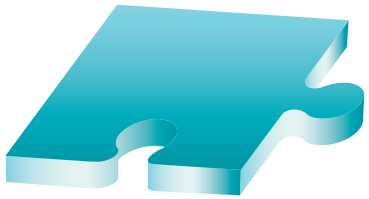


Section 8 : Developing Our Preferred Plan

This section explains how we have developed our preferred plan for WRMP14

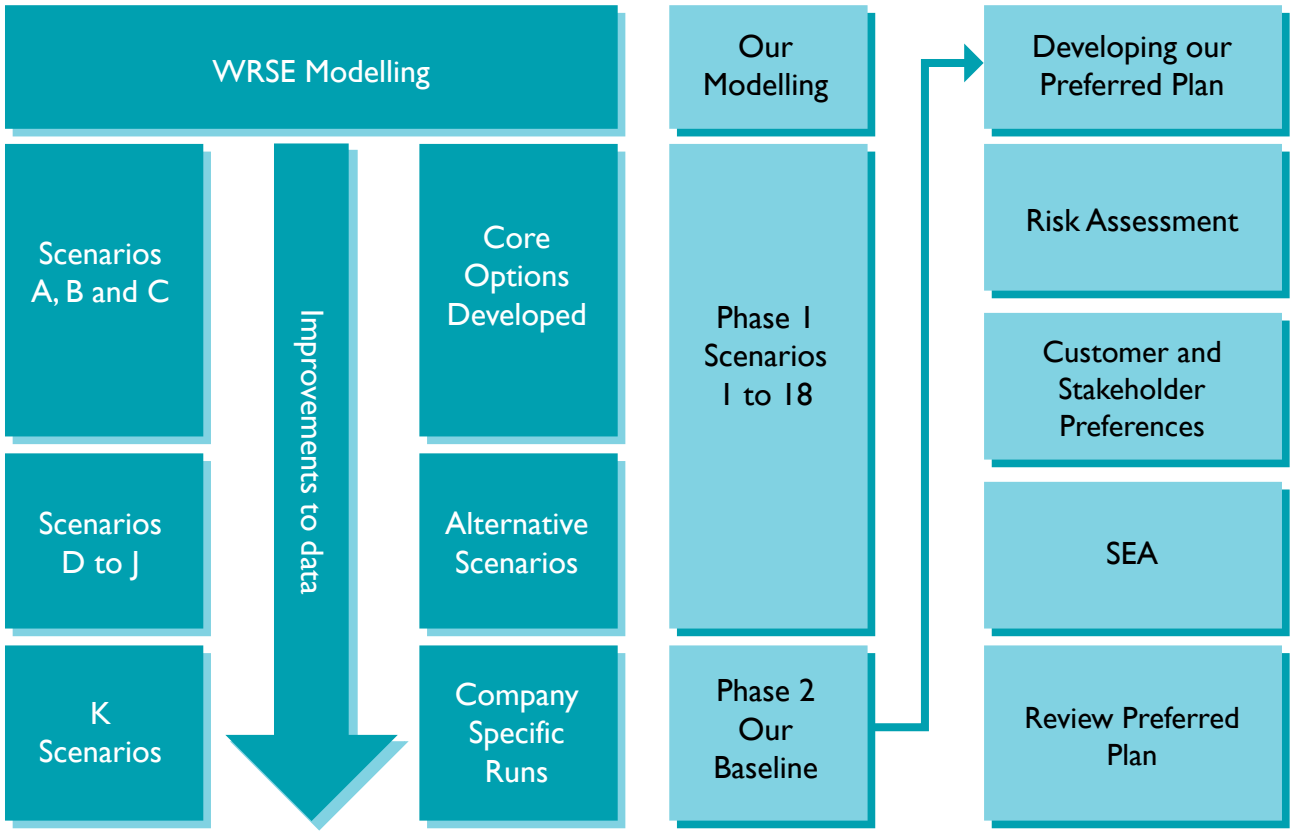
Introduction

8.1 We have a statutory duty to develop a preferred WRMP14 to manage water resources within our area. Our plan should include a clear and transparent explanation of the decision making process used to arrive at the preferred plan. This section explains how we have developed our preferred plan and how we have tested that plan using a risk assessment, taking on board our customers' and key stakeholders' preferences, and included a Strategic Environmental Assessment (SEA).

8.2 For our dWRMP14 we undertook our own modelling using the same model and data as the WRSE Group. Essentially, we undertook two modelling phases; the first phase included an initial run which was consistent with the WRSE work. The second phase included more detailed modelling which was based on improved data sets, including other companies updated data to the WRSE model and advice received from neighbouring water companies on transfers they could offer us. Ahead of finalising the WRMP14 the WRSE Group completed a final phase of modelling in September and October 2013 that validated our WRMP14 as being consistent with the WRSE modelling outcomes. The economic modelling undertaken by ourselves and the WRSE Group considered a range of costs and benefits, including: initial construction costs; environmental and social costs and benefits (including carbon); capital maintenance costs; and, operational costs.

8.3 The guidelines recognise that the optimum solution may not necessarily be the combination of the least cost options to meet the supply demand deficit. As a result, we are required to review our modelled least cost solution and if appropriate, re-iterate it to account for any significant risks or uncertainties, or changes to options available to us.

Figure 8.1: Our approach to developing our preferred plan



8.4 Our approach to developing our WRMP14 preferred plan is illustrated in Figure 8.1. Each stage of this approach is explored in more detail below, with further technical supporting information provided in Appendix 8.

WRSE modelling for WRMP14

8.5 An iterative and phased approach was adopted by the WRSE Group to determine a 'least cost' regional water resources strategy. The central activity of the WRSE Group has been to resolve a shortfall in water across the South East of England of around 1,000 Ml/d by 2040. The regional model, which included feasible options from our own optioneering work (described in Section 7), considered a total of 1,061 feasible options across 34 WRZs. The options were evenly split between demand management side and supply side options.

8.6 The WRSE Group's iterative approach became more detailed as new reliable data became available and included:

- WRSE Group Phase 1 Model development (May 2011 to June 2012)
  An optimisation model was developed by the WRSE Group using the best available data from water companies' WRMP09s, with any subsequent updates. At this stage provisional data was included for new demand management options (i.e. leakage reduction, water efficiency and metering options) and sustainability reduction scenarios.

- WRSE Group Phase 2A: Model testing (July to October 2012)
  The model from Phase 1 was updated on the basis of the findings from Phase 1, and tested using new data provided by the Group's water companies.

- WRSE Group Phase 2B: Development of a regional strategy (November 2012 to February 2013)
  The Phase 2B model was further improved following testing and review of the Phase 2A work. Final data on supply and demand forecasts, and options was based on best available data water companies were intending to use in their own dWRMPs whilst accepting there would be some further updates. Demand management options were developed in more detail than in earlier phases.

8.7 The WRSE model produces the optimum regional 'least cost' solution to meet any shortfall in water. The modelling results were published in a Phase 2B Report (Water Resources in the South East – Progress towards a shared water resources strategy in the South East of England Phase 2B Report – February 2013) in February 2013. The results are presented using 10 initial modelling scenarios A to K, as detailed in Appendix 8. These 10 scenarios cover:

- The 'Base Case' scenario comprising companies' supply demand balance data, with climate change and sustainability reduction allowances included;
- A number of variations to the 'Base Case' scenarios including both an increase and decrease in demand, a reduction in forecast deployable output and further sustainability reductions;
- Scenarios removing options considered 'at risk' by the Environment Agency due to their environmental effects, and
- Sensitivity testing around the capital cost of resource side options.

8.8 From the initial 10 modelling scenarios, the WRSE Group was able to define a list of 41 core options, as listed in Appendix 8. For a specific option to be included in this list, it had to meet the following criteria:

- The option must have been selected in 5 of the 10 initial scenarios;
- It must deliver a summer peak period capacity of 5 Ml/d or more; and
- It must have a 'very high' or 'high' confidence grade in at least half of the years that the option is selected.

The value of the WRSE modelling to WRMP14

8.9 The WRSE Group's development of least cost solutions allowed all option types to be considered using consistent data and inputs in a transparent and robust manner. Consensus was reached amongst the Group on the technical approach used and the outcomes of the modelling exercise. The work included an allowance for the future impacts of sustainability reductions and climate change across the region and employed a range of scenario and sensitivity testing to give confidence in the range of solutions produced. This included company specific runs and alternative scenarios.

8.10 Appendix 8 provides details of the key features arising from the results of the scenario testing for Phase 2B undertaken by the WRSE Group. This did not adopt a single scenario as the regional solution for a number of reasons. These include:

- That several companies have withdrawn regional transfer options from the process;
- That the model is unable to assess a mix of options or provide the in-combination assessment provided by the SEA process;
- That the options in the WRSE model do not include customer willingness to pay; and
- Some companies, including ourselves, updated the supply demand data part way through the modelling process.

Therefore, given the complexity of the model, and uncertainties that exist, there was no single WRSE Group Phase 2B scenario run that we or other companies in the group could adopt as our preferred plan for our WRMP14.

8.11 The Environment Agency, Ofwat and Defra were consistent in their expectations that individual water companies' dWRMP14s provide a clear audit

trail between the outcomes of the WRSE Phase 2B modelling and their individual WRMPs. Differences were expected and acceptable, but needed to be explained and justified. In developing our WRMP14 preferred plan we compared our proposed options against the list of core and alternative options that emerge from the WRSE Phase 2B modelling.

8.12 Whilst the Phase 2B modelling scenarios for the WRSE Group work used the most up to date and reliable data available at the time, their purpose was to seek a least cost solution. The later WRSE Group model run identified a number of regional transfer options, a large number of groundwater options, and some alternatives including a reservoir in the River Ouse catchment.

8.13 The value of the Phase 2B modelling in developing our WRMP14 preferred plan was that we undertook further discussions with individual water companies to assess further the WRSE Group regional transfer options, which might be available to us. In doing so, we were conscious of the need to meet our objectives as set out in Section 1, in particular the need to develop a more resilient set of options for our preferred plan, and to ensure that any inter-company transfer options do not leave our customers or our business worse off in terms of costs or risks.

Our modelling for WRMP14

8.14 For our own modelling we adopted the WRSE Group model. We considered there was clear benefit in doing so, not least that the model was supported by our regulators and Government and has been subject to robust independent peer review.

8.15 During the development of our preferred plan we undertook our own modelling in parallel with, and using the results of, the WRSE Phase 2B modelling. By doing so we were able to:

- Develop a new baseline consistent with the best data as it became available from all the WRSE water companies;
- Include more sensitivity testing to improve the resilience in our preferred plan;
- Understand the impact of our customers' preferences;
- Consider the wider environmental costs and benefits which are not included in the environmental, social and carbon costs;
- Determine the availability and costs of regional transfers options; and
- Ensure that our preferred plan is consistent with the regional supply demand balance data.

Phase 1 Modelling Scenarios 1 – 18

8.16 Phase 1 of our modelling work was undertaken at the same time as the WRSE testing of scenarios A to K. The results of all 18 of our phase 1 scenario runs and how these compare to the WRSE Phase 2B modelling are included in Appendix 8. Scenarios 2a, 9b and 12a were our Phase 1 baseline plans against which we tested the other scenarios.

8.17 As part of our phase 1 modelling work, we discussed and refined the possible regional transfer options from the WRSE Group Phase 2B modelling with donor companies to reach agreement on a set of transfer options for potential inclusion in our preferred plan. Before doing so, we reached understanding of the full costs involved (details which were not included in the WRSE model), to verify that these options were economically viable. No demand management options were excluded at this phase 1 stage, although some water efficiency options were developed into our water efficiency strategy (see Appendix 4).

8.18 At this point we also considered the potential for including groundwater options in our preferred plan. Both the WRSE Group and our own scenario model runs based purely on least cost, consistently selected approximately 40 Ml/d of new groundwater options. However, this selection did not take any account of risk, and we had real

concerns around the sustainability and resilience of pursuing further new groundwater development. The Environment Agency's 'red list' included the majority of our groundwater schemes, indicating that incorporating these into our preferred plan would be risky on deliverability and sustainability grounds. Only two of our groundwater schemes were excluded from the 'red list'. Given the recent drought, and susceptibility of groundwater to three years of little recharge, we decided to constrain the amount of new groundwater in our preferred plan to ensure alternative options were selected. This approach was broadly supported by the EFG.

8.19 Taken together, the WRSE Group and our Phase 1 least cost modelling provide an early understanding of what a least cost Phase 1 baseline solution might be. However, the modelling approach to this point had not demonstrably delivered a final best value preferred plan, taking account of: whether we were modelling the most robust options available to us, overall risk, customer preferences and SEA.

Phase 2 modelling

8.20 As part of this phase we revised and finalised the list of available options to be modelled, after concluding our discussions with other water companies in respect of inter-company transfer options. This ensured that when we re-ran the least cost modelling we were able to produce a new and improved baseline scenario. Our new Phase 2 baseline is summarised below and described in detail in Appendix 8 (Scenario 19). The Phase 2 baseline comprised:

- A variety of leakage options;
- A variety of water efficiency measures for the period 2015 to 2020;
- Three reservoir options;
- Six new inter-company transfer schemes in addition to the existing inter company transfer schemes;
- Two groundwater schemes following the exclusion of all the Environment Agency red list options;
- Improvements to two water treatment works, one in WRZ2 and one in WRZ4, as selected by the WRSE scenario;
- Two water re-use schemes at Peacehaven and Aylesford; and
- Five new transfers between our WRZs.

Risk assessment

8.21 The guidance states that the optimum solution should be robust and flexible to the range of risks and uncertainties identified. With this in mind we developed a set of risk factors, as shown in Table 8.1, to assess the different scenario outputs from our modelling and provide an overall view of the risk of a preferred plan. Further detail of the assumptions used in the risk analysis is included in Appendix 8. The biggest risks identified in the plan preparation were:

- The delivery of our ambitious demand forecast;
- The ability to agree formal contracts for future bulk supplies;
- Dealing with uncertainty;
- Long lead times of many of the new future new resource options and ensuring flexibility to bring forward alternative options should any of these prove unfeasible;
- Dealing with uncertainty from sustainability reductions; and
- Uncertainty of climate change adaptation and severe droughts. We have taken the view that improving the mix of resources in the medium to longer term provides the best solution.

8.22 We took account of a number of these identified risks in our target headroom calculations. Given the uncertainty identified during the plan preparation process, these incremental risks can be managed through our annual review of the WRMP.

Long lead in times

8.23 Our own modelling included a number of future options, which have long lead in times and are complex schemes. We were mindful of the selection of options with longer lead in times when reviewing the outcomes of our scenario test runs. While we will manage the incremental risks of changing demands for water, we need to carefully consider the risk associated with how we manage future new resource options too.

Table 8.1 Risk Framework

Risk Factor	Explanation
Improves Mix	Does the option improve the mix of sources so we will have a balanced mix of different types of supply and demand options? For example, groundwater options will score poorly because the company is already groundwater dependent.
Water Available	What is the certainty that the water is available? How confident are we in the yield of a new source and does the yield depend upon another scheme being built first? For example, chalk groundwater schemes score poorly because of the Environment Agency's water scarcity work. Water re-use schemes tend to score well.
Drought Resilient	Is the scheme likely to be resilient in a drought as well as during normal operations? Leakage and water re-use schemes are likely to score well.
Environmental impacts and delivery	Is the scheme difficult to promote for environmental reasons? Some reservoir options score poorly whilst demand management schemes are likely to score well.
Third Party Risk	Is the scheme dependent on one or more third parties to deliver the option? For instance schemes, which require customer behaviour changes, tend to score poorly along with options from other water companies where they are dependent upon a complex scheme being built.

8.24 There is a risk that if we were too late in bringing forward schemes which will give us greater yield for the later part of the planning horizon, we may have to consider and ultimately rely on a scheme, or schemes, which may be less sustainable and cost effective in the absence of anything else.

8.25 The progressive testing of transfer options and the exclusion of higher risk groundwater schemes through our phase 1 and phase 2 scenario runs has allowed us to understand costs, risks and impacts of removing these schemes. This has led to a better set of options, but not necessarily a reduction in long lead time scheme risk, as these become increasingly relied upon.

8.26 We ended up with a more constrained list of options during the review and testing of the WRSE Phase 2B outcomes and the development of our preferred plan, with many of those options remaining being long lead in time schemes, and arguably with an associated higher degree of planning risk. Taking account of this we focused on both developing our preferred plan, and identifying the alternative options, which we went on to include in WRMP14.

8.27 Looking at the range of options, lead times and permutations available to us for WRMP14, we were mindful that the period 2015 to 2020 will be critical to undertake investigations on some of the long lead in time preferred and alternative options.

Engagement and customer preferences

8.28 In arriving at our preferred plan for WRMP14 we involved stakeholders and our regulators in the decision making process through a number of ways as detailed in Section 2 and Appendix 2. Participation in the WRSE Group Phase 2B modelling provided us with the opportunity to explore with other water companies 'regional solutions' and this had a significant bearing on our WRMP14. The EFG were appraised of the least cost modelling process and given the opportunity to develop their own scenarios to be tested through the model. The preliminary outcomes of the modelling and testing process were shared with the group and their feedback has influenced the preferred plan presented later in Section 9.

8.29 Our customers also provided us with their views on their preferences around the types of options that are included in our preferred plan to address the water supply deficit, and we have assessed their levels of willingness to pay for those options. The results of our work to determine customer preferences are included in Appendix 2, and we have described how these were applied in developing our preferred plan in Appendix 8.

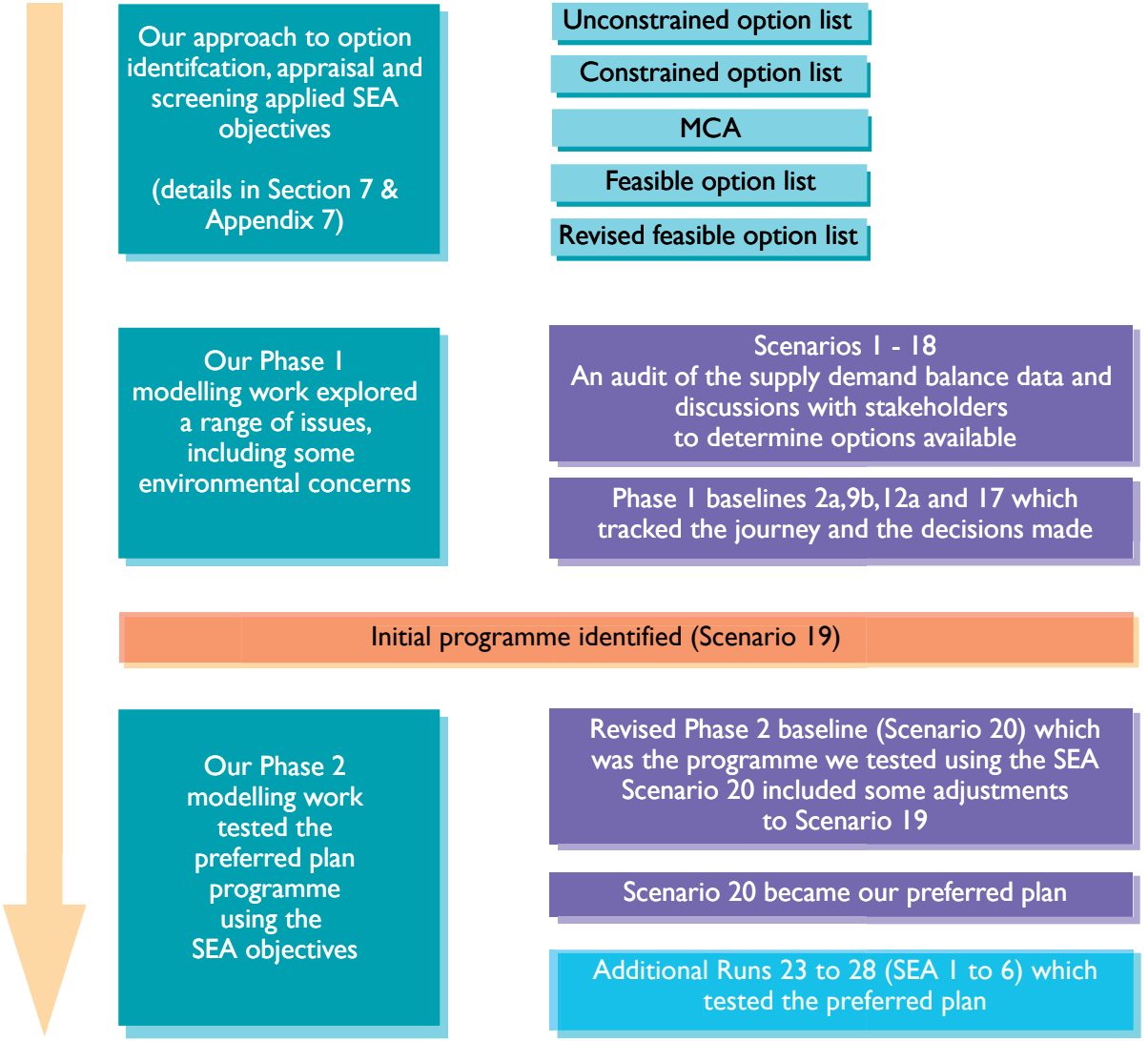
Strategic Environmental Assessment and Habitats Regulations Assessment

8.30 We are required to undertake a Strategic Environmental Assessment (SEA) of our plan. SEA is a process for identifying the overall environmental impact of a plan or programme; to ensure that the environmental effects are taken into account and the environmental implications are appropriately reported and consulted on. A detailed Environmental Report has been produced which is in a separate document available from our website (South East Water, Strategic Environmental Assessment, Environmental Report, March 2013).

8.31 The SEA process influenced the development of our WRMP14 preferred plan in a number of ways. The three stages of how the SEA process has influenced the development of our WRMP14 are summarised in Figure 8.2.

8.32 Firstly, the comments we received as part of the consultation on our SEA scoping report were incorporated into our analysis of options, with individual options being appraised against SEA objectives and specific criteria covering magnitude and extent, short and long-term impacts and without and with mitigation. The results are recorded in a summary matrix, which is included in Appendix 8.

Figure 8.2 : SEA process stages



8.33 Secondly, along with other concerns, environmental issues influenced the development of the exploratory Phase 1 modelling scenarios.

8.34 Thirdly, the preferred plan and other scenarios were assessed within the SEA using both the individual options matrices and cumulative impacts assessment. The results were used to identify specific options that should be removed from our economic modelling to see if alternative programmes would be better. The first level of cumulative assessment looked at in-combination effects within the company options selected.

8.35 An assessment of each option in the preferred plan was then undertaken and from this we were able to recommend mitigation measures. A summary of this assessment is included in Appendix 8. A second level of cumulative assessment at this stage included sources outside our area included in other companies' WRMP14 preferred plans. Details are provided in the Environmental Report.

8.36 In addition to the SEA, we have undertaken a Habitats Regulations Assessment (HRA) of our dWRMP14 as set out in the Conservation of Habitats and Species Regulations 2010. HRA is a multi-stage process which helps determine likely significant effects, and to assess adverse impacts on the integrity of a European site.

8.37 The HRA screening provided information influencing our options appraisal and selection process for the plan. Three options in the preferred plan required further assessment after screening. Stages 1 and 2 of the HRA report identified only two options, Aylesford re-use and Thames Water Windsor to Surrey Hills transfer, as needing 'down the line' appropriate assessment. Further information is included in the HRA Report.

Determining our preferred plan

8.38 To develop our preferred plan we made changes to the options available compared with Scenario 19, in respect of:

- Limiting the reservoir options to Broad Oak and existing reservoir sites (Arlington and Ardingly), in line with the SEA process and our customers' and stakeholders' preferences;
- Including three additional groundwater options (two of which – Cowbeech and Forest Row - were on the Environment Agency's red list, plus Maytham Farm), which we consider could be developed at low or medium environmental risk; and
- Deferring transfers from Thames Water from 2018 to the period commencing 2030 to address uncertainty on timing.

Further detail of these changes can be found in Appendix 8.

8.39 We re-ran our economic analysis to determine a final preferred option set and costs. This confirmed the inclusion of leakage reduction measures, additional water efficiency measures from 2015 to 2020, two reservoir schemes at Broad Oak and Arlington, six inter-company transfer schemes, five groundwater schemes, improvement at two existing treatment works (one in WRZ2 and one in WRZ4) and three transfer schemes between our WRZs. The other key difference was advancing the water re-use scheme at Peacehaven. This provided us with our preferred plan which is set out in detail in Section 9.

8.40 The difference in cost between the initial Phase 2 baseline described earlier in paragraph 8.20 (Scenario 19 in Appendix 8) and the revised Phase 2 baseline run described in paragraph 8.39 (Scenario 20 in Appendix 8) was small overall.

8.41 Therefore, adopting this revised Phase 2 baseline run as our preferred plan ensured we had: effectively adopted the 'least cost' plan; taken proper account of customer preferences in terms of options selected; had met the environmental test provided by our SEA; and, selected options from the list of most robust and reliable options available.

WRSE Phase 3 modelling

8.42 Ahead of finalising WRMP14 the WRSE Group completed a final Phase 3 of modelling (September and October 2013) that validated the WRSE Group water companies' dWRMP14 preferred plans. This confirmed that our preferred plan remains consistent with the outcomes from regional work.

8.43 A summary of the WRSE Group Phase 3 findings is included as Appendix 8D.