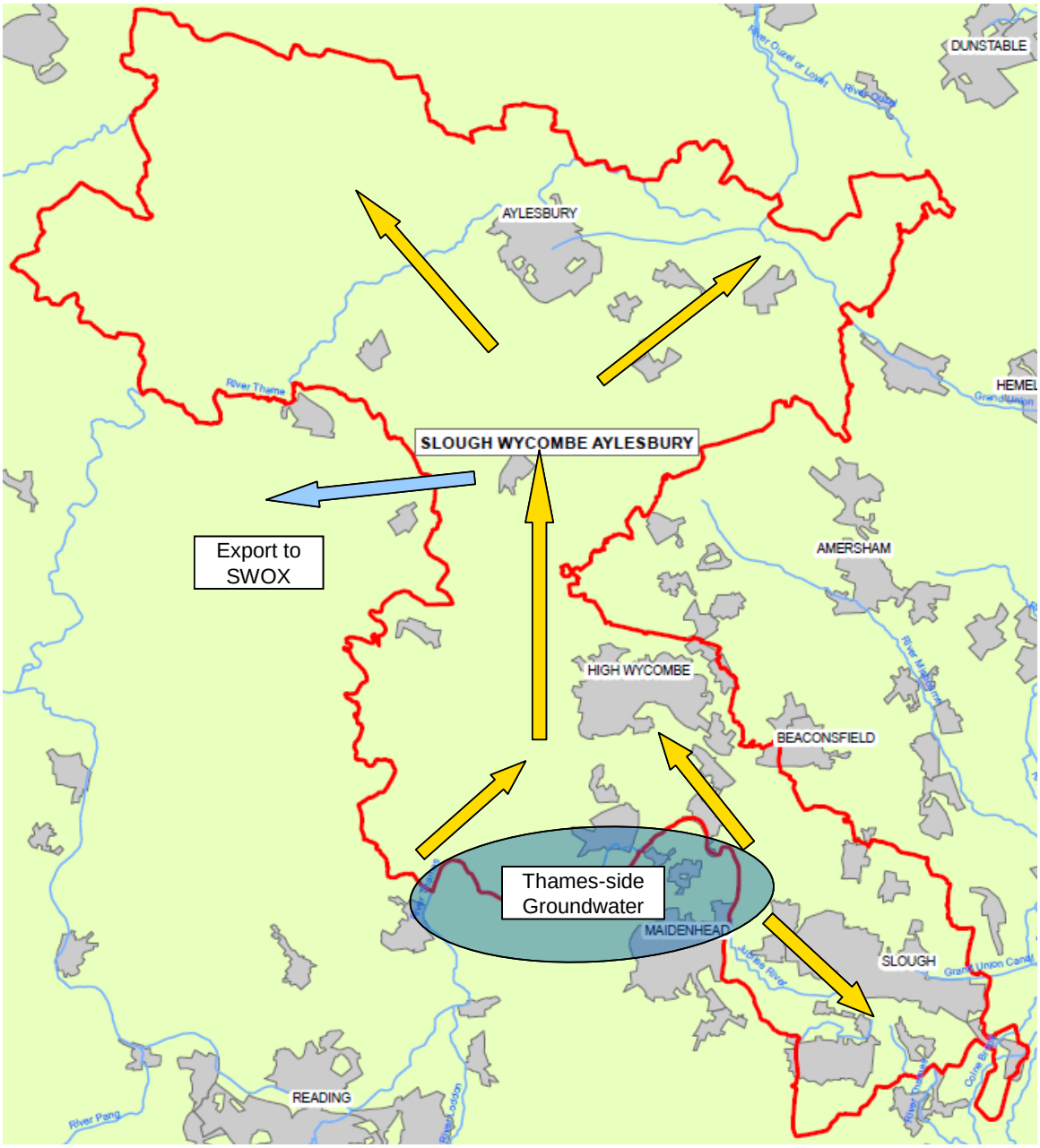

Figure A - 3: Principal features of the SWA WRZ

Kennet Valley

A.14 The Kennet Valley WRZ is primarily supplied from groundwater (c.60%) supported by a surface water abstraction from the River Kennet. There are no raw water reservoirs.

A.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.

A.16 The zone comprises two large sub-areas (Reading and Newbury) and smaller island zones. Connections between the sub-area and island zones are limited.

A.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.

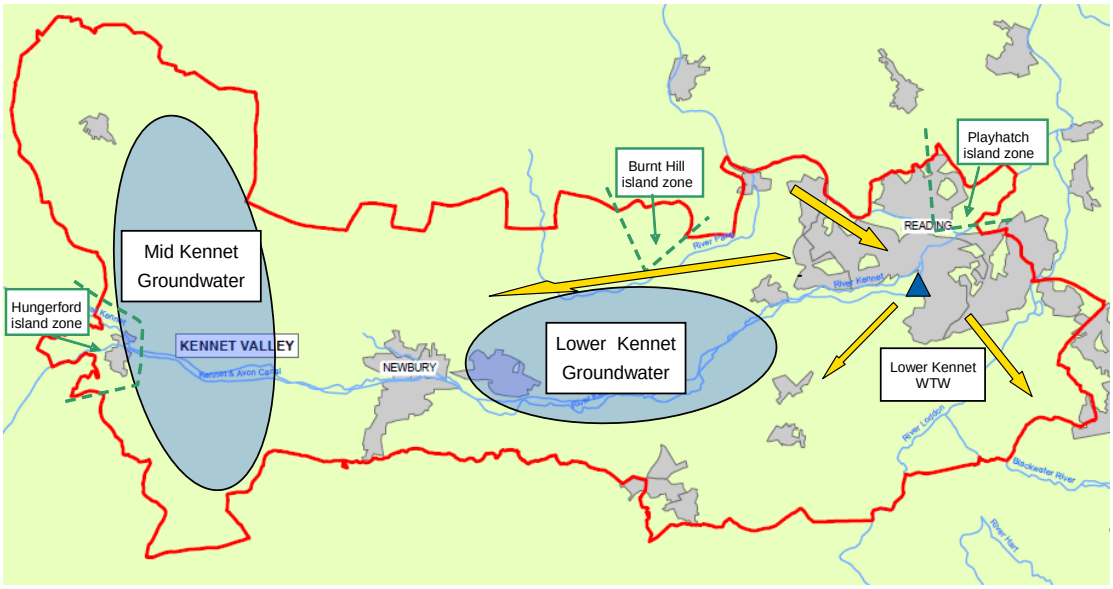

Figure A - 4: Principal features of the Kennet Valley WRZ

Guildford

A.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.

A.19 The zone is operated as two distinct sub-areas, Shalford and Albury. There is currently limited movement of water between the two areas however we are investing to connect the two sub-areas by 2026.

A.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.

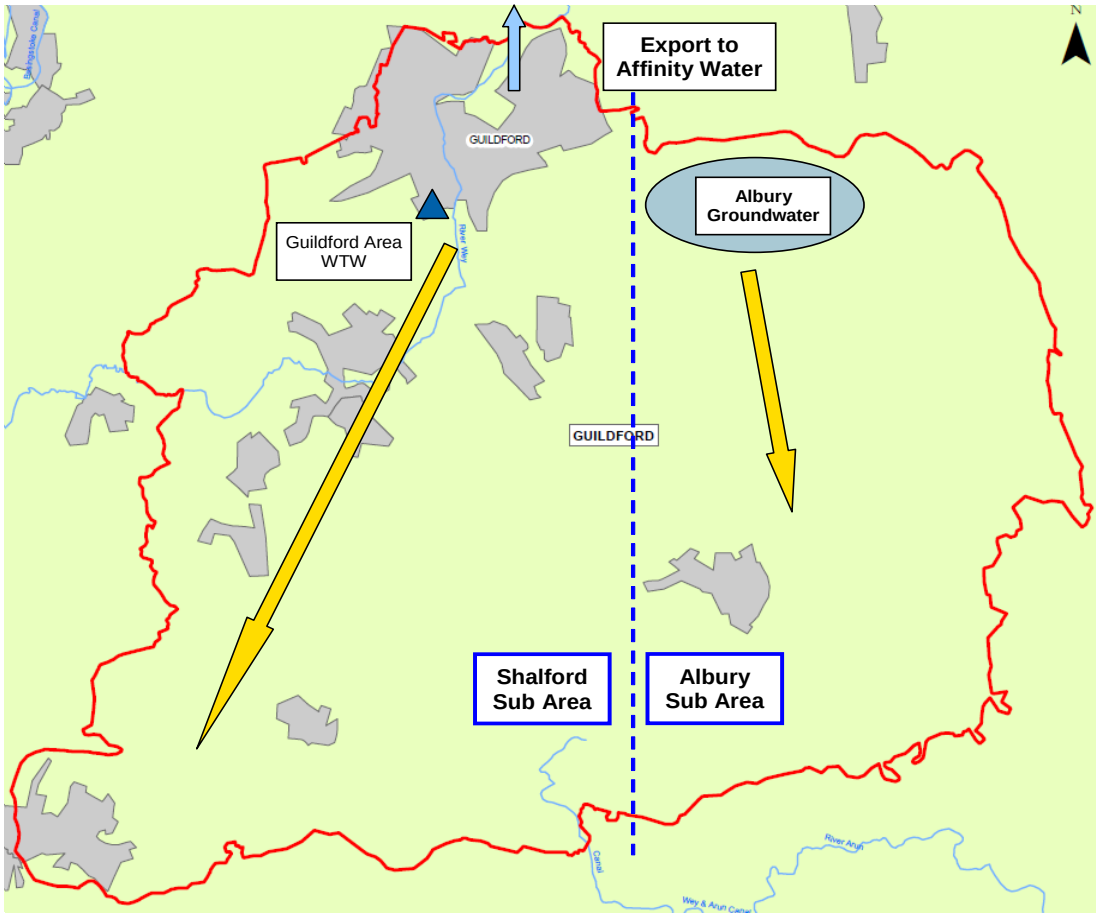

Figure A - 5: Principal features of the Guildford WRZ

Henley

A.21 The Henley WRZ is supplied entirely from three groundwater and has a relatively simple distribution network with three service reservoirs.

A.22 There is interconnectivity with both Kennet Valley (to the south) and SWOX (to the west) but are not generally active under normal operation.

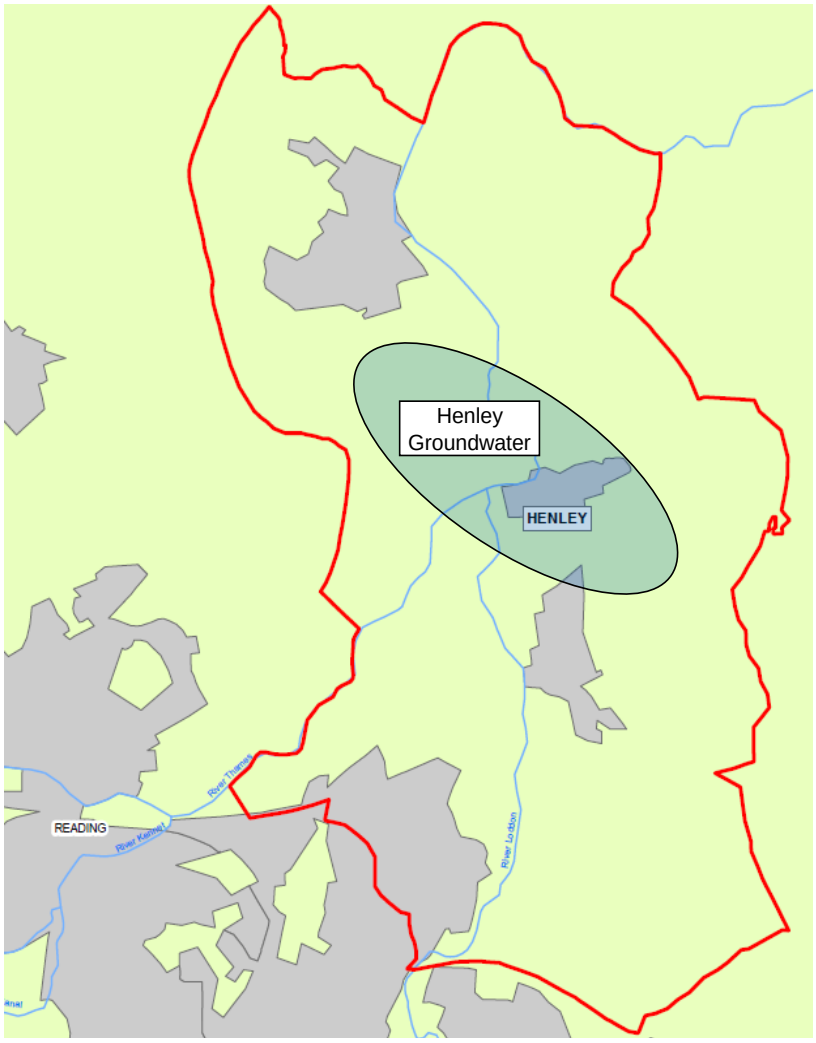

Figure A - 6: Principal features of the Henley WRZ

WRZ Integrity assessment process

A.23 We have followed the WRZ assessment process and liaison method referred to within the WRPG, as follows:

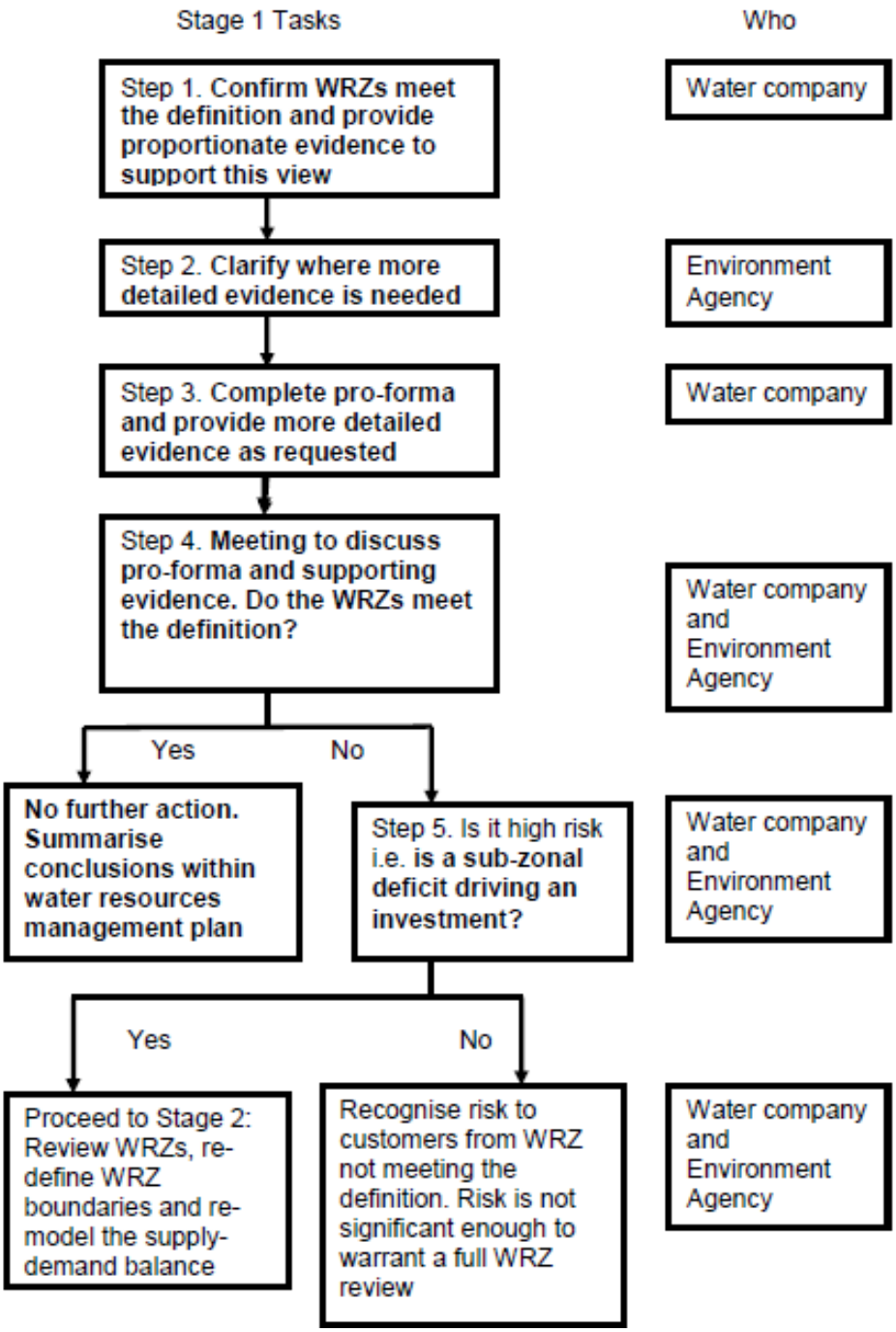

Figure A - 7: WRZ integrity process diagram

A.24 We have discussed WRZ integrity at regular pre-consultation meetings with the Environment Agency in the build-up to our submission. Our integrity assessment concluded that three of our WRZs (London, SWA and Henley) had integrated networks and met the definition for a WRZ fully.

A.25 We continue to note that there are small non-integrated sub-areas within the supply systems of the SWOX, Kennet Valley and Guildford WRZs, as set out below.

Table A - 1: Sub-areas identified within our supply system

WRZ	Areas	Prop Nos.	% of zone
GUI	Albury	7,622	14%
	Shalford	47,730	86%
SWOX	Stow Hill	1,705	0.4%
	Clatford	837	0.2%
	Bedwyn	1,246	0.3%
Kennet Valley	Playhatch	8,577	5.9%
	Hungerford	2,466	1.7%
	Burnt Hill	495	0.3%

A.26 The sub-areas in SWOX and Kennet Valley WRZs small, local groundwater systems and are generally below the de-minimis threshold for considering WRZ splitting. We consider that these areas are matter of operational resilience rather than a WRZ integrity issue and present low risk.

A.27 Investment to increase intra-zonal connectivity in Guildford was part of our WRMP19 and PR19 Business Plan, and we are currently delivering the improvements required to remove the sub-areas by 2026.

A.28 The full WRZ Integrity proforma is set out in Table A - 2 at the end of this Appendix.

Integrity risks in the future

A.29 We have reviewed and shared with the Environment Agency our views on whether future changes to our planned supply or demand may cause sub-zonal issues and thus future consideration of sub-dividing or merging the resource zones.

A.30 The biggest future challenge to WRZ integrity comes from changes to current operations as a result of sustainability reductions. Generally, all reductions require changes in operational practice and reconfiguration of the supply system. The larger the reductions the more complex the re-plumbing can be. 'Environmental Destination' (see Sections 2 and 5 for further details) scenarios have given us larger volumes of future sustainability reductions to consider in WRMP24 than we considered for WRMP19. All scenarios of Environmental Destination are, however, very uncertain, and we do not consider that pre-emptively making changes to our WRZs on the basis of very uncertain sustainability reductions would be the best course of action.

A.31 Overall, we consider that sustainability reductions will serve to increase the inter-connectivity and the integration of our zones and that the current WINEP process of investigation, options appraisal and then reductions (if proven required) gives us enough time to sufficiently plan, seek funding and deliver solutions and reductions. We anticipate that our AMP8 WINEP submission will set out a significant programme of investigations into the ecological impacts of sustainability reductions along with investigation of solutions, in order to determine which reductions set out in our Environmental Destination scenarios will be ecologically beneficial and cost effective.

A.32 As such and at this stage whilst the location and extent of reductions are unconfirmed, we do not foresee the need to change our WRZ boundaries.

A.33 However, if reductions are made quickly, without plans in place to replace the lost supply, we would need to highlight potential zonal and sub-zonal risks, which could lead to boundary changes.

Table A - 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?	No	Yes, there are small sub-areas: Stow Hill Clatford Bedwyn	No	Yes, there are small sub-areas: 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: TW Ring Main NW London pipe-track	Major transfers: GATOX Farmoor Banbury Swindon Cotswolds	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					

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, but low risk	No	Yes, but low risk	Yes, but project in delivery	No


Thames
Water