Water Resource Plan 2009
Summary Document
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EXECUTIVE SUMMARY

Planning For The Future

In this Adopted Water Resource Plan we set out our strategy to ensure that all our customers, the length and breadth of Scotland, have a secure supply of clear, fresh, safe drinking water to 2031/32 and beyond. We believe this Plan supports Scottish Water’s Vision to be ‘Scotland’s most valued and trusted business, and one that we can all be proud of’.

The key challenges for Scottish Water:

- To ensure a constant 24/7 supply of clear, fresh safe drinking water to our five million customers.
- To ensure no demand restrictions other than in exceptional circumstances.
- To respond to changing demographics in support of economic growth.
- To adapt to pressures on water resources due to climate change and environmental constraints.
- To ensure we value our most natural resource, water, by reducing leakage, working with our customers to use water wisely and in a sustainable manner and using the most appropriate ways to store and distribute water to ensure a reliable and consistent supply of water.
Executive Summary

We are committed to providing our customers with clear, fresh and safe drinking water at the turn of a tap. This vital resource is helping Scotland grow and prosper.

In addition, we have specific legal obligations not only to provide adequate water supplies but to secure efficient and sustainable water use.

We are extremely fortunate in Scotland that we have some of the best raw water supplies in the world. We must always remember the importance of this natural resource.

But many of our systems to treat and make-safe the drinking water were established in different times and for different needs. We must ensure that we have the ability, both in the short term and 25 years hence to continue to supply our customers during peak demands and drought events.

In exceptional circumstances, such as a severe drought, we must have the plans in place to ensure our service to customers is not compromised. This is further explained in section 3.3, but relates to the severity of drought which can be expected to occur no more frequently than once every 40 years.

Scottish Context

We produce around 2 billion litres of water every day. In our Base Year, our water treatment and supply system included 300 water treatment works served by over 500 sources of water. The water travels through 29,000 miles of water pipes to 2.5 million homes and businesses and we continue to improve water quality year on year. Our latest asset data can be found in Table 1.

While Scotland is a water rich country, this does not mean that we have unlimited water available for treatment and supply. Scotland covers a third of the UK land mass with only 8% of the UK population. Due to the geography and large numbers of small communities Scotland has over 200 water resource zones. This is double the whole of England and Wales. This is a unique water supply system with 70% of the zones accounting for just 1% of the population.

We have inherited a water supply system which has developed over the last 100 years. Therefore there are regional variations in the capability and flexibility of the water supply systems.

We have some areas, where the water supply system is community-focused with limited or no interconnectivity between population centres. This means if there was a shortage of water to treat in that area then SW is limited in how we supply our customers. Our inherited water resource assets may be stretched in some areas during exceptionally dry periods. These issues are now being addressed in our water resource plan.

There are also areas such as the Central Belt which have a high population density with good interconnectivity enabling a degree of flexibility in the distribution system.
Supply Demand Balance Assessment

A supply demand balance assessment is used to measure our current and future ability to maintain a secure supply to our customers.

The supply demand balance assessment follows a standard UK water industry methodology, adapted where appropriate for Scotland, and identifies whether a supply area (water resource zone) is in surplus or deficit. This helps identify what investment or work will need to be carried out to ensure a reliable and consistent supply of water for our customers in the event of exceptional circumstances.

The present and what needs to be done

For the WRP Base Year, 2007/08, the application of the Supply Demand Balance assessment across Scotland has identified that around 30% of our customers are in zones which would require investment to ensure consistent supply against exceptional events as mentioned above.

In our 2010 to 2015 Business Plan we are promoting additional prioritised investment to meet the challenge of securing the long term supplies in selected zones. These projects typically involve:

- Reducing leakage across Scotland to the “economic level” by 2014.
- Improving the interconnectivity between zones to provide operational flexibility to move water around.
- Raw water source augmentation or renewal.
- Improving raw water storage capacity.
- Working with our customers to ensure they understand the value of this Scottish resource.

Following this additional targeted investment we intend by 2014 to reduce the number of customers which may be in deficit to 65,000, around 1% of the population.

These customers are mainly spread across a large number of small zones and mitigation measures will be put in place to ensure a continuous wholesome supply of drinking water. Further work is ongoing to determine the most appropriate long term cost effective solution for these customers.

Long term considerations

Leakage reduction and maintenance is an ongoing challenge that will feature highly in all water companies’ plans at all times for economic and environmental reasons. We will continue to improve our data relating to leakage and deliver and maintain leakage reduction targets.

The sustainability of our abstractions must be considered as a balance between environmental impact on the waterbody, mitigation of other environmental impacts (carbon footprint etc), economic affordability to our customers, security of supply during drought events and adaptability to climate change estimates. In our current investment period, we are currently assessing and implementing schemes to achieve Water Framework Directive compliance for
'good ecological status' in waterbodies prioritised by SEPA. We are integral in the development of the River Basin Management Plans that are being led by SEPA. SEPA has a pivotal role in the decision making process in relation to sustainability and environmental issues and we will continue to work in close alliance.

Civil structures last for at least 60 years and it is essential that investment decisions taken today provide robust long term solutions that take account of both local factors and strategic opportunities. Where it is appropriate we will phase investment decisions to avoid unnecessary immediate capital expenditure. However we must also avoid decisions which do not provide the basis for adequate long term solutions.

The latest climate change analysis on our water resources provides an extremely wide range of potential outcomes which could lead to significant capital expenditure if we fully incorporate these results into schemes. However, we must ensure that where possible we have taken account of this to ensure any new assets which are required are future proofed as much as is reasonably practicable. As a general principle, raw water systems with storage are likely to be less affected by climate change than small river systems.

Our Water Efficiency Strategy supports water efficiency in 3 key areas:
- Working with our Assets.
- Working with our Customers.
- Working with Government, Stakeholders and Regulators.

We are a committed contributor to the Saving Water in Scotland forum convened by Waterwise.

Conclusion

WRP08 was issued in May 2008 as a Draft for consultation, along with the first draft of the SR10 Business Plan for the next regulatory investment period which runs from April 2010 to March 2015. WRP09 was revised to take account of responses and the latest data sets and issued again as ‘draft’ WRP09 in March 2009. This document is now the final ‘adopted’ WRP following final determination of the SR10 Regulatory Business Plan.

We believe that this strategy is robust, sustainable and meets the needs of our customers and Scotland.

NOTE: All data tables and associated text relates to 07/08 data unless otherwise stated and aligns with our final draft Business Plan submission and subsequent Final Determination. However, current year data has been added to Plan Tables where relevant to provide a view of the current status of key data at a SW level.

This applies to Tables 1 and to Figures 1, 2 and 10.
1.0 INTRODUCTION

Scotland is a water rich country, but it would be incorrect to assume that we have no problems with water resources in relation to public water supplies. Scottish Water (SW) has inherited an asset base which provides a wide variability in our ability to maintain supplies during peak demands and during drought events. It is our responsibility to assess the current capability of our assets to highlight existing problems and plan for the future.

The aim of this Summary Report is to provide a summary of the Water Resource Plan 2009.

1.1 Strategic Intent

Our water resource strategy is to secure the reliable supply of drinking water to protect public health and facilitate economic growth while abstracting and using water in a sustainable way to provide a value for money service for customers.

The preparation of a 25 year water resource plan improves our understanding and management of water supplies in Scotland taking account of our legacy position, medium term investment plans and longer term pressures such as climate change, growth and environmental legislation.

1.1.1 Long Term Water Resource Planning Considerations

The sustainability of our abstractions must strike a balance between environmental impact on the water body, mitigation of other environmental impacts (carbon footprint etc), economic affordability to our customers, security of supply during drought events and adaptability to climate change estimates. We are currently assessing and implementing schemes to achieve Water Framework Directive compliance and are integral in the development of the River Basin Management Plans that are being developed by SEPA. SEPA has a pivotal role in the decision making process in relation to sustainability and we will continue to work in close alliance.

Leakage reduction and maintenance is an ongoing challenge that will feature highly in all water companies plans at all times for economic and environmental reasons. We will continue to improve our data relating to leakage and deliver and maintain leakage reduction targets.

Civil structures last for at least 60 years and it is essential that investment decisions taken today provide robust long term solutions that take account of both local factors and strategic opportunities. Where it is appropriate we will phase investment decisions to avoid unnecessary immediate capital expenditure. However we must also avoid decisions which do not provide the basis for adequate long term solutions.

The latest climate change analysis on our water resources provides an extremely wide range of potential outcomes which could lead to significant capital expenditure if we fully incorporate these results into schemes. However, we must ensure that where possible we have taken account of this to ensure any new assets which are required are future proofed as much as is reasonably practicable. As a general principle, raw water systems with storage are likely to be less affected by climate change than small river systems.
1.2 Water Resource Planning
The overall aim of the water resource planning process is to enable us to move towards the optimum balance of supply and demand across Scotland and where investment is required to restore this balance, it is planned and prioritised to meet the needs of the people of Scotland, enable economic development and minimise impacts on the environment.

1.2.1 Supply Demand Balance Assessment
A water resource plan (WRP) provides a comprehensive statement of the water available for supply (from our reservoirs, lochs, rivers and boreholes), our treatment capacity and the estimated demand for water from our customers. The WRP shows which parts of Scotland have a Supply Demand Balance deficit and which have a surplus.

The WRP provides a 25 year forecast of the Supply Demand Balance (SDB) taking account of many factors including tightening environmental legislation, climate change, growth projections, impact of water quality projects, asset rationalisation and leakage reduction programmes. It also provides the audit trail for the methods and assumptions used in the analysis. The SDB is calculated using standard water industry methodologies, adapted for Scotland, where appropriate, in collaboration with SEPA.

1.2.2 Investment to Restore the Balance
The WRP provides a robust justification of the need for investment. Potential options to restore the Supply Demand Balance are assessed and a strategy is developed for achieving the required level of service. The WRP also provides a prioritisation mechanism to allow us to target investment at those zones that will gain the greatest benefit from investment.

The costs are then fed into the Business Planning process which takes account of the overall priorities for Scottish Water when delivering and improving its services to customers.

1.3 Sustainability

1.3.1 Sustainability of Abstractions
The sustainability of our abstractions is considered in a number of ways:

(i) SEPA Review of Existing Abstraction Licences
SEPA is responsible for licensing our abstractions. We are currently going through a programme of detailed reviews in 78 named Water Resource Zones covering 40% of our sources to determine which licences may need to be altered to meet the requirements of the Water Framework Directive. Potential reductions in abstraction limits or increases to compensation flows from reservoirs are currently being agreed and implemented. Significant progress has been made, with more detail included in section 10.1. It is anticipated that these reviews will continue over forthcoming River Basin Planning cycles and programmes of measures will then be agreed and delivered through our investment planning cycles.

(ii) Applications for new or varied Abstraction Licences
Any new water resource development or variation proposed under the WRP or any other programme of works will be subject to the WFD standards and as such will be deemed to be sustainable if SEPA licence the activity.
(iii) Strategic Environmental Assessment (SEA)

We have undertaken an SEA for WRP08 and have prepared an update addendum for issue with WRP09 to take account of the consultation responses. Any proposals have been assessed against the findings of the SEA Environmental Report which assesses the environmental impacts of key receptors to generic types of water resource planning interventions on the ground.

1.3.2 Climate Change Strategies

We have developed climate change strategies looking forward to 2025 for both mitigation and adaptation. In terms of adaptation, the aims are that by 2025 we will have robust climate models based on 15 years of good data, our asset base will be managed according to climate risks and water resources will be secure.

In terms of mitigation by 2025 the aims are that we will be foremost among energy efficient low carbon utilities; be energy secure; have maximised self generation and be selling excess electricity to the grid; contributing to national GHG emission reduction targets and achieving value for money.

In accordance with the above strategies we will work to improve our understanding of the impact of climate change on water resource issues. We are currently working with the Environment Agency and UKWIR to develop water resource assessment tools based on the UKCP09 scenarios. Once these tools are available we will first apply them to the existing WRP investment zones to compare the findings.

Over the next five years we will aim to carry out climate change assessments for all remaining deficit zones and have an understanding of those other zones which may be susceptible to climate change which may result in deficits in the future.

Note: Climate change impact on raw water source yield is covered in section 4.2.1

1.3.3 Water Efficiency

We have specific legal obligations to provide adequate water supplies and secure efficient and sustainable water use.

All abstractors are required “to take all reasonable steps to secure efficient and sustainable water use” under the CAR Regulations. This is in addition to the provisions of the Water (Scotland) Act 1980 as amended by the Local Government (Scotland) Act 1994 where SW is obliged to “to promote the conservation and effective use of the water resources of, and the provision of adequate water supplies throughout, Scotland.”

Our Water Efficiency Strategy supports water efficiency in 3 key areas:

- Working with our Assets.
- Working with our Customers.
- Working with Government, Stakeholders and Regulators.

We are a committed contributor to the Saving Water in Scotland forum convened by Waterwise.

Our activity in relation to water efficiency is discussed further in section 5.5.
1.3.4 Carbon Accounting

The emissions of greenhouse gases which arose as a result of supplying water and wastewater services to our customers in 2008/09 was 475,265 tonnes of carbon dioxide equivalents or tCO₂e (+/-5.2%). These figures have been calculated using the updated UKWIR Carbon Accounting Methodology v3.0.

Whilst this is a significant quantity, it is worth noting that the U.K. average for an individual’s carbon footprint is in the range 3.5 – 7 tCO₂e /annum. Our proportion of this is clearly very small (approximately 1.5 to 3%).

The split of our carbon footprint between the major categories of activity is shown in Figure 1 below.
The percentage of our total footprint attributable to drinking water treatment and pumping is 119,916 tCO₂e or 25.2%. This results in a value of 0.15 tCO₂e/Ml.

Our energy consumption (and hence footprint) had been increasing in recent years by an average of approximately 2.5% per annum, although the 2008/09 footprint suggests a levelling off of this trend. This increase in emissions is attributable to the £4bn investment we made between 2002 and 2010 in improving environmental quality and public health, largely to meet the standards set by EU law and implemented through Scottish regulations.

We are committed to halting the historical rise in emissions, agreeing long term targets for emissions reduction, developing a low carbon water industry for Scotland and a service resilient to climate change.

Between 2010 and 2015, we will increase, by at least 25GWh per annum, our renewable generation from embedded hydro schemes located within our existing asset base. This will double our current capacity and potentially save around 12,000 tonnes carbon dioxide equivalent per annum. We will also assess the feasibility of developing further the Combined Heat and Power potential of sludge assets.

We are also currently exploring opportunities, and will seek to develop further appropriate opportunities, for renewable energy including the scope for third parties to develop and operate wind powered generation on our land.

Figure 2 Scottish Waters Operational Footprint (financial year 2008/09 - split by major categories of activity)
1.4 Water Resource Plan 2009 (WRP09)

WRP09 is a Regulatory Document developed in collaboration with the Scottish Environment Protection Agency (SEPA) utilising their Water Resource Plan Guidance for Scottish Water (Final draft Version 1.0 dated 31 January 2006).

We agreed a staged approach with SEPA to the development of the draft 2008 Water Resource Plan (WRP08) which was the first comprehensive WRP for the whole of Scotland. This was revised to produce the draft WRP09 and now the ‘adopted’ WRP09.

The aim of WRP09 is therefore to:

- Define our long term water resources strategy to secure the reliable supply of drinking water to protect public health and facilitate economic growth while abstracting and using water in a sustainable way to provide a value for money service for customers.

- Provide a long term (25 year) assessment of the Supply Demand Balance across Scotland at a zonal level consistent with UK good practice.

- Justify investment to restore deficits in the Supply Demand Balance in a prioritised water resource zones during the next investment period (2010-2015) and beyond.
1.4.1 Structure of WRP09

Since WRP09 is a revision of WRP08, the Supplementary Reports will not be reissued, but are still relevant reference documents. Any changes are included and fully reviewed in the relevant chapters of this Main Document. Data tables were fully revised based on 07/08 data and reissued to SEPA with our draft WRP09. These Tables were also used for final determination of the SR10 Business Plan and therefore have not been revised.
2.0 SCOTTISH CONTEXT

In general terms, Scotland is a water rich country. However, this does not translate to us having unlimited water resource capability. The supply system has developed over the last century with a wide variability of scale across the various supply systems. In the central belt of Scotland, for example, the opportunities to utilise large strategic sources to provide good drought resilience to major population centres has been planned and delivered, whereas in most of the rural communities in the rest of Scotland, the supply systems have been historically developed only to meets the needs of the immediate community.

As shown in Figure 4, Scottish Water has evolved into a single entity from many predecessor organisations including water boards, councils and local authorities over a 40 year period. This clearly has a major impact on the diversity and capability of water resource assets that we have inherited. However, the creation of Scottish Water provides us with the opportunity to provide a unified, consistent and strategic approach to water resource planning that has not previously been possible.

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2002
- Scottish Water

1996
- 3 Water Authorities

1975
- 12 Regional Councils & CSWDB

1968
- 13 Water Boards & 1 Bulk Supply

Pre 1968
- 210 Water Boards / Local Councils

---

**Figure 4 Evolution of Scottish Water**

We supply water to approximately 5 million people and 135,000 non-household customers throughout Scotland requiring us to produce an average of about 2,250 million litres of potable water each day\(^1\). In our Base Year, 2007/08, our water asset system included 300 water treatment works served by over 500 raw water sources.

Due to the geography of Scotland, combined with the lower population density, we have a scattered and disconnected water supply system. As a result, we have over 220 Water Resource Zones\(^2\) (WRZ), which are zones for which we plan the supply and demand of water. This is approximately double the entire number in England and Wales (E&W).

There is a wide range of scale in our WRZs from the small number of large WRZs in the central belt which serve approximately 55% (~2.5 million) of our population to the significantly smaller WRZs in the Highlands serving fewer than 50 people. To put this in context, 70% of our WRZs together serve less than 1% of our population. Whilst we are committed to providing this number of zonal supply demand balances to enable us to adequately

\(^1\) 2007/08 figures

\(^2\) A water resource zone is the largest supply zone in which resources can be shared and customers experience an equal level of service during a drought.
understand and report our discrete zones, it does present us with particular logistical and presentational difficulties. For the purposes of water resource planning, we created 16 “Megazones” (see map below) to enable us to group and easily locate individual zones within a geographic region of Scotland. This provides some context as to the numbers of assets and population served across the regions.

Figure 5 Map showing Megazones
### Table 1 Distribution of population and assets by Megazone

<table>
<thead>
<tr>
<th>Megazone</th>
<th>Average Demand (Ml/d)</th>
<th>Population (000's)</th>
<th>No. of WRZ</th>
<th>No. of WTW</th>
<th>No. of Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argyll and Bute</td>
<td>41.8</td>
<td>65.9</td>
<td>32</td>
<td>33</td>
<td>46</td>
</tr>
<tr>
<td>Ayrshire and Inverclyde</td>
<td>255.8</td>
<td>440.4</td>
<td>8</td>
<td>14</td>
<td>66</td>
</tr>
<tr>
<td>Central Scotland</td>
<td>1265.4</td>
<td>2712.2</td>
<td>11</td>
<td>30</td>
<td>110</td>
</tr>
<tr>
<td>Dumfries and Galloway</td>
<td>78.3</td>
<td>131.1</td>
<td>5</td>
<td>18</td>
<td>31</td>
</tr>
<tr>
<td>East Lothian and Borders</td>
<td>59.5</td>
<td>145.3</td>
<td>11</td>
<td>17</td>
<td>25</td>
</tr>
<tr>
<td>Fife</td>
<td>143</td>
<td>357.3</td>
<td>1</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>Fort William</td>
<td>8.9</td>
<td>17.9</td>
<td>19</td>
<td>19</td>
<td>21</td>
</tr>
<tr>
<td>Grampian</td>
<td>148.5</td>
<td>420.2</td>
<td>11</td>
<td>17</td>
<td>36</td>
</tr>
<tr>
<td>Inverness and Central Highlands</td>
<td>86.2</td>
<td>201.6</td>
<td>20</td>
<td>24</td>
<td>28</td>
</tr>
<tr>
<td>North West Coast</td>
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<td>7.5</td>
<td>19</td>
<td>19</td>
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<tr>
<td>Orkney</td>
<td>8.7</td>
<td>19.6</td>
<td>10</td>
<td>11</td>
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<tr>
<td>Shetland</td>
<td>10.7</td>
<td>22</td>
<td>13</td>
<td>14</td>
<td>23</td>
</tr>
<tr>
<td>Skye and Lochalsh</td>
<td>6.7</td>
<td>14.6</td>
<td>28</td>
<td>28</td>
<td>32</td>
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<tr>
<td>Tayside and Rural Forth Valley</td>
<td>127</td>
<td>372.6</td>
<td>13</td>
<td>16</td>
<td>18</td>
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<tr>
<td>Western Isles</td>
<td>13.4</td>
<td>26.8</td>
<td>22</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Wick</td>
<td>13.9</td>
<td>28.7</td>
<td>7</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Scotland Total 2007/08(BaseYear)</td>
<td>2,271</td>
<td>4,983.7</td>
<td>230</td>
<td>300</td>
<td>532</td>
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<tr>
<td>Scotland Total (2009/10)</td>
<td>2,044</td>
<td>5,035</td>
<td>221</td>
<td>278</td>
<td>481</td>
</tr>
</tbody>
</table>
3.0 LEVELS OF SERVICE

For the first time in Scotland, WRP08 provided a baseline position of our ability to provide our planned level of service or drought resilience across all of our asset systems using an industry standard methodology. This has been updated for WRP09.

Investment in the enhancement of water resource assets has been low in recent times, in part due to the substantial investment required to comply with European Directives for Water Quality and Wastewater Quality. Investment in water resources from 2006-2010 is to ensure compliance with environmental legislation or to enable growth, such that our existing levels of service will neither be worsened nor improved. In addition, the leakage reduction programme will also bring benefits to the Supply Demand Balance across many parts of Scotland. For 2010 – 2015, investment is included in our Business Plan, supported by DWQR, to address Supply Demand Balance deficits in 15 specific Water Resource Zones, which will result in nearly 99% of our customers receiving our planned LoS, as described in section 6.3.2.

In the short term we must therefore attempt to mitigate any supply problems until we can restore the Supply Demand Balance to the target level in each zone.

The following sections lay out our long term planned level of service with regard to water restrictions.

3.1 Phased Restrictions During a Drought

As part of our day to day operational activities, we monitor our raw water stock levels and flows to highlight any risks to our raw water availability.

Before imposing any formal restrictions on customers or causing further environmental impact in a zone, we undertake significant drought management activities e.g. Use Water Wisely campaigns, issue domestic water saving devices, emergency leakage activities, rezoned supply areas, tanker water into areas of shortage (if appropriate).

Thereafter, there are three formal stages for conserving supply during a drought. These are:

- Hosepipe Bans.
- Drought Orders.
- Rota Cuts or Standpipes.

3.2 Hosepipe Bans

This is the first stage of restriction on our customers. It provides a clear public statement about the seriousness of the drought event.

In many cases hosepipe bans will be expected by SEPA before we can secure a Drought Order.

However, the imposition of a hosepipe ban will be reviewed on a case by case basis, to ensure that it is an appropriate measure during a particular drought event.

"Where appropriate, Hosepipe Bans will be imposed in a water resource zone once the process to apply for a Drought Order has been initiated."
3.3 Drought Orders

Drought Orders can be used in two ways:

- To reduce customer demand by imposing limits on non-essential use.
- To change conditions in our CAR Abstraction Licence to reduce compensation flows from our reservoirs or temporarily introduce a new source into our supply system.

Our level of service is expressed as Drought Order frequency. A level of service of 1 in 40 years in a WRZ means that we plan to have to invoke a Drought Order in that WRZ no more frequently than once every 40 years.

The 1 in 40 year level of service is considered to be an appropriate balance between customer service and environmental impacts. We use this Drought Order frequency (i.e. 1 in 40 years) as the design drought event return period to determine the reliable availability of resource (yield) which is a key building block for our Supply Demand Balance. We seek investment to achieve this level of service in zones where the risk of drought is more frequent.

The use of 1 in 40 year level of service for Drought Orders is mid-table when benchmarked against E&W. This is generally considered to be an acceptable standard by environmental regulators.

“Drought Orders no more frequent than once every 40 years for a water resource zone.”

3.4 Rota Cuts or Standpipes

In relation to water resource planning, this emergency planning procedure is a last resort that would only be initiated in the event of severe drought. No such situation has yet been encountered in Scotland or anywhere in the UK which makes it impossible for us to place a numerical frequency on this event.

“Standpipes / Rota Cuts will only be considered under extreme drought conditions”

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3 Compensation flows are the flows of water discharged from our impoundments to protect the downstream aquatic environment and / or for the benefit of other downstream water users.
4.0 SUPPLY SYSTEM

4.1 Overview

For the purposes of water resource planning, the supply system is defined as the assets that collect, store, transfer and treat raw water up to the output of the water treatment works. The majority of large population centres such as Edinburgh, Glasgow, Dundee and Stirling are supplied by a relatively small number of large impounding reservoirs. However the majority of sources are small independent sources supplying water to isolated communities in remote parts of Scotland.

![532 Sources by Type](image)

**Figure 6: Number of Sources by Type**

In the Base Year 2007/08, there were 207 river sources, 103 of these being indirect sources supporting reservoirs. The larger river sources tend to be on the east coast, while the smaller river sources are predominantly in the northwest. Of the 96 groundwater sources, there were 42 spring sources and 54 borehole systems located across Scotland. The majority of the loch sources are in the northwest.

Impounding reservoirs (and their supporting indirect sources) provide 82% of our raw water. Direct river sources provide a further 10% while lochs and groundwater provide 4% each.

4.2 Deployable Output

There are a number of elements that can cause a constraint in our ability to maintain supply including:

- The **Yield** of the sources.
- The **CAR Abstraction Licence** limits.
- Any **raw water infrastructure** constraints.
- The **Water Treatment Works** capacity.

The **Deployable Output** is the key supply side figure which takes account of the above constraints and is used in the Supply Demand Balance.
4.2.1 Water Resource Yield

The yield of a source is related to the target Level of Service. We use a target drought resilience of 1 in 40 years. Therefore the yield is the volume of water which can be reliably supplied from a source up to a 1 in 40 year drought event.

We use four main methods to estimate yield for surface water sources which account for 96% of the total:

- Direct analysis of measured river flow records (5% of yield).
- Aquator-HYSIM hydrological models (78% of yield).
- Report 108 (a national based low flows regression method) (13% of yield).
- CAR Licence Limit (where yield is greatly in excess of requirement).

Whilst we have made significant improvements to the consistency of yield estimates for WRP09, we recognise the need for ongoing prioritised improvements in the assessment of yield. In particular in the utilisation of the output from the current flow gauging strategy and improvement in the estimation of storage volumes.

4.2.1.1 Climate Change in Yield Estimates

Given that water supply is dependent on rainfall, the impact of potential climate change needs to be understood in order to plan for the future. Figure 7 below shows the extent to which rainfall is predicted to differ in each month of the year during the 2020s, by comparison with the same month during the 1960s -1990s.
Figure 7  Average changes in monthly precipitation for the 2020s compared to the 1961-1990 period based on the UKWIR06 scenarios.  

There is still considerable uncertainty over climate change predictions with different Global Climate Models predicting different future impacts. The challenge for managing critical national infrastructure such as water is to understand the extent to which climate change may impact and to develop appropriate, proportionate responses. Generally, in terms of water quantity, the expected impact of climate change on water resources is thought to be less pronounced in Scotland as a whole compared with other parts of the UK; however more analysis is required when improved models become available to confirm the national regional impact on water resources.

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4 UKWIR Report N0. 07/CL/04/10 “Effects of Climate Change on River Flows and Groundwater Recharge – A Practical Methodology, Synthesis Report – Figure 4
Broadly speaking, the impact of the above changes will be most evident on small river abstractions or systems with very limited storage where the summer dry periods are predicted to result in up to 30% lower flows than occur at present. However, for reservoir systems which are able to store the increased rainfall in winter, spring and autumn, the impact of climate change is likely to be less severe. Some very large reservoir systems may have increased yields from the increased annual runoff.

In the short to medium term, under current models and with current data it is unlikely that climate change alone would justify investment in water resources. However, where investment is required for other reasons, the impact of climate change should be considered to determine whether the proposed solutions are sufficiently robust. More analysis is required to determine long term needs for water resources.

We have therefore prioritised our consideration of climate change impacts in those zones and options which we are considering for investment to resolve Supply Demand Balance deficits in this WRP09. We are also currently developing a corporate Climate Change Strategy which will incorporate the approach to climate change associated with water resource planning.

Going forward during the 2010-15 period, we will ensure that the latest climate models are incorporated into the rolling review of the water resource plan. We are currently working with the Environment Agency and UKWIR to develop a standard assessment of the impact of climate change on river flows and groundwater levels across Great Britain.

4.2.2 CAR Abstraction Licences

Prior to 1st April 2006 the primary control of water abstraction for public supply of water was conferred to Scottish Water in the form of Water Orders and private Acts of Parliament. Since 1st April 2006, abstraction licensing is regulated by CAR5. All of the conditions contained in our previous Water Orders have been transferred to CAR Abstraction Licences. There are a number of sites where the volumes associated with Water Orders and therefore current CAR Licences date back many years and the Water Orders had not been updated to reflect current demand. In collaboration with SEPA, we are currently applying for variations to existing CAR Licences where the abstraction volume does not reflect current demand.

It is our intention that, by 2015, we will have all such variations approved, such that none of our WRZ will be in deficit due to a CAR Licence constraint.

4.2.3 Water Treatment Works Capacity

Water treatment works capacity constrains the deployable output in many of our WRZs. The ability of a water treatment works to produce sufficient water to the required water quality standards to meet the peak demands caused by tourism, bursts etc is obviously critical to the Supply Demand Balance in a WRZ.

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5 The Water Environment (Controlled Activity) (Scotland) Regulations 2005
4.3 Forecast Changes to Deployable Output

We are making a significant investment in Water Quality, Growth, and asset rationalisation and this will affect Deployable Output. We take account of these impacts in our projections of deployable output for each WRZ.

We are also working to determine what we need to do to become compliant with the requirements of the Water Framework Directive and Birds and Habitats Directives as described in Section 1.3.1. We have only included the effects of these Directives in this WRP if the final interventions have not yet been fully agreed with SEPA. In any case, they have no net impact on the Supply Demand Balance because we are funded to restore any impact on the Supply Demand Balance as a result of compliance with the Directives.
5.0 DEMAND OVERVIEW

For the purposes of water resource planning, demand is considered to be the daily amount of water required to be produced at a Water Treatment Works. The daily volume of potable water entering the distribution network is known as the Distribution Input (DI).

Our plan covers the next 25 years. We forecast for investment and financial planning, general operational management as well as regulatory reporting requirements.

We have prepared a WRZ demand analysis which is based on assessment of our 2007/08 Base Year demand with each component projected forward to create the demand forecast to 2031/32.

There is particular concentration of demand in Central Scotland which covers the Glasgow and Edinburgh conurbations. This area contains 55% of household and 51% of non-household consumption within Scotland but covers only approximately 5% of the land mass.

5.1 Principle Components of Demand

The demand (or DI) can be broken down into a number of components as shown below.

**Breakdown of DI - The Components of Demand 2007/08**

![Diagram showing breakdown of DI components.]

- **Household Consumption**: 35.1%
- **Measured Non Household Consumption**: 19.6%
- **Unmeasured Non Household Consumption**: 1.1%
- **DSOU**: 0.2%
- **Water Taken Unbilled**: 2.9%
- **UGSP Losses**: 5.5%
- **Distribution Losses**: 35.6%

**Figure 8 Components of Demand**

Note: Total Leakage is the sum of distribution losses (leakage from SW distribution mains system) and underground supply pipe leakage (UGSPL – the leakage from the small supply pipes within the boundary of the customers’ property). DSOU refers to the usage of water to maintain normal operation of the distribution system, such as mains flushing and scouring.
5.1.1 Household Customers

Scotland’s population has continued to increase in recent years due mainly to net in-migration. This includes a net gain from within the UK as well as the wider world. Looking at the historic trend, the population has increased by only 0.5% over the last 20 years. The areas with the biggest increases over the last 10 years are West Lothian, East Lothian and Stirling while Western Isles (Eilean Siar), Dundee City and Inverclyde have the largest decrease over the same period.

Figure 9 GROS Percentage change in population 1997-2007

Population data used in the WRP is based on the 2001 Census data and GROS population projections by council. The population connected to the our network in 2007/08 was 4.89 million.

The 32 Councils, who bill on behalf of Scottish Water, provide the number of unmeasured household properties receiving water services. For the base year, the number of properties in this category was 2.37 million.

Household metering in Scotland remains very low at approximately 530 properties. Those household properties that are metered do not represent a typical household and are more likely to be the examples of household use at farms, public houses or large estates. For this reason it is not possible to analyse or compare the water usage at these properties with metered households in England & Wales (E&W).

At this time there is no policy to change the household metering within Scotland. The current policy is that household properties will continue to be charged based on their council tax band.

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However, as a consequence of the final determination for the 2010-2015 investment period, we have been instructed to undertake a series of household metering trials across Scotland including establishing the potential impact on water use. The plan will be submitted to Ministers for their approval by 31st March 2011.

The prioritisation and extent of domestic metering would require careful consideration prior to implementation, if this is considered in future.

We have measured Per-Capita Consumption figure as 154.2 l/hd/d, inclusive of plumbing losses for 2007/08. This has been derived from a series of studies since 1999 and compared with 3 comparator companies in England and Wales.

We have now installed a permanent consumption monitor. The Monitor covers almost 7,000 properties located within 114 new PCC areas, making up a sample that will be representative of Scottish households based on the Classification of Residential Neighbourhoods (ACORN, Messrs CACI). This data will also be augmented by an occupancy survey of all new PCC areas. The Monitor provides us with an accurate assessment of household demand which is a significant improvement on the previous sampling and estimation methods used. 2009/10 data supports the value used in our WRP, indicating a variance of less than 1 l/hd/d.

5.1.2 Non-Household Customers

Non-household properties are defined as properties connected to the distribution network but are not occupied as domestic premises. They are reported as either unmeasured or measured.

We supply 135,000 non-household properties (e.g. businesses, hospitals and schools) of which approximately 60% were metered in 07/08. We are committed to move towards full metering of non-household properties, where practicable, by 2009, with the remainder being given an assessed consumption.

Our projections for non-household growth are based on studies carried out by Experian Business Strategies on the wider UK water industry and applied to Scotland. In coming to its conclusion a number of factors were considered such as the impact of climate change, the economic outlook informed by the Fraser of Allander Institute, Experian forecasts, the actual downturn experienced in 2008/09, the need to reduce costs (including the adoption of more innovative solutions by retailers), and customer pressure to be more environmentally sustainable. This results in Experian forecasting reductions in customer numbers in 2009/10 and 2010/11 before starting to increase again from 2012/13. Similarly consumption is forecast to drop in 2008/9 and 2009/10 before increasing again from 2010/11. See Table 2 below. We have applied the consumption forecasts over the overall measured customer base.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage Growth</td>
<td>0.00%</td>
<td>-1.03%</td>
<td>-0.37%</td>
<td>0.14%</td>
<td>0.39%</td>
<td>0.35%</td>
<td>0.33%</td>
</tr>
</tbody>
</table>

Table 2 Growth Profile (to 2014)

5.2 Peak Demand

Peak demand in a zone can be attributed to increased water usage due to tourism, seasonal changes in consumption and pipe bursts. Tourism is due to increase over the coming years as the Scottish Government has outlined a 10 year plan to increase the tourism industry by
50%, with a 20% increase in the number of tourists visiting Scotland by 2015. Increase in demand due to tourism can be for several months in summer and a shorter peak in December over the Christmas and New Year period. In 2007 there were nearly 16 million tourist trips taken to Scotland by both UK and international visitors; this equated to approximately 72 million overnight visits in Scotland.

These tourism driven peak demands and peaks from pipe bursts are a particular issue in many parts of rural Scotland where there is a lot of tourism and the population in areas such as Aviemore, Ullapool and Skye can double in the peak seasons.

5.3 Leakage

We reported that the level of leakage for Base Year 2007/08 was 924 Ml/d. On-going leakage reduction activities are estimated to have reduced total leakage in 2009/10 to 783 Ml/d.

In 07/08, we repaired in excess of 1,500 leaks per month. A pilot project which achieved >80% of reported leak repairs in less than 3 working days has now been rolled out to all 8 operational regions.

As the level of leakage is lowered, the cost of further reducing leaks becomes more expensive. Eventually a point is reached where the costs of further leakage reduction are greater than the costs of water supplied. This point is termed the Economic Level of Leakage (ELL).

ELL studies have been revised since publication of the draft WRP09, resulting in a lower target being agreed with the WICS and included in our SR10 Business Plan. The target leakage reduction profile to 2014 as shown in Figure 10 below. Future targets are based on the Most Likely Estimation Value (MLE) Methodology as agreed with our Regulator.

![Figure 10 Leakage Reduction Profile 2014/15](image)

5.4 Projected Demand

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7 Scottish tourism led framework mapping the direction of Scottish tourism for the next decade, ISBN-75594940, March 2006

8 United Kingdom Tourism Survey (UKTS) 2006 / National Statistics International Passenger Survey (IPS) 2006
Household growth and leakage are two components of demand which are thought to significantly influence the overall demand forecast and are described below:

- We do not expect population to increase significantly over the 25 year planning horizon. However the number of properties is estimated to increase by approximately 20% over the same period reflecting reduced occupancy rates of households.

- By 2014, the reported Total Leakage figure is projected to reduce by approximately 310Ml/d from the 07/08 position, resulting in a 34% reduction.

### 5.5 Water Efficiency

In many countries, water efficiency is driven by necessity (i.e. a lack of water resources) which is not as much of an issue for Scotland. However, before we commit to the development of any new source, we will undertake a study to determine the potential benefits that can be achieved by water efficiency activities in terms of economic viability, reliability and practicality. Such demand management activities are likely to be driven by social responsibility in relation to environmental sustainability and climate change mitigation and adaptation or through financial incentivisation of billing (not currently possible).

The legislation is clear in terms of our responsibilities with respect to the efficient and sustainable use of our water resources.

We are committed to the promotion of water efficiency by providing help and support to our customers to reduce waste and optimise water usage. This is a vital element of discharging our sustainability duty.

Water Efficiency is a major topic considered by the English and Welsh Companies, and we have taken note of current activities and reported benefits. However, there are a number of key differences in Scotland which make direct comparison inappropriate, including:

- Scotland has virtually zero domestic metering penetration, with no compulsory metering and there is no current plan for change.
- Scotland has no ‘water stressed areas’ which is a measure of the annual rainfall per population for an area.
- The cost of treated water is generally cheaper in Scotland which impacts the cost effectiveness of demand management initiatives.

Our Water Efficiency Strategy supports water efficiency in 3 key areas:

- Working with our Assets; reducing leakage, optimising processes.
- Working with our Customers; information campaigns, SW website, promotions, ‘Save a flush’ offers.
- Working with Government, Stakeholders and Regulators; active participation to the Roundtable of the ‘Saving water in Scotland’ Network chaired by an MSP, partnership activities.

Over the last few years we have undertaken a campaign to inform and educate our household customers of measures they can take to preserve water resources through customer...
information communications (including leaflets and the Scottish Water website), promotions (Save-a-flush offers) and partnerships with local councils.

We are aware that the effects of water efficiency activities are difficult to measure (even where good demand component measurement is in place) but we are committed to exploring water efficiency opportunities.

We now have clear Ministerial Directions as part of the SR10 Final Determination to create a Water Efficiency Plan to lay out how we intend to promote water conservation and water-use efficiency.

As part of these new duties, action plans are being drawn up to with particular funded focus on:

- Leakage reduction.
- Incentivising developers.
- Household metering trial.
6.0 SUPPLY DEMAND BALANCE

6.1 Supply Demand Balance appraisal

We calculate the Supply Demand Balance (SDB) for each of our WRZs using the industry standard methodology.

In simple terms, the SDB is the balance between available water for supply and water demand. This is therefore a measure of our ability to maintain supplies during the target drought event and during periods of peak demand.

As part of the methodology, we must include a number of factors into the basic calculation of comparing supply capability against demand requirements as follows:

6.1.1 Dry Year Demand

An uplift of 3% has been applied to the total demand assessment to represent the effect of a dry year.

6.1.2 Target Headroom

Headroom is the term used to refer to the margin between supply and demand. Target headroom is defined as the minimum buffer that a prudent water company should introduce into the annual Supply Demand Balance to ensure that the water utility’s chosen level of service can be achieved.

Available Headroom is the actual difference between water available for use and demand at any given point in time.

Where Available Headroom falls below Target Headroom the water resource zone is considered to be in Supply Demand Balance deficit.

Target Headroom uncertainty is made up of supply side and demand side components such as data accuracy, planned leakage reduction and demand forecast uncertainty.

The results of our headroom analysis indicate that our target headroom varies between 5 and 12%.

6.1.3 Outage

Outage is planned or unplanned temporary loss of Deployable Output.

We have recently undertaken an outage pilot study using a national probabilistic method\textsuperscript{10}. This approach dictates that if detailed outage data is not available then outage is estimated from expert knowledge of WTW operators. Consequently workshops were held to capture outage information for 60 WTWs in 38 WRZs.

The results indicated that outage is much lower than previously anticipated. 25 WRZs modelled have an outage less than 0.5% of Deployable Output and all WRZs have outage less than 4%. This is due to the strong operational mitigation measures. The results from this pilot study have been extrapolated to all WRZs in Scotland.

\textsuperscript{10} UKWIR, 1995 Outage Allowance for Water Resource Planning Report
In a second phase for WRP09, we carried out further workshops which concentrated on covering deficit WRZs with average demand critical periods and DO >1 Ml/d. These workshops confirmed the trends from the initial workshops.

To further verify the trend towards low outage values, we carried out a 6 month outage data capture project in Tay Region, which broadly confirmed the results from the workshops.

6.2 Current Supply Demand Balance

Table 3 shows our Base Year 2007/08 SDB position utilising the UK standard methodology.

<table>
<thead>
<tr>
<th>Key on Map</th>
<th>Deficit Bandings</th>
<th>No. of WRZs</th>
<th>Population ('000s)</th>
<th>% of SW's Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In Surplus</td>
<td>98</td>
<td>3487</td>
<td>70</td>
</tr>
<tr>
<td>&gt;0 to -10%</td>
<td></td>
<td>20</td>
<td>806</td>
<td>16</td>
</tr>
<tr>
<td>&gt;-10% to -25%</td>
<td></td>
<td>29</td>
<td>538</td>
<td>11</td>
</tr>
<tr>
<td>&gt;-25% to -50%</td>
<td></td>
<td>32</td>
<td>109</td>
<td>2</td>
</tr>
<tr>
<td>&gt;-50%</td>
<td></td>
<td>51</td>
<td>44</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>230</td>
<td>4984</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 3 Deficit Bandings for 2007/08

The table above indicates that presenting our Base Year 2007/08, approximately 1.5 million customers (30%) in 132 zones were in Supply Demand Balance deficit. This equates to a volumetric deficit of 125 Ml/d.

It should be noted that the standard SDB methodology results in the use of a number of uplift factors (outage, headroom and dry year demand allowance) therefore we consider the population served in the ">0 to -10%" banding (806,000) are of lower priority when considering potential prioritised investment needs. Accordingly our focus for WRP09, will be on zones in the bottom three deficit bandings.

This analysis takes account of all of the constraints in the supply system as previously described (Inc WTW constraints, abstraction licence limitations etc).

Some customers would be reliant on contingency/emergency measures to maintain their supply. A decrease in leakage and directed capital investment to improve our drought resilience will reduce the frequency and population at risk during drought or peak demand condition.

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11 Deficits are calculated using UK standard methodologies for the determination of the supply demand balance and include 3% dry year uplift, headroom and outage allowances. This is the current (not forecast) supply demand balance assessment (using 2007/08 base year data) and does not include projected growth or WFD impact or planned water quality projects.
6.3 Forecast Supply Demand Balance

6.3.1 Committed Programme of Work

For water resource planning purposes the SDB is forecast over a 25 year planning period to 2032. The following aspects significantly influence the SDB forecast and have been incorporated into our calculations:

- Increase in household and non-household demand due to growth (as described in section 5.0).
- Delivery of projects in current investment period (2006-2010) which have either quality or growth drivers. Although not all water quality projects are undertaken to have a direct impact on the SDB, there may be consequential impact on the SDB for example increase in WTW capacity, or increased raw water demand.
- Leakage reduction to ELL by 2014.
- By 2014, we will have secured variations to CAR Licences as described in detail in Section 4.2.2.

Taking account of the above planned interventions, our 2014 projections indicate that there will be approximately 823,000 customers (16%) in 49 zones with an inadequate Supply Demand Balance.

We believe this is an unacceptable position for the customers of Scotland and are therefore promoting a number of projects to restore the Supply Demand Balance as described in the following sections.

6.3.2 Proposed Additional Programme of Work to 2015

In our SR10 Business Plan (2010-2015) we have promoted schemes to restore the Supply Demand Balance in a further prioritised 15 WRZ. Details of the prioritisation and types of intervention are included in Section 7.0.

Following final determination of our SR10 Business Plan, improvements to Supply Demand Balance are included in the Ministerial Objectives.

The Ministerial Objective requires that SW “shall ensure compliance with the Water (Scotland) Act 1980 to provide a supply of wholesome water, by providing a LoS to all customers such that Drought Orders in any water resource zone are no more frequent than once every 40 years”.

In reviewing the number of WRZs and population covered by this Objective, the DWQR accepted that it was not reasonable to remove all deficit zones and provide 100% of the population with our target LoS in a single investment period. It was agreed that we prioritise WRZs for investment to provide maximum benefit, as described in section 8.0. The Ministers Objectives for 2010-2015 therefore include the restoration of the Supply Demand Balance in 15 of our deficit zones as ‘essential’.

Our 2014 projections indicate this will result in a huge improvement, leaving only approximately 65,000 customers (1%) in 33 zones with Supply Demand Balance deficit.

These remaining customers are distributed over mainly small zones and as such the potential to provide mitigation to these customers during drought events is greater (e.g. tankering).
Further work is ongoing to determine the most appropriate long-term cost effective solution for these customers but in the interim period we are committed to maintaining a continuous wholesome supply of water to all of our customers.

The following maps show a pictorial representation of the current and 2014 forecast SDB banding by WRZ across Scotland.

**Key on Map**  

<table>
<thead>
<tr>
<th>Deficit Bandings</th>
<th>2007/08</th>
<th>2013/14 (Predicted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In Surplus</td>
<td>98</td>
<td>197</td>
</tr>
<tr>
<td>&gt;0 to -10%</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
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<td>29</td>
<td>9</td>
</tr>
<tr>
<td>&gt;-25% to -50%</td>
<td>32</td>
<td>10</td>
</tr>
<tr>
<td>&gt;-50%</td>
<td>51</td>
<td>10</td>
</tr>
</tbody>
</table>

**No. of WRZs**  

<table>
<thead>
<tr>
<th>Population ('000s)</th>
<th>% of SW's Population</th>
<th>No. of WRZs</th>
<th>Population ('000s)</th>
<th>% of SW's Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>3487</td>
<td>70%</td>
<td>197</td>
<td>5012</td>
<td>98.7%</td>
</tr>
<tr>
<td>806</td>
<td>16%</td>
<td>4</td>
<td>8</td>
<td>0.2%</td>
</tr>
<tr>
<td>538</td>
<td>11%</td>
<td>9</td>
<td>44</td>
<td>0.9%</td>
</tr>
<tr>
<td>109</td>
<td>2%</td>
<td>10</td>
<td>3</td>
<td>0.1%</td>
</tr>
<tr>
<td>44</td>
<td>1%</td>
<td>10</td>
<td>10</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

**Totals**  

<table>
<thead>
<tr>
<th>Population ('000s)</th>
<th>% of SW's Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>4984</td>
<td>100%</td>
</tr>
<tr>
<td>5077</td>
<td>100%</td>
</tr>
</tbody>
</table>

**Figure 11 Map showing zonal critical period SDB deficits at 2007/08 and 2013/14**
7.0 INTERVENTIONS TO RESTORE THE SUPPLY DEMAND BALANCE

This WRP establishes what is required in future investment plans to improve the long term customer security of supply and drought resilience. It is clear that due to the scale and quantity of schemes required to completely resolve all Supply Demand Balance deficits, such improvements would need to be delivered over more than one investment cycle. It is also essential to ensure that any investment is targeted to deliver optimum benefits to our customers within the affordability and competing priorities of our Business Planning process.

Therefore for WRP09 we have targeted option appraisal and promotion of investment by prioritising our deficit zones.

7.1 Security of Supply Index (SoSI)

Having calculated the Supply Demand Balance as described in the previous sections, we then determine the Security of Supply Index (SoSI). The SoSI is a standard UK methodology to provide an indication of the extent to which a water company is able to guarantee the provision of a planned level of service. Commencing in April 2010 this indicator is being used as part of our Overall Performance Assessment (OPA) calculation which is a series of indicators on which SW performance is measured.

7.2 Prioritisation of zones for investment

Selection of zones has been based primarily on SoSI calculations, targeting the highest ranked zones by zonal index. As this index is the product of percentage deficit in a zone and the percentage of total population affected, it provides the maximum benefit to customers by improving security of supply and drought resilience. However, consideration was also given to known problematic zones outwith the top SoSI rankings and to achieving a balance of investment across Scotland, not limited to large zones only.

This prioritisation process has identified 15 WRZs (refer to Figure 12 below) that we need to restore/improve the Supply Demand Balance such that we achieve our aspirational target SoSI score.

7.3 Summary of WRP09 options

Development of options and justification of solutions was undertaken generally in accordance with Section 4.6 of the SEPA WRP Guidance document12.

The proposed interventions to improve our Supply Demand Balance include:

- Significant leakage reduction activities across Scotland to achieve Economic Level of Leakage by 2014, including further leakage reduction to achieve the lowest cost mix of solutions.
- Utilisation of surpluses made available from leakage reduction in neighbouring zones – e.g. infrastructure links in Fife.
- Resource augmentation schemes which supplement existing sources during high demand or extended dry periods to provide the necessary security of supply.
- Resource replacement schemes which require the development of new sources as permanent replacements e.g. Bonar Bridge.

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• Promotion of a number of strategic regional sources which can potentially provide wider regional resource back up during times of drought e.g. Loch Maree (Gairloch and Inverasdale) and Loch Ness (Inverness area).

Demand management options were included in the Economic Level of Leakage modelling for Second Draft Business Plan and WRP09, along with a review of current practice and results from demand management in England and Wales. This modelling is highly academic, and assumes that metering would be installed, with an appropriate pricing policy, with high penetration and uptake of water saving devices. The results confirm that, for the majority of the zones modelled, demand management was not a cost effective option even with these assumptions. In 3 of the 17 zones modelled, a marginal benefit was indicated, but not as a replacement for any proposed investment.

For the purposes of WRP09, we have therefore not specifically included the effects of these initiatives (other than the inherent benefits included in the current demand assessment). By developing customer awareness we are proactively taking steps to inform our customers in how they can use water wisely which will hopefully in turn influence their water usage behaviours. We will continue to benchmark and report our activities against industry best practice.
**Proposed Water Resource Zones for SDB Improvement Investment**

Figure 12 Map Showing 15 Investment Zones

Note: Gairloch and Inverasdale are treated as one zone.
8.0 ACTION PLAN

8.1 Short Term Deliverables (to 2010)

In the short term we are using this plan to lay out our 2007/08 Base Year Supply Demand Balance position and to promote and justify investment during 2010-2015 to improve our SDB in a number of specified WRZs. Our SDB is going through a significant transitional period due to investment to meet water quality drivers, growth requirements, leakage targets, environmental sustainability reductions and general data improvements.

A key element of our strategy must therefore be to track these changes carefully over time to determine the benefits and effects of the current committed programme of work. It is important to stress that water resource planning is an ongoing iterative process but progress can be monitored clearly by the Security of Supply Index and linked to our Overall Performance Assessment (OPA).

- We have delivered agreed targets for leakage reduction by 2010 en route to delivering the Economic Level of Leakage by 2014.
- We have delivered the majority of the sustainability reductions required for 78 WRZ (covering 220 sources) to meet the requirements of Water Framework Directive and Birds and Habitats Directive. Outstanding work comprises the completion of investigations in 5 zones and implementation of schemes in 15 zones.
- We have tracked the impacts of the SR06 programme on our SDB (leakage reduction, growth projects, Water Quality schemes, Water Framework Directive projects etc) and refreshed our SDB Tables with 09/10 data.
- We have improved data in the key components of the Supply Demand Balance including flow gauging, reservoir depths, bathymetric surveys, Distribution Input, Per Capita Consumption etc. and this work will continue in SR10.
- We have refined and improved confidence in the proposed solutions for priority investment zones for SR10 (2010-2015) business plan. Further work continues to finalise the schemes and commence delivery.
- We have delivered the Abstraction Licence measurement programme and commenced licence compliance reporting to SEPA. All abstractions are metered as required by SEPA allowing us to demonstrate compliance with our abstraction licences.
- We proactively promote the Water Efficiency message within and out with Scottish Water and demonstrate that progress is being made with customers to reduce unnecessary demand. We will continue to investigate the cost effectiveness of Demand Management to determine the long-term cost/benefit of water efficiency demand measures.
- We have Influenced and contributed to the production of the first River Basin Management Plan (2009) and secured the necessary investment in SR10 to deliver our commitments to the agreed Programmes of Measures to meet the WFD objectives.
- We have developed a long term robust drought planning strategy agreed with SEPA for individual sources deemed to be at risk. We have actively engaged with SEPA and the Scottish Government in the development and consultation regarding the inclusion of drought planning in the Controlled Activities Regulations. We have developed detailed drought plans for several of our key sources and drought contingency plans covering all SW.
• In the event of a drought, we will attempt to mitigate any supply problems by means of proactive operational drought contingency planning focussed on close monitoring of zones which currently have poor drought resilience. This was successfully demonstrated in June 2010 with a potential drought event in Dumfries and Galloway, during which we worked closely with, and were very well supported by SEPA and the Scottish Government.

8.2 Medium Term Commitments (2010-2015)

• We will investigate the methodologies and software tools available in the water industry to optimise the use of water (raw and treated) in our conjunctive supply systems (mainly central belt). This tool will enable us to model the optimal conjunctive supply arrangements to drive operational expenditure efficiencies during normal and wet years, and the need for a balance between the environmental impact and maintaining customer supplies during dry and drought years.

• Achieve the agreed Economic Level of Leakage and prioritise the utilisation of the reduced leakage as described in section 7.

• Implement promoted capital investment schemes to improve Supply Demand Balance in the prioritised zones. This is dependent on the schemes gaining the necessary approvals by the Stakeholder Group established to deliver this programme through the staged process referred to in section 8.2.

• Achieve agreed target score on the Security of Supply Index resulting in an improved security of supply to over 1.5 million customers in zones which have Supply Demand Balance deficits in our 2007/08 Base Year. As part of this we will improve the drought resilience to over 1.35 million customers who are currently served by sources which are unable to maintain full supplies during a 1 in 40 year drought (our target drought resilience return period).

• Increase water efficiency activities – determine the benefits, costs, incentivisation and political will to improve household metering penetration across Scotland taking the opportunity presented by any potential changes in how we bill domestic customers (currently billed by local councils with the Council Tax). We will deliver a Water Efficiency Plan for submission to the Scottish Government by March 2011.

• Continue to integrate water resource planning activities with the River Basin Management Planning process by providing ongoing commitment to Area Advisory Groups and supporting SEPA in the development of appropriate Programmes of Measures (through the Quality and Standards process) and drafting of the River Basin Management Plans.

• Implement the corporate Climate Change Strategy which incorporates the approach to climate change associated with water resource planning. Utilise the UKCP09 scenarios as they become available.

• By membership of Water UK, continuously benchmark our performance and approaches with best practice in England and Wales in such areas as demand forecasting, demand management, water resources management and levels of service.

• Continued improvements to our demand forecasting methodologies and components of our Supply Demand Balance.

• Continued progress of our Hydrology Improvement Plan.

• Develop our Water Resource Plan, to align with the production of our SR15 Business Plan.

• Obtain ISO 9001 accreditation for the production of our 25 year Supply Demand Balance.
8.3 Drought Planning

Water Resource Planning is primarily used to plan how we restore or maintain the Supply Demand Balance to achieve our target level of service — i.e. if we achieve our planned level of service in a zone we should be able to maintain full demand for that given drought scenario (in our case a drought event with a 1 in 40 year return period).

Drought Planning is the planning process or framework associated with how we manage emerging drought events, as you cannot predict how severe a drought event will be when it is emerging — i.e. it could be worse than the target level of service for which we have designed.

As stated in section 8.1, we have developed Drought Plans for several large systems and Drought Contingency Plans covering all of SW. It is recognised by our stakeholders that it will take a number of years to provide full coverage of all of our assets, and we plan to have detailed Drought Plans covering all of our major systems by 2015.

8.4 Water Resource Plan 2008 Consultation

Our Draft Water Resource Plan Summary Document for WRP08 was formally issued for widespread consultation at the end of May 2008, with the WRP08 Main Document available on request, although it is recognised that this document is a technical report with SEPA and the Commission being the primary audience.

We have taken account of representations made during the consultation period and, where appropriate, incorporated changes into the Plan.

SEPA have made the following statement, in support of the draft WRP09, whilst also providing views on future liaison and Action Plans.

‘Overall, we think that the 2009 draft is a very useful document which meets the stated aims i.e. to:

- Define SW’s long term water resources strategy.
- Provide a long-term assessment of the Supply Demand Balance across Scotland at a zonal level.
- Justify investment to restore deficits in prioritised water resource zones (WRZs).’