

Water Resources Management Plan 2014

Appendix I : Introduction

Executive Summary

1. This appendix provides useful additional information to support the WRMP14.

Contents Page

SUMMARY1

PAGE2

..... 2

RESOURCE ZONE INTEGRITY REPORT3

STATEMENT4

confidentiality and security considerations..... 4

issues..... 4

with Sections 37A to D of the Water Industry Act 1991 4

Appendices

- 1A Water Resource Zone Integrity Report

Water Resource Zone Integrity Report

2. We commissioned Jacobs Engineering to carry out a high level WRZ Integrity study. A copy of the study report is enclosed in appendix 1A.

Compliance Statement

3. We have developed WRMP14 to comply with the following:
 - The Security and Emergency Measures Direction, in respect of the non-disclosure of sensitive information
 - The Water Act 2003, in respect of taking account of competition issues
 - The WRPg, in respect of the processes followed in the preparation of baseline supply-demand forecasts and the evaluation of total water management options to resolve forecast shortfalls
 - The Environmental Assessment of Plans and Programmes Regulations 2004, in respect of the decision to subject the proposed WRMP to a Strategic Environmental Assessment
 - The Conservation of Habitats and Species Regulations 2010 as amended, in respect of the decision to undertake a Habitats Regulations Assessment of the proposed WRMP
 - Sections 37A to D of the Water Industry Act 1991.

Commercial confidentiality and security considerations

4. We confirm that:
 - we have not excluded or included any commercially confidential information and so will not be submitting a statement in accordance with s.37B (1) (b) of the Act to this effect, and;
 - a statement of compliance to the Secretary of State is provided confirming that the WRMP has been prepared in accordance with requirements of The Control of Sensitive Water Company Information – Advice Note 11 Edition 3 Defra May 2008 and EKP Document Designation Handling and Storage Advice Note 2 Defra Nov. 06.

Competition issues

5. We confirm that there are no other water licensees currently operating in its area, nor are there any that are likely to do so in the foreseeable future.

Compliance with Sections 37A to D of the Water Industry Act 1991

6. The WRMP14 complies with the requirements upon companies set out in the Water Resources Act 1991, the Water Industry Act 1991 and the Water Resources Management Plan Regulations 2007, and deals in particular with the several statutory requirements for such plans. Those requirements, together with a reference to that part of the Plan in which they are addressed, are set out in table 1, using the following abbreviations:
 - s.37A to D - Sections 37A to D of the Water Industry Act 1991
 - Direction 2012 - The Water Resources Management Plan Direction 2012

Table 1: Compliance of the Company's WRMP with the required contents of a WRMP

No	Provision	Contents of a WRMP as specified by legislation	Company Consideration in plan and statutory process
1	s.37A(3)(a)	The water undertaker's estimate of the quantities of water required to meet its obligations under WIA Part III.	SECTIONS 3 TO 6
2	s.37A(3)(b)	The measures which the water undertaker intends to take or continue to take to manage and develop to meet its obligations	SECTIONS 7 TO 9
3	Direction 2012, 2	Prepare a water resources management plan, for a period of 25 years commencing on April 2015	SECTIONS 1 TO 9
4	Direction 2012, 3 (a)	How frequently the water undertaker expects that it may need to impose prohibitions or restrictions on its customers in relation to: (i) WIA s.76 (temporary hosepipe bans) (ii) WRS 1991 s.74(2)(b) (drought order restricting "non-essential use") (iii) WIA s.76 (temporary hosepipe bans)	SECTIONS 1, 8 AND 9
5	Direction 2012, 3 (b)	The appraisal methodologies which the water undertaker has used in choosing the measures it intends to take or continue for the purpose of making its WRMP.	SECTIONS 7, 8 AND 9
6	Direction 2012, 3 (c)	The emissions of greenhouse gases which are likely to arise as a result of each measure which the water undertaker has identified to meet its obligations	SECTION 8
7	Direction 2012, 3 (d)	How the supply and demand forecasts contained in the WRMP have taken into account the implication of climate change	SECTIONS 3, 4, 5, 6, 8 AND 9
8	Direction 2012, 3 (e)	How the water undertaker has estimated future household demand in its area over the planning period.	SECTIONS 4, 5, 6, 8, AND 9
9	Direction 2012, 3 (f)	Its estimate of the increase in the number of domestic household premises in its area, over the planning period, in respect of which it will be required to fix charges by reference to volume of water supplied to those premises under section 144A(i.e. by way of a water meter).	SECTION 4
10	Direction 2012, 3 (g)	Where the whole or part of its area has been determined by the Secretary of State to be an area of serious water stress on 1st October 2007, the water undertaker's estimate of the number of domestic household premises in its area which, over the planning period, in respect of which it would fix charges by reference to volume of water supplied to those premises.	SECTIONS 4, 7, 8 AND 9
11	Direction 2012, 3 (h)	Its estimate of the increase in the number of domestic household premises in its area (excluding any included in the estimate given under paragraph 2(b) (i.e. 9 in this table), over the planning period, in respect of which the water undertaker will be able to fix charges by reference to volume because conditions	SECTION 4

No	Provision	Contents of a WRMP as specified by legislation	Company Consideration in plan and statutory process
		prescribed under s.144B(1)(c)m are not met and which it will so charge.	
12	Direction 2012, 3 (i)	Full details of the likely effect of what is forecast pursuant to the estimates provided under paragraphs (2)(a), (b) and (c) (i.e. 9-11 of this table).	SECTIONS 4 AND 9
13	Direction 2012, 3 (j)	The estimated cost to the water undertaker in relation to the installation and operation of water meters to meet what is forecast pursuant to the estimates provided under paragraphs 2(a) to (c) (i.e. 9-11 of this table) and a comparison of that cost with the other measures which it might take to manage demand for water, or increase supplies of water, to meet its obligations under WIA Part III.	SECTIONS 7 TO 9
14	Direction 2012, 3 (k)	A programme for the implementation of what is forecasted pursuant to paragraphs (2) (a) and (b) (i.e. 8 and 9 of this table).	SECTIONS 7 TO 9

South East Water

WRZ Integrity Assessment Report

September 2012

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Contents

Executive Summary	1
WRZ Integrity for South East Water	2
1. Introduction	2
2. Methodology	2
3. SEW Area	2
4. SEW Water Resource Zones	2
4.1 Background	2
4.2 WRZ1	5
4.3 WRZ2	7
4.4 WRZ3	9
4.5 WRZ4	11
4.6 WRZ5	13
4.7 WRZ6	15
4.8 WRZ7	17
4.9 WRZ8	19
5 WRZ Integrity – Discussions with EA	21
6 WRZ Integrity Assessment based on Guidelines	24
6.1 General	24
6.2 WRZ Integrity WRZ1	24
6.3 WRZ Integrity WRZ2	24
6.4 WRZ Integrity WRZ3	26
6.5 WRZ Integrity WRZ4	28
6.6 WRZ Integrity WRZ5	28
6.7 WRZ Integrity WRZ6	30
6.8 WRZ Integrity WRZ7	32
6.9 WRZ Integrity WRZ8	32
7. Conclusions	32
Appendix A – Response to EA Observations relating to detailed examination of WRZ Composition	34
Appendix B – Network Constraints - Zonal Utilisation Deficit Assessment	37

Executive Summary

The Water Resources Planning Guideline - technical methods and instructions (June 2012) advises water companies to follow a formal WRZ assessment method, as outlined in Appendix 1 of the Guideline.

The assessment process includes consultation with the local EA team. This report has been prepared to describe the first phase of the WRZ assessment and to enable initial review by the EA.

The South East Water (SEW) supply area is currently divided into eight WRZs (two in Western Region, three in Eastern Region (East) and three in Eastern Region (West)). These WRZs were in place at the time of the last periodic review (PR09).

A meeting has been held with the EA to discuss their initial feedback on SEW's WRZ integrity assessment following the EA's previous internal review of PR09 data for SEW and all other water companies. The EA made a number of observations which have now been addressed; responses to these issues are contained in Appendix A.

WRZ Integrity for South East Water

1. Introduction

A water resource zone (WRZ) provides a water company with a strategic framework for water resources supply-demand management and investment.

The WRZ describes a zone: within which the management of supply and demand is largely self-contained (apart from defined bulk transfers of water); where the resource units, supply infrastructure and demand centres are integrated to the extent that customers in the WRZ experience the same risk of supply failure, that is all customers share the same level of service.

The Environment Agency (EA) expects all water companies to clearly demonstrate that their WRZs meet the WRZ definition. This requirement has been defined in the Water Resources Planning Guideline published in June 2012 (by the EA, Ofwat, Defra and the Welsh Government). As per the guidance, water companies need to demonstrate that their main water resources planning units (WRZs) are fit for purpose.

Jacobs was engaged to carry out a high level WRZ Integrity study for South East Water (SEW).

2. Methodology

The assessment was carried out utilising current zonal schematics to gain an understanding of the existing configuration and operation of the SEW network. Results from InfoWorks all mains models were also reviewed to determine hydraulic performance and any sub zonal boundaries within the respective WRZs.

3. SEW Area

The SEW water supply area currently comprises eight water resource zones, WRZ1 through to WRZ8.

Historically, SEW had seven water-into-supply zones (WISZ) in its former Mid Kent Area. These were further split into sub zones generally based on the principal demand areas. Following a review of the WRZ boundaries for PR09, the WISZ areas were merged to create three new WRZs: WRZ6, WRZ7 and WRZ8 respectively, all located in the area now termed Eastern Region (East).

The WRZ structure in the former SEW areas has been maintained since the merger with the former Mid Kent Water and comprises five zones located respectively in the Western Region (WRZ4 and WRZ5) and in the Eastern Region (West) (WRZ1, WRZ2 and WRZ3).

4. SEW Water Resource Zones

4.1 Background

WRZ schematics and model balances were reviewed in detail to understand the system configuration of the WRZs. The WRZ structure comprises the following details incorporating the company's water-into-supply zones (WISZ):

Western Region - WRZ4 and WRZ5

WRZ4 comprises WISZs centred on the predominantly urban demand areas in Maidenhead to the north, Bracknell, Camberley and Wokingham in the central region, Farnborough, Fleet and Aldershot to the south and Basingstoke and Alton to the west. WRZ5 comprises WISZs with a mix of rural and urban demand areas centred on Farnham and Wrecclesham to the north and Bordon and Petersfield to the south.

Eastern Region (West) - WRZ1, WRZ2 and WRZ3

WRZ1 comprises WISZs centred on the predominantly urban demand areas of Sevenoaks, Tonbridge and Tunbridge Wells. WRZ2 comprises WISZs with a mix of rural and urban demand areas centred on Haywards Heath and Burgess Hill in the west, East Grinstead and Forest Row to the north, Uckfield in the central region and Newhaven and Peacehaven in the south. WRZ3 comprises WISZs with a mix of urban demand areas centred on Eastbourne, Hailsham and Bexhill in the south and extensive rural communities to the north.

Eastern Region (East) - WRZ6, WRZ7 and WRZ8

WRZ6 comprises WISZs centred on the demand areas in mid Kent, namely Maidstone, Maidstone, Malling, Aylesford and Snodland and the rural areas outside this conurbation. WRZ7 comprises WISZs which are located in the predominantly rural areas of the Kent Weald including the urban areas of Paddock Wood, Tenterden and Cranbrook. WRZ8 comprises WISZs centred on Canterbury, Ashford and the northern coastal towns of Faversham, Whitstable and Herne Bay.

The WRZs are shown on the map below

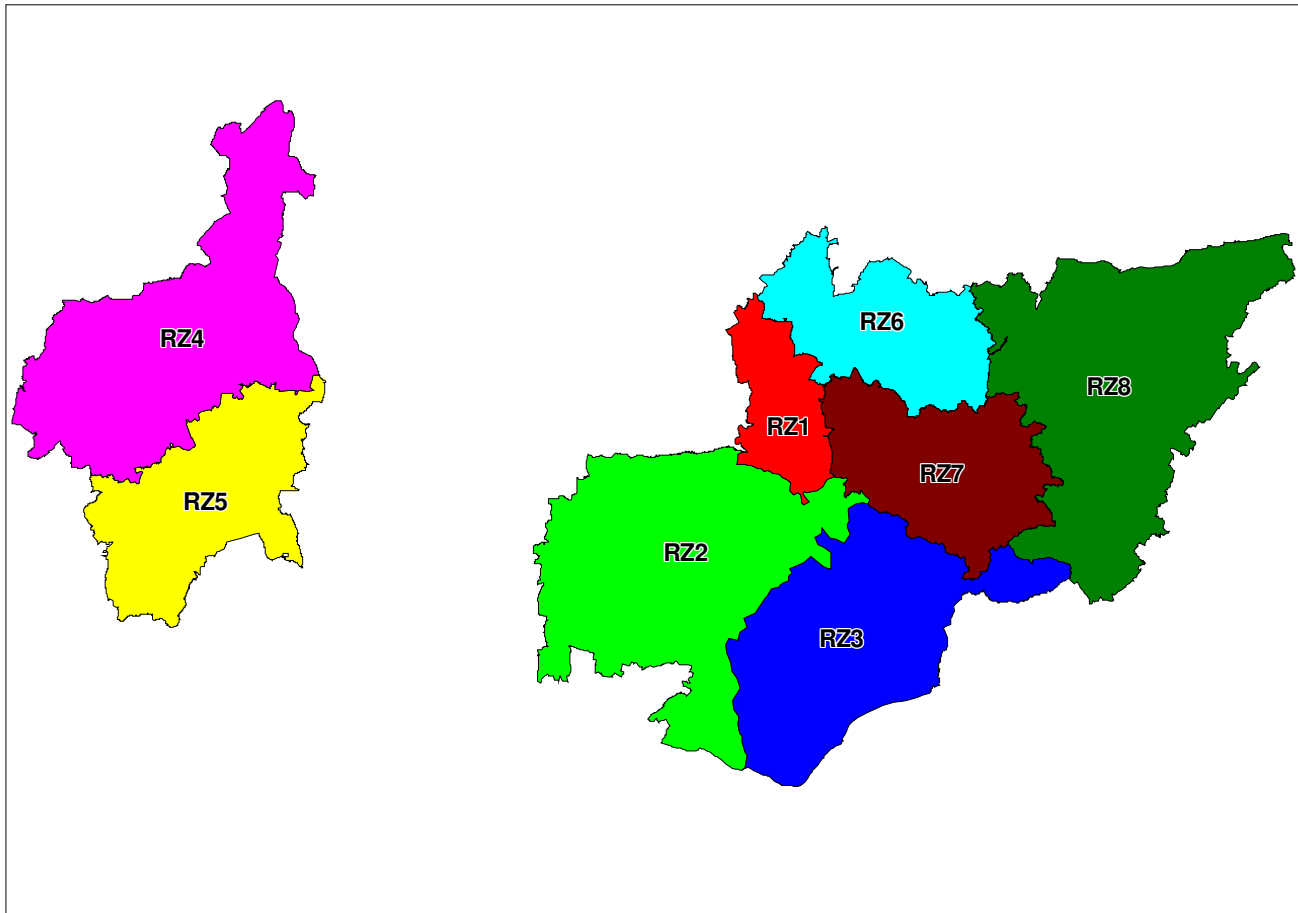


Figure 1: Map Showing Current Water Resource Zones

4.2 WRZ1

WRZ1 is located in the west Kent area with demand centres in Sevenoaks, Tonbridge and Tunbridge Wells. It operates as an integrated zone with the principal flows moving in a north-south direction. The groundwater sources are: Cramptons Road, Oak Lane, Kemsing, Tonbridge, Saints Hill and Pembury. There are no surface water sources.

The typical Distribution Input (ADD) into this zone is currently circa 39 MI/d.

Inter-zonal transfers are provided from WRZ7 at Pembury WTW (circa 2 MI/d) and from WRZ2 at Langton SR (circa 3MI/d). Total inter-zonal import is circa 5 MI/d.

Net values of average and peak deployable outputs, including typical inter-zonal transfer volumes and bulk supplies are as follows:

ADO & inter-zonal transfers MI/d	PDO & inter-zonal transfers MI/d	Bulk Supply MI/d	ADO & inter-zonal transfers + Bulk Supply MI/d	PDO & inter-zonal transfers + Bulk Supply MI/d
46.10	50.92	0	46.10	50.92

Figure 2 below shows the schematic layout of WRZ1.

WRZ1 – SUPPLY AND DEMAND CENTRES

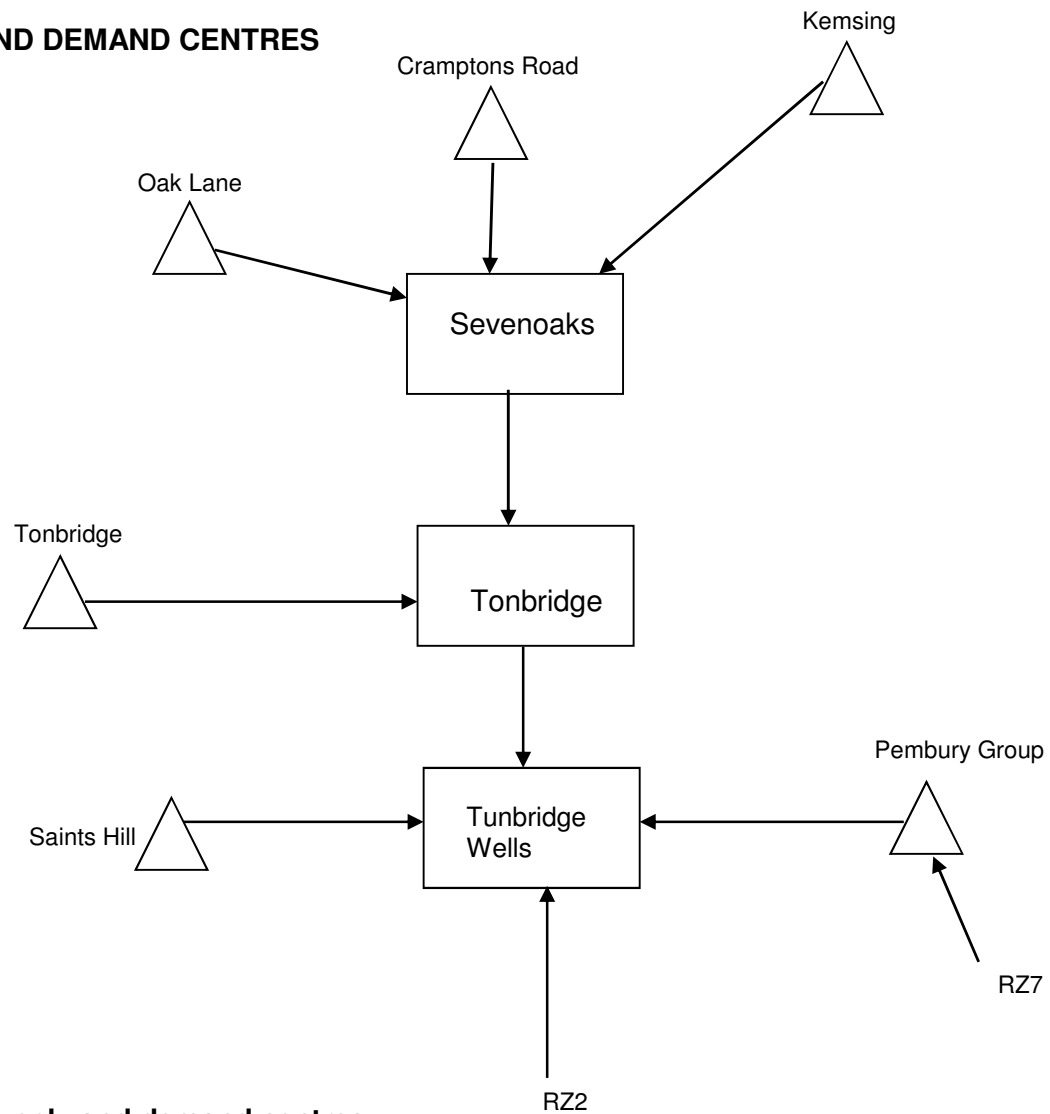


Figure 2: WRZ1 – supply and demand centres

4.3 WRZ2

WRZ2 is located in the East Sussex area with demand centres in Haywards Heath, Burgess Hill, East Grinstead, Uckfield, Peacehaven and Newhaven. It operates as six sub zones currently (two principal and four secondary) but options are available to merge a number of the subzones to improve zonal integrity. The groundwater sources are: Groombridge, Coggins Mill, Forest Row, Hempsted, Cockhaise (formerly Hollywell), Cow Wish Bottom, Poverty Bottom, Rathfinney, Saddlescombe, Clayton, Whitelands, Coombe Down and Offham. Surface water treatment works are within existing facilities within RZ2.

An inter-zonal import/export (bi-directional) up to circa 10 MI/d is provided from WRZ3 at Arlington surface water WTW and an export circa 3 MI/d to WRZ1 from Groombridge WTW.

The typical Distribution Input (ADD) into this zone is currently circa 71 MI/d.

An inter-company bulk supply is transferred from SWS into the zone at Weir Wood circa 5.4 MI/d.

Net values of average and peak deployable outputs, including typical inter-zonal transfer volumes and bulk supplies are as follows:

ADO & inter-zonal transfers MI/d	PDO & inter-zonal transfers MI/d	Bulk Supply MI/d	ADO & inter-zonal transfers + Bulk Supply MI/d	PDO & inter-zonal transfers + Bulk Supply MI/d
79.63	105.51	5.4	85.03	110.91

Figure 3 below shows the schematic layout of WRZ2.

WRZ2 – SUPPLY AND DEMAND CENTRES

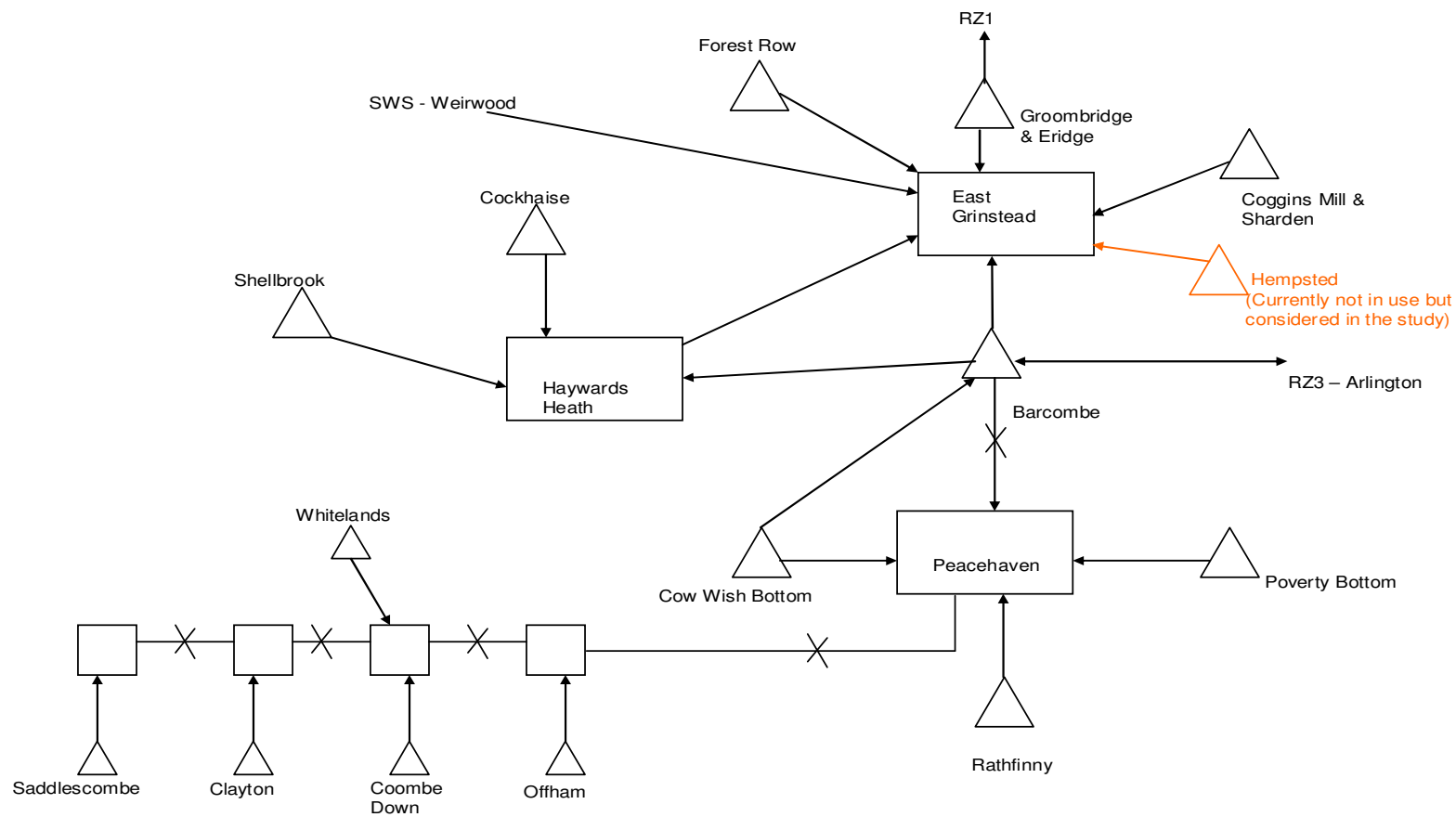


Figure 3: WRZ2 – supply and demand centres

4.4 WRZ3

WRZ3 is located in the East Sussex area with demand centres in Eastbourne, Hailsham and Bexhill and rural communities in the north and east of the zone. It has previously operated as two distinct sub zones, but has become a more integrated zone recently by the introduction of a strategic transfer main laid between Friston WTW and Folkington SR. The groundwater sources are: Friston, Birling, Cornish, Holywell, Waterworks Road, Deep Dean, Filching, Sweet Willow Wood, Crowhurst Bridge, Hazards Green and Powdermill. Surface Water treatment works are: Arlington and Hazards Green (via SWS Darwell Reservoir).

The typical Distribution Input (ADD) into this zone is currently circa 61 MI/d.

An inter-zonal import/export (bi-directional) up to circa 10 MI/d is provided from WRZ2 at an existing WTW. An inter-company raw water bulk supply is transferred from SWS Darwell Reservoir into the zone at Hazards Green, circa 8 MI/d.

Net values of average and peak deployable outputs, including typical inter-zonal transfer volumes and bulk supplies are as follows:

ADO & inter-zonal transfers MI/d	PDO & inter-zonal transfers MI/d	Bulk Supply MI/d	ADO & inter-zonal transfers + Bulk Supply MI/d	PDO & inter-zonal transfers + Bulk Supply MI/d
76.93	89.4	8.0	84.93	97.40

Figure 4 below shows the schematic layout of WRZ3.

WRZ3 – SUPPLY AND DEMAND CENTRES

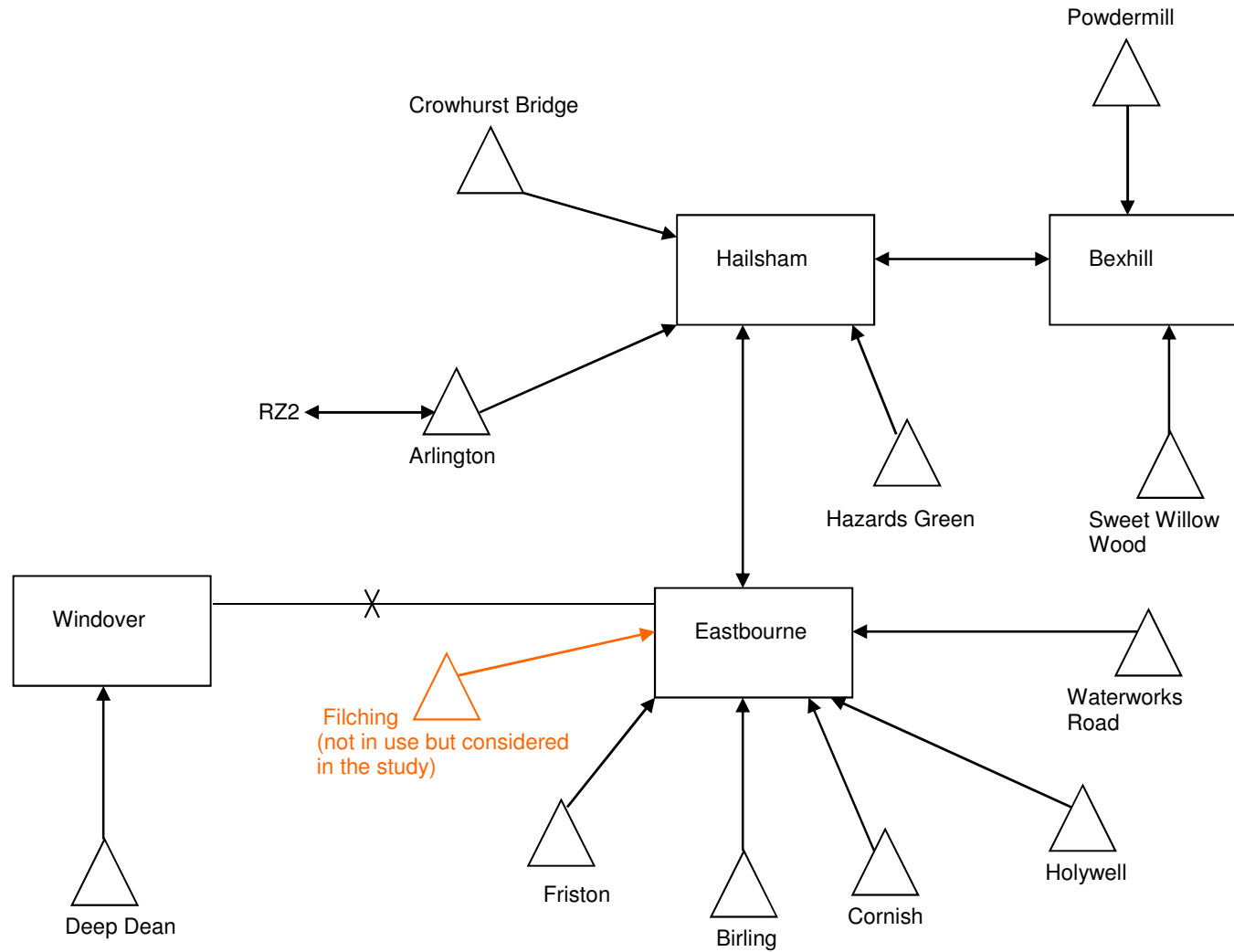


Figure 4: WRZ3 – supply and demand centres

4.5 WRZ4

WRZ4 is located in the Surrey/Hampshire/Berkshire areas with demand centres in Maidenhead, Wokingham, Bracknell, Farnborough-Camberley, Fleet, Aldershot and Basingstoke conurbations. It operates as an integrated zone with the principal flows moving in a north-south direction. The groundwater sources are: Cookham, College Avenue, RZ4 Gravels, Hurley, Greywell, Itchel, Boxalls Lane, Windmill, Lasham, Cliddesden, West Ham and Woodgarston, Surface Water treatment at an existing water treatment works facility.

The typical Distribution Input (ADD) into this zone is currently circa 185 MI/d.

An inter-company bulk supply of 36 MI/d is transferred into the zone from Veolia Central (TVW) via an existing WTW to Surrey Hills SR. Inter-zonal transfers, circa total 10MI/d import at peak demand, are available from WRZ5 at a number of locations on the zonal boundary between WRZ4 and WRZ5.

Net values of average and peak deployable outputs, including typical inter-zonal transfer volumes and bulk supplies are as follows:

ADO & inter-zonal transfers MI/d	PDO & inter-zonal transfers MI/d	Bulk Supply MI/d	ADO & inter-zonal transfers + Bulk Supply MI/d	PDO & inter-zonal transfers + Bulk Supply MI/d
194.33	206.0	36.0	230.33	242.0

Figure 5 below shows the schematic layout of WRZ4.

WRZ4 – SUPPLY AND DEMAND CENTRES

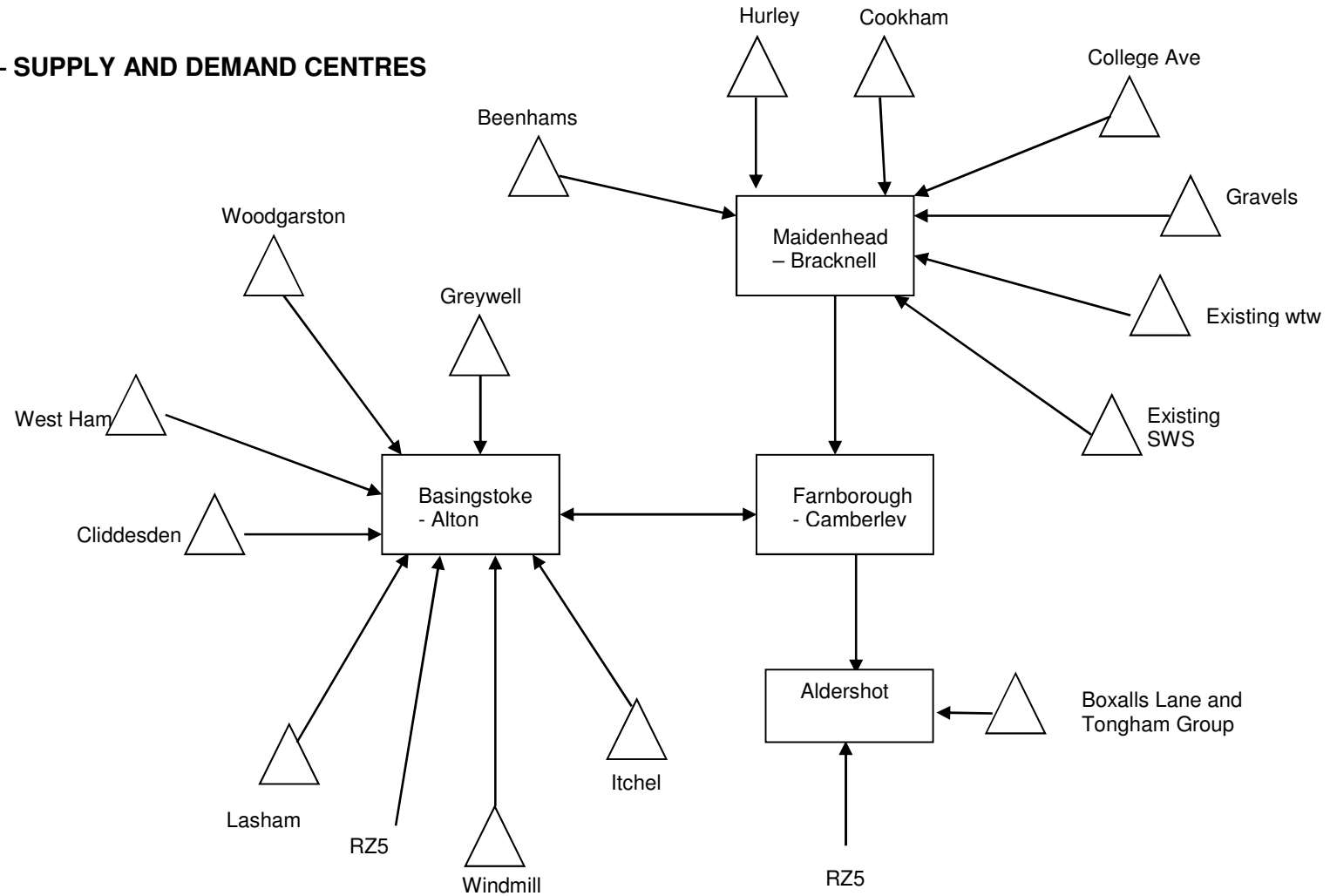


Figure 5: WRZ4 – supply and demand centres

4.6 WRZ5

WRZ5 is located in the Surrey/Hampshire areas with demand centres in Farnham, Wrecclesham, Petersfield and Bordon, with extensive rural communities generally distributed across the zone. It operates as an integrated zone with the exception of a small satellite sub zone in the East Meon area. This sub zone can, however, be supplied from the main zone in the event of an outage of the East Meon WTW. The groundwater sources are: Britty Hill, Tilford Meads, Tilford, The Bourne, Headley Park, Oakhanger, Greatham, Tower Road, Hindhead, Hawkley, Oakshot, Sheet and East Meon. There are no surface water treatment sites.

The typical Distribution Input (ADD) into this zone is currently circa 38 MI/d.

Supplies can be transferred to WRZ4 from WRZ5 sites at Oakhanger (to Alton and Boyneswood) and at Britty Hill (to Hogsback SR) circa total 10 MI/d export at peak demand.

Net values of average and peak deployable outputs, including typical inter-zonal transfer volumes and bulk supplies are as follows:

ADO & inter-zonal transfers MI/d	PDO & inter-zonal transfers MI/d	Bulk Supply MI/d	ADO & inter-zonal transfers + Bulk Supply MI/d	PDO & inter-zonal transfers + Bulk Supply MI/d
46.44	58.39	0	46.44	58.39

Figure 6 below shows the schematic layout of WRZ5.

WRZ5 – SUPPLY AND DEMAND CENTRES

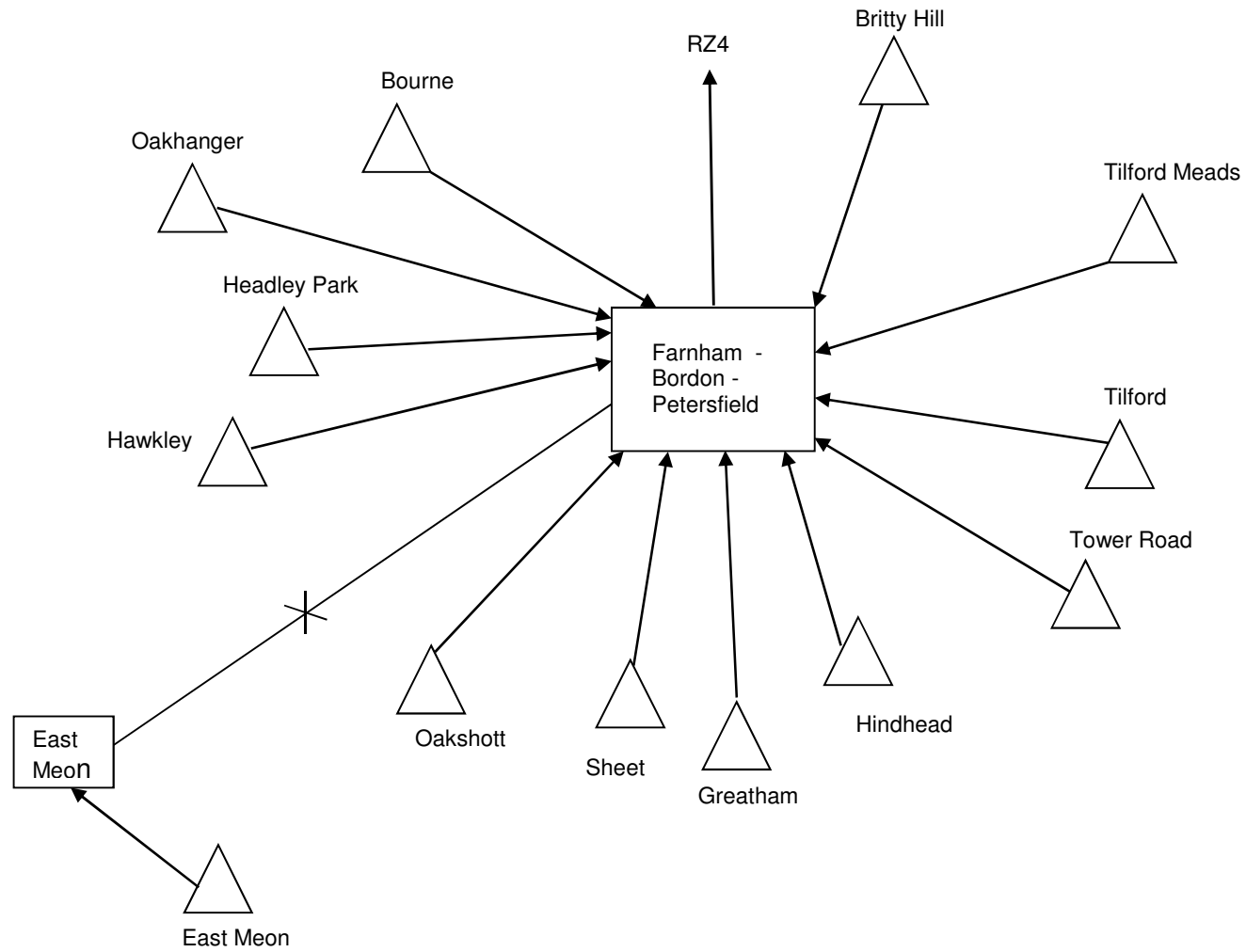


Figure 6: WRZ5 – supply and demand centres

4.7 WRZ6

WRZ6 is located in the mid Kent area with demand centres in Maidstone, Maidstone, Aylesford and Snodland and rural communities to the north-west. It operates as an integrated zone with ample network connectivity. The groundwater sources are: Trosley, Hartley, Ridley, Borough Green, Halling, Forstal, Cossington, Boxley and Hockers Lane.

The typical Distribution Input (ADD) into this zone is currently circa 60 MI/d.

An inter-company agreement exists for the transfer of a bulk supply from the SWS Burham WTW, which has an intake from the River Medway and is a principal import to the zone (circa 9 MI/d) together with additional SWS bulk supply transfers from Matts Hill, Pitfield booster and Tunbury Avenue (circa total 7 MI/d)

Inter-zonal transfers operate between WRZ6 and WRZ7 at Hale Street (circa 4 MI/d export) and between WRZ6 and WRZ8 at Hollingbourne (circa 4 MI/d import), to maintain supply-demand balance in the respective zones.

Net values of average and peak deployable outputs, including typical inter-zonal transfer volumes and bulk supplies are as follows:

ADO & inter-zonal transfers MI/d	PDO & inter-zonal transfers MI/d	Bulk Supply ADO/PDO MI/d	ADO & inter-zonal transfers + Bulk Supply MI/d	PDO & inter-zonal transfers + Bulk Supply MI/d
62.60	77.71	6.9 / 8.8	69.5	86.51

Figure 7 below shows the schematic layout of WRZ6.

WRZ6 – SUPPLY AND DEMAND CENTRES

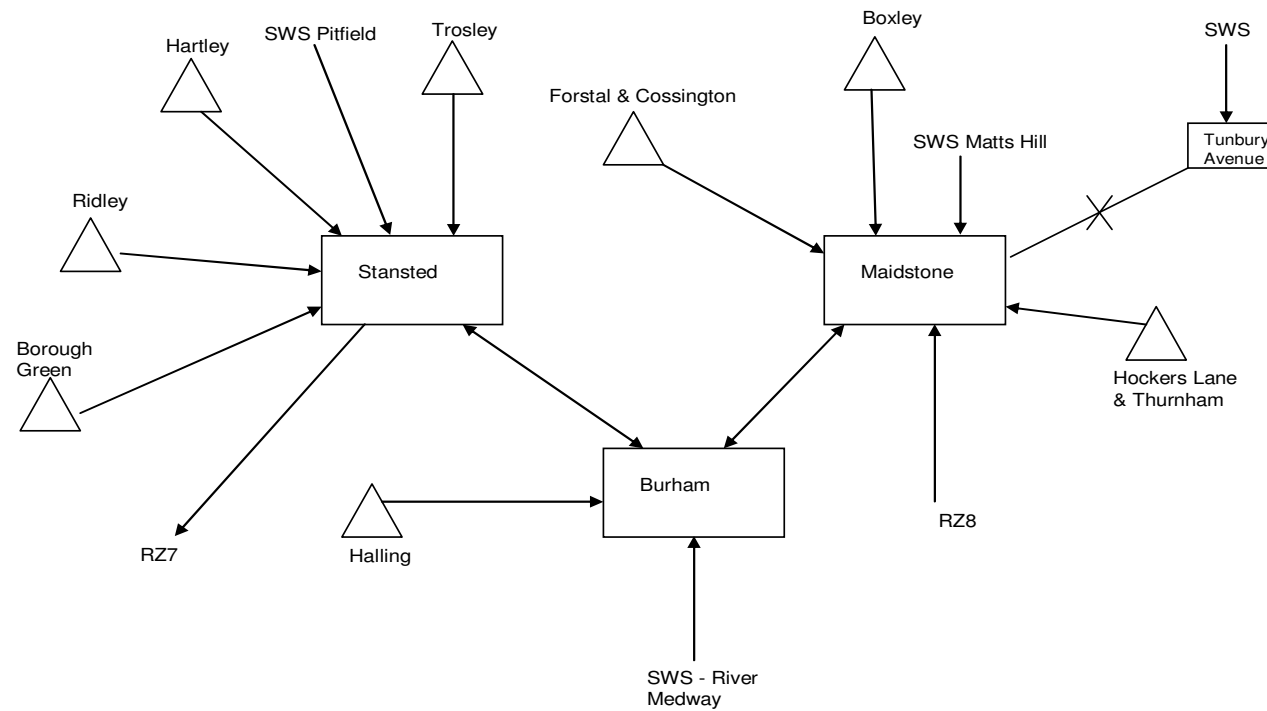


Figure 7: WRZ6 – supply and demand centres

4.8 WRZ7

WRZ7 is located in the Kent Weald area with demand centres in Paddock Wood, Pembury, Staplehurst, Cranbrook and Tenterden. It also serves large rural communities across the Weald region and operates as an integrated zone, with no sub zones. The groundwater sources are: Goudhurst/Lamberhurst, Bewl Bridge and Maytham Farm (currently not in use). Surface water is supplied from the Bewl Bridge WTW.

The typical Distribution Input (ADD) into this zone is currently circa 20 MI/d.

Inter-zonal transfers operate between WRZ7 and WRZ6 at Hale Street, (circa 4.0 MI/d import) between WRZ7 and WRZ8 at Cranbrook SR, (circa 3.0 MI/d import) via a recently constructed 500mm trunk main and between WRZ7 and WRZ1 (circa 2 Mld export) at Kippings Cross SR, to maintain supply-demand balance in the respective zones.

Net values of average and peak deployable outputs, including typical inter-zonal transfer volumes and bulk supplies are as follows:

ADO & inter-zonal transfers MI/d	PDO & inter-zonal transfers MI/d	Bulk Supply MI/d	ADO & inter-zonal transfers + Bulk Supply MI/d	PDO & inter-zonal transfers + Bulk Supply MI/d
21.4	27.3	0	21.4	27.3

Figure 8 below shows the schematic layout of WRZ7.

WRZ7 – SUPPLY AND DEMAND CENTRES

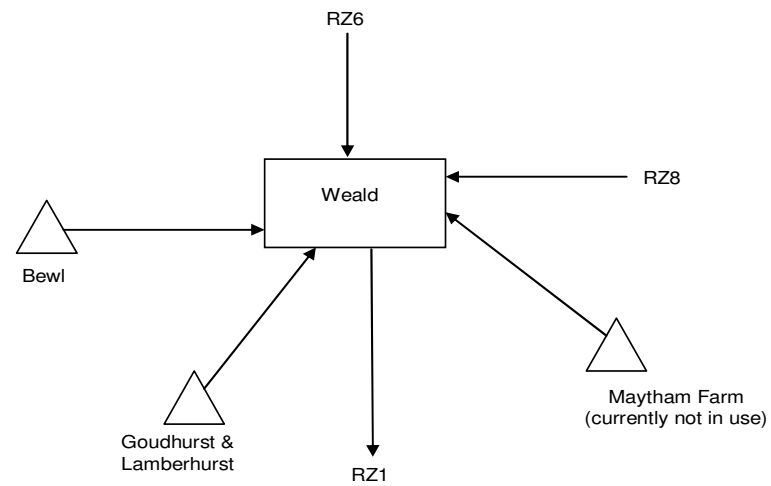


Figure 8: WRZ7 – supply and demand centres

4.9 WRZ8

WRZ8 is located in the east Kent North Downs area with demand centres in Ashford, Canterbury and the northern coastal towns of Faversham, Whitstable and Herne Bay. It also encompasses extensive rural communities across the zone and operates as an integrated resource zone, with no sub zones. The groundwater sources are: Wichling, Ospringe, Newnham, Wineycock Shaw, Boughton, Bottom Pond (SWS to SEW import) Stockbury (SEW to SWS export), Thanington, Howfield, Kingston, Hoplands Farm, Ford, Chilham, Godmersham, Westwell/Henwood and Charing. There are no surface water sites in the zone.

The typical Distribution Input (ADD) into this zone is currently circa 82 MI/d.

An inter-company reciprocal arrangement exists in the North Downs area (circa 2.8 MI/d at Stockbury and Bottom Pond sites) and inter-zonal transfers operate between RZ8 and RZ6 at Hollingbourne (circa 4 MI/d export) and between RZ8 and RZ7 at Cranbrook SR (circa 3 MI/d export).

An inter-company bulk supply export (circa 2 MI/d) is transferred from SEW to Veolia SE (Folkestone and Dover).

Net values of average and peak deployable outputs, including typical inter-zonal transfer volumes and bulk supplies are as follows:

ADO & inter-zonal transfers MI/d	PDO & inter-zonal transfers MI/d	Bulk Supply MI/d	ADO & inter-zonal transfers + Bulk Supply MI/d	PDO & inter-zonal transfers + Bulk Supply MI/d
106.36	121.31	- 2.0	104.36	119.31

Figure 9 below shows the schematic layout of WRZ8.

WRZ8 – SUPPLY AND DEMAND CENTRES

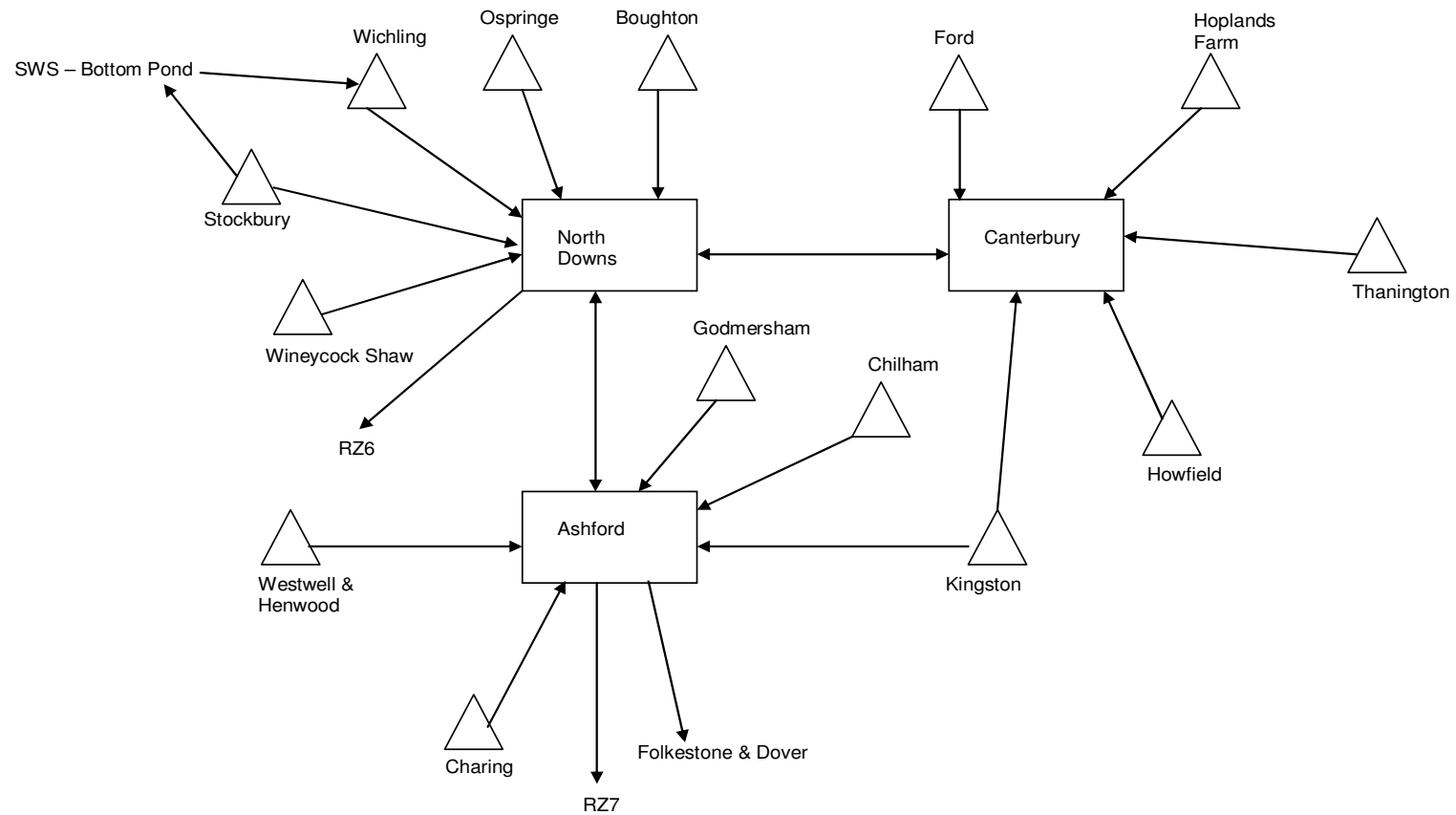
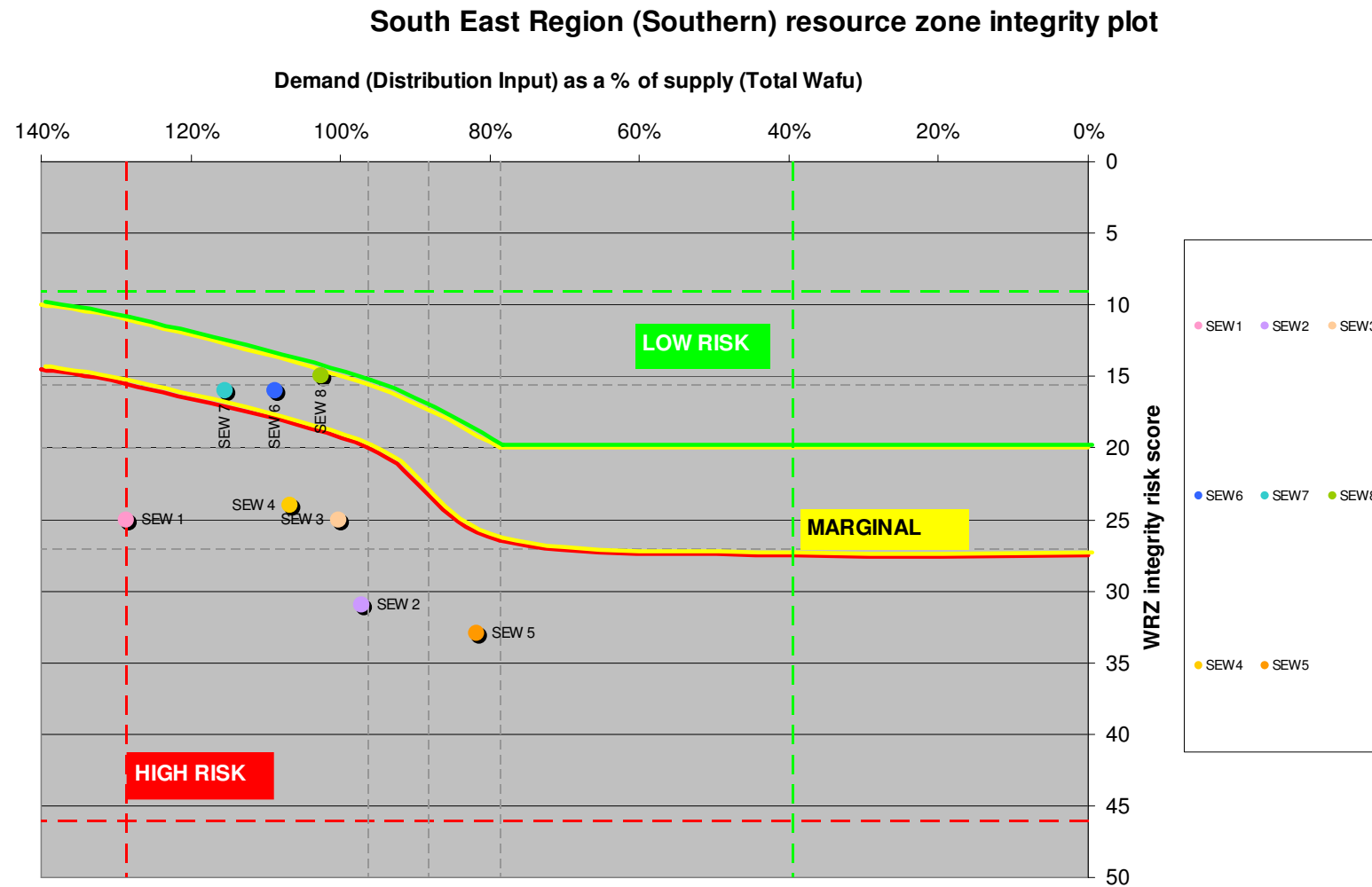


Figure 9: WRZ8 – supply and demand centres

5 WRZ Integrity – Discussions with EA

To commence early consultation with the EA, a teleconference was held on 26 July 2012 with the EA Water Resources Planners for SEW (Paul Nason and David Gorzelany). A detailed review meeting was then held on 20 August 2012 with David Gorzelaney. The EA Water Resources Planners reiterated that the EA had previously completed a WRZ Integrity Score based on PR09 data for the resource zones for all the water companies. The following charts indicate the assessment status of SEW Water Resource Zones.

EA ASSESSMENT



Notes:

1. DYCP condition

2. Average value of 2010 – 2035 based on Total Wafu* and DI (ref: WRP1 Baseline table)

* Total Wafu includes own sources, bulk transfers and fixed inter-zonal transfers (only RZ6 and RZ8)

Figure 10: SEW WRZ Integrity - Source: EA Water Resource Planners

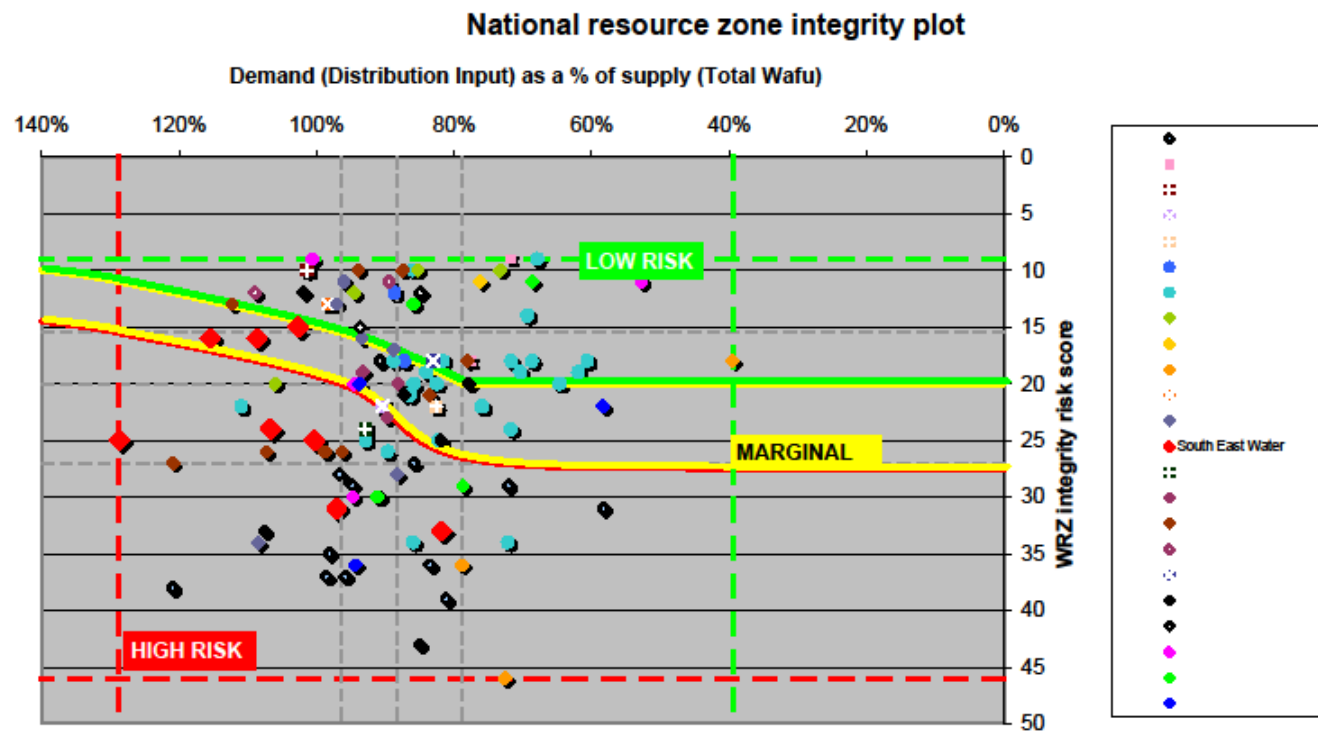


Figure 11: SEW WRZ Integrity - Source: EA Water Resource Planners

6 WRZ Integrity Assessment based on Guidelines

6.1 General

In an integrated WRZ, investment in schemes would be expected to match the demand needs within the WRZ so that no group of customers experience a different risk to their water supply. This principle has been applied to all eight SEW resource zones as a check, using the supply-demand balance from the PR09 Post Determination WRMP Tables as a preliminary baseline.

6.2 WRZ Integrity WRZ1

Resource Zone 1 has been assessed as an integrated zone with no sub zones. It is likely that without additional source development this zone will begin to experience a deficit in the WRMP planning period. Planned improvements under the AMP5 capital programme to existing source outputs at Tonbridge, Saints Hill and Bassetts BH to Pembury WTWs, together with inter-zonal transfer support flows, will mitigate the deficit to some extent. Previously identified improvement works relating to the Kemsing WTW have been completed within the AMP 5 programme.

Hydraulic analysis of the zone has indicated that the available DO from Pembury WTW fed via Blackhurst SR into the zone, is currently constrained due to the absence of a downstream network flow control facility. SEW has considered the introduction of a control device at the hydraulic boundary of the Blackhurst and Langton SR systems to enable optimised use of the Pembury WTW supply.

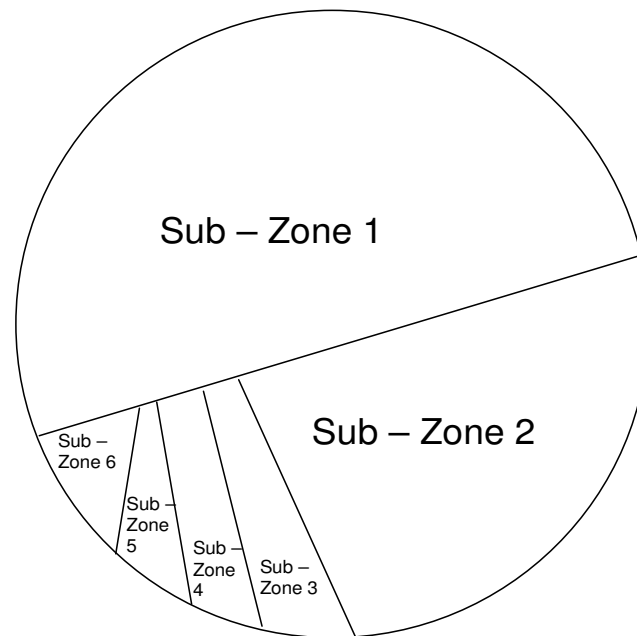
The proposed scheme is outlined in the table in Appendix B.

6.3 WRZ Integrity WRZ2

Resource Zone 2 has been assessed as a partially integrated zone, comprising six sub zones. However, three of the sub zones, (Offham, Coombe Down/Whitelands and Saddlescombe) fall outside the assessment criteria, by virtue of the de-minimus threshold rule. Therefore, only the remaining three sub zones have been reviewed.

Figure 12 below shows the composition of the WRZ2 sub zones:

RZ2 – subdivided into six distinct sub-zones



Sub Zones 3, 4 and 6 are exempted from the assessment, as they do not meet any of the thresholds below :

- >1% of the WRZ customers
- >5000 customers
- >1MI/d of Total Wafu

Figure 12: WRZ2 with Sub Zones

It is likely that without additional source development, sub zones 1 and 2 will begin to experience a deficit in the WRMP planning period. Planned improvements under the current AMP5 capital programme to existing source outputs at Eridge BH to Groombridge WTW together with inter-zonal transfer support flows, will mitigate the deficit to some extent.

Sub zones 5 and 6 (Clayton and Saddlescombe respectively) appear to be capable of operating as a combined network, subject to the capacity of existing transfer mains, which needs to be investigated further.

Hydraulic analysis of the zone has indicated that delivery of the available DO from Forest Row WTW is currently constrained due to the configuration of its supply envelope. SEW has considered a revision to the configuration of the existing network, by creation of a discrete area to be fed principally by Forest Row, with a pressure controlled supplementary feed from the Wych Cross SR system.

A further constraint of the available DO has been identified within the Underhill Chalk source works, where there may be an opportunity to optimise combined output by reinforcement of inter-connecting zonal mains. SEW is currently investigating operational feasibilities relating to these minor sub zones.

The proposed schemes are outlined in the table in Appendix B.

6.4 WRZ Integrity WRZ3

Resource Zone 3 has been assessed as a substantially integrated zone with two sub zones; a principal Sub Zone 1 and Deep Dean minor Sub Zone 2. Figure 13 below shows the composition of the WRZ3 sub zones:

RZ3 – subdivided into two distinct sub-zones

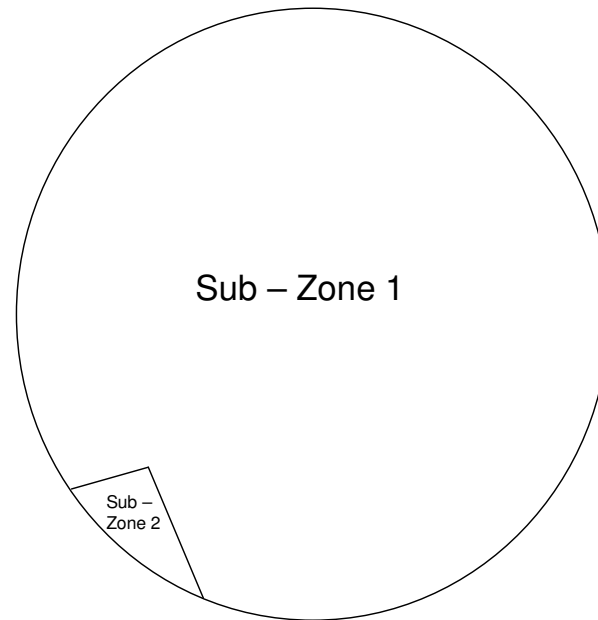


Figure 13: WRZ3 with Sub Zones

It is likely that without additional source development Sub Zone 1 (the principal subzone) will begin to experience a deficit in the WRMP planning period.

Sub zone 2 (Deep Dean WTW to Windover SR) operates as an independent network.

Hydraulic analysis of the zone has indicated that delivery of the available DO from both Cornish and Hazards Green WTWs are currently constrained. In the case of Cornish WTW, SEW have considered the introduction of a flow control valve to enable surplus DO to be transferred to the Meads SR. In the case of Hazards Green WTW, a recently constructed 400 mm reinforcement main can be configured to optimise available DO flows to supplement supply from the Arlington WTW.

The proposed schemes are outlined in the table in Appendix B.

6.5 WRZ Integrity WRZ4

Resource Zone 4 has been assessed as an integrated zone with no sub zones. It is likely that without additional source development this zone will begin to experience a deficit in the WRMP planning period.

Hydraulic analysis of the zone has indicated that delivery of the available DO from Cookham, College Avenue and Boxalls Lane WTWs are currently constrained. SEW has schemes within its AMP5 programme to reinforce the pumped delivery mains at Cookham and Boxalls Lane sites and a further remediation scheme, to address the issues associated with College Avenue WTW, is under consideration.

The proposed schemes are outlined in the table in Appendix B.

6.6 WRZ Integrity WRZ5

Resource Zone 5 has been assessed as a substantially integrated zone with a small sub zone in the East Meon geographic area. However, the sub zone falls outside the assessment criteria, by virtue of the de-minimus threshold rule. Therefore, only the principal zone (Sub Zone 1) has been considered in this assessment. WRZ5 is considered to be the most robust SEW zone in terms of maintaining projected supply-demand balance and currently has spare source capacity.

Figure 14 below shows the composition of the WRZ5 sub zones; principal sub zone and East Meon sub zone:

RZ5 – subdivided into two distinct sub-zones

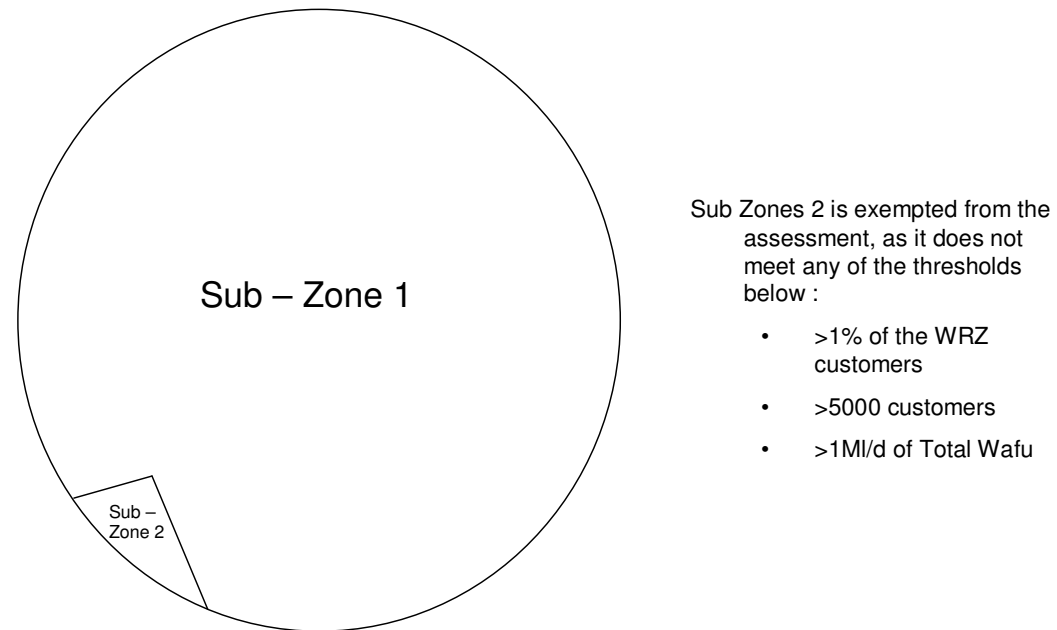


Figure 14: WRZ5 with Sub Zones

Hydraulic analysis of the zone has indicated that delivery of the available DO from Hawkley WTW is currently constrained due to the limited demand from within its discrete supply envelope. SEW has considered an option to extend and re-configure the supply area into an adjoining DMA with provision of an additional pressure control facility, resulting in optimised use of available DO at Hawkley.

The proposed scheme is outlined in the table in Appendix B.

6.7 WRZ Integrity WRZ6

Resource Zone 6 has been assessed as a substantially integrated zone with a minor sub zone in the Bluebell Hill geographic area (Tunbury Avenue - a single DMA). However, the sub zone falls outside the assessment criteria, by virtue of the de-minimus threshold rule. Therefore, only the principal zone (Sub Zone 1) has been considered in this assessment.

Figure 15 below shows the composition of the WRZ6 sub zones

RZ6 – subdivided into two distinct sub-zones

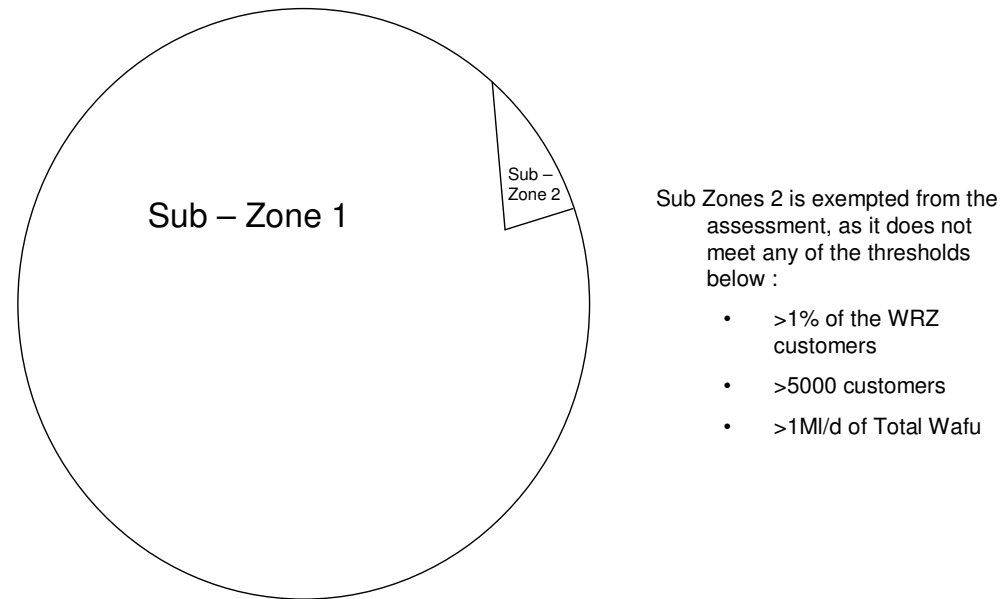


Figure 15: WRZ6 with Sub Zones

It is likely that without additional source development sub zone 1 (main subzone) will begin to experience a deficit in the WRMP planning period.

Hydraulic analysis of the zone has indicated that delivery of the available DO from both Boxley and Hockers Lane WTWs is currently constrained due mainly to the limited demand from within their respective supply envelopes.

In the case of Boxley WTW, SEW has considered transfer of surplus DO into the adjoining Matts Hill zone via an existing flow control valve at Penenden Heath, Maidstone. In the case of Hockers Lane WTW, SEW has considered the reconfiguration of DMA supplies in the Loose Hill areas of Maidstone, where Hockers Lane supply can substitute existing feeds from the Matts Hill zone.

The proposed schemes are outlined in the table in Appendix B.

6.8 WRZ Integrity WRZ7

Resource Zone 7 has been assessed as an integrated zone with no sub zones. It is likely that without additional source development this zone will begin to experience a deficit in the WRMP planning period. Hydraulic analysis has not highlighted any constraint issues.

6.9 WRZ Integrity WRZ8

Resource Zone 8 has been assessed as an integrated zone with no sub zones. It is likely that without additional source development, this zone will begin to experience a deficit in the WRMP planning period.

Hydraulic analysis of the zone has indicated that delivery of the available DO from both Chilham and Godmersham WTWs is currently constrained due mainly to the hydraulic capacity of existing trunk mains feeding towards Ashford demand centres.

SEW has considered options to reinforce sections of the trunk main system or to provide a booster pump facility to raise the hydraulic gradient at a strategic location.

The proposed scheme for the booster option is outlined in the table in Appendix B.

7. Conclusions

It can be demonstrated that SEW Resource Zones are currently fit for purpose and that each zone functions generally in compliance with EA Guidelines for Resource Zone Integrity. It is recognised that a number of small sub zones exist alongside the principal sub zones (in WRZ2, WRZ3, WRZ5 and WRZ6). However, a number of the small sub zones fall outside the assessment criteria, by virtue of the de-minimis threshold rule (in WRZ2, WRZ5 and WRZ6). Sub zones in WRZ2 and WRZ3, although currently operating independently from the principal zone(s), could be incorporated into a single zonal structure, by reviewing the provision of reinforcement and/or link mains, within the zonal network and thereby creating better integration.

The SEW Water Resource Management Plan will address the above issues by proposing and assessing viable options.

N.B. Modification of the outputs via the EA questionnaire, which subjectively positions SEW WRZs generally in the “Marginal” to “High Risk” category, has not been addressed in this study but could be developed further, with a view to the EA updating the questionnaire results to better reflect SEW’s future position e.g. If the Risk score could be improved nominally by 10 points then all SEW zones would move into the “Marginal” to “Low Risk” sector.

Appendix A – Response to EA Observations relating to detailed examination of WRZ Composition

WRZ Reference	EA Observation	Comments
RZ1	Principal flows are generally in a north-south direction from Cramptons Road locality towards Tonbridge and Tunbridge Wells. What percentage support flow is fed from the Bloodshots SR booster pumps towards the southern section of the zone, via existing 12" and 8" mains? Could the zone be better operated, hypothetically as two distinct sub zones?	<p>The flow from Bloodshots SR towards Tunbridge Wells at 2012 ADD condition is circa 2.6 Ml/d compared with the total 2012 ADD flow into the southern section of the zone, which is circa 15 Ml/d. The percentage support flow from Bloodshots SR into the southern section of the zone is, therefore, circa 17%.</p> <p>An existing constraint has been identified which prevents maximised output of the Pembury WTW via Blackhurst SR and its distribution into the local network. A scheme is under consideration to enable flow control of the respective supplies fed from Bloodshots, Blackhurst and Langton SRs to address this issue.</p>
RZ2	The zone appears to be split into two principal areas, which are bounded by closed valves, shown on the schematic network plan and a number of smaller sub zones to the south. Could the zone be better operated, hypothetically as two distinct principal sub zones, alongside the smaller sub zones?	<p>Hydraulic analysis of the performance of the two principal sub zones is being undertaken to determine the viability of operating these as a combined distribution network and thereby improving the integrity of the zone. Further hydraulic analysis is to be undertaken to determine the viability of combining network systems within the smaller sub zones to the south of the WRZ.</p> <p>An identified constraint at the Forest Row WTW can be addressed by creation of a discrete supply envelope and the introduction of a flow control facility at its hydraulic boundary. This proposed action will remove the constraint and allow maximised use of the resource site.</p>

RZ3	The Zone appears to be well integrated with improved connectivity, by virtue of recently constructed trunk main routes.	Previously identified constraints relating to the maximised outputs of both Friston and Hazards Green WTWs, have been addressed, respectively, by the construction of 400mm diameter trunk main transfer facilities.
RZ4	The flow into the Basingstoke area appears to be uni-directional, east to west. Should the Basingstoke area be considered as a distinct sub zone?	<p>Although the basic schematic shows a single mains supply to the Basingstoke area from the principal zonal area, this comprises a number of existing supply mains, ranging between 500mm to 100mm diameter, each with the capability of providing bi-directional flow support. The typical ADD combined flow into Basingstoke from the Farnborough area is circa 13 MI/d, which is a significant proportion of the overall demand of circa 40 MI/d. RZ4 is, therefore considered to be a well integrated zone.</p> <p>Previously identified constraints relating to the maximised output of Cookham, College Avenue and Boxalls Lane BH site DOs can be addressed by the construction of reinforcement mains. Schemes for Cookham and Boxalls Lane are currently included in the AMP5 programme, with College Avenue under review.</p>
RZ5	There are perceived surplus volumes from some sources in the zone. Can these surplus volumes be exported effectively?	<p>SEW to explore potential areas where any surplus DO can be transferred, either internally or externally.</p> <p>An identified constraint relating to the under-utilisation of DO at Hawkley WTW can be addressed by the provision of a flow control valve at its boundary with the Oakhanger supply envelope.</p>
RZ6	Should the Stansted area be considered as a distinct sub zone, as there appears to be only one support flow from the Burham/Maidstone areas?	The transfer flow from Burham to Stansted, via Kingswood BS and discharged to Beech SR is a significant flow (circa 6MI/d). A similar reciprocal gravity flow can, in practice, operate directly from Beech SR bypassing Kingswood BS as a flexible facility. Therefore, RZ6 is considered to be well integrated.

		<p>Identified constraints at PR09, adversely affecting delivery of maximum source outputs at both Hockers Lane and Boxley WTWs have already been addressed.</p> <p>Reinforcement of the outlet at HockersLane, with a 400mm diameter main and at Boxley, where an existing flow control valve at the supply envelope boundary (Penenden Heath) can be re-commissioned to provide solutions to these issues</p>
RZ7	Perceived to be well integrated with no particular issues.	No constraints identified.
RZ8	Perceived to be well integrated with no particular issues.	<p>The hydraulic performance of the combined 21"/500mm trunk main system from the Chilham/Godmersham sites is perceived to be a network constraint, preventing optimum delivery of source outputs into the Ashford areas.</p> <p>In order to deliver the maximum combined source outputs, it will be necessary to either reinforce a significant length of this system or, alternatively, consider improving the hydraulic gradient by the introduction of a strategic trunk main booster pumping. Scheme details for the latter option have been previously identified by SEW.</p>

Appendix B – Network Constraints - Zonal Utilisation Deficit Assessment

Water Resource Zone	Resource Site	ADO Utilisation current average deficit MI/d	PDO Utilisation current average deficit MI/d	Scheme Details
RZ1	Pembury	1.1	1.0	Provide motorised flow control valve on existing 12" main at Yew Tree Road, Tonbridge between Blackhurst and Langton reservoir systems.
RZ1	Kemsing	0.2	0.2	Upgrade to existing borehole site and reinforcement of pump delivery main
RZ2	Forest Row	0.4	0.7	Create discrete demand area in vicinity of DMAs 6804 and 6809 with pressure controlled connection to Wych Cross gravity main as emergency support.
RZ2	Saddlescombe, Clayton, Coombe Down, Whitelands and Offham	0.3	0.67	Reinforcement of two sections of existing mains to enable transfer of supplies between source works. Circa 2.7 Km of 180mm diameter PE Pipe
RZ3	Cornish	0.4	0.9	Provide motorised flow control valve on existing 12" main at MS Link 39830
RZ3	Hazards Green	2.3	2.3	Utilise recently commissioned 400 mm reinforcement main to transfer any surplus DO towards Amberstone PS
RZ4	Cookhams to Malders Lane SR	6.85	6.85	Reinforcement of existing 15" pump delivery main from PS to SR circa 1.8 km x 600mm.

RZ4	College Avenue	6.85	6.85	Reinforcement of existing 12" pump delivery main with 750 metres of 400mm pipe.
RZ4	Boxalls Lane LGS and Tongham	2.8	2.9	Reinforcement of existing 12" delivery from PS towards Hogsback SR (PR09 Zonal Strategy scheme). 3Km of 300mm pipe
RZ5	Hawkley	1.2	1.2	Install pressure control valve on existing 3" main to feed surplus DO into adjacent Snailing Lane DMA
RZ6	Boxley Chalk and Greensand	0.54	0.61	Utilise existing motorised flow control valve at Penenden Heath to transfer surplus DO into adjacent Detling sub- zone
RZ6	Thurnham to Hockers Lane	2.31	3.91	Proposed DMA re-organisation changes at Cranbourne/Southpark areas of Maidstone will utilise surplus DO from Hockers Lane.
RZ7	No Constraints			
RZ8	Chilham/ Godmersham	3	3	Trunk Main Booster Station to improve hydraulic gradient towards Ashford
	Total	28.25	31.09	