south east water

Water Resources Management Plan
2014

Appendix 5 : Headroom

Executive Summary

1. We require an assessment of target headroom for the WRMP14.

2. As part of the headroom assessment process, a review of the headroom models created for WRMP09 has been undertaken, and the models updated with current data.

3. This appendix describes the various uncertainties in headroom, the key assumptions made in the models for these uncertainties by taking into account the current supply demand conditions and the outputs from the models.

4. The summary also lists the changes in assumptions made in the current headroom models in comparison to those made for WRMP09. It should be noted that the headroom assessment relies on data from several other tasks which are being undertaken concurrently and the updated information from these tasks have been incorporated in this WRMP14.

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Introduction

Target Headroom

5. When a supply and demand balance is calculated and forecast over a planning period there are many sources of uncertainties that arise. This is due to assumptions being made about the future, incomplete or unreliable data sets or a lack of understanding of factors that may influence the supply demand balance such as climate change. Incorporating target headroom into the balance helps to ensure that levels of service can be maintained despite uncertainties surrounding supply demand forecasting.

6. Target headroom may be defined as "the minimum buffer that a prudent water company should allow between supply and demand to cater for specified uncertainties (except for those due to outages) in the overall supply and demand balance".

7. The Guidelines do not expect water companies to eliminate all potential uncertainties, but they should certainly plan to eliminate the majority of the uncertainties in the immediate future and less over the longer term as it is understood that there will be changes to the supply demand balance later on in the planning period that could not be anticipated at the beginning. Therefore, the current methodology allows headroom to be displayed as a probability distribution known as headroom uncertainty.

Headroom Uncertainty

8. Headroom uncertainty addresses key components of the supply demand balance for the entire planning period and, through the quantification of all foreseeable sources of uncertainty, provides an additional planning allowance added to the demand forecast. Further to that the assessment of headroom uncertainty allows water companies to see which components of their supply demand balance are the major sources of uncertainty. When a company understands the uncertainties in its supply demand projections it can make appropriate investment decisions to ensure levels of service are maintained.

9. The 2002 UKWIR methodology[1] suggests that there are eight sources of uncertainty in the supply side data and four in the demand side as shown below.

Supply Related	Demand Related
S1 Vulnerable surface water licences	**D1** Accuracy of sub-component data
S2 Vulnerable groundwater licences	**D2** Demand forecast variation
S3 Time limited licences	**D3** Uncertainty of impact of climate change on demand
S4 Bulk imports	**D4** Uncertain outcome from demand management measures
S5 Gradual pollution causing a reduction in abstraction	
S6 Accuracy of supply-side data	
S8 Uncertainty of impact of climate change on source yield	
S9 Uncertain output from new resource development	

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[1] An improved methodology for assessing Headroom – final report (UKWIR, 2002).

10. The methodology allows for water companies to include as many or few as are relevant bearing in mind that within a 30 year planning period there are likely to be many changes to the operation of a company and therefore many additional sources of uncertainty. Some components may be specific to a particular source such as a pollution issue, whilst others may affect a whole Resource Zone (RZ) such as licence reductions and some will affect the company as a whole such as the impacts of climate change on supply and demand.

11. After an assessment has been made on which components apply in each RZ, and for what period, the uncertainties must then be quantified. This process requires close liaison within our Company with the personnel who have the most experience / knowledge in each individual area. Many assumptions and simplifications are made, which must be documented to ensure the approach is fully auditable and above all, robust enough to be able to provide realistic targets throughout the planning horizon.

12. The headroom assessment can then be integrated with other components of the supply – demand balance in order to provide a tool that can aid planning and decision making regarding the timing and nature of schemes designed to increase supply and manage demand.

Objectives

13. The objective of this report is to summarise and complete a model for the assessment of headroom uncertainty using all data currently available. The output is displayed as a probability distribution that allows the Company to plan to manage uncertainties throughout the planning period to 2040. We have produced three sets of results which are presented in Section3:

    1. Target Headroom for the dWRMP
    2. Target Headroom for the WRMP which considers baseline uncertainty
    3. Target headroom for the WRMP which considers the additional uncertainty of including the options in the Preferred Plan.

14. The assessment of headroom has been done so in accordance with the latest UKWIR methodology (UKWIR, 2002). The approach is transparent and fully auditable and has been done at a company, regional and Resource Zone (RZ) level. The results have been discussed with the Environment Agency and Environmental Focus Group (EFG) throughout the initial development and revision to ensure key stakeholders understand the approach adopted. Two assessments have been undertaken, one for Dry Year Annual Average (DYAA) and another for Average Day Peak Week (ADPW) which is also known as Dry Year Critical Period (DYCP).

15. The base year of the planning horizon is 2015; thereafter the results are displayed in five year intervals up to 2040, consistent with each AMP period.

16. This report also details comprehensive methods of quantifying uncertainties for each of the components that comprise the headroom assessment to enable future users of the model to manipulate raw data in a way that ensures consistency across all components and that all assumptions and simplifications are mathematically correct.

17. A further output of the model is a clearly defined assessment of the degree to which each component influences the headroom uncertainty throughout the planning period, allowing the user to identify the key drivers of uncertainty in the supply demand balance.

18. To assess the headroom for DYCP the same approach has been adopted for DYAA calculation but all deployable outputs used have been the peak deployable outputs and all calculations involving demand figures have used the peak demand.

The Model

19. The model requires all uncertainties to be quantified in Ml/d and represented by probability distributions which are then used to populate a Monte Carlo model. For this project @Risk version 4.5 was used as the simulation tool.

20. The model is based on a template developed by UKWIR (2002), however a considerable number of improvements have made to make the analysis more robust and to improve the functionality, so the model can be used to test assumptions.

Key Assumptions

Supply Side Data

S1, S2 and S3 Vulnerable Water Licences

21. S1 and S2 uncertainties relate to vulnerable surface water and groundwater licences. As per the WRPG (S 3.2), the Environment Agency has provided companies with "confirmed" and "likely" sustainability changes required, and these have been included explicitly in baseline deployable output according to the guidance. Companies are instructed not to make any additional allowance for sustainability reduction in headroom and consequently these components are set to zero in the model.

22. S3 allows for reductions in deployable output through time limited licences being reduced or revoked upon expiration. The WRPG (S 5.3) states that we should not make allowances in their headroom calculations for the risk of time-limited licences not being renewed or a licence revoked because of a sustainability reduction. Consequently, the results presented in this report do not take into account any uncertainty from time limited licences with the S3 component set to zero.

S4 Bulk Imports

23. S4 Allows for uncertainties in bulk imports that are out of the receiving water company's control. Five imports have been identified and through discussions with our Operations Control Centre we have reviewed historical operations and their reliability has been approximately quantified. The four imports are summarised in Table 1.

24. Our treatment of Bulk Supply uncertainty has changed since the publication of our dWRMP. In particular we have agreed with Southern Water that the existing bulk imports will be extended beyond their current agreement period (i.e. Weir Wood, Darwell and Matts Hill).

Table 1: Summary of Bulk Supplies

Donor Source	Resource Zone	Current Agreed Volume (Ml/d)	
		Average	Peak
Weir Wood	2	5.4	5.4
Affinity Water	4	36	36
Darwell Reservoir	3	8	8
Belmont Scheme (Matts Hill)	6	6.3	7.8
River Medway Scheme (Bewl Bridge and Burham) *	6/7	11.6	16.2

*The yield of the River Medway Scheme reduces after 2025 to 10.7Ml/d (DYAA) and 15Ml/d (DYCP). The impact of this change is not material.

<u>Weir Wood</u>

25. Weir Wood Reservoir is owned and operated by Southern Water Services (SWS). The treatment works at the reservoir transfers water into our system at five locations which are metered and monitored. In recent years the full supply has not been guaranteed under the severe drought conditions experienced so the uncertainties surrounding the Weir Wood abstraction have been modelled using a triangular distribution based on the possibility that

the deployable output could reduce to 3.4 Ml/d. This has been derived from the operational experience during the drought of 2011/12 when SWS reduced the supply to this level for much of the period.

26. The distribution therefore has the following parameters for average and peak condition:
    - Max loss 2.0 Ml/d
    - Min loss 0 Ml/d
    - Average loss 1.0 Ml/d[2]

Affinity Water

27. Affinity (Central) Water supplies water from their existing WTW supply to our Surrey Hills Reservoir in RZ4. The abstraction by Affinity Water is up to 101 Ml/d, of which we have an assured supply of 36 Ml/d, however, should the abstraction decrease then our entitlement will decrease accordingly. Based upon the experience in the recent drought and assurances received from Affinity, the import is considered reliable, however the reduction in supply that is out of our control has been assumed at 10% reduction of the agreement.

28. The distribution therefore has the following parameters for average and peak condition:
    - Max loss 3.6 Ml/d
    - Min loss 0 Ml/d
    - Average loss 1.8 Ml/d

29. Lower risk is expected in the ADPW and this has been incorporated in the modelling as follows for the DYCP condition:
    - Max loss 1.5 Ml/d
    - Min loss 0 Ml/d
    - Average loss 0.75 Ml/d.

Darwell

30. We receive bulk supply from SWS's Darwell Reservoir which provides raw water to our Hazards Green Water Treatment Works in RZ3. The current agreement with SWS is for 8 Ml/d to be available. Historically Darwell Reservoir has been considered to be unreliable with severe restrictions during droughts as the reservoir has been down to 10 – 20% full for weeks at a time. Additional transfer capacity has been recently implemented to transfer water from Bewl Reservoir to Darwell Reservoir, which is likely to increase the security of the import in the future.

31. The scheme has not been operational long enough to confirm this but based on operational data supplied by Southern Water the Darwell bulk import could reduce to 5.98Ml/d. This is represented in the model by a triangular distribution with the following parameters for both average and peak periods at the start of the planning period:
    - Max loss 2.0Ml/d
    - Min loss 0 Ml/d
    - Average loss 1.0 Ml/d

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[2] Whilst the correct figure is 1.0Ml/d our review has identified that the actual number used in our modelling was 1.085Ml/d. This difference is not material and will be updated prior to our next WRMP

32. The modelling of the Darwell Transfer assumes that there is an increase in uncertainty in the future with the risk of 5Ml/d at the end of the planning period. This uncertainty is based on early discussions with Southern Water on the reliability of the Darwell bulk transfer. This increased risk was based on changes to the yield and operation of the system which Southern Water are proposing. We have undertaken separate sensitivity tests which show this increased risk does not affect the AMP6 schemes in our preferred plan, but we acknowledge that the uncertainty beyond AMP6 needs to be clarified before the next WRMP.

Matts Hill

33. The import from SWS at Matts Hill into RZ6 (representing the Belmont Agreement) has been identified as uncertain as there have been prolonged periods, particularly during droughts, where the agreed quantity was not available. The current agreement with SWS provides for 6.3 Ml/d average and 7.8 Ml/d peak to be available. During recent dry periods SWS have reduced the supply directly due to source capability issues. It is on this basis that a triangular distribution has been used to represent the uncertainty with the following parameters:
    - Max loss 1.3 Ml/d average and 2.8 Ml/d peak
    - Min loss 0 Ml/d
    - Average loss 0.65 Ml/d and 1.4 Ml/d peak (50% of the maximum)

River Medway Scheme

34. The Bewl Bridge and Burham WTWs are the treatment works for the River Medway Scheme. The works supply RZ 6 and 7. There is flexibility as to where the water is abstracted, however the total cannot exceed the agreed deployable output which is calculated by SWS. There have been several reviews of the yield of the scheme and the overall yield available to SEW will reduce in AMP6. The scheme's yield is generally considered unreliable (as represented by the recent reductions in deployable output).

35. We have represented the uncertainty by a triangular distribution with a maximum of 5% reduction for both average and peak periods.

36. For Bewl Bridge (RZ7) :
    - Max loss 0.28 Ml/d average and 0.4 Ml/d peak
    - Min loss 0 Ml/d
    - Average loss 0.14 Ml/d and 0.2 Ml/d peak (50% of the maximum).

37. For Burham (RZ6)
    - Max loss 0.3 Ml/d average and 0.43 Ml/d peak
    - Min loss 0 Ml/d
    - Average loss 0.15 Ml/d and 0.215 Ml/d peak (50% of the maximum).

S5 Gradual Pollution

38. S5 allows for uncertainties surrounding permanent loss of output through gradual pollution of a source resulting in either abandonment or the installation of treatment. By contrast, temporary losses are accounted for in the outage assessment which is reported elsewhere.

39. The risk of contamination has been quantified by using a standard approach of borehole vulnerability which assesses the risk of contamination at each source using the following parameters:
    - Groundwater flow mechanism - Fissured aquifers are allocated a larger risk score;
    - Distance from outcrop - For confined aquifers, risk is inversely proportional to distance from outcrop;
    - Superficial cover - Unconfined aquifers may have a decreased risk if they are overlain by superficial deposits. The nature of the deposits is also considered;
    - Unsaturated depth - Risk is inversely proportional to unsaturated depth;
    - Primary land use - For unconfined aquifers the land use around the source has been considered and for confined aquifers the land use around the outcrop has been considered;
    - Age of casing - If the last geophysical inspection of a borehole found the casing to be in good order then degradation of the casing has been taken to increase the risk of contamination. If a boreholes casing is known (from geophysical inspection) to be in disrepair then it is discounted as the casing is assumed to have been replaced;
    - Site specific risks - Subjective assessment based on presence of adits, proximity to motorways, rivers etc.

40. To calculate figures for the total risk, the scores for all sources within the same aquifer have been averaged and categorised into low, medium and high risk. This has then been applied to all our sources constructed in the same type of aquifer. If the aquifer is confined the risk has been halved. Through discussions with our Water Quality Manager, losses of output due to gradual pollution have been estimated to be 10% of the risk value and this is factored into the model.

41. For these models, it has been assumed that no source will be abandoned due to gradual pollution uncertainty. The headroom risk has been related to the process losses associated with additional treatment required due to pollution. The risk of contamination has been quantified based on the type of aquifer as assumed for WRMP09 and shown in the following table. The risk values, and therefore the probability values, used in the analysis are shown in Table 2.

Table 2: Risk of Contamination based on Aquifer types

Aquifer	Risk of Contamination
Chalk	High – 5%
Upper / Lower Greensand	Medium – 2.5%
Tunbridge Wells Sand	Medium – 2.5%
Ashdown Formation	Medium – 2.5%
Hythe Formation	Medium – 2.5%
Gravels	High – 5%

42. It should be noted that where a loss in S5 is identified in the headroom simulation the loss is permanently excluded in the headroom assessment for the rest of the period. This matches the model closer to what occurs in reality, where a source that is lost to gradual pollution will be lost for the rest of the assessment period.

S6 Accuracy of Supply Side Data

43. S6 allows for uncertainties surrounding the measurement of outputs and the quantity of water being abstracted at a source. For S6, all sources firstly had to be categorised according to their constraints so the origin of the uncertainty can then be identified and estimated.

44. Surface water sources have uncertainties surrounding the deployable output assessment. These models are based on numerical models, which include assumptions and estimates. On that basis, surface water deployable outputs have been assigned an uncertainty of +/- 10%.

45. The deployable output of groundwater sources that are constrained by the aquifer or the Deepest Advisable Pumped Water Level (DAPWL) have uncertainties arising from the method of the deployable output assessment. The deployable output assessment uses historical water level and pumping rate data, which can often be incomplete or erroneous, or may not fully represent the conditions that would exist during times of drought or peak demand for example.

46. Based on the confidence level grading carried out in the output assessment, the sources have been graded as 1 (Good), 2 (Fair), 3 (Poor). This has also been linked to the constraints affecting an output value. This has been converted into a percentage uncertainty of the deployable output to obtain the triangular distribution (Minimum, Average and Maximum Values) for @Risk analysis as shown in Table 3 below.

Table 3: Percentage Loss for Triangular Distribution for S6 component

Confidence Grading	DO constraint	% Loss
No uncertainty	Licence constraint	1%
Good	Treatment/process	5%
Good	Hydrology/hydrogeology	5%
Fair	Treatment/process	10%
Fair	Hydrology/hydrogeology	10%
Poor	Treatment/process	20%
Poor	Hydrology/hydrogeology	20%

47. The Baseline deployable outputs used in this headroom assessment are the most robust and up-to-date information available using the updated figures reported in the Supply Section.

S7 Single Source Dominance

48. S7 has been omitted from the headroom assessment in accordance with UKWIR (2002) as it is considered as an outage and business planning issue. We have excluded S7 from our Target Headroom report, and have considered it in our business plan.

S8 Uncertainty of Impact of Climate Change on Deployable Output

49. HR Wallingford has carried out an assessment of the impact of climate change on deployable outputs which concluded that the range of uncertainty made for WRMP09 remains reasonable using the latest information, although the projected impacts themselves are marginally lower than those reported for WRMP09. This is in part due to this assessment using UKCP09 climate change projections, resulting in different deployable output changes.

50. The impacted deployable outputs for mid, wet and dry scenarios have been supplied, which may then be used to form triangular distributions at a RZ level with the following equations:
    - Maximum deployable output loss = (Mid deployable output) – (Dry deployable output)
    - Minimum deployable output loss = (Mid deployable output) – (Wet deployable output)
    - Base case = 0 (Mid deployable output – Mid deployable output)

51. The uncertainty is based on dry years in accordance with the Level of Service.

52. Overall, therefore, no major changes have been applied to the WRMP09 models with regard to the distribution of uncertainty in the models.

S9 New source uncertainty

53. S9 allows for uncertainties in estimations of the deployable output of new sources. Uncertainties were assigned based on type of options such as: transfers, new storage reservoirs, effluent reuse and groundwater.

    - We have assumed that the transfers with other companies will be robust and assigned an uncertainty of +/- 5%
    - We have assessed that the yields of reservoirs are more likely to be overstated at pre-feasibility stage than understated. In particular environmental obligations may reduce the yield below pre-feasibility calculations. We have provided an uncertainty range of -10%, -5% and 0%
    - For effluent re-use we have assessed that the yield of the scheme is likely to be robust and have assigned probabilities of +/-5%.
    - For groundwater we have assumed that because of environmental obligations the pre-feasibility yield may be overstated and have provided an uncertainty range of -10%, -5% and 0%.

54. Uncertainties assumed around each option in the model are tabulated in Table 4.

Table 4 Uncertainty Options

	Uncertainty of Options		
	Min	Most probable	Max
Transfers with other company	-5%	0%	5%
Arlington and Broad Oak Reservoirs	-10%	-5%	0%
Effluent reuse at Aylesford and Peacehaven	-5%	0%	5%
Groundwater	-10%	-5%	0%

55. To accommodate this uncertainty there is some additional functionality that has been included within the model set up. This is explained below.

56. Each scheme has its own triangular distribution around its DO. In order to model the impact of S9, those water resource schemes that feature in the plan should be incorporated into the model so as to impact on the headroom uncertainty at the beginning of the AMP period in which the scheme is due to be implemented. This is achieved by incorporating an activation function into the model which simply involves assigning a '1' to the scheme to activate it or assigning a '0' to the scheme to deactivate it, a scheme will not impact the headroom uncertainty unless it is activated. This may be done at any point within the planning period to allow the user to control which schemes will affect the headroom uncertainty and when.

57. Sensitivity analysis has been carried out to compare the impact on the headroom uncertainty of introducing a new source in the five year period prior to the planned year of introduction with annualising the model and introducing the scheme in the planned year of introduction. The analysis showed that the headroom was not materially affected

Demand Side Data

D1   Accuracy of Sub–component Demand Data

58. The D1 parameter allows for uncertainties in the demand forecast that arise from the input of the base year data of the forecast. Data for the base year, 2011/12 has been derived from the June Returns/Annual Return.

59. Two methods are employed to quantify the demand over the year in the Annual Return. A 'bottom up' approach sums the demand from each individual sub-component, while the source meters sum the total distribution input (referred to as the 'top-down' approach). There is often a small discrepancy between the two totals, which is addressed in a calculation which spreads the imbalance across all components in proportion to their uncertainty.

60. A review of the return data and the imbalances reported suggests an appropriate distribution is a uniform distribution ranging from -1% to +2.5%. This is included in the baseline model. The high and low scenario difference therefore has been derived the current best estimate DYAA forecast, with the lower margin set at -1% and the upper margin at +2.5% of the demand. This range is unchanged to the distribution reported in the previous WRMP09.

D2   Demand Forecast Uncertainty

61. Sources of uncertainty in the demand forecast include assumptions in population growth, per capita consumption and changes and growth in non-household demand.

62. In order to quantify the uncertainties around the central demand forecast, an upper and a lower demand forecast has been estimated with the changes in demand as shown in the table below. The forecast is weighted with a higher level of uncertainty towards the upper, or higher forecast. This reflects the significant reductions in household consumption adopted in the base forecast and our assessment of the likelihood of these reductions in demand management being achieved. This upper end forecast is some 3 times higher than the lower end forecast which we consider is a reasonable reflection of the conservative nature of the base forecast.

Table 5: D2: High and Low Forecast Range

	Change to Forecast	
	Low	High
2014/15	-0.5%	0.5%
2019/20	-0.8%	1.5%
2024/25	-1.0%	3.0%
2029/30	-1.5%	5.0%
2034/35	-2.0%	7.0%
2039/40	-2.5%	9.0%

63. Triangular distributions have been modelled for each year using the following equations:
   - Maximum increase in demand = High – Mid
   - Minimum increase in demand = Low – Mid
   - Base case = 0 (Mid – Mid)

64. As a proportion of the total target headroom, the D2 component contributes about 5% in 2020 and over 20% in 2040 due to the increased future uncertainty in the demand forecast.

D3   Uncertainty of Climate Change on Demand

65. Modelling the impact of climate change on demand has been undertaken by HR Wallingford for the company. Demand figures for mid, wet and dry scenarios have been supplied. The climate change impacted demand forecasts have been used to form a triangular distribution at a RZ level using the following equations:
   - Maximum increase in demand = High – Mid
   - Minimum increase in demand = Low – Mid
   - Base case = 0 (Mid – Mid)

66. In order to quantify the uncertainties around the central demand forecast, an upper and a lower demand forecast has been estimated with the changes in demand as shown in Table 6 below.

Table 6: D3: High and Low Forecast Range

	Change to Forecast	
	Low	High
2014/15	0.00%	0.10%
2019/20	0.00%	0.21%
2024/25	-0.05%	0.32%
2029/30	-0.11%	0.44%
2034/35	-0.17%	0.58%
2039/40	-0.24%	0.71%

D4   Uncertainty of Demand Management Measures

67. D4 is the demand equivalent of S9 and although not included in the baseline analysis but is included in the Preferred Plan scenario.

68. The study has identified a number of demand management measures and has estimated the uncertainty surrounding water savings on a scale of 0 – 100. The score has been converted into a percentage by assuming that a score of 0 equates to no saving uncertainty, whilst a score of 100 equates to a saving uncertainty of 50%.

69. Each scheme within the shortlist has been included in the model with its own triangular distribution. The scheme can be activated by assigning a '1' to the scheme and deactivated by assigning a '0' to the scheme. This may be done at any modelled year within the planning period to allow the user to control which schemes will affect the headroom uncertainty.

Overlapping and Correlated

70. Headroom components may be related or dependent, which will often need to be incorporated into the statistical analysis. Relationships between headroom components will be in one of the following forms:
    - Overlapping
    - Correlated

Overlapping

71. Headroom components are said to overlap when only the larger of the two uncertainties needs to be included. S1/S2 and S5 are the only overlapping headroom components in the model and as the former are not included in this model, being set to zero, there are no further parameters which overlap.

Correlated

72. Headroom components are correlated when they are influenced by the same factors. The following correlations have been used:

S8, D3   Correlation coefficient 0.75

73. If climate change has a large impact on supply then it will also have a large impact on demand. In the future, climate change cannot be wet and dry at the same time, so if the dry scenario is selected for one component it should also be selected for the other. However, as demand is generally driven by summer discretionary use, resulting from hot dry summers and supply is mostly dependent on water recharge it is not appropriate to use a correlation coefficient of 1 so 0.75 has been adopted.

S8, S4   Correlation coefficient 0.5

74. If climate change has a large impact on supply then the uncertainty around bulk imports is likely to increase. The company does not have detailed modelling on the yields of bulk supplies, so it may not be appropriate to use a correlation coefficient of 1. As an estimate a figure of 0.5 has been used.

Results

Modelled Scenarios

75. This section of the report summarises three sets of data.
    - Firstly the data used in the dWRMP
    - Secondly the baseline data which includes updates to the models excluding the incorporation of the preferred options
    - Thirdly the final planning data which includes the impacts of the preferred plan on target headroom

76. The model runs were completed for the baseline forecast and deployable output and a full suite of percentile plots were produced for each of the average and peak scenarios for each of the 8 WRZs. An example plot is shown in Figure 1 below, for RZ3 Average condition from the dWRMP. The full set of tables, for each RZ are included in Appendices A and B for the dry year annual average and the dry year summer peak periods respectively, together with the relevant tornado plots in Appendices C and D.

Figure 1: Average Headroom Percentile plot, WRZ3
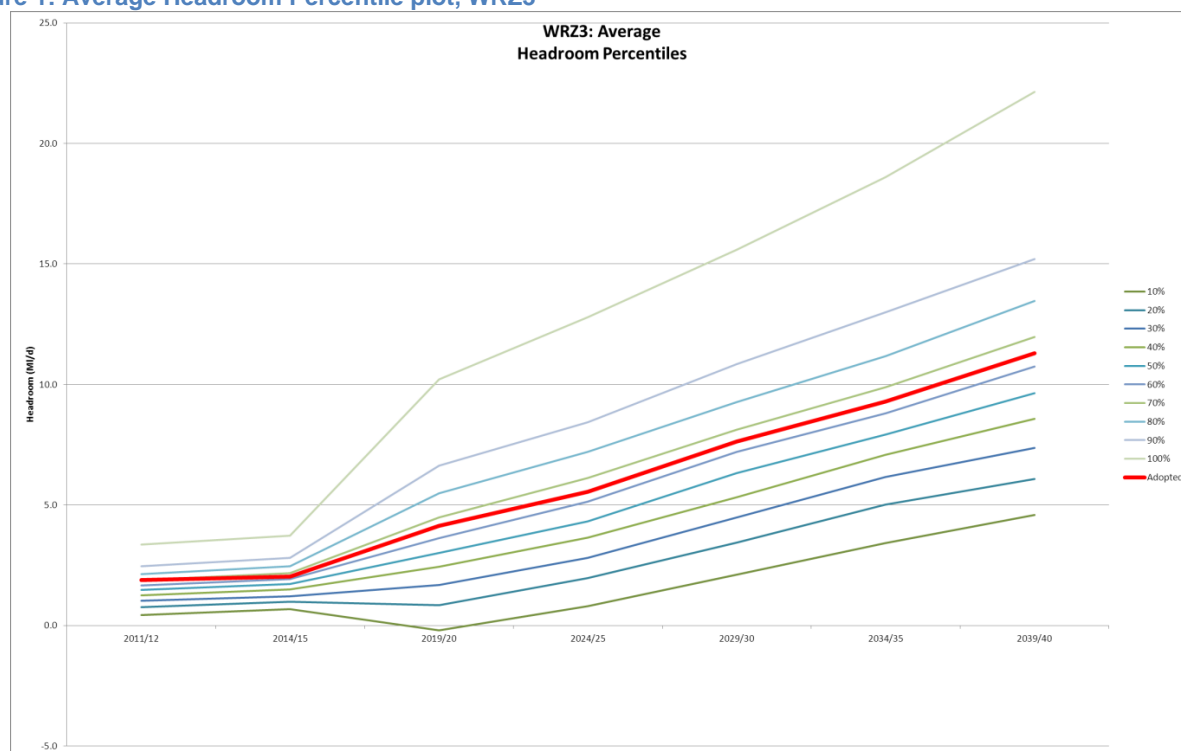
Appropriate Level of Headroom

77. We have considered a range of issues in assessing the appropriate level of headroom for the WRMP14 and consider that the 65 percentile reflects the most appropriate level of risk across the planning period. Previous percentiles have ranged from 90 %ile down to 50%ile, but, in comparison with target headroom figures produced for WRMP09 and the current level of risk experienced in the industry, the 65%ile represents:

- Reasonable consistency with historic levels of target headroom;
- A figure which is proportionate with the demands and resources of the company; and
- A level of risk that is within the range of other companies estimates.

78. Comparisons of the headroom of other water companies in PR09 and for dWRMP14 were carried out to enable confidence in South East Water's determination of the uncertainty profile percentile. The comparison results showed that in the dWRMP South East Water was on average lower at the start of the planning period than other companies in the region. Most of the Industry had adopted a varying level of confidence starting at a much higher confidence level and declining over time.

79. The application of a varying level of confidence represents the heightened requirement for confidence in the preferred solution over the short term, progressively reducing over time given the review in the solution possible as part of the periodic review process. Our view is that we have undertaken a detailed assessment of risk in all elements of the supply demand balance (such as outage, process losses and deployable output), and this increased certainty in our baseline data means we can be more confident about accepting a lower level of risk at the start of the planning period.

80. These results of our analysis are broadly in line with other neighbouring water companies' headroom as a percentage of DI and in terms of levels of confidence. In other words the overall headroom over time is similar to the average of the other water companies' headroom assessments.

Results

dWRMP14

81. The target headroom figures included in our dWRMP14 are summarised in Table 7 below for Average (DYAA) and Peak (ADPW/DYCP).

Table 7: Summary of Target Headroom for dWRMP14

	2015		2020		2025		2030		2035		2040	
Ml/d	Ave	Peak	Ave	Peak	Ave	Peak	Ave	Peak	Ave	Peak	Ave	Peak
RZ1	0.9	1.5	2.4	3.4	3.0	4.3	3.8	5.1	4.7	6.4	5.5	7.0
RZ2	2.4	2.7	6.1	8.0	7.4	10.0	8.4	11.2	9.2	12.2	10.6	13.6
RZ3	2.0	1.6	4.1	4.7	5.6	6.6	7.6	9.3	9.3	11.7	11.3	13.6
RZ4	4.7	5.5	7.1	8.2	8.6	10.6	10.3	13.7	12.1	16.5	13.5	19.5
RZ5	0.7	1.2	1.7	2.6	2.1	3.2	2.8	4.1	3.2	5.1	4.0	5.5
RZ6	1.5	2.1	1.9	2.4	2.5	3.4	3.1	4.1	3.9	4.9	4.7	5.8
RZ7	1.4	1.2	2.6	2.5	2.8	2.7	3.0	2.9	3.2	3.2	3.4	3.6
RZ8	0.9	1.0	2.5	3.0	3.6	4.2	4.8	5.6	6.2	7.2	7.6	8.6
TOTAL	14.6	16.7	28.5	35.0	35.6	45.0	43.8	56.1	51.7	67.2	60.7	77.2

WRMP Baseline

82. For the WRMP we produced a baseline target headroom analysis which included changes to Bulk Supply agreements and the Demand Forecast, but which excluded the Preferred Plan options.

83. Table 8 summarises the target headroom results for the baseline for the same 65th percentile, as used in the dWRMP.

Table 8: Summary of Target Headroom for WRMP14 Baseline

Ml/d	Ave	Peak	Ave	Peak	Ave	Peak	Ave	Peak	Ave	Peak	Ave	Peak
RZ1	0.9	1.5	2.4	3.4	3.0	4.3	3.8	5.1	4.6	6.3	5.5	6.9
RZ2	2.5	2.8	6.1	8.1	7.5	10.1	8.5	11.3	9.3	12.3	10.6	13.6
RZ3	2.0	1.6	4.1	4.7	5.5	6.6	7.6	9.2	9.3	11.7	11.2	13.5
RZ4	4.7	5.6	7.1	8.3	8.6	10.7	10.3	14.0	12.2	16.8	13.6	20.1
RZ5	0.7	1.1	1.7	2.6	2.1	3.1	2.7	4.0	3.1	4.9	3.9	5.1
RZ6	1.3	2.1	1.8	2.4	2.6	3.5	3.2	4.2	3.9	4.9	4.7	5.8
RZ7	0.5	0.4	0.9	0.8	1.0	1.1	1.2	1.3	1.4	1.6	1.7	1.9
RZ8	0.9	1.0	2.5	3.0	3.6	4.2	4.7	5.6	6.2	7.2	7.7	8.7
TOTAL	13.7	15.9	26.8	33.4	34.1	43.6	42.1	54.7	50.1	66.0	58.9	75.7

WRMP Preferred Plan

84. Table 9 summarises the target headroom results for the preferred plan assessment, where the impact of option uncertainty is included in the analysis. Again the figures given are for the 65th percentile.

Table 9: Summary of Target Headroom for WRMP14 Preferred Plan

Ml/d	Ave	Peak	Ave	Peak	Ave	Peak	Ave	Peak	Ave	Peak	Ave	Peak
RZ1	1.0	1.7	2.8	3.9	3.4	4.9	4.1	5.5	5.0	6.7	5.8	7.4
RZ2	1.7	2.1	6.1	8.1	6.8	9.7	7.8	10.9	8.7	11.8	10.0	13.1
RZ3	2.3	1.8	4.4	5.0	5.9	6.9	7.7	9.5	9.7	12.2	11.2	12.4
RZ4	5.5	6.2	9.0	10.4	10.4	12.6	11.7	15.8	13.2	18.5	14.8	21.5
RZ5	0.9	1.2	1.9	2.9	2.4	3.5	3.1	4.6	3.4	5.2	4.2	5.5
RZ6	1.5	2.3	2.1	2.8	3.1	4.1	3.7	4.8	4.4	5.6	5.2	6.2
RZ7	0.6	0.4	0.9	0.8	1.1	1.1	1.3	1.4	1.4	1.7	1.7	2.0
RZ8	1.1	1.3	2.6	3.0	4.1	4.9	5.4	6.2	6.2	7.8	7.7	9.3
TOTAL	14.5	17.1	29.7	37.0	37.2	47.7	44.7	58.6	52.0	69.4	60.6	77.4

85. The results show that there is a small increase in target headroom as a result of including the preferred plan options. The differences between the WRMP baseline and WRMP preferred plan are relatively small, and as a result we have treated the preferred plan as a sensitivity analysis. On this basis we have used the baseline WRMP14 assessment for our WRMP with the results as presented in Table 8.

Summary

86. We consider that the final headroom figures presented in this report are consistent, transparent, robust and are comparable with the rest of the region. These results are in line with other neighbouring water companies' headroom as reported previously, as a percentage of distribution input and in terms of levels of confidence.

87. Full ranges of the target headroom are provided in Tables 10 to 25. Additional information is provided in the Appendices.

Table 10: Target Headroom for WRMP Baseline: DYAA RZ1 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-0.4	-3.0	-2.4	-2.6	-2.2	-2.0
5%	0.0	-0.9	-0.6	-0.3	0.0	0.3
10%	0.1	-0.5	-0.1	0.3	0.7	1.0
15%	0.2	-0.2	0.3	0.7	1.4	1.6
20%	0.3	0.2	0.6	1.2	1.8	2.1
25%	0.4	0.5	1.0	1.5	2.2	2.6
30%	0.4	0.8	1.2	1.8	2.4	3.0
35%	0.5	1.0	1.5	2.1	2.8	3.3
40%	0.6	1.2	1.7	2.3	3.1	3.7
45%	0.6	1.4	1.9	2.6	3.4	4.0
50%	0.7	1.7	2.2	2.9	3.6	4.3
55%	0.8	1.9	2.5	3.2	4.0	4.6
60%	0.9	2.2	2.7	3.5	4.4	5.0
65%	0.9	2.4	3.0	3.8	4.6	5.5
70%	1.0	2.7	3.4	4.2	5.0	5.9
75%	1.1	3.0	3.7	4.6	5.5	6.3
80%	1.2	3.3	4.0	5.1	6.0	6.7
85%	1.2	3.7	4.3	5.5	6.5	7.3
90%	1.3	4.2	4.9	6.0	7.0	8.0
95%	1.4	4.7	5.4	6.7	7.9	9.1
100%	1.8	6.4	7.5	9.1	10.7	12.2

Table 10: Target Headroom for WRMP Baseline: DYAA RZ1 (Ml/d)

Table 11: Target Headroom for WRMP Baseline: DYAA RZ2 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-0.7	-8.2	-7.8	-8.8	-8.7	-8.7
5%	0.4	-3.7	-3.9	-4.1	-4.2	-3.7
10%	0.7	-2.3	-2.1	-2.2	-1.7	-1.5
15%	0.9	-1.3	-0.8	-0.6	-0.3	0.3
20%	1.1	-0.4	0.2	0.6	1.1	1.4
25%	1.3	0.5	1.0	1.7	2.3	2.5
30%	1.5	1.5	2.0	2.5	3.0	3.8
35%	1.6	2.0	2.8	3.5	4.2	4.8
40%	1.8	2.6	3.5	4.4	4.9	5.7
45%	1.9	3.3	4.1	5.1	5.9	6.7
50%	2.0	3.9	4.8	5.8	6.7	7.6
55%	2.2	4.6	5.7	6.8	7.7	8.4
60%	2.3	5.2	6.6	7.6	8.5	9.5
65%	2.5	6.1	7.5	8.5	9.3	10.6
70%	2.7	7.0	8.3	9.5	10.5	12.1
75%	2.8	8.1	9.2	10.8	11.7	13.3
80%	2.9	8.9	10.5	11.9	13.4	14.6
85%	3.1	9.8	11.6	13.3	14.6	16.3
90%	3.4	11.4	12.8	15.0	16.5	18.0
95%	3.8	13.3	15.2	16.6	19.1	20.8
100%	5.1	18.0	19.1	22.7	27.1	27.7

Table 11: Target Headroom for WRMP Baseline: DYAA RZ2 (Ml/d)

Table 12: Target Headroom for WRMP Baseline: DYAA RZ3 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-0.1	-3.7	-2.9	-2.5	-2.1	-0.6
5%	0.5	-1.0	0.1	1.2	2.1	3.3
10%	0.7	-0.2	0.8	2.1	3.4	4.5
15%	0.8	0.3	1.5	2.9	4.2	5.4
20%	1.0	0.8	2.0	3.4	4.9	6.0
25%	1.1	1.4	2.4	4.0	5.6	6.7
30%	1.2	1.7	2.8	4.5	6.1	7.3
35%	1.4	2.1	3.2	4.9	6.6	7.9
40%	1.5	2.4	3.6	5.3	7.0	8.5
45%	1.6	2.7	4.0	5.8	7.5	9.1
50%	1.7	3.0	4.3	6.3	7.9	9.6
55%	1.8	3.3	4.8	6.7	8.3	10.2
60%	1.9	3.6	5.1	7.2	8.8	10.7
65%	2.0	4.1	5.5	7.6	9.3	11.2
70%	2.2	4.5	6.1	8.1	9.8	11.9
75%	2.3	5.0	6.6	8.6	10.5	12.5
80%	2.5	5.5	7.2	9.2	11.2	13.4
85%	2.6	6.1	7.8	10.1	11.9	14.2
90%	2.8	6.6	8.4	10.8	12.9	15.1
95%	3.0	7.5	9.5	12.0	14.5	16.4
100%	3.7	10.2	12.8	15.5	18.5	21.9

Table 12: Target Headroom for WRMP Baseline: DYAA RZ3 (Ml/d)

Table 13: Target Headroom for WRMP Baseline: DYAA RZ4 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-2.4	-6.2	-6.6	-7.1	-7.6	-8.5
5%	-0.1	-1.1	-0.8	-0.1	-0.3	0.7
10%	0.6	0.1	0.6	1.5	1.1	2.5
15%	1.1	1.2	1.5	2.5	3.1	3.7
20%	1.4	2.0	2.3	3.6	4.4	5.0
25%	1.8	2.8	3.1	4.7	5.1	6.1
30%	2.1	3.2	3.9	5.5	5.9	7.3
35%	2.5	3.9	4.5	6.2	7.0	8.1
40%	2.9	4.5	5.1	6.9	7.9	9.3
45%	3.3	5.1	5.7	7.6	8.6	10.2
50%	3.6	5.6	6.4	8.2	9.3	11.0
55%	4.0	6.1	7.0	9.1	10.1	11.8
60%	4.3	6.6	7.9	9.7	11.0	12.6
65%	4.7	7.1	8.6	10.4	11.8	13.4
70%	5.0	7.8	9.3	11.2	12.7	14.7
75%	5.4	8.5	10.1	12.0	13.7	16.3
80%	5.8	9.2	11.1	13.1	15.0	17.5
85%	6.2	10.0	12.0	14.2	16.3	19.4
90%	6.7	10.9	13.0	15.7	18.2	21.6
95%	7.5	12.6	14.6	17.3	20.6	24.4
100%	10.7	18.7	21.9	25.2	28.8	36.7

Table 14: Target Headroom for WRMP Baseline: DYAA RZ5 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-0.5	-1.6	-1.6	-1.9	-1.3	-1.5
5%	-0.1	-0.6	-0.4	-0.3	0.0	0.5
10%	0.0	-0.3	0.1	0.1	0.4	1.0
15%	0.1	0.0	0.3	0.5	0.8	1.3
20%	0.1	0.2	0.6	0.7	1.1	1.6
25%	0.2	0.4	0.8	1.0	1.3	2.0
30%	0.3	0.6	0.9	1.2	1.5	2.2
35%	0.3	0.7	1.1	1.5	1.7	2.5
40%	0.4	0.9	1.3	1.7	2.0	2.8
45%	0.5	1.0	1.5	1.9	2.2	3.0
50%	0.6	1.2	1.7	2.1	2.5	3.2
55%	0.6	1.3	1.9	2.3	2.6	3.5
60%	0.7	1.5	2.0	2.5	2.9	3.7
65%	0.7	1.7	2.2	2.8	3.1	3.9
70%	0.8	1.9	2.4	3.0	3.4	4.3
75%	0.9	2.1	2.6	3.2	3.7	4.5
80%	1.0	2.3	2.9	3.4	4.0	4.9
85%	1.0	2.6	3.2	3.7	4.4	5.3
90%	1.1	2.9	3.5	4.2	4.9	5.7
95%	1.2	3.3	3.9	4.6	5.5	6.4
100%	1.5	4.4	5.3	6.1	7.6	8.3

Table 14: Target Headroom for WRMP Baseline: DYAA RZ5 (Ml/d)

Table 15: Target Headroom for WRMP Baseline: DYAA RZ6 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-1.5	-1.3	-1.0	-0.5	-0.7	-0.7
5%	-0.4	-0.1	0.4	0.5	1.0	1.0
10%	-0.1	0.2	0.7	0.9	1.4	1.5
15%	0.1	0.5	1.0	1.4	1.7	1.9
20%	0.2	0.6	1.2	1.6	1.9	2.2
25%	0.3	0.8	1.4	1.8	2.2	2.5
30%	0.4	0.9	1.5	1.9	2.4	2.8
35%	0.5	1.0	1.8	2.1	2.6	3.1
40%	0.7	1.2	1.9	2.3	2.9	3.4
45%	0.8	1.3	2.1	2.5	3.1	3.6
50%	0.9	1.4	2.2	2.7	3.3	3.9
55%	1.0	1.5	2.3	2.8	3.5	4.1
60%	1.2	1.7	2.4	3.1	3.7	4.5
65%	1.3	1.8	2.6	3.3	3.9	4.7
70%	1.4	2.0	2.7	3.5	4.2	5.1
75%	1.6	2.1	2.9	3.7	4.5	5.5
80%	1.7	2.3	3.1	3.9	4.8	5.8
85%	1.9	2.5	3.3	4.2	5.2	6.3
90%	2.0	2.7	3.6	4.6	5.6	6.8
95%	2.4	3.0	3.9	5.0	6.3	7.6
100%	3.7	4.6	5.1	6.7	8.2	10.5

Table 16: Target Headroom for WRMP Baseline: DYAA RZ7 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-1.0	-0.9	-0.8	-0.9	-1.2	-1.5
5%	-0.4	-0.2	-0.1	-0.1	-0.2	-0.2
10%	-0.2	0.0	0.0	0.1	0.0	0.1
15%	-0.1	0.1	0.2	0.2	0.3	0.3
20%	0.0	0.2	0.3	0.4	0.4	0.5
25%	0.0	0.3	0.4	0.5	0.5	0.6
30%	0.1	0.4	0.5	0.6	0.6	0.8
35%	0.2	0.5	0.6	0.7	0.8	0.9
40%	0.2	0.5	0.6	0.8	0.9	1.1
45%	0.3	0.6	0.7	0.9	1.0	1.2
50%	0.3	0.7	0.8	1.0	1.1	1.3
55%	0.4	0.7	0.9	1.1	1.2	1.4
60%	0.5	0.8	1.0	1.1	1.3	1.5
65%	0.5	0.9	1.0	1.2	1.4	1.7
70%	0.6	0.9	1.1	1.3	1.5	1.8
75%	0.7	1.0	1.2	1.5	1.7	2.0
80%	0.7	1.1	1.3	1.6	1.8	2.1
85%	0.8	1.2	1.4	1.7	2.0	2.3
90%	0.9	1.3	1.5	1.9	2.3	2.6
95%	1.1	1.5	1.8	2.2	2.6	3.0
100%	1.8	2.6	2.4	3.1	4.0	4.5

Table 16: Target Headroom for WRMP Baseline: DYAA RZ7 (Ml/d)

Table 17: Target Headroom for WRMP Baseline: DYAA RZ8 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-0.8	0.0	0.1	0.5	0.5	0.9
5%	-0.2	0.6	1.2	1.7	2.4	2.7
10%	-0.1	0.9	1.6	2.2	2.9	3.4
15%	0.0	1.0	1.9	2.5	3.2	3.8
20%	0.1	1.2	2.1	2.8	3.6	4.2
25%	0.2	1.4	2.3	3.0	3.9	4.6
30%	0.3	1.5	2.5	3.3	4.1	5.1
35%	0.4	1.6	2.7	3.5	4.4	5.5
40%	0.5	1.8	2.9	3.7	4.7	5.9
45%	0.6	1.9	3.0	3.9	5.0	6.1
50%	0.7	2.1	3.2	4.1	5.2	6.4
55%	0.7	2.2	3.3	4.4	5.5	6.9
60%	0.8	2.4	3.4	4.6	5.8	7.3
65%	0.9	2.5	3.6	4.7	6.2	7.7
70%	1.0	2.7	3.8	5.0	6.6	8.0
75%	1.1	2.9	4.0	5.3	7.0	8.5
80%	1.2	3	4.2	5.7	7.4	9.0
85%	1.3	3.2	4.4	5.9	7.84	9.7
90%	1.4	3.4	4.8	6.4	8.4	10.3
95%	1.5	3.8	5.2	6.9	9.2	11.3
100%	2.0	4.9	6.3	8.7	11.8	13.9

Table 18: Target Headroom for WRMP Baseline: ADPW/DYCP RZ1 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-0.2	-3.5	-3.4	-3.7	-4.4	-3.8
5%	0.3	-1.4	-1.3	-1.3	-1.0	-0.7
10%	0.5	-0.8	-0.5	-0.3	0.2	0.3
15%	0.6	-0.4	0.0	0.5	1.0	1.2
20%	0.7	0.3	0.6	1.1	1.7	2.0
25%	0.8	0.7	1.0	1.7	2.2	2.7
30%	0.9	1.1	1.4	2.1	2.9	3.2
35%	1.0	1.4	1.8	2.5	3.4	3.8
40%	1.1	1.8	2.2	2.9	3.9	4.2
45%	1.2	2.0	2.6	3.3	4.3	4.8
50%	1.3	2.4	3.1	3.8	4.8	5.3
55%	1.3	2.8	3.5	4.1	5.2	5.9
60%	1.4	3.1	3.9	4.6	5.7	6.4
65%	1.5	3.4	4.3	5.1	6.3	6.9
70%	1.6	3.9	5.0	5.7	6.8	7.6
75%	1.7	4.3	5.5	6.2	7.4	8.2
80%	1.7	4.9	6.0	6.8	8.1	8.9
85%	1.9	5.5	6.7	7.5	8.9	9.8
90%	2.0	6.1	7.3	8.5	10.1	11.1
95%	2.1	7.2	8.3	9.7	11.3	12.4
100%	2.7	9.8	11.3	12.6	15.2	16.9

Table 18: Target Headroom for WRMP Baseline: ADPW/DYCP RZ1 (Ml/d)

Table 19: Target Headroom for WRMP Baseline: ADPW/DYCP RZ2 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-1.4	-11.8	-14.4	-16.0	-14.7	-16.6
5%	-0.1	-7.3	-7.7	-7.4	-7.0	-7.3
10%	0.4	-5.0	-5.5	-4.8	-4.4	-4.1
15%	0.7	-3.1	-3.7	-2.6	-1.9	-1.7
20%	1.0	-1.7	-2.0	-1.2	-0.2	0.8
25%	1.2	-0.4	-0.1	0.5	1.3	2.7
30%	1.3	0.8	1.2	1.7	2.8	4.3
35%	1.5	1.7	2.7	3.0	4.2	5.5
40%	1.7	2.8	3.8	4.3	5.5	6.9
45%	1.8	3.7	4.9	5.4	6.8	8.5
50%	2.1	4.8	5.9	6.6	8.0	9.6
55%	2.3	5.7	7.5	8.0	9.5	11.1
60%	2.5	7.0	8.7	9.3	10.7	12.4
65%	2.8	8.1	10.1	11.3	12.3	13.6
70%	3.0	9.1	11.6	12.3	13.5	15.1
75%	3.2	10.9	13.4	14.0	15.0	16.9
80%	3.5	12.4	14.9	15.4	17.3	18.9
85%	3.7	14.1	17.3	17.3	19.3	21.0
90%	4.0	16.4	19.5	20.4	22.2	23.7
95%	4.5	19.5	23.1	23.8	26.1	27.7
100%	6.1	26.4	30.3	32.3	36.5	40.4

Table 20: Target Headroom for WRMP Baseline: ADPW/DYCP RZ3 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	0.1	-7.6	-8.0	-6.8	-5.0	-8.2
5%	0.6	-4.2	-3.7	-2.7	-1.0	-1.0
10%	0.8	-3.0	-1.9	-1.3	0.8	1.5
15%	0.9	-2.2	-0.6	-0.1	2.3	2.9
20%	1.0	-1.2	0.4	1.2	3.3	4.1
25%	1.1	-0.4	1.1	2.1	4.3	5.1
30%	1.2	0.3	1.8	3.1	5.1	6.1
35%	1.2	0.9	2.4	4.0	6.1	7.3
40%	1.3	1.5	3.2	4.7	7.0	8.3
45%	1.4	2.1	3.8	5.5	7.9	9.3
50%	1.4	2.9	4.4	6.0	8.8	10.3
55%	1.5	3.5	5.1	6.9	9.6	11.4
60%	1.6	4.0	5.9	8.0	10.7	12.5
65%	1.6	4.7	6.6	9.2	11.7	13.5
70%	1.7	5.6	7.4	10.2	12.8	14.7
75%	1.8	6.4	8.3	11.0	14.2	15.7
80%	1.9	7.7	9.5	12.4	15.2	16.9
85%	2.0	8.6	11.1	13.5	16.4	18.5
90%	2.1	10.1	12.2	15.0	17.9	20.2
95%	2.2	11.9	14.0	16.6	19.8	22.9
100%	2.8	15.7	18.9	23.2	26.6	28.3

Table 20: Target Headroom for WRMP Baseline: ADPW/DYCP RZ3 (Ml/d)

Table 21: Target Headroom for WRMP Baseline: ADPW/DYCP RZ4 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-3.4	-4.6	-6.1	-2.9	-2.5	-1.5
5%	-0.2	0.1	1.3	2.3	3.3	5.3
10%	0.6	1.5	2.8	4.1	5.6	7.8
15%	1.2	2.4	3.9	5.5	7.2	9.3
20%	1.8	3.4	4.7	6.7	8.2	10.7
25%	2.3	4.1	5.5	7.6	9.3	11.8
30%	2.6	4.8	6.3	8.4	10.3	12.6
35%	3.0	5.2	7.1	9.2	11.4	13.7
40%	3.5	5.9	7.6	10.2	12.2	14.7
45%	3.9	6.5	8.2	10.9	12.9	15.8
50%	4.4	7.1	8.7	11.6	13.8	16.8
55%	4.8	7.7	9.4	12.2	14.5	17.8
60%	5.3	8.2	10.0	12.8	15.6	18.6
65%	5.6	8.8	10.8	13.5	16.4	19.7
70%	6.0	9.4	11.4	14.5	17.1	20.6
75%	6.3	10.1	12.2	15.2	18.1	21.8
80%	6.7	10.9	13.2	16.4	19.3	23.5
85%	7.2	11.6	14.1	17.2	20.6	25.1
90%	7.7	12.6	15.1	18.6	22.5	27.1
95%	8.3	13.8	16.9	20.5	25.1	30.6
100%	11.2	19.2	22.1	26.6	34.1	41.0

Table 21: Target Headroom for WRMP Baseline: ADPW/DYCP RZ4 (Ml/d)

Table 22: Target Headroom for WRMP Baseline: ADPW/DYCP RZ5 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-0.5	-2.4	-2.5	-2.5	-2.9	-2.9
5%	0.0	-0.9	-0.7	-0.4	-0.6	0.3
10%	0.1	-0.4	-0.1	0.3	0.4	1.1
15%	0.3	-0.1	0.3	0.8	0.9	1.7
20%	0.4	0.2	0.7	1.1	1.4	2.1
25%	0.5	0.5	0.9	1.5	1.9	2.6
30%	0.6	0.7	1.3	1.8	2.3	2.9
35%	0.6	1.0	1.5	2.1	2.7	3.2
40%	0.7	1.2	1.7	2.4	3.1	3.6
45%	0.8	1.4	2.0	2.7	3.5	4.0
50%	0.9	1.7	2.2	3.0	3.8	4.3
55%	1.0	1.9	2.5	3.3	4.2	4.7
60%	1.0	2.1	2.8	3.7	4.6	5.0
65%	1.1	2.4	3.1	4.1	4.9	5.3
70%	1.2	2.6	3.4	4.4	5.3	5.8
75%	1.3	2.9	3.8	4.8	5.9	6.2
80%	1.4	3.2	4.2	5.1	6.3	6.7
85%	1.5	3.6	4.7	5.7	6.8	7.3
90%	1.6	3.9	5.2	6.3	7.7	8.0
95%	1.8	4.6	5.9	7.1	8.9	8.8
100%	2.2	7.3	7.8	10.6	12.5	12.2

Table 22: Target Headroom for WRMP Baseline: ADPW/DYCP RZ5 (Ml/d)

Table 23: Target Headroom for WRMP Baseline: ADPW/DYCP RZ6 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-1.8	-1.6	-0.7	-0.9	-0.9	-1.9
5%	-0.2	-0.1	0.7	0.7	0.9	0.8
10%	0.0	0.4	1.2	1.4	1.6	1.6
15%	0.3	0.7	1.5	1.8	2.1	2.0
20%	0.5	0.9	1.8	2.0	2.5	2.5
25%	0.7	1.1	2.0	2.3	2.8	2.8
30%	0.9	1.3	2.2	2.5	3.0	3.1
35%	1.1	1.5	2.4	2.8	3.3	3.5
40%	1.2	1.7	2.6	3.0	3.5	3.8
45%	1.4	1.8	2.8	3.2	3.8	4.2
50%	1.5	2.0	2.9	3.5	4.1	4.5
55%	1.7	2.2	3.1	3.7	4.3	4.8
60%	1.9	2.3	3.3	3.9	4.5	5.3
65%	2.0	2.5	3.5	4.1	4.9	5.6
70%	2.2	2.7	3.7	4.4	5.2	6.0
75%	2.4	2.9	4.0	4.7	5.5	6.4
80%	2.6	3.1	4.1	5.0	5.9	6.9
85%	2.9	3.3	4.4	5.4	6.4	7.4
90%	3.2	3.6	4.7	5.8	6.8	8.2
95%	3.6	4.0	5.3	6.4	7.8	9.3
100%	5.3	6.0	7.0	8.5	10.7	12.9

Table 24: Target Headroom for WRMP Baseline: ADPW/DYCP RZ7 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-0.8	-0.9	-0.8	-1.2	-1.2	-1.3
5%	-0.4	-0.2	-0.1	-0.2	-0.2	-0.2
10%	-0.3	0.0	0.0	0.1	0.1	0.1
15%	-0.2	0.1	0.2	0.3	0.2	0.4
20%	-0.1	0.2	0.3	0.4	0.4	0.5
25%	-0.1	0.3	0.4	0.5	0.5	0.7
30%	0.0	0.4	0.5	0.6	0.7	0.9
35%	0.1	0.4	0.6	0.7	0.8	1.0
40%	0.1	0.5	0.7	0.8	0.9	1.2
45%	0.2	0.6	0.7	0.9	1.1	1.3
50%	0.2	0.6	0.8	1.0	1.2	1.4
55%	0.3	0.7	0.9	1.1	1.3	1.6
60%	0.3	0.8	1.0	1.2	1.5	1.8
65%	0.4	0.8	1.1	1.3	1.6	1.9
70%	0.4	0.9	1.1	1.4	1.7	2.1
75%	0.5	0.9	1.2	1.5	1.9	2.3
80%	0.5	1.0	1.3	1.7	2.1	2.5
85%	0.6	1.1	1.5	1.8	2.3	2.7
90%	0.7	1.2	1.7	2.0	2.5	3.0
95%	0.8	1.4	1.9	2.2	2.8	3.4
100%	1.3	2.1	2.6	3.3	4.5	5.1

Table 24: Target Headroom for WRMP Baseline: ADPW/DYCP RZ7 (Ml/d)

Table 25: Target Headroom for WRMP Baseline: ADPW/DYCP RZ8 (Ml/d)

percentile	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
0%	-1.0	-0.1	-0.2	0.0	0.3	-0.3
5%	-0.3	0.5	1.2	1.7	2.2	2.4
10%	-0.2	0.8	1.6	2.3	2.8	3.5
15%	-0.1	1.1	1.9	2.8	3.3	3.9
20%	0.1	1.2	2.2	3.1	3.7	4.4
25%	0.2	1.4	2.4	3.4	4.2	4.9
30%	0.3	1.6	2.7	3.7	4.5	5.4
35%	0.4	1.8	2.8	4.0	4.9	5.9
40%	0.5	2.1	3.1	4.2	5.3	6.3
45%	0.6	2.3	3.3	4.5	5.6	6.7
50%	0.7	2.5	3.6	4.7	6.0	7.2
55%	0.8	2.7	3.8	5.0	6.4	7.7
60%	0.9	2.8	4.0	5.3	6.8	8.1
65%	1.0	3.0	4.2	5.6	7.2	8.7
70%	1.1	3.2	4.4	5.9	7.7	9.4
75%	1.2	3.4	4.6	6.2	8.1	10.0
80%	1.3	3.7	4.9	6.5	8.7	10.9
85%	1.5	3.9	5.2	7.0	9.2	11.7
90%	1.6	4.1	5.6	7.6	10.3	12.8
95%	1.8	4.4	6.2	8.4	11.4	14.1
100%	2.4	5.9	7.8	11.3	14.7	17.8

Appendix A

DYAA Resource Zone Model Workbook Data

south east water

Headroom Spreadsheet

Company Name	South East Water				
Scenario Ref	DYAA		Version	Phase 4.5	
Resource Zone Ref	RZ1		Date	07/11/2013	

Component / Headroom Component (Ml/d)

Component		Correlated? With / By	Continuous/ Intermittent	Dependent Component	Overlapping Component	Parameters	2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2	Vulnerable surface water and groundwater licences												
	Now included in S5/S1 & S2 below												
S4	Bulk transfers					FALSE	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S5/S1 & S2 Max of Gradual pollution/Vulnerable surface water and groundwater licences				C	FALSE	Type	0.000 / 0.00	0.000 / 0.40	0.000 / 0.81	0.000 / 1.21	0.000 / 1.62	0.000 / 2.02	0.000 / 2.43
S6	Accuracy of supply side data				FALSE FALSE	Type	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00
S8	Uncertainty of impact of climate change on source yields				FALSE	Type	0.000 / 0.00	0.000 / 0.00	0.000 / 0.54	0.000 / 0.60	0.000 / 0.66	0.000 / 0.72	0.000 / 0.77
S9	Uncertainty over New Sources				FALSE FALSE	Type	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00
D1	Accuracy of sub-component data				FALSE	Type	0.000 / 0.30	0.000 / 0.30	0.000 / 0.30	0.000 / 0.30	0.000 / 0.30	0.000 / 0.30	0.000 / 0.30
D2	Demand forecast variation				FALSE FALSE	Type	0.27	0.000 / 0.00	0.000 / 0.10	0.000 / 0.26	0.000 / 0.45	0.000 / 0.66	0.000 / 0.86
D3	Uncertainty of impact of climate change on demand				FALSE FALSE	Type	0.000 / 0.00	0.000 / 0.01	0.000 / 0.03	0.000 / 0.04	0.000 / 0.05	0.000 / 0.06	0.000 / 0.06
D4	Uncertainty of impact of demand management				FALSE FALSE	Type	0.00 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00

			Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
		Param.A	Min	0.00	Min 0.00	Min 0.00	Min 0.00	Min 0.00	Min 0.00	Min 0.00
		Param.B	Best	0.00	Best 0.00	Best 0.00	Best 0.00	Best 0.00	Best 0.00	Best 0.00
		Param.C	Max	0.00 / 0.00	Max 0.03 / 0.00	Max 0.06 / 0.00	Max 0.09 / 0.00	Max 0.13 / 0.00	Max 0.15 / 0.00	Max 0.18 / 0.00

Overlapping components

Group 1										
Group 2										
Group 3										

Distribution Profile Parameters

Profile	A		B		C		D		Sum of Headroom components

								2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Fixed	Val	Value						0.57	0.72	1.77	2.41	3.07	3.75	4.43
Triangular	Min	Min	Best	Best Estimate	Max	Max								
Normal	Avg	Mean	Max	Max Estimate	SD	Std Deviation								
Lognormal	Avg	Mean	Max	Max Estimate	SD	Std Deviation								
Beta	A	Alpha	B	Beta	Sol	Scale								
Exponential	Rate	Rate													
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2							

Analysis Statistics

	2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Uniform	Min Min Estimate Max Max Estimate						
Weibull	Loc Location Sol Scale Shp Shape						
Gamma	Loc Location Sol Scale Shp Shape						
Logistic	Avg Mean Sol Scale						
Pareto	Loc Location Shp Shape						
External value	Mod Mode Sol Scale M/M Min/Max						
Other							

	2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Mean	0.577	0.709	1.764	2.300	3.047	3.817	4.441
Minimum	-0.734	-0.380	-2.961	-2.401	-2.617	-2.161	-2.022
25th percentile	0.188	0.351	0.471	0.953	1.528	2.153	2.585
50th percentile	0.609	0.702	1.672	2.187	2.890	3.642	4.287
75th percentile	0.946	1.064	2.951	3.653	4.560	5.488	6.266
Maximum	1.924	1.758	6.437	7.484	9.121	10.652	12.226
Std Deviation	0.505	0.454	1.738	1.857	2.140	2.384	2.651
Variance	0.255	0.206	3.020	3.449	4.581	5.685	7.030
Skewness	0.019	-0.042	0.142	0.180	0.169	0.155	0.159

south east water

Headroom Spreadsheet

Company Name	South East Water				
Scenario Ref	DYAA		Version	Phase 4.5	
Resource Zone Ref	R22		Date	07/11/2013	

Component	Correlated With	Correlated By	Continuous/intermittent	Dependent Component	Overlapping Component	Parameters	2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2 Vulnerable surface water and groundwater licences													
Now included in S5/S1 & S2 below													
S4 Bulk transfers						FALSE	0.0000	1.0850	1.0850	1.0850	1.0850	1.0850	1.0850
S5/S1 & S2 Max of Gradual pollution/Vulnerable surface water and groundwater licences		C				FALSE	0.00	0.41	0.83	1.24	1.66	2.07	2.49
S6 Accuracy of supply side data				FALSE	FALSE		0.00	0.00	0.00	0.00	0.00	0.00	0.00
S8 Uncertainty of impact of climate change on source yields				FALSE			0.00	0.00	1.54	1.72	1.89	2.06	2.23
S9 Uncertainty over New Sources				FALSE	FALSE		0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1 Accuracy of sub-component data				FALSE			0.56	0.56	0.56	0.56	0.56	0.56	0.56
D2 Demand forecast variation				FALSE	FALSE		0.31	0.00	0.18	0.48	0.85	1.22	1.62
D3 Uncertainty of impact of climate change on demand				FALSE	FALSE		0.00	0.03	0.05	0.07	0.08	0.10	0.12
D4 Uncertainty of impact of demand management				FALSE	FALSE		0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

				Sum of Headroom components							
				2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40	
Group 1				0.87	2.09	4.25	5.15	6.12	7.10	8.10	
Group 2											
Group 3											

Distribution Profile Parameters

Profile		A		B		C		D		Analysis Statistics							
Fixed	Val	Value															
Triangular	Min	Min	Best	Best Estimate	Max	Max				Mean	0.9	2.06	4.3	5.3	6.2	7.0	8.0
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation				Minimum	-1.5	-0.65	-8.2	-7.8	-8.8	-8.7	-8.7
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation				25th percentile	0.2	1.29	0.5	1.0	1.7	2.3	2.5
Beta	A	Alpha	B	Beta	Scl	Scale				50th percentile	0.9	2.05	3.9	4.8	5.8	6.7	7.6
Exponential	Rate	Rate								75th percentile	1.5	2.80	8.1	9.2	10.8	11.7	13.3
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2		Maximum	3.2	5.06	18.0	19.1	22.7	27.1	27.7
Uniform	Min	Min Estimate	Max	Max Estimate						Std Deviation	0.9	1.03	5.1	5.7	6.4	6.9	7.3
Weibull	Loc	Location	Scl	Scale	Shp	Shape				Variance	0.8	1.06	26.3	32.1	41.0	47.0	54.0
Gama	Loc	Location	Scl	Scale	Shp	Shape				Skewness	0.0	0.10	0.2	0.2	0.1	0.2	0.2
Logistic	Avg	Mean	Scl	Scale													
Preto	Loc	Location	Shp	Shape													
Extreme value	Mod	Mode	Scl	Scale	M/M	Min/Max											
Other																	

Headroom Spreadsheet

Company Name	South East Water	Version	Pharo 4.5
Scenario Ref	DYAA	Date	07/11/2013
Resource Zone Ref	RZ3		

Component	Correlated With	By	Continuous/intermittent	Dependent Component	Overlapping Component	Parameters	2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2 Vulnerable surface water and groundwater licences													
Now included in S5/S1 & S2 below													
S4 Bulk transfers													
					FALSE		1.0000	1.0000	1.0000	2.0000	3.0000	4.0000	5.0000
S5/S1 & S2 Max of Gradual pollution/Vulnerable surface water and groundwater licences													
			C		FALSE	Type FALSE	0.00	0.25	0.51	0.76	1.02	1.27	1.52
S6 Accuracy of supply side data													
				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S8 Uncertainty of impact of climate change on source yields													
					FALSE	Type	0.00	0.00	0.79	0.88	0.96	1.05	1.14
S9 Uncertainty over New Sources													
				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1 Accuracy of sub-component data													
					FALSE	Type	0.47	0.47	0.47	0.47	0.47	0.47	0.47
D2 Demand forecast variation													
				FALSE	FALSE	Type	0.00	0.00	0.15	0.40	0.70	1.01	1.32
D3 Uncertainty of impact of climate change on demand													
				FALSE	FALSE	Type	0.00	0.02	0.04	0.06	0.07	0.08	0.10
D4 Uncertainty of impact of demand management													
				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

				Sum of Headroom components						
				2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Group 1										
Group 2				1.47	1.74	2.96	4.56	6.22	7.88	9.54
Group 3										

Distribution Profile Parameters

Profile	A		B		C		D	
Fixed	Val	Value						
Triangular	Min	Min	Best	Best Estimate	Max	Max		
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Beta	A	Alpha	B	Beta	Scl	Scale		
Exponential	Rate	Rate						
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate				
Weibull	Loc	Location	Scl	Scale	Shp	Shape		
Gama	Loc	Location	Scl	Scale	Shp	Shape		
Logistic	Avg	Mean	Scl	Scale				
Preto	Loc	Location	Shp	Shape				
Extreme value	Mod	Mode	Scl	Scale	M/M	Min/Max		
Other								

Analysis Statistics

	2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Mean	1.5	1.7	3.1	4.5	6.4	8.0	9.7
Minimum	-0.5	-0.1	-3.7	-2.9	-2.5	-2.1	-0.6
25th percentile	0.9	1.1	1.4	2.4	4.0	5.6	6.7
50th percentile	1.5	1.7	3.0	4.3	6.3	7.9	9.6
75th percentile	2.0	2.3	5.0	6.6	8.6	10.5	12.5
Maximum	3.4	3.7	10.2	12.8	15.5	18.5	21.9
Std Deviation	0.8	0.8	2.6	2.9	3.3	3.6	4.1
Variance	0.6	0.6	6.6	8.4	10.8	13.2	16.5
Skewness	0.0	0.1	0.1	0.2	0.1	0.1	0.0

Headroom Spreadsheet

Company Name	South East Water			
Scenario Ref	DYAA	Version	Phase 4.5	
Resource Zone Ref	RZ4	Date	07/11/2013	

Component		Correlated With	Correlated By	Continuous/ Intermittent	Dependent Component	Overlapping Component	Parameters	Headroom Component (Ml/d) 2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2	Vulnerable surface water and groundwater licences													
	Now included in S5/S1 & S2 below													
S4	Bulk transfers						FALSE	1.8000	1.8000	1.8000	1.8000	1.8000	1.8000	1.8000
S5/S1 & S2	Max of Gradual pollution/Vulnerable surface water and groundwater licences				C	FALSE	Type	0.000 / 0.00	0.000 / 0.36	0.000 / 0.72	0.000 / 1.08	0.000 / 1.44	0.000 / 1.80	0.000 / 2.16
S6	Accuracy of supply side data				FALSE	FALSE	Type	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00
S8	Uncertainty of impact of climate change on source yields				FALSE		Type	0.000 / 0.00	0.000 / 0.00	0.000 / 0.97	0.000 / 1.08	0.000 / 1.18	0.000 / 1.29	0.000 / 1.40
S9	Uncertainty over New Sources				FALSE	FALSE	Type	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00
D1	Accuracy of sub-component data					FALSE	Type	0.000 / 1.45	0.000 / 1.45	0.000 / 1.45	0.000 / 1.45	0.000 / 1.45	0.000 / 1.45	0.000 / 1.45
D2	Demand forecast variation				FALSE	FALSE	Type	-1.90	0.000 / 0.00	0.000 / 0.47	0.000 / 1.25	0.000 / 2.21	0.000 / 3.19	0.000 / 4.21
D3	Uncertainty of impact of climate change on demand				FALSE	FALSE	Type	0.000 / 0.00	0.000 / 0.07	0.000 / 0.13	0.000 / 0.17	0.000 / 0.21	0.000 / 0.26	0.000 / 0.30
D4	Uncertainty of impact of demand management				FALSE	FALSE	Type	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00	0.000 / 0.00

Overlapping components

		Sum of Headroom components						
		2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Group 1		1.35	3.67	5.54	6.83	8.30	9.79	11.32
Group 2								
Group 3								

Distribution Profile Parameters

Profile	A		B		C		D	
Fixed	Val	Value						
Triangular	Min	Min	Best	Best Estimate	Max	Max		
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Beta	A	Alpha	B	Beta	Scl	Scale		
Exponential	Rate	Rate						
Curtsm	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate				
Weibull	Loc	Location	Scl	Scale	Shp	Shape		
Gamo	Loc	Location	Scl	Scale	Shp	Shape		
Logistic	Avg	Mean	Scl	Scale				
Preto	Loc	Location	Shp	Shape				
Extreme valu	Mod	Mode	Scl	Scale	M/M	Min/Max		
Other								

Analysis Statistics

	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Mean	1.4	3.6	5.4	6.8	8.2	9.7	11.1
Minimum	-7.7	-3.1	-5.5	-5.4	-7.1	-8.7	-6.6
25th percentile	-0.8	1.8	2.5	3.5	4.5	5.0	5.9
50th percentile	1.3	3.6	5.4	6.8	8.0	9.4	10.9
75th percentile	3.6	5.4	8.4	10.1	12.0	14.0	15.7
Maximum	9.9	10.3	18.4	21.8	25.3	30.3	33.6
Std Deviation	3.1	2.3	4.1	4.6	5.4	6.4	7.1
Variance	9.5	5.3	17.1	21.1	29.6	41.3	49.8
Skewness	0.0	0.0	0.1	0.1	0.0	0.2	0.2

Headroom Spreadsheet

Company Name	South East Water			
Scenario Ref	DYAA	Version	Phase 4.5
Resource Zone Ref	RZ5	Date	07/11/2013

Component		Correlated		Continuous / Intermittent	Dependent Component	Overlapping Component	Parameters	Headroom Component (Ml/d)						
		With	By					2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2	**Vulnerable surface water and groundwater licences**													
	Now included in S5/S1 & S2 below													
S4	**Bulk transfers**					FALSE		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S5/S1 & S2	**Max of Gradual pollution/Vulnerable surface water and groundwater licences**				C	FALSE	Type	0.00	0.22	0.43	0.65	0.86	1.08	1.29
S6	**Accuracy of supply side data**				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S8	**Uncertainty of impact of climate change on source yields**					FALSE	Type	0.00	0.00	0.35	0.39	0.42	0.46	0.50
S9	**Uncertainty over New Sources**				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1	**Accuracy of sub-component data**					FALSE	Type	0.30	0.30	0.30	0.30	0.30	0.30	0.30
D2	**Demand forecast variation**				FALSE	FALSE	Type	0.04	0.00	0.09	0.25	0.44	0.63	1.14
D3	**Uncertainty of impact of climate change on demand**				FALSE	FALSE	Type	0.00	0.01	0.03	0.04	0.04	0.05	0.06
D4	**Uncertainty of impact of demand management**				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

	Sum of Headroom components						
	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Group 1							
Group 2	0.33	0.53	1.20	1.62	2.07	2.52	3.30
Group 3							

Distribution Profile Parameters

Profile	A		B		C		D
Fixed	Val	Value					
Triangular	Min	Min	Best	Best Estimate	Max	Max	
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Beta	A	Alpha	B	Beta	Scl	Scale	
Exponential	Rate	Rate					
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate			
Weibull	Loc	Location	Scl	Scale	Shp	Shape	
Gama	Loc	Location	Scl	Scale	Shp	Shape	
Logistic	Avg	Mean	Scl	Scale			
Proto	Loc	Location	Shp	Shape			
Extreme value	Mod	Mode	Scl	Scale	M/M	Min/Max	
Other							

Analysis Statistics

	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Mean	0.3	0.5	1.2	1.7	2.2	2.5	3.3
Minimum	-0.6	-0.5	-1.7	-1.7	-2.1	-1.7	-1.4
25th percentile	0.0	0.2	0.4	0.7	1.1	1.2	1.9
50th percentile	0.3	0.5	1.2	1.6	2.0	2.4	3.2
75th percentile	0.7	0.9	2.0	2.5	3.3	3.6	4.5
Maximum	1.3	1.6	4.3	5.4	6.6	7.5	8.7
Std Deviation	0.4	0.4	1.2	1.3	1.5	1.7	1.9
Variance	0.2	0.2	1.4	1.6	2.3	3.0	3.4
Skewness	0.0	0.0	0.1	0.2	0.2	0.2	0.2

Headroom Spreadsheet

Company Name	South East Water (ex MKW)	
Scenario Ref	DYAA	Version: Phase 4.5
Resource Zone Ref	R26	Date 07/11/2013

Headroom Component (Ml/d)

Component	Correlated With	By	Continuous/Intermittent	Dependent Component	Overlapping Component	Parameters	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2 Vulnerable surface water and groundwater licences													
Now included in S5/S1 & S2 below													
S4 Bulk transfers					FALSE		0.4550	0.4550	0.4550	0.6500	0.6500	0.6500	0.6500
S5/S1 & S2 Max of Gradual pollution/Vulnerable surface water and groundwater licences		C			FALSE	Type	0.00	0.00	0.23	0.46	0.69	0.92	1.15
S6 Accuracy of supply side data				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S8 Uncertainty of impact of climate change on source yields					FALSE	Type	0.00	0.00	0.04	0.06	0.09	0.11	0.13
S9 Uncertainty over New Sources				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1 Accuracy of sub-component data					FALSE	Type	0.50	0.50	0.50	0.50	0.50	0.50	0.50
D2 Demand forecast variation				FALSE	FALSE	Type	0.00	0.00	0.16	0.43	0.76	1.11	1.47
D3 Uncertainty of impact of climate change on demand				FALSE	FALSE	Type	0.00	0.02	0.05	0.06	0.07	0.09	0.10
D4 Uncertainty of impact of demand management				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

	Sum of Headroom components						
	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Group 1	0.95	0.98	1.44	2.16	2.76	3.37	4.01
Group 2							
Group 3							

Distribution Profile Parameters

Profile	A		B		C		D
Fixed	Val	Value					
Triangular	Min	Min	Best	Best Estimate	Max	Max	
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Beta	A	Alpha	B	Beta	Scl	Scale	
Exponential	Rate	Rate					
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2 Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate			
Weibull	Loc	Location	Scl	Scale	Shp	Shape	
Gamma	Loc	Location	Scl	Scale	Shp	Shape	
Logistic	Avg	Mean	Scl	Scale			
Proto	Loc	Location	Shp	Shape			
Extreme value	Mod	Mode	Scl	Scale	M/M	Min/Max	
Other							

Analysis Statistics

	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Mean	1.0	1.0	1.4	2.2	2.7	3.3	4.0
Minimum	-1.4	-1.5	-1.3	-0.9	-0.4	-0.9	-1.2
25th percentile	0.3	0.3	0.7	1.5	1.8	2.1	2.5
50th percentile	1.0	0.9	1.3	2.2	2.7	3.3	3.8
75th percentile	1.6	1.6	2.0	2.9	3.5	4.5	5.5
Maximum	3.3	3.2	3.9	5.7	6.7	9.4	9.7
Std Deviation	0.9	0.9	0.9	1.1	1.3	1.6	2.0
Variance	0.7	0.8	0.9	1.2	1.6	2.7	3.9
Skewness	0.0	0.0	0.1	0.1	0.2	0.3	0.2

Note: Component S4 (bulk supply) was finally modelled with 0.65 Ml/d on average as paragraph 33 of main text of this Appendix.
The minor reduction to 0.455 Ml/d shown above for the years leading up to 2024/25 was based on an intermediate assessment.

Headroom Spreadsheet

Company Name	South East Water (ex MKW)		
Scenario Ref	DYAA	Version	Phase 4.5
Resource Zone Ref	RZ7	Date	07/11/2013

Component		Correlated		Continuous/intermittent	Dependent Component	Overlapping Component	Parameters	Headroom Component (Ml/d)						
		With	By					2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2	Vulnerable surface water and groundwater licences													
	Now included in S5/S1 & S2 below													
S4	Bulk transfers						FALSE	0.0000	0.1494	0.2988	0.2988	0.2988	0.2988	0.2988
S5/S1 & S2	Max of Gradual pollution/Vulnerable surface water and groundwater licences					C	Type FALSE	0.000 0.00	0.000 0.03	0.000 0.06	0.000 0.09	0.000 0.11	0.000 0.14	0.000 0.17
S6	Accuracy of supply side data						Type FALSE FALSE	0.000 0.00	0.000 0.00	0.000 0.06	0.000 0.09	0.000 0.00	0.000 0.00	0.000 0.00
S8	Uncertainty of impact of climate change on source yields						Type FALSE	0.000 0.00	0.000 0.00	0.000 0.06	0.000 0.09	0.000 0.12	0.000 0.15	0.000 0.18
S9	Uncertainty over New Sources						Type FALSE FALSE	0.000 0.00	0.000 0.00	0.000 0.00	0.000 0.00	0.000 0.00	0.000 0.00	0.000 0.00
D1	Accuracy of sub-component data						Type FALSE	0.000 0.17	0.000 0.17	0.000 0.17	0.000 0.17	0.000 0.17	0.000 0.17	0.000 0.17
D2	Demand forecast variation						Type FALSE FALSE	0.000 0.02	0.000 0.00	0.000 0.05	0.000 0.14	0.000 0.25	0.000 0.37	0.000 0.48
D3	Uncertainty of impact of climate change on demand						Type FALSE FALSE	0.000 0.00	0.000 0.01	0.000 0.02	0.000 0.02	0.000 0.02	0.000 0.03	0.000 0.03
D4	Uncertainty of impact of demand management						Type FALSE FALSE	0.000 0.00	0.000 0.00	0.000 0.00	0.000 0.00	0.000 0.00	0.000 0.00	0.000 0.00

Overlapping components

				Sum of Headroom components						
				2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Group 1				0.19	0.35	0.65	0.80	0.97	1.15	1.33
Group 2										
Group 3										

Distribution Profile Parameters

Profile	A		B		C		D	
Fixed	Val	Value						
Triangular	Min	Min	Best	Best Estimate	Max	Max		
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Beta	A	Alpha	B	Beta	Scl	Scale		
Exponential	Rate	Rate						
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate				
Weibull	Loc	Location	Scl	Scale	Shp	Shape		
Gama	Loc	Location	Scl	Scale	Shp	Shape		
Logistic	Avg	Mean	Scl	Scale				
Proto	Loc	Location	Shp	Shape				
Extreme value	Mod	Mode	Scl	Scale	M/M	Min/Max		
Other								

Analysis Statistics

Mean	0.2	0.3	0.7	0.8	1.0	1.1	1.3
Minimum	-1.3	-1.0	-0.9	-0.8	-0.9	-1.2	-1.5
25th percentile	-0.1	0.0	0.3	0.4	0.5	0.5	0.6
50th percentile	0.2	0.3	0.7	0.8	1.0	1.1	1.3
75th percentile	0.5	0.7	1.0	1.2	1.5	1.7	2.0
Maximum	1.5	1.8	2.6	2.4	3.1	4.0	4.5
Std Deviation	0.4	0.5	0.5	0.6	0.7	0.8	1.0
Variance	0.2	0.2	0.3	0.3	0.5	0.7	0.9
Skewness	0.0	0.0	0.1	0.0	0.1	0.2	0.2

Headroom Spreadsheet

Company Name	South East Water (ex MKW)		
Scenario Ref	DYAA	Version	Phase 4.5
Resource Zone Ref	RZ8	Date	07/11/2013

Component		Correlated		Continuous/ intermittent	Dependent Component	Overlapping Component	Parameters	Headroom Component (Ml/d)						
		With	By					2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2	**Vulnerable surface water and groundwater licences**													
	Now included in S5/S1 & S2 below													
S4	**Bulk transfers**													
				FALSE				0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S5/S1 & S2	**Max of Gradual pollution/Vulnerable surface water and groundwater licences**													
							Type		0.000	0.000	0.000	0.000	0.000	0.000
S5/1	Summary of S5 components (sheet S5)			C	FALSE	FALSE		0.00	0.60	1.21	1.81	2.42	3.02	3.63
S6	**Accuracy of supply side data**													
							Type		0.000	0.000	0.000	0.000	0.000	0.000
S6/1				FALSE	FALSE			0.00	0.00	0.00	0.00	0.00	0.00	0.00
S8	**Uncertainty of impact of climate change on source yields**													
							Type		0.000	0.000	0.000	0.000	0.000	0.000
S8/1	Summary of S8 components (sheet S8)			FALSE				0.00	0.00	0.02	0.04	0.05	0.06	0.07
S9	**Uncertainty over New Sources**													
							Type		0.000	0.000	0.000	0.000	0.000	0.000
S9/1				FALSE	FALSE			0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1	**Accuracy of sub-component data**													
							Type		0.000	0.000	0.000	0.000	0.000	0.000
D1/1	Summary of D1 components (sheet D1)			FALSE				0.00	0.00	0.63	0.63	0.63	0.63	0.63
D2	**Demand forecast variation**													
							Type		0.000	0.000	0.000	0.000	0.000	0.000
D2/1	Summary of D2 components (sheet D2)			FALSE	FALSE			0.13	0.00	0.22	0.59	1.07	1.61	2.19
D3	**Uncertainty of impact of climate change on demand**													
							Type		0.000	0.000	0.000	0.000	0.000	0.000
D3/1	Summary of D3 components (sheet D3)			FALSE	FALSE			0.00	0.03	0.06	0.07	0.09	0.11	0.13
D4	**Uncertainty of impact of demand management**													
							Type		0.000	0.000	0.000	0.000	0.000	0.000
D4/1	Summary of D4 components (sheet D4)			FALSE	FALSE			0.00	0.00	0.00	0.00	0.00	0.00	0.00
Overlapping components														
	Group 1													
	Group 2													
	Group 3													

Distribution Profile Parameters

Profile	A		B		C		D
Fixed	Val	Value					
Triangular	Min	Min	Best	Best Estimate	Max	Max	
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Beta	A	Alpha	B	Beta	Scl	Scale	
Exponential	Rate	Rate					
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate			
Weibull	Loc	Location	Scl	Scale	Shp	Shape	
Gama	Loc	Location	Scl	Scale	Shp	Shape	
Logistic	Avg	Mean	Scl	Scale			
Pareto	Loc	Location	Shp	Shape			
Extreme value	Mod	Mode	Scl	Scale	M/M	Min/Max	
Other							

Sum of Headroom components

	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	0.13	0.63	2.13	3.14	4.26	5.43	6.64

Analysis Statistics

Mean	0.1	0.6	2.1	3.2	4.2	5.5	6.7
Minimum	-1.0	-0.8	0.0	0.1	0.5	0.5	0.9
25th percentile	-0.3	0.2	1.4	2.3	3.0	3.9	4.6
50th percentile	0.1	0.7	2.1	3.2	4.1	5.2	6.4
75th percentile	0.6	1.1	2.9	4.0	5.3	7.0	8.5
Maximum	1.3	2.0	4.9	6.3	8.7	11.8	13.9
Std Deviation	0.5	0.5	1.0	1.2	1.6	2.1	2.7
Variance	0.3	0.3	0.9	1.4	2.4	4.4	7.0
Skewness	0.0	0.0	0.2	0.1	0.2	0.4	0.3

Appendix B

DYCP Resource Zone Model Workbook Data

Headroom Spreadsheet

Company Name	South East Water			
Scenario Ref	ADPW	Version	Phase 4.5	
Resource Zone Ref	RZ1	Date	07/11/2013	

Component			Correlated With	Correlated By	Continuous/ Intermittent	Dependent Component	Overlapping Component	Parameters	Headroom Component (Ml/d)						
									2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2	Vulnerable surface water and groundwater licences														
	Now included in S5/S1 & S2 below														
S4	Bulk transfers														
					FALSE				0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S5/S1 & S2	Max of Gradual pollution/Vulnerable surface water and groundwater licences														
		)		C	FALSE			Type	0.42	0.83	1.25	1.66	2.08	2.49	2.91
S6	Accuracy of supply side data														
					FALSE	FALSE		Type	0.00	0.00	0.00	0.00	0.00	0.00	0.80
S8	Uncertainty of impact of climate change on source yields														
					FALSE			Type	0.00	0.00	0.82	0.92	1.01	1.10	1.19
S9	Uncertainty over New Sources														
					FALSE	FALSE		Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1	Accuracy of sub-component data														
					FALSE			Type	0.37	0.37	0.37	0.37	0.37	0.37	0.37
D2	Demand forecast variation														
					FALSE	FALSE		Type	0.27	0.00	0.12	0.32	0.57	0.83	1.11
D3	Uncertainty of impact of climate change on demand														
					FALSE	FALSE		Type	0.00	0.02	0.03	0.04	0.05	0.07	0.07
D4	Uncertainty of impact of demand management														
					FALSE	FALSE		Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

Group 1	
Group 2	
Group 3	

Distribution Profile Parameters

Profile	A		B		C		D
Fixed	Val	Value					
Triangular	Min	Min	Best	Best Estimate	Max	Max	
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Beta	A	Alpha	B	Beta	Scl	Scale	
Exponential	Rate	Rate					
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate			
Weibull	Loc	Location	Scl	Scale	Shp	Shape	
Gama	Loc	Location	Scl	Scale	Shp	Shape	
Logistic	Avg	Mean	Scl	Scale			
Pareto	Loc	Location	Shp	Shape			
Extreme value	Mod	Mode	Scl	Scale	M/M	Min/Max	
Other							

Sum of Headroom components

	2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	1.05	1.21	2.59	3.31	4.08	4.85	5.64

Analysis Statistics

	2011/12	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Mean	1.1	1.2	2.6	3.3	4.0	5.0	5.5
Minimum	-0.5	-0.2	-3.5	-3.4	-3.7	-4.4	-3.8
25th percentile	0.6	0.8	0.7	1.0	1.7	2.2	2.7
50th percentile	1.1	1.3	2.4	3.1	3.8	4.8	5.3
75th percentile	1.5	1.7	4.3	5.5	6.2	7.4	8.2
Maximum	2.6	2.7	9.8	11.3	12.6	15.2	16.9
Std Deviation	0.6	0.6	2.6	3.0	3.3	3.7	4.0
Variance	0.3	0.3	6.8	8.7	10.7	13.5	15.8
Skewness	0.0	0.0	0.2	0.2	0.2	0.2	0.2

Headroom Spreadsheet

Company Name	South East Water			
Scenario Ref	ADPW	Version	Phase 4.5	
Resource Zone	RZ2	Date	07/11/2013	

Component		Correlated With	By	Continuous	Dependant Component	Overlapping Component	Parameters	Headroom Component (Ml/d)						
								2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2	**Vulnerable surface water and groundwater licences**													
	Now included in S5/S1 & S2 below													
S4	**Bulk transfers**													
						FALSE		0.0000	1.0850	1.0850	1.0850	1.0850	1.0850	1.0850
S5/S1 & S2	**Max of Gradual pollution/Vulnerable surface water and groundwater licences**													
					C	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.43	0.87	1.30	1.73	2.17	2.50	3.03
S6	**Accuracy of supply side data**													
						FALSE FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.00	0.00	0.00	0.00	0.00	0.00
S8	**Uncertainty of impact of climate change on source yields**													
						FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.00	2.57	2.85	3.03	3.21	3.39
S9	**Uncertainty over New Sources**													
						FALSE FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1	**Accuracy of sub-component data**													
						FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.22	0.22	0.22	0.22	0.22	0.22	0.22
D2	**Demand forecast variation**													
						FALSE FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.38	0.00	0.22	0.53	1.06	1.56	2.08
D3	**Uncertainty of impact of climate change on demand**													
						FALSE FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.03	0.06	0.08	0.10	0.12	0.14
D4	**Uncertainty of impact of demand management**													
						FALSE FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

			Sum of Headroom components						
Group 1			2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Group 2			1.04	2.20	5.46	6.56	7.67	8.73	9.35
Group 3									

Distribution Profile Parameters

Profile		A		B		C	D
Fixed	Val	Value					
Triangular	Min	Min	Best	Best Estimate	Max	Max	
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Beta	A	Alpha	B	Beta	Scl	Scale	
Exponential	Rate	Rate					
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate			
Weibull	Loc	Location	Scl	Scale	Shp	Shape	
Gama	Loc	Location	Scl	Scale	Shp	Shape	
Logistic	Avg	Mean	Scl	Scale			
Preto	Loc	Location	Shp	Shape			
Extreme value	Mod	Mode	Scl	Scale	M/M	Min/Max	
Other							

Analysis Statistics

Mean	0.9	2.2	5.3	6.7	7.3	8.6	9.9
Minimum	-2.4	-1.4	-11.8	-14.4	-16.0	-14.7	-16.6
25th percentile	-0.1	1.2	-0.4	-0.1	0.5	1.3	2.7
50th percentile	0.9	2.1	4.8	5.9	6.6	8.0	9.6
75th percentile	2.0	3.2	10.9	13.4	14.0	15.0	16.9
Maximum	4.3	6.1	26.4	30.3	32.3	36.5	40.4
Std Deviation	1.4	1.4	8.0	9.2	9.4	9.9	10.6
Variance	1.9	1.9	63.3	85.3	88.0	98.0	111.4
Skewness	0.0	0.1	0.2	0.2	0.2	0.2	0.1

south east water

Headroom Spreadsheet

Company Name	South East Water			
Scenario Ref	ADPW	Version	Phase 4.5	
Resource Zone Ref	RZ3	Date	07/11/2013	

Component		Correlated With	By	Continuous/intermittent	Dependant Component	Overlapping Component	Parameters	Headroom Component (Ml/d) 2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2	Vulnerable surface water and groundwater licences													
	Now included in S5/S1 & S2 below													
S4	Bulk transfers					FALSE		1.0000	1.0000	1.0000	2.0000	3.0000	4.0000	5.0000
S5/S1 & S2	Max of Gradual pollution/Vulnerable surface water and groundwater licences				C	FALSE	Type	0.21	0.41	0.62	0.83	1.03	1.24	1.44
S6	Accuracy of supply side data				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S8	Uncertainty of impact of climate change on source yields				FALSE		Type	0.00	0.00	1.54	1.71	1.33	1.95	2.06
S9	Uncertainty over New Sources				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1	Accuracy of sub-component data				FALSE		Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
D2	Demand forecast variation				FALSE	FALSE	Type	0.00	0.00	0.19	0.51	0.90	1.31	1.73
D3	Uncertainty of impact of climate change on demand				FALSE	FALSE	Type	0.00	0.03	0.05	0.07	0.08	0.10	0.10
D4	Uncertainty of impact of demand management				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

	Sum of Headroom components 2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Group 1							
Group 2	1.21	1.44	3.40	5.11	6.85	8.60	10.34
Group 3							

Distribution Profile Parameters

Profile	Val	A		B		C	D
Fixed	Val	Value					
Triangular	Min	Min	Best	Best Estimate	Max	Max	
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Beta	A	Alpha	B	Beta	Scl	Scale	
Exponential	Rate	Rate					
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2 Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate			
Weibull	Loc	Location	Scl	Scale	Shp	Shape	
Gama	Loc	Location	Scl	Scale	Shp	Shape	
Logistic	Avg	Mean	Scl	Scale			
Preto	Loc	Location	Shp	Shape			
Extreme value	Mod	Mode	Scl	Scale	M/M	Min/Max	
Other							

Analysis Statistics

Mean	1.2	1.4	3.2	4.8	6.7	9.1	10.5
Minimum	-0.1	0.1	-7.6	-8.0	-6.8	-5.0	-8.2
25th percentile	0.9	1.1	-0.4	1.1	2.1	4.3	5.1
50th percentile	1.2	1.4	2.9	4.4	6.0	8.8	10.3
75th percentile	1.5	1.8	6.4	8.3	10.9	14.2	15.7
Maximum	2.3	2.8	15.7	18.9	23.2	26.6	28.3
Std Deviation	0.5	0.5	4.9	5.2	6.0	6.4	7.1
Variance	0.2	0.2	23.9	27.2	36.3	41.0	51.0
Skewness	-0.1	0.0	0.3	0.2	0.2	0.1	0.1

Headroom Spreadsheet

Company Name	South East Water		
Scenario Ref	ADPW	Version	Phase 4.5
Resource Zone Ref	R24	Date	07/11/2013

Component		Correlated		Continuous/Intermittent	Dependent Component	Overlapping Component	Parameters	Headroom Component (Ml/d)						
		With	By					2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2	Vulnerable surface water and groundwater licences													
	Now included in S5/S1 & S2 below													
S4	Bulk transfers													
							FALSE	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500	0.7500
S5/S1 & S2	Max of Gradual pollution/Vulnerable surface water and groundwater licences													
						C	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.80	1.59	2.39	3.18	3.98	4.77	5.57
S6	Accuracy of supply side data													
					FALSE	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.00	0.00	0.00	0.00	0.00	0.00
S8	Uncertainty of impact of climate change on source yields													
						FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.00	1.00	1.11	1.23	1.34	1.45
S9	Uncertainty over New Sources													
					FALSE	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1	Accuracy of sub-component data													
						FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								1.74	1.74	1.74	1.74	1.74	1.74	1.74
D2	Demand forecast variation													
					FALSE	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.31	0.05	0.30	1.95	2.57	5.26	7.04
D3	Uncertainty of impact of climate change on demand													
					FALSE	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.08	0.16	0.21	0.26	0.31	0.31
D4	Uncertainty of impact of demand management													
					FALSE	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

	Sum of Headroom components						
	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Group 1							
Group 2	3.60	4.21	6.84	8.95	11.52	14.18	16.87
Group 3							

Distribution Profile Parameters

Profile		A		B		C	D
Fixed	Val	Value					
Triangular	Min	Min	Best	Best Estimate	Max	Max	
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Beta	A	Alpha	B	Beta	Scl	Scale	
Exponential	Rate	Rate					
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2 Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate			
Weibull	Loc	Location	Scl	Scale	Shp	Shape	
Gama	Loc	Location	Scl	Scale	Shp	Shape	
Logistic	Avg	Mean	Scl	Scale			
Preto	Loc	Location	Shp	Shape			
Extreme valu	Mod	Mode	Scl	Scale	M/M	Min/Max	
Other							

Analysis Statistics

Mean	3.7	4.2	6.8	8.8	11.9	14.4	17.4
Minimum	-3.6	-2.5	-6.4	-3.1	-2.8	-3.5	-2.2
25th percentile	1.6	2.1	3.8	5.2	7.7	9.6	12.0
50th percentile	3.6	4.2	6.7	8.7	11.8	14.2	17.0
75th percentile	5.7	6.5	9.7	12.2	15.8	19.1	22.7
Maximum	10.8	10.6	19.9	23.5	30.6	36.4	40.2
Std Deviation	2.6	2.7	4.2	4.9	5.6	6.6	7.7
Variance	6.9	7.5	17.6	23.6	31.6	42.9	59.8
Skewness	0.0	0.0	0.1	0.1	0.2	0.1	0.2

south east water

Headroom Spreadsheet

Company Name	South East Water			
Scenario Ref	ADPW	Version	Phase 4.5	
Resource Zone Ref	R25	Date	07/11/2013	

Component		Correlated		Continuous / intermittent	Dependent Component	Overlapping Component	Parameters	Headroom Component (Ml/d)						
		With	By					2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2	**Vulnerable surface water and groundwater licences**													
	New included in S5/S1 & S2 below													
S4	**Bulk transfers**													
						FALSE		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S5/S1 & S2	**Max of Gradual pollution/Vulnerable surface water and groundwater licences**						Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
					C	FALSE		0.24	0.48	0.72	0.96	1.20	1.44	1.63
S6	**Accuracy of supply side data**						Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
					FALSE	FALSE		0.00	0.00	0.00	0.00	0.00	0.00	0.00
S8	**Uncertainty of impact of climate change on source yields**						Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
					FALSE			0.00	0.00	0.51	0.57	0.63	0.68	0.74
S9	**Uncertainty over New Sources**						Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
					FALSE	FALSE		0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1	**Accuracy of sub-component data**						Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
					FALSE			0.35	0.35	0.35	0.35	0.35	0.35	0.35
D2	**Demand forecast variation**						Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
					FALSE	FALSE		0.04	0.00	0.19	0.51	0.90	1.31	1.42
D3	**Uncertainty of impact of climate change on demand**						Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
					FALSE	FALSE		0.00	0.02	0.03	0.04	0.05	0.06	0.06
D4	**Uncertainty of impact of demand management**						Type	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular	Triangular
					FALSE	FALSE		0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

					Sum of Headroom components						
					2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Group 1											
Group 2					0.64	0.85	1.81	2.44	3.14	3.85	4.25
Group 3											

Distribution Profile Parameters

Profile	A		B		C		D	
Fixed	Val	Value						
Triangular	Min	Min	Best	Best Estimate	Max	Max		
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Beta	A	Alpha	B	Beta	Scl	Scale		
Exponential	Rate	Rate						
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate				
Weibull	Loc	Location	Scl	Scale	Shp	Shape		
Gama	Loc	Location	Scl	Scale	Shp	Shape		
Logistic	Avg	Mean	Scl	Scale				
Preto	Loc	Location	Shp	Shape				
Extreme value	Mod	Mode	Scl	Scale	M/M	Min/Max		
Other								

Analysis Statistics

Mean	0.6	0.9	2.0	2.4	3.1	3.9	4.2
Minimum	-0.6	-0.5	-2.5	-3.4	-2.8	-3.0	-1.8
25th percentile	0.2	0.5	0.7	1.0	1.4	1.9	2.2
50th percentile	0.6	0.9	1.9	2.3	3.0	3.7	4.1
75th percentile	1.0	1.3	3.2	3.8	4.8	5.8	5.9
Maximum	2.0	2.3	6.4	8.2	10.2	11.8	11.7
Std Deviation	0.5	0.5	1.7	2.0	2.4	2.7	2.6
Variance	0.3	0.3	2.9	3.8	5.7	7.1	6.8
Skewness	0.1	-0.1	0.1	0.2	0.2	0.2	0.2

Headroom Spreadsheet

Company Name	South East Water (ex MKW)		
Scenario Ref	ADPW	Version	Phase 4.5
Resource Zone Ref	RZ6	Date	07/11/2013

Component				Correlated		Continuous / intermittent	Dependent Component	Overlapping Component	Parameters	Headroom Component (Ml/d)						
				With	By					2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2	Vulnerable surface water and groundwater licences															
	Now included in S5/S1 & S2 below															
S4	Bulk transfers															
						FALSE				0.9800	0.9800	0.9800	1.4000	1.4000	1.4000	1.4000
S5/S1 & S2	Max of Gradual pollution/Vulnerable surface water and groundwater licences				1			C	Type		0.000	0.000	0.000	0.000	0.000	0.000
							FALSE			0.00	0.00	0.15	0.31	0.46	0.61	0.76
S6	Accuracy of supply side data								Type		0.000	0.000	0.000	0.000	0.000	0.000
						FALSE	FALSE			0.00	0.00	0.00	0.00	0.00	0.00	0.00
S8	Uncertainty of impact of climate change on source yields								Type		0.000	0.000	0.000	0.000	0.000	0.000
						FALSE				0.00	0.00	0.05	0.07	0.09	0.12	0.14
S9	Uncertainty over New Sources								Type		0.000	0.000	0.000	0.000	0.000	0.000
						FALSE	FALSE			0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1	Accuracy of sub-component data								Type		0.000	0.000	0.000	0.000	0.000	0.000
						FALSE			0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
D2	Demand forecast variation															
						FALSE	FALSE			0.00	0.00	0.19	0.52	0.93	1.37	1.84
D3	Uncertainty of impact of climate change on demand								Type		0.000	0.000	0.000	0.000	0.000	0.000
						FALSE	FALSE			0.00	0.03	0.05	0.07	0.09	0.11	0.12
D4	Uncertainty of impact of demand management								Type		0.000	0.000	0.000	0.000	0.000	0.000
						FALSE	FALSE			0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

				Sum of Headroom components						
				2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Group 1										
Group 2				1.57	1.60	2.02	2.96	3.56	4.20	4.86
Group 3										

Distribution Profile Parameters

Profile	A		B		C		D	
Fixed	Val	Value						
Triangular	Min	Min	Best	Best Estimate	Max	Max		
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Beta	A	Alpha	B	Beta	Scl	Scale		
Exponential	Rate	Rate						
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate				
Weibull	Loc	Location	Scl	Scale	Shp	Shape		
Gama	Loc	Location	Scl	Scale	Shp	Shape		
Logistic	Avg	Mean	Scl	Scale				
Preto	Loc	Location	Shp	Shape				
Extreme valu	Mod	Mode	Scl	Scale	M/M	Min/Max		
Other								

Analysis Statistics

	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Mean	1.5	1.6	2.0	3.0	3.6	4.3	4.9
Minimum	-2.0	-1.7	-1.3	-1.1	-0.9	-0.5	-2.3
25th percentile	0.7	0.7	1.1	2.0	2.4	2.9	3.0
50th percentile	1.5	1.6	1.9	2.9	3.5	4.1	4.7
75th percentile	2.3	2.5	2.8	3.9	4.6	5.6	6.4
Maximum	4.8	5.5	5.4	7.7	8.5	10.7	13.5
Std Deviation	1.2	1.2	1.3	1.4	1.6	2.0	2.5
Variance	1.4	1.4	1.6	1.9	2.6	3.9	6.4
Skewness	0.1	0.1	0.2	0.1	0.2	0.2	0.3

Note: Component S4 (bulk supply) was finally modelled with 1.4 Ml/d on peak as paragraph 33 of main text of this Appendix.
The minor reduction to 0.98 Ml/d shown above for the years leading up to 2024/25 was based on an intermediate assessment .

south east water

Headroom Spreadsheet

Company Name	South East Water (ex MKW)			
Scenario Ref	ADPW	Version	Phase 4.5
Resource Zone Ref	RZ7	Date	07/11/2013

Component — **Correlated** (With / By) — Continuous/intermittent — Dependent Component — Overlapping Component — Parameters — **Headroom Component (Ml/d)**

Component	With	By	Cont/int	Dep	Ovl	Parameters	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
S1 & S2 Vulnerable surface water and groundwater licences													
Now included in S5/S1 & S2 below													
S4 Bulk transfers													
						FALSE	0.0000	0.2075	0.4150	0.4150	0.4150	0.4150	0.4150
S5/S1 & S2 Max of Gradual pollution/Vulnerable surface water and groundwater licences													
				C		FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.03	0.07	0.10	0.13	0.17	0.20
S6 Accuracy of supply side data													
					FALSE	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								-0.24	-0.24	-0.24	-0.24	-0.24	-0.24	-0.24
S8 Uncertainty of impact of climate change on source yields													
						FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.00	0.09	0.13	0.17	0.22	0.26
S9 Uncertainty over New Sources													
					FALSE	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.00	0.00	0.00	0.00	0.00	0.00
D1 Accuracy of sub-component data													
						FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.21	0.21	0.21	0.21	0.21	0.21	0.21
D2 Demand forecast variation													
					FALSE	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.02	0.00	0.07	0.16	0.32	0.48	0.63
D3 Uncertainty of impact of climate change on demand													
					FALSE	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.01	0.02	0.02	0.03	0.04	0.04
D4 Uncertainty of impact of demand management													
					FALSE	FALSE	Type	0.000	0.000	0.000	0.000	0.000	0.000	0.000
								0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

			Sum of Headroom components						
			2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Group 1									
Group 2			-0.01	0.22	0.62	0.82	1.04	1.28	1.51
Group 3									

Distribution Profile Parameters

Profile	Val	A		B		C	D
Fixed	Val	Value					
Triangular	Min	Min	Best	Best Estimate	Max	Max	
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation	
Beta	A	Alpha	B	Beta	Scl	Scale	
Exponential	Rate	Rate					
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate			
Weibull	Loc	Location	Scl	Scale	Shp	Shape	
Gamma	Loc	Location	Scl	Scale	Shp	Shape	
Logistic	Avg	Mean	Scl	Scale			
Pareto	Loc	Location	Shp	Shape			
Extreme value	Mod	Mode	Scl	Scale	M/M	Min/Max	
Other							

Analysis Statistics

	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Mean	0.0	0.2	0.6	0.8	1.0	1.2	1.5
Minimum	-0.9	-0.8	-0.9	-0.8	-1.2	-1.2	-1.3
25th percentile	-0.3	-0.1	0.3	0.4	0.5	0.5	0.7
50th percentile	0.0	0.2	0.6	0.8	1.0	1.2	1.4
75th percentile	0.2	0.5	0.9	1.2	1.5	1.9	2.3
Maximum	0.9	1.3	2.1	2.6	3.3	4.5	5.1
Std Deviation	0.3	0.4	0.5	0.6	0.7	1.0	1.1
Variance	0.1	0.1	0.2	0.4	0.6	0.9	1.3
Skewness	-0.1	0.0	0.0	0.2	0.1	0.2	0.2

Headroom Spreadsheet

Company Name	South East Water (ex MKW)		
Scenario Ref	ADPW	Version	Phase 4.5
Resource Zone Ref	RZ8	Date	07/11/2013

	Component	Correlated With	Correlated By	Continuous / intermittent	Dependent Component	Overlapping Component	Parameters	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
								Headroom Component (Ml/d)						
S1 & S2	Vulnerable surface water and groundwater licences													
	Now included in S5/S1 & S2 below													
S4	Bulk transfers					FALSE		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S5/S1 & S2	Max of Gradual pollution/Vulnerable surface water and groundwater licences				C	FALSE	Type	0.00	0.65	1.29	1.94	2.58	3.23	3.87
								0.000	0.000	0.000	0.000	0.000	0.000	0.000
S6	Accuracy of supply side data				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
								0.000	0.000	0.000	0.000	0.000	0.000	0.000
S8	Uncertainty of impact of climate change on source yields				FALSE		Type	0.00	0.00	0.02	0.03	0.04	0.05	0.06
								0.000	0.000	0.000	0.000	0.000	0.000	0.000
S9	Uncertainty over New Sources				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00
								0.000	0.000	0.000	0.000	0.000	0.000	0.000
D1	Accuracy of sub-component data				FALSE		Type	0.00	0.00	0.80	0.80	0.80	0.80	0.80
								0.000	0.000	0.000	0.000	0.000	0.000	0.000
D2	Demand forecast variation				FALSE	FALSE	Type	0.13	0.00	0.28	0.76	1.41	2.13	2.94
								0.000	0.000	0.000	0.000	0.000	0.000	0.000
D3	Uncertainty of impact of climate change on demand				FALSE	FALSE	Type	0.00	0.04	0.07	0.09	0.12	0.14	0.14
								0.00	0.00	0.00	0.00	0.00	0.00	0.00
D4	Uncertainty of impact of demand management				FALSE	FALSE	Type	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Overlapping components

Group 1			
Group 2			
Group 3			

Distribution Profile Parameters

Profile	A		B		C		D	
Fixed	Val	Value						
Triangular	Min	Min	Best	Best Estimate	Max	Max		
Normal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Lognormal	Avg	Mean	Max	Max Estimate	SD	St'd Deviation		
Beta	A	Alpha	B	Beta	Scl	Scale		
Exponential	Rate	Rate						
Custom	x1	Value 1	x2	Value 2	p1	Probability 1	p2	Probability 2
Uniform	Min	Min Estimate	Max	Max Estimate				
Weibull	Loc	Location	Scl	Scale	Shp	Shape		
Gama	Loc	Location	Scl	Scale	Shp	Shape		
Logistic	Avg	Mean	Scl	Scale				
Preto	Loc	Location	Shp	Shape				
Extreme valu	Mod	Mode	Scl	Scale	M/M	Min/Max		
Other								

Sum of Headroom components

	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	0.13	0.68	2.45	3.62	4.95	6.35	7.81

Analysis Statistics

|	2009/10	2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
Mean	0.1	0.7	2.4	3.6	4.9	6.3	7.6
Minimum	-1.5	-1.0	-0.1	-0.2	0.0	0.3	-0.3
25th percentile	-0.4	0.2	1.4	2.4	3.4	4.2	4.9
50th percentile	0.1	0.7	2.5	3.6	4.7	6.0	7.2
75th percentile	0.6	1.2	3.4	4.6	6.2	8.1	10.0
Maximum	1.6	2.4	5.9	7.8	11.3	14.7	17.8
Std Deviation	0.7	0.7	1.2	1.5	2.0	2.8	3.5
Variance	0.4	0.5	1.5	2.2	4.0	7.8	12.4
Skewness	0.0	0.0	0.1	0.1	0.2	0.4	0.4

south east water

Appendix C

DYAA Resource Zone Tornado Plots

Simulation Results for
RESOURCE ZONE 1 - AVERAGE - 2019

Distribution for 2019 avg/U55

Mean=1,750508

(histogram)

| 5% | 90% | 5% |
| -1.0868 | | 4.8877 |

Distribution for 2019 avg/U55

Mean=1,750508

(cumulative distribution)

| 5% | 90% | 5% |
| -1.0868 | | 4.8877 |

Regression Sensitivity for 2019 avg/U55

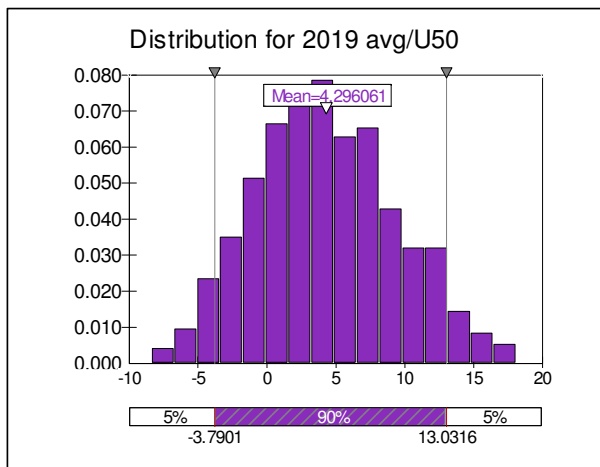|	Std b Coefficients
S8, WRZ 1 / 2019/20/G17	.946
D1, RZ1 / 2019/20/L31	.227
D2, RZ1 / 2019/20/G76	.107
S6, Kemsing / 2019/20/J29	.085
S6, Hartlake / 2019/20/J31	.073
S6, Tonbridge (Gravels) / …/J34	.042
S6, Cramptons Rd / 2019/20…/J25	.02
2019/20/L27	.014
D3, RZ1 / 2020/21/I61	.011
2014/15/J19	.009
S6, Pembury (Ash) / 2019/2…/J33	.004
2014/15/J24	.004
2014/15/J25	.004
2014/15/J20	.004
2019/20/L20	.003
2009/10/H23	.002

Summary Information	
Workbook Name	RZ1_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	482
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 19:02
Simulation Stop Time	08/11/2013 19:04
Simulation Duration	00:01:31
Random Seed	1613929339

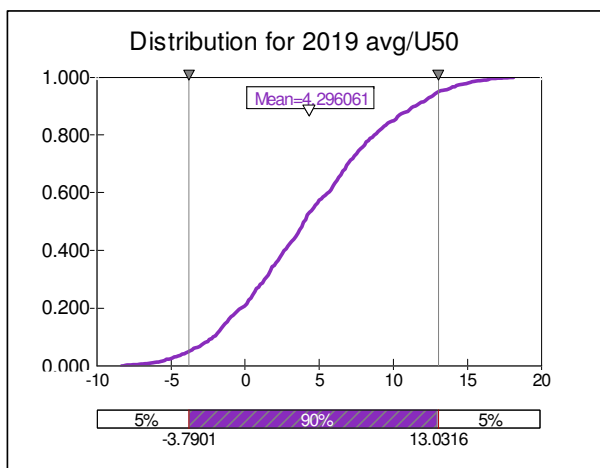| Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-2.41	5%	-1.09
Maximum	6.74	10%	-0.44
Mean	1.75	15%	-0.08
Std Dev	1.77	20%	0.23
Variance	3.125994035	25%	0.45
Skewness	0.257641381	30%	0.68
Kurtosis	2.534088019	35%	0.92
Median	1.58	40%	1.14
Mode	1.18	45%	1.31
Left X	-1.09	50%	1.58
Left P	5%	55%	1.86
Right X	4.89	60%	2.13
Right P	95%	65%	2.33
Diff X	5.97	70%	2.62
Diff P	90%	75%	3.00
#Errors	0	80%	3.38
Filter Min		85%	3.72
Filter Max		90%	4.18
#Filtered	0	95%	4.89
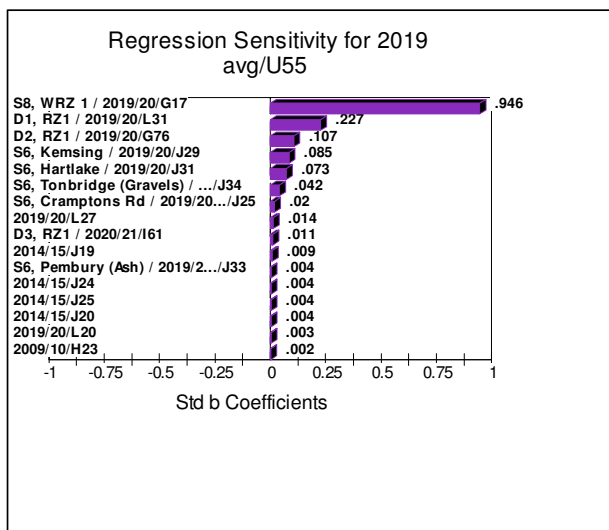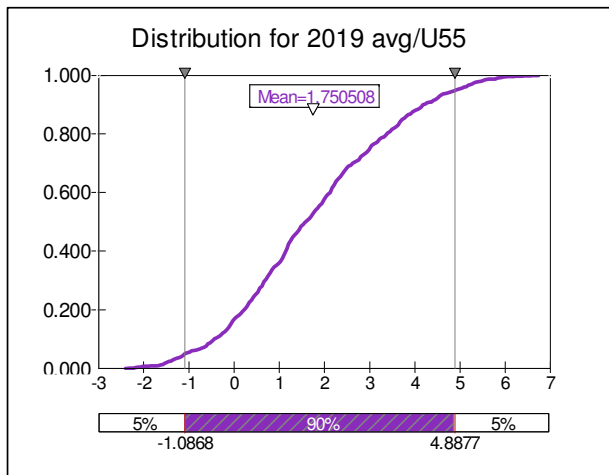
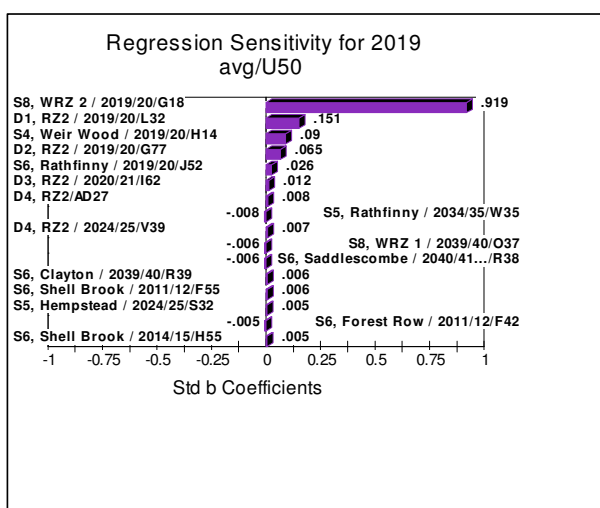| Sensitivity			
Rank	Name	Regr	Corr
#1	S8, WRZ 1 / 20	0.946	0.955
#2	D1, RZ1 / 2019/	0.227	0.219
#3	D2, RZ1 / 2019/	0.106	0.122
#4	S6, Kemsing / 2	0.085	0.078
#5	S6, Hartlake / 20	0.072	0.080
#6	S6, Tonbridge (	0.043	0.072
#7	S6, Cramptons	0.021	0.034
#8	2014/15 / J27	0.014	0.010
#9	2019/20 / L27	0.014	0.048
#10	D3, RZ1 / 2020/	0.011	0.701
#11	2019/20 / L19	0.010	-0.007
#12	2014/15 / J19	0.010	0.033
#13	S6, Saints Hill /	0.008	0.005
#14	2014/15 / J22	0.006	-0.020
#15	S6, Oak Lane /	0.006	-0.016
#16	2019/20 / L22	0.006	-0.010

Simulation Results for
RESOURCE ZONE 2 - AVERAGE - 2019

Distribution for 2019 avg/U50

Mean=4,296061

5%	90%	5%
-3.7901		13.0316

Distribution for 2019 avg/U50

Mean=4,296061

5%	90%	5%
-3.7901		13.0316

Regression Sensitivity for 2019 avg/U50

S8, WRZ 2 / 2019/20/G18 .919
D1, RZ2 / 2019/20/L32 .151
S4, Weir Wood / 2019/20/H14 .09
D2, RZ2 / 2019/20/G77 .065
S6, Rathfinny / 2019/20/J52 .026
D3, RZ2 / 2020/21/I62 .012
D4, RZ2/AD27 .008
-.008 S5, Rathfinny / 2034/35/W35
D4, RZ2 / 2024/25/V39 .007
-.006 S8, WRZ 1 / 2039/40/O37
-.006 S6, Saddlescombe / 2040/41.../R38
S6, Clayton / 2039/40/R39 .006
S6, Shell Brook / 2011/12/F55 .006
S5, Hempstead / 2024/25/S32 .005
-.005 S6, Forest Row / 2011/12/F42
S6, Shell Brook / 2014/15/H55 .005

Std b Coefficients

Summary Information

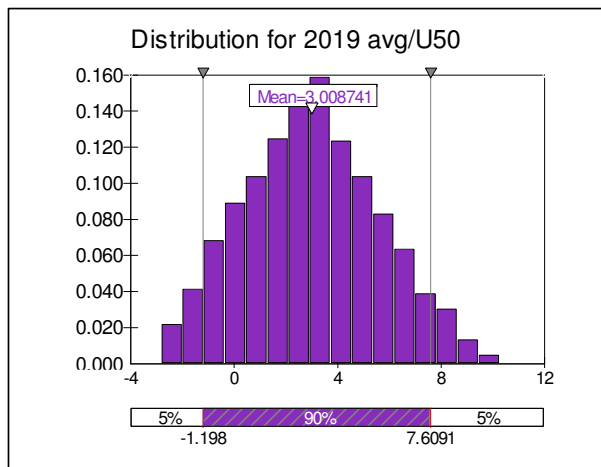| Summary Information	
Workbook Name	RZ2_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	607
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 17:11
Simulation Stop Time	08/11/2013 17:13
Simulation Duration	00:01:38
Random Seed	50

Summary Statistics

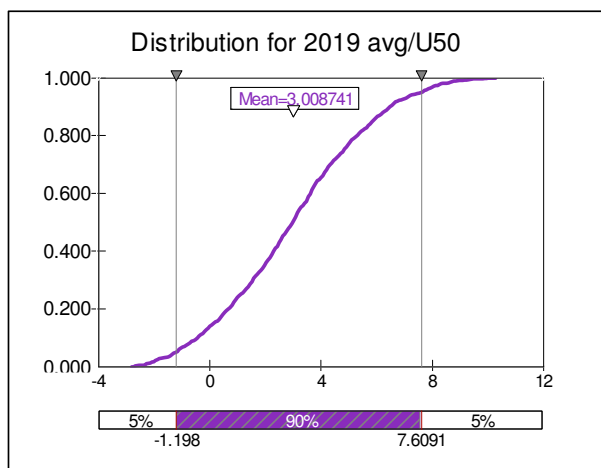| Statistic	Value	%tile	Value
Minimum	-8.36	5%	-3.79
Maximum	18.09	10%	-2.16
Mean	4.30	15%	-1.25
Std Dev	5.13	20%	-0.23
Variance	26.28860714	25%	0.55
Skewness	0.176491291	30%	1.33
Kurtosis	2.54564959	35%	2.01
Median	3.97	40%	2.64
Mode	4.13	45%	3.44
Left X	-3.79	50%	3.97
Left P	5%	55%	4.65
Right X	13.03	60%	5.55
Right P	95%	65%	6.28
Diff X	16.82	70%	6.93
Diff P	90%	75%	7.74
#Errors	0	80%	8.72
Filter Min		85%	10.04
Filter Max		90%	11.41
#Filtered	0	95%	13.03

Sensitivity

Rank	Name	Regr	Corr
#1	S8, WRZ 2 / 20	0.930	0.979
#2	D1, RZ2 / 2019/	0.150	0.137
#3	S4, Weir Wood	0.087	0.545
#4	S6, Barcombe /	0.078	0.024
#5	D2, RZ2 / 2019/	0.067	0.114
#6	S6, Rathfinny /	0.022	0.030
#7	S6, Poverty Bott	0.019	0.022
#8	S6, Cow wish /	0.010	-0.010
#9	D3, RZ2 / 2020/	0.007	0.702
#10	S6, Saddlescom	0.004	-0.022
#11	S5, Saddlescom	0.004	-0.027
#12	S5, Saddlescom	0.004	-0.006
#13	S6, Cockhaise V	0.003	0.004
#14	S6, Forest Row	0.003	-0.018
#15	S6, Clayton / 20	0.003	-0.016
#16	S5, Clayton / 20	0.002	-0.023

Simulation Results for
**RESOURCE ZONE 3 - AVERAGE - 2019**

Distribution for 2019 avg/U50

Mean=3,008741

| 5% | 90% | 5% |
| -1.198 | | 7.6091 |

Distribution for 2019 avg/U50

Mean=3,008741

| 5% | 90% | 5% |
| -1.198 | | 7.6091 |

Regression Sensitivity for 2019 avg/U50

	Std b Coefficients
S8, WRZ 3 / 2019/20/G19	.943
D1, RZ3 / 2019/20/L33	.242
S4, Darwell Reservoir / 20…/G10	.157
D2, RZ3 / 2019/20/G78	.112
S6, Wallers Haven / 2019/2…/J55	.053
2014/15/J31	.013
D3, RZ3 / 2020/21/I63	.012
S6, Crowhurst Bridge / 201…/J42	.009
2014/15/J29	.006
2019/20/L41	.005
S6, Water Works Rd / 2019/…/J50	.005
2019/20/L29	.004
2014/15/J44	.003
2019/20/L39	.003
S6, Cornish / 2019/20/J38	.003
-.002 S6, Darwell Reservoir / 20…/N54	

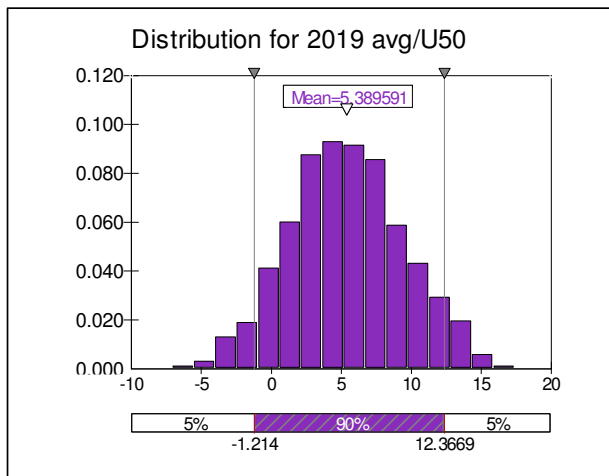| Summary Information	
Workbook Name	RZ3_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	653
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 17:41
Simulation Stop Time	08/11/2013 17:43
Simulation Duration	00:01:40
Random Seed	50

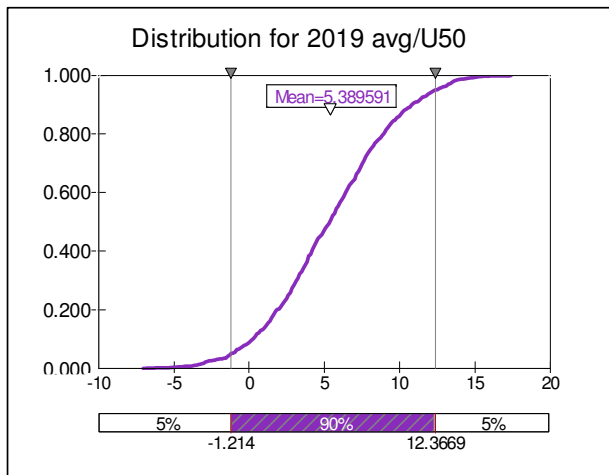| Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-2.80	5%	-1.20
Maximum	10.27	10%	-0.43
Mean	3.01	15%	0.13
Std Dev	2.60	20%	0.66
Variance	6.780492745	25%	1.10
Skewness	0.135476393	30%	1.55
Kurtosis	2.53584641	35%	1.97
Median	2.99	40%	2.31
Mode	3.12	45%	2.61
Left X	-1.20	50%	2.99
Left P	5%	55%	3.27
Right X	7.61	60%	3.64
Right P	95%	65%	3.94
Diff X	8.81	70%	4.32
Diff P	90%	75%	4.82
#Errors	0	80%	5.26
Filter Min		85%	5.84
Filter Max		90%	6.47
#Filtered	0	95%	7.61
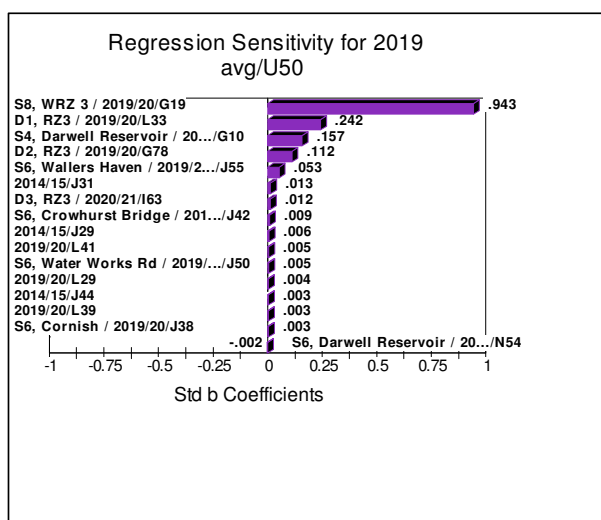
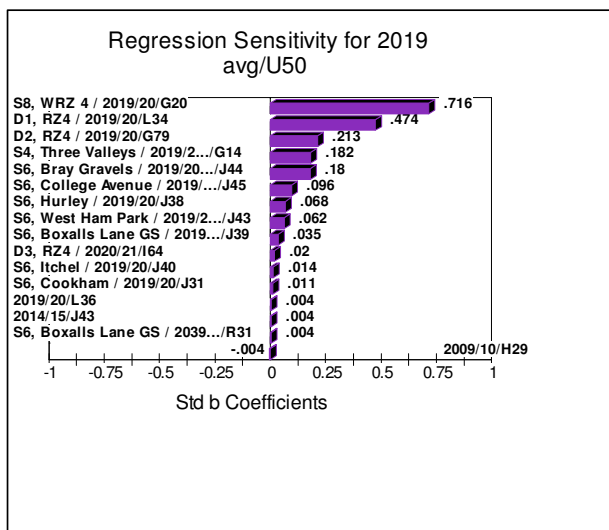| Sensitivity			
Rank	Name	Regr	Corr
#1	S8, WRZ 3 / 20	0.944	0.949
#2	D1, RZ3 / 2019/	0.242	0.214
#3	S4, Darwell Res	0.158	0.186
#4	D2, RZ3 / 2019/	0.111	0.053
#5	S6, Wallers Hav	0.053	0.063
#6	2019/20 / L31	0.013	-0.004
#7	2014/15 / J31	0.013	0.045
#8	S6, Friston & De	0.013	0.026
#9	D3, RZ3 / 2020/	0.011	0.708
#10	S6, Birling Farm	0.010	-0.004
#11	S6, Crowhurst B	0.008	-0.028
#12	2019/20 / L41	0.006	0.043
#13	S6, Water Work	0.005	0.035
#14	2014/15 / J41	0.005	-0.014
#15	S6, Wallers Hav	0.005	0.006
#16	2014/15 / J29	0.004	0.039

Simulation Results for
RESOURCE ZONE 4 - AVERAGE - 2019

Distribution for 2019 avg/U50

Mean=5,389591

5%	90%	5%
-1.214		12.3669

Distribution for 2019 avg/U50

Mean=5,389591

5%	90%	5%
-1.214		12.3669

Regression Sensitivity for 2019 avg/U50

	Std b Coefficients
S8, WRZ 4 / 2019/20/G20	.716
D1, RZ4 / 2019/20/L34	.474
D2, RZ4 / 2019/20/G79	.213
S4, Three Valleys / 2019/2.../G14	.182
S6, Bray Gravels / 2019/20.../J44	.18
S6, College Avenue / 2019/.../J45	.096
S6, Hurley / 2019/20/J38	.068
S6, West Ham Park / 2019/2.../J43	.062
S6, Boxalls Lane GS / 2019.../J39	.035
D3, RZ4 / 2020/21/I64	.02
S6, Itchel / 2019/20/J40	.014
S6, Cookham / 2019/20/J31	.011
2019/20/L36	.004
2014/15/J43	.004
S6, Boxalls Lane GS / 2039.../R31	.004
2009/10/H29	-.004

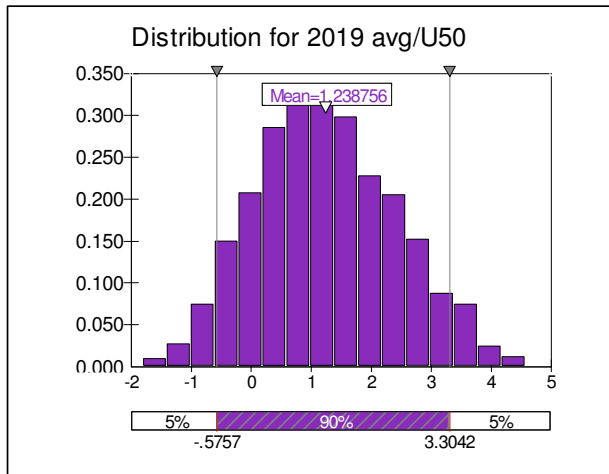| Summary Information	
Workbook Name	RZ4_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	590
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 18:04
Simulation Stop Time	08/11/2013 18:06
Simulation Duration	00:01:36
Random Seed	50

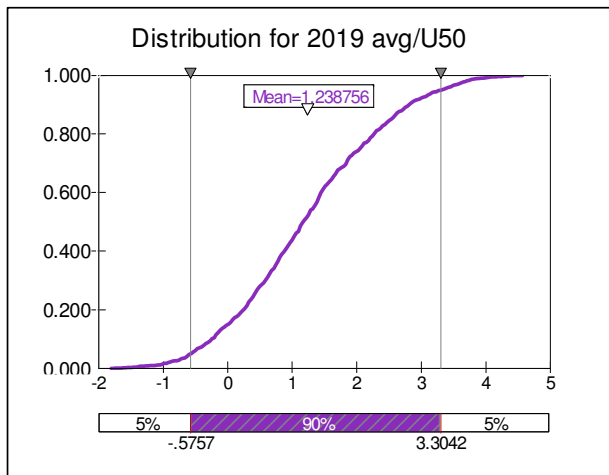| Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-7.05	5%	-1.21
Maximum	17.39	10%	0.25
Mean	5.39	15%	1.18
Std Dev	4.07	20%	1.81
Variance	16.59372149	25%	2.60
Skewness	0.05707132	30%	3.13
Kurtosis	2.772543454	35%	3.70
Median	5.35	40%	4.14
Mode	7.09	45%	4.67
Left X	-1.21	50%	5.35
Left P	5%	55%	5.84
Right X	12.37	60%	6.38
Right P	95%	65%	7.08
Diff X	13.58	70%	7.53
Diff P	90%	75%	8.05
#Errors	0	80%	8.87
Filter Min		85%	9.78
Filter Max		90%	10.79
#Filtered	0	95%	12.37

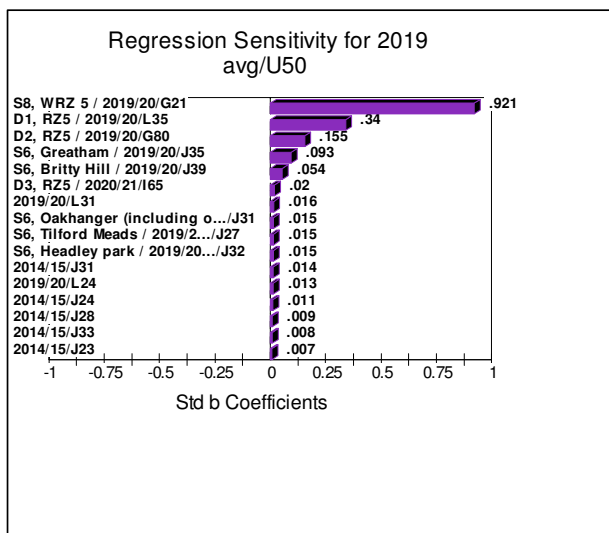| Sensitivity			
Rank	Name	Regr	Corr
#1	S8, WRZ 4 / 20	0.715	0.787
#2	D1, RZ4 / 2019/	0.475	0.440
#3	D2, RZ4 / 2019/	0.214	0.191
#4	S6, Bray Gravel	0.179	0.233
#5	S4, Three Valley	0.179	0.512
#6	S6, College Ave	0.094	0.070
#7	S6, Hurley / 201	0.068	0.087
#8	S6, West Ham F	0.060	0.069
#9	S6, Boxalls Lan	0.038	0.053
#10	S6, West Ham F	0.035	0.027
#11	D3, RZ4 / 2020/	0.022	0.596
#12	S6, Itchel / 2019	0.017	0.074
#13	S6, Woodgarsto	0.016	0.008
#14	S6, Beenhams F	0.015	0.023
#15	S6, Cookham / 2	0.009	0.040
#16	S6, Lasham / 20	0.007	0.000

Simulation Results for
RESOURCE ZONE 5 - AVERAGE - 2019

Distribution for 2019 avg/U50

Mean=1,238756

5%	90%	5%
-.5757		3.3042

Distribution for 2019 avg/U50

Mean=1,238756

5%	90%	5%
-.5757		3.3042

Regression Sensitivity for 2019 avg/U50

S8, WRZ 5 / 2019/20/G21	.921
D1, RZ5 / 2019/20/L35	.34
D2, RZ5 / 2019/20/G80	.155
S6, Greatham / 2019/20/J35	.093
S6, Britty Hill / 2019/20/J39	.054
D3, RZ5 / 2020/21/I65	.02
2019/20/L31	.016
S6, Oakhanger (including o.../J31	.015
S6, Tilford Meads / 2019/2.../J27	.015
S6, Headley park / 2019/20.../J32	.015
2014/15/J31	.014
2019/20/L24	.013
2014/15/J24	.011
2014/15/J28	.009
2014/15/J33	.008
2014/15/J23	.007

Std b Coefficients

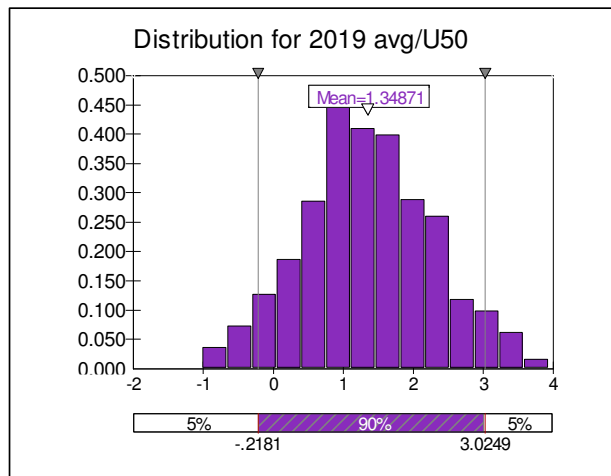| Summary Information	
Workbook Name	RZ5_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	510
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 18:16
Simulation Stop Time	08/11/2013 18:18
Simulation Duration	00:01:34
Random Seed	50

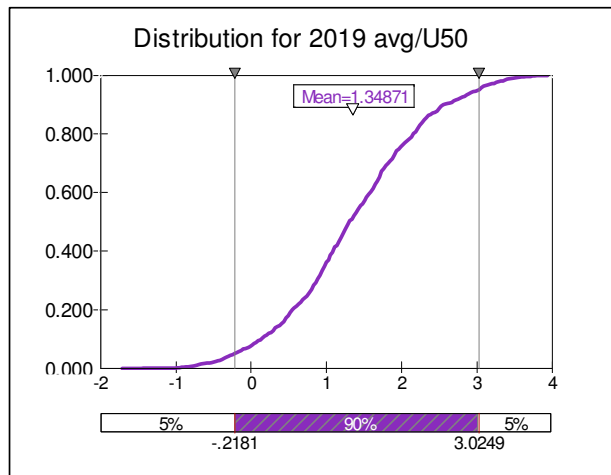| Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-1.81	5%	-0.58
Maximum	4.57	10%	-0.25
Mean	1.24	15%	0.00
Std Dev	1.16	20%	0.24
Variance	1.350698687	25%	0.41
Skewness	0.207151145	30%	0.58
Kurtosis	2.637862312	35%	0.74
Median	1.16	40%	0.88
Mode	1.40	45%	1.02
Left X	-0.58	50%	1.16
Left P	5%	55%	1.33
Right X	3.30	60%	1.45
Right P	95%	65%	1.63
Diff X	3.88	70%	1.84
Diff P	90%	75%	2.05
#Errors	0	80%	2.27
Filter Min		85%	2.53
Filter Max		90%	2.81
#Filtered	0	95%	3.30

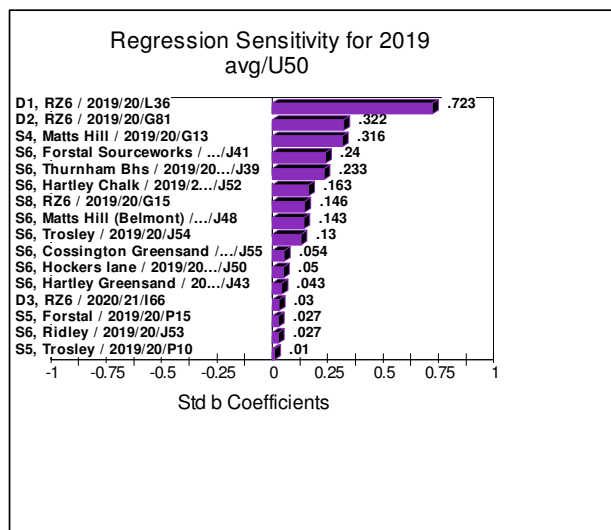| Sensitivity			
Rank	Name	Regr	Corr
#1	S8, WRZ 5 / 20	0.924	0.920
#2	D1, RZ5 / 2019/	0.340	0.277
#3	D2, RZ5 / 2019/	0.155	0.122
#4	S6, Greatham /	0.092	0.094
#5	S6, Britty Hill / 2	0.054	0.065
#6	D3, RZ5 / 2020/	0.017	0.676
#7	S6, Tilford Mead	0.016	0.019
#8	S6, Headley par	0.015	-0.021
#9	S6, Oakhanger	0.015	0.045
#10	2019/20 / L31	0.014	0.041
#11	2014/15 / J31	0.014	0.055
#12	2019/20 / L32	0.013	-0.012
#13	2014/15 / J32	0.013	0.009
#14	2019/20 / L24	0.012	-0.019
#15	S6, Hawkley / 2	0.012	0.008
#16	2014/15 / J24	0.012	0.021

Simulation Results for
RESOURCE ZONE 6 - AVERAGE - 2019

Distribution for 2019 avg/U50

Mean=1.34871

5% | 90% | 5%
-.2181 | | 3.0249

Distribution for 2019 avg/U50

Mean=1.34871

5% | 90% | 5%
-.2181 | | 3.0249

Regression Sensitivity for 2019 avg/U50

	Std b Coefficients
D1, RZ6 / 2019/20/L36	.723
D2, RZ6 / 2019/20/G81	.322
S4, Matts Hill / 2019/20/G13	.316
S6, Forstal Sourceworks / .../J41	.24
S6, Thurnham Bhs / 2019/20.../J39	.233
S6, Hartley Chalk / 2019/2.../J52	.163
S8, RZ6 / 2019/20/G15	.146
S6, Matts Hill (Belmont) / .../J48	.143
S6, Trosley / 2019/20/J54	.13
S6, Cossington Greensand /.../J55	.054
S6, Hockers lane / 2019/20.../J50	.05
S6, Hartley Greensand / 20.../J43	.043
D3, RZ6 / 2020/21/I66	.03
S5, Forstal / 2019/20/P15	.027
S6, Ridley / 2019/20/J53	.027
S5, Trosley / 2019/20/P10	.01

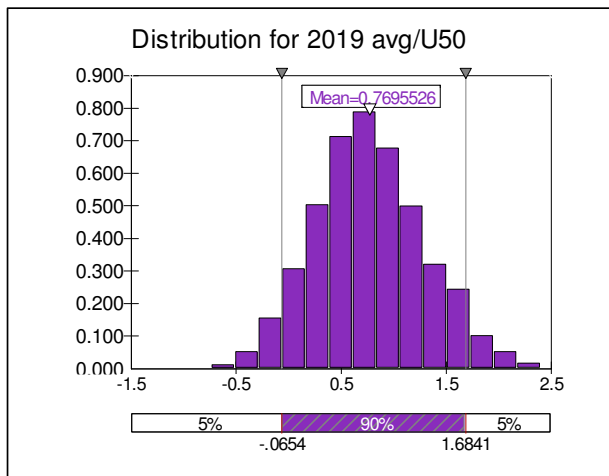| Summary Information	
Workbook Name	RZ6_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	629
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 18:26
Simulation Stop Time	08/11/2013 18:28
Simulation Duration	00:01:58
Random Seed	50

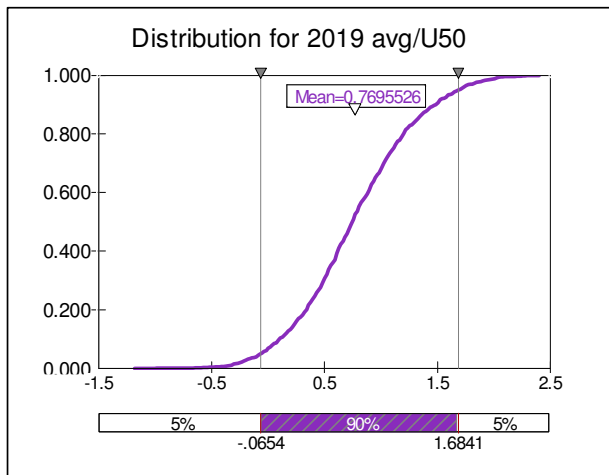| Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-1.71	5%	-0.22
Maximum	3.94	10%	0.14
Mean	1.35	15%	0.38
Std Dev	0.94	20%	0.54
Variance	0.879200228	25%	0.75
Skewness	0.057840971	30%	0.87
Kurtosis	2.789002014	35%	0.98
Median	1.30	40%	1.09
Mode	1.72	45%	1.20
Left X	-0.22	50%	1.30
Left P	5%	55%	1.44
Right X	3.02	60%	1.58
Right P	95%	65%	1.70
Diff X	3.24	70%	1.82
Diff P	90%	75%	1.96
#Errors	0	80%	2.15
Filter Min		85%	2.31
Filter Max		90%	2.54
#Filtered	0	95%	3.02

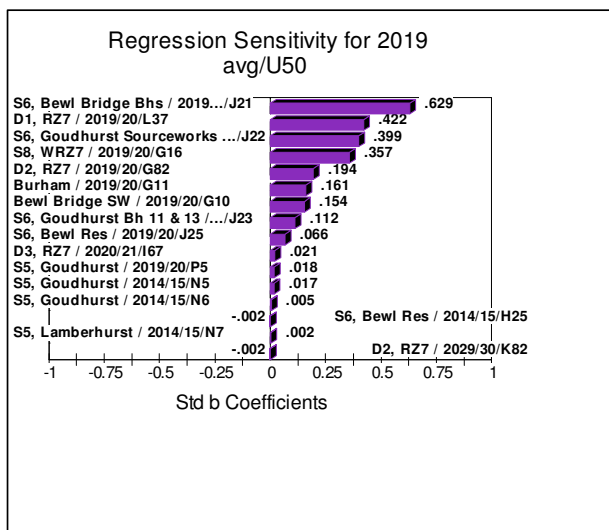| Sensitivity			
Rank	Name	Regr	Corr
#1	D1, RZ6 / 2019/	0.727	0.722
#2	D2, RZ6 / 2019/	0.328	0.295
#3	S4, Matts Hill / 2	0.318	0.356
#4	S6, Forstal Sour	0.243	0.220
#5	S6, Thurnham E	0.233	0.245
#6	S6, Hartley Cha	0.169	0.182
#7	S8, RZ6 / 2019/	0.143	0.267
#8	S6, Matts Hill (B	0.139	0.148
#9	S6, Trosley / 20	0.137	0.139
#10	S6, Boxley Gree	0.053	0.027
#11	S6, Cossington	0.052	0.062
#12	S6, Hockers Ian	0.050	0.049
#13	S6, Hartley Gree	0.048	0.089
#14	S6, Ryarsh / 20	0.043	0.016
#15	S6, Boxley Well	0.042	0.025
#16	D3, RZ6 / 2020/	0.034	0.232

Simulation Results for
RESOURCE ZONE 7 - AVERAGE - 2019

Distribution for 2019 avg/U50

Mean=0.7695526

Distribution for 2019 avg/U50

Mean=0.7695526

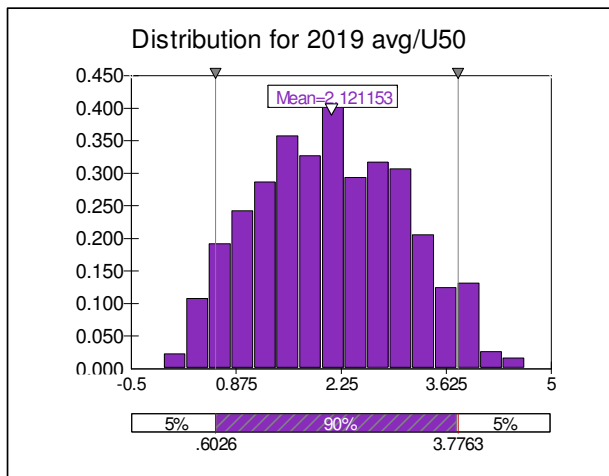| Summary Information	
Workbook Name	RZ7_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	308
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 18:39
Simulation Stop Time	08/11/2013 18:40
Simulation Duration	00:01:32
Random Seed	50

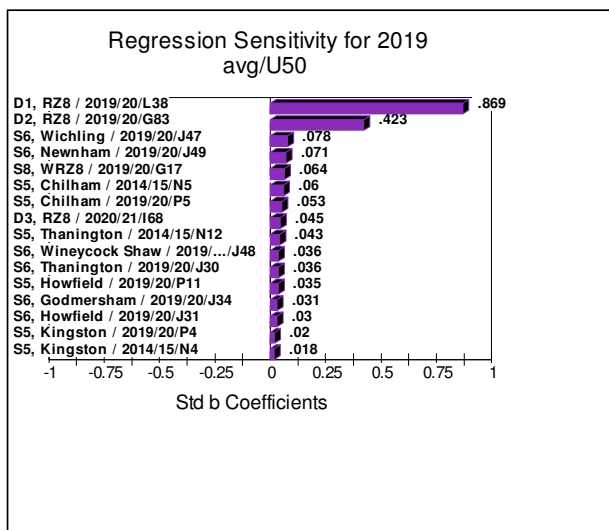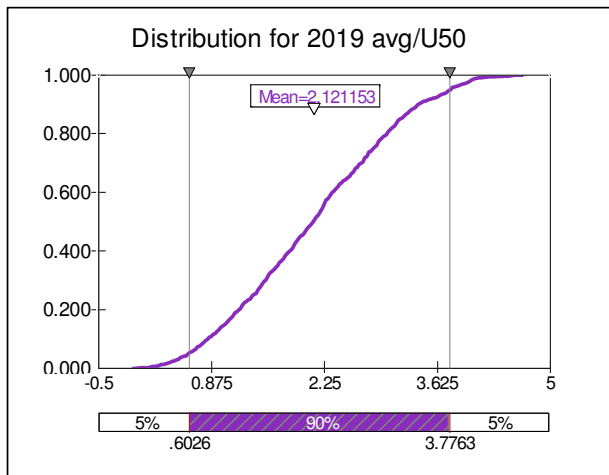| Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-1.18	5%	-0.07
Maximum	2.40	10%	0.10
Mean	0.77	15%	0.23
Std Dev	0.52	20%	0.34
Variance	0.272902273	25%	0.42
Skewness	0.138858735	30%	0.49
Kurtosis	2.967525084	35%	0.55
Median	0.74	40%	0.62
Mode	0.61	45%	0.69
Left X	-0.07	50%	0.74
Left P	5%	55%	0.81
Right X	1.68	60%	0.89
Right P	95%	65%	0.95
Diff X	1.75	70%	1.02
Diff P	90%	75%	1.10
#Errors	0	80%	1.20
Filter Min		85%	1.32
Filter Max		90%	1.48
#Filtered	0	95%	1.68

Regression Sensitivity for 2019
avg/U50

S6, Bewl Bridge Bhs / 2019.../J21 .629
D1, RZ7 / 2019/20/L37 .422
S6, Goudhurst Sourceworks .../J22 .399
S8, WRZ7 / 2019/20/G16 .357
D2, RZ7 / 2019/20/G82 .194
Burham / 2019/20/G11 .161
Bewl Bridge SW / 2019/20/G10 .154
S6, Goudhurst Bh 11 & 13 /.../J23 .112
S6, Bewl Res / 2019/20/J25 .066
D3, RZ7 / 2020/21/I67 .021
S5, Goudhurst / 2019/20/P5 .018
S5, Goudhurst / 2014/15/N5 .017
S5, Goudhurst / 2014/15/N6 .005
-.002 S6, Bewl Res / 2014/15/H25
S5, Lamberhurst / 2014/15/N7 .002
-.002 D2, RZ7 / 2029/30/K82

Std b Coefficients

Sensitivity			
Rank	Name	Regr	Corr
#1	S6, Bewl Bridge	0.629	0.621
#2	D1, RZ7 / 2019/	0.421	0.439
#3	S6, Goudhurst S	0.398	0.377
#4	S8, WRZ7 / 201	0.358	0.339
#5	D2, RZ7 / 2019/	0.194	0.257
#6	Burham / 2019/2	0.161	0.183
#7	Bewl Bridge SW	0.153	0.105
#8	S6, Goudhurst E	0.111	0.145
#9	S6, Bewl Res / 2	0.065	0.010
#10	D3, RZ7 / 2020/	0.021	0.270
#11	S6, Lamberhurs	0.020	-0.001
#12	S5, Goudhurst /	0.018	-0.038
#13	S5, Goudhurst /	0.018	0.078
#14	S5, Goudhurst /	0.004	0.001
#15	S5, Goudhurst /	0.004	-0.010
#16	S5, Lamberhurs	0.001	-0.037

Simulation Results for
RESOURCE ZONE 8 - AVERAGE - 2019

Distribution for 2019 avg/U50

Mean=2.121153

5% 90% 5%
.6026   3.7763

Distribution for 2019 avg/U50

Mean=2.121153

5% 90% 5%
.6026   3.7763

Summary Information	
Workbook Name	RZ8_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	572
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 18:48
Simulation Stop Time	08/11/2013 18:49
Simulation Duration	00:01:34
Random Seed	50

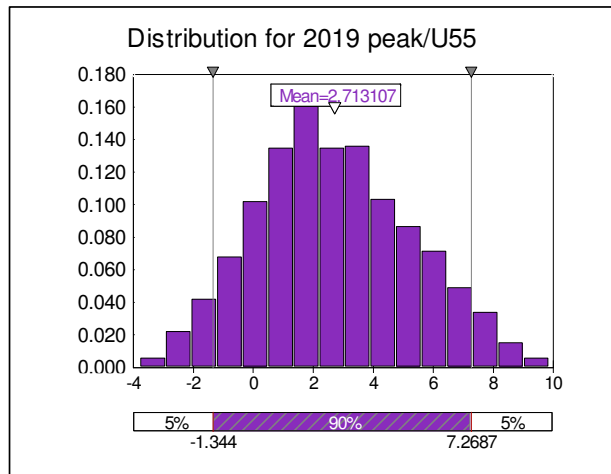| Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-0.08	5%	0.60
Maximum	4.66	10%	0.83
Mean	2.12	15%	1.04
Std Dev	0.96	20%	1.21
Variance	0.9306829	25%	1.39
Skewness	0.11979432	30%	1.52
Kurtosis	2.295727289	35%	1.68
Median	2.12	40%	1.84
Mode	1.87	45%	1.96
Left X	0.60	50%	2.12
Left P	5%	55%	2.23
Right X	3.78	60%	2.35
Right P	95%	65%	2.53
Diff X	3.17	70%	2.69
Diff P	90%	75%	2.86
#Errors	0	80%	3.01
Filter Min		85%	3.17
Filter Max		90%	3.38
#Filtered	0	95%	3.78

Regression Sensitivity for 2019
avg/U50

D1, RZ8 / 2019/20/L38   .869
D2, RZ8 / 2019/20/G83   .423
S6, Wichling / 2019/20/J47   .078
S6, Newnham / 2019/20/J49   .071
S8, WRZ8 / 2019/20/G17   .064
S5, Chilham / 2014/15/N5   .06
S5, Chilham / 2019/20/P5   .053
D3, RZ8 / 2020/21/I68   .045
S5, Thanington / 2014/15/N12   .043
S6, Wineycock Shaw / 2019/.../J48   .036
S6, Thanington / 2019/20/J30   .036
S5, Howfield / 2019/20/P11   .035
S6, Godmersham / 2019/20/J34   .031
S6, Howfield / 2019/20/J31   .03
S5, Kingston / 2019/20/P4   .02
S5, Kingston / 2014/15/N4   .018

-1 -0.75 -0.5 -0.25 0 0.25 0.5 0.75 1

Std b Coefficients

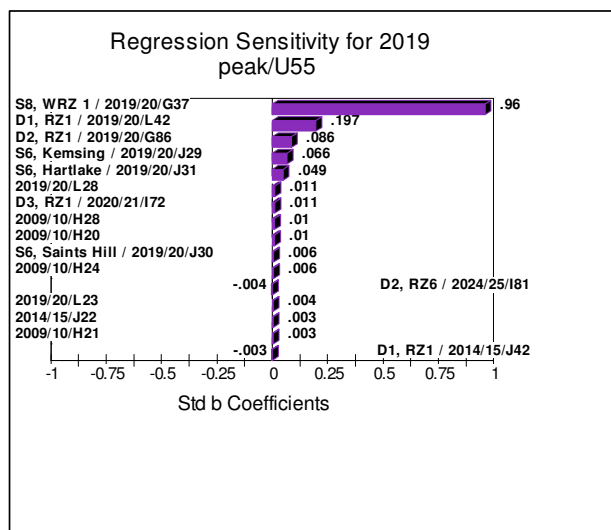| Sensitivity			
Rank	Name	Regr	Corr
#1	D1, RZ8 / 2019/	0.879	0.884
#2	D2, RZ8 / 2019/	0.423	0.398
#3	S6, Wichling / 2	0.080	0.134
#4	S8, WRZ8 / 201	0.075	0.063
#5	S6, Newnham /	0.068	0.074
#6	S5, Godmersha	0.056	0.019
#7	S5, Chilham / 20	0.055	0.061
#8	S5, Chilham / 20	0.054	0.069
#9	S5, Godmersha	0.053	0.016
#10	S5, Thanington	0.047	-0.006
#11	S5, Thanington	0.047	0.061
#12	S6, Thanington	0.039	0.078
#13	D3, RZ8 / 2020/	0.039	0.083
#14	S5, Howfield / 2	0.037	0.024
#15	S6, Wineycock	0.035	0.051
#16	S5, Howfield / 2	0.034	-0.027

Appendix D

DYCP Resource Zone Tornado Plots

Simulation Results for
RESOURCE ZONE 1 - PEAK - 2019

Distribution for 2019 peak/U55

Mean=2.713107

5% — 90% — 5%
-1.344 — 7.2687

Distribution for 2019 peak/U55

Mean=2.713107

5% — 90% — 5%
-1.344 — 7.2687

Regression Sensitivity for 2019 peak/U55

S8, WRZ 1 / 2019/20/G37	.96
D1, RZ1 / 2019/20/L42	.197
D2, RZ1 / 2019/20/G86	.086
S6, Kemsing / 2019/20/J29	.066
S6, Hartlake / 2019/20/J31	.049
2019/20/L28	.011
D3, RZ1 / 2020/21/I72	.011
2009/10/H28	.01
2009/10/H20	.01
S6, Saints Hill / 2019/20/J30	.006
2009/10/H24	.006
	-.004 (D2, RZ6 / 2024/25/I81)
2019/20/L23	.004
2014/15/J22	.003
2009/10/H21	.003
	-.003 (D1, RZ1 / 2014/15/J42)

Std b Coefficients

Summary Information

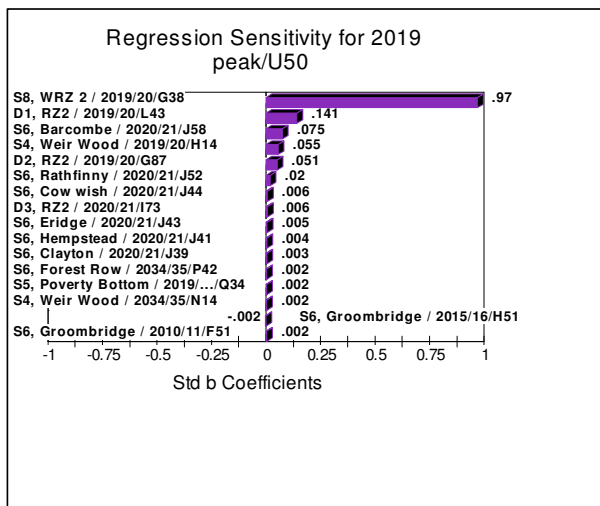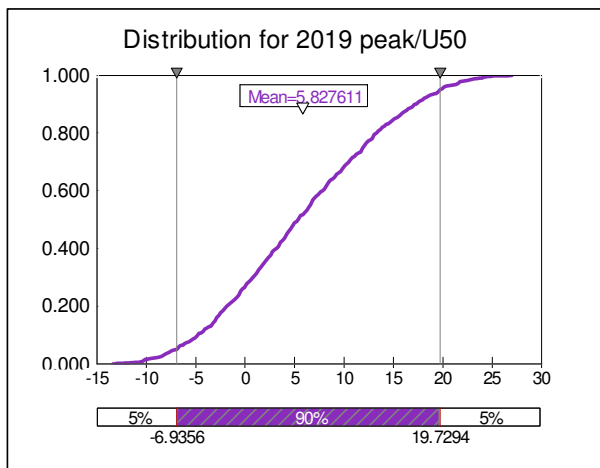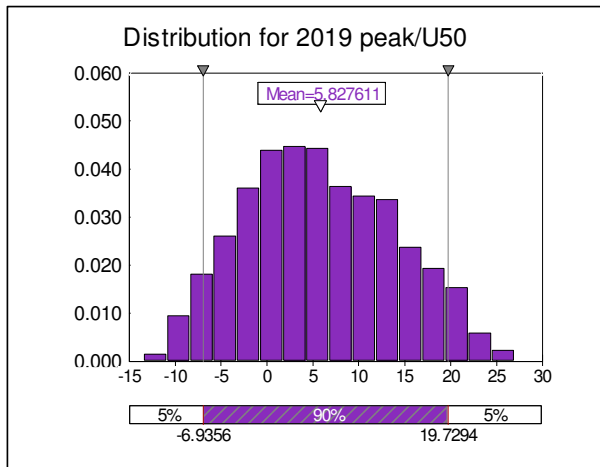|	
Workbook Name	RZ1_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	482
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 19:02
Simulation Stop Time	08/11/2013 19:04
Simulation Duration	00:01:31
Random Seed	1613929339
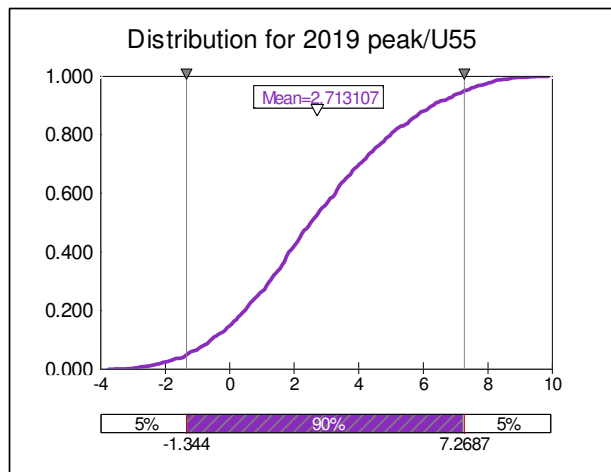
Summary Statistics

Statistic	Value	%tile	Value
Minimum	-3.76	5%	-1.34
Maximum	9.88	10%	-0.58
Mean	2.71	15%	0.00
Std Dev	2.58	20%	0.46
Variance	6.650264123	25%	0.84
Skewness	0.210125389	30%	1.24
Kurtosis	2.555124306	35%	1.59
Median	2.51	40%	1.83
Mode	2.20	45%	2.17
Left X	-1.34	50%	2.51
Left P	5%	55%	2.85
Right X	7.27	60%	3.28
Right P	95%	65%	3.59
Diff X	8.61	70%	4.01
Diff P	90%	75%	4.47
#Errors	0	80%	4.98
Filter Min		85%	5.61
Filter Max		90%	6.28
#Filtered	0	95%	7.27

Sensitivity

Rank	Name	Regr	Corr
#1	S8, WRZ 1 / 20	0.960	0.971
#2	D1, RZ1 / 2019/	0.196	0.226
#3	D2, RZ1 / 2019/	0.087	0.042
#4	S6, Kemsing / 2	0.067	0.036
#5	S6, Hartlake / 20	0.050	0.053
#6	S6, Tonbridge (	0.028	0.018
#7	S6, Cramptons	0.017	-0.021
#8	D3, RZ1 / 2020/	0.010	0.705
#9	2009/10 / H28	0.010	0.050
#10	2019/20 / L28	0.010	0.044
#11	2014/15 / J28	0.010	0.009
#12	2014/15 / J20	0.009	-0.017
#13	2009/10 / H20	0.009	0.031
#14	2019/20 / L20	0.008	0.020
#15	S6, Saints Hill /	0.005	0.045
#16	S6, Oak Lane /	0.004	0.022

Simulation Results for
RESOURCE ZONE 2 - PEAK - 2019

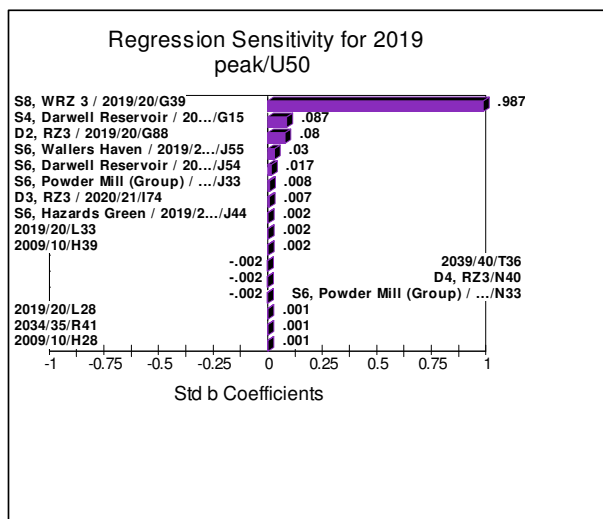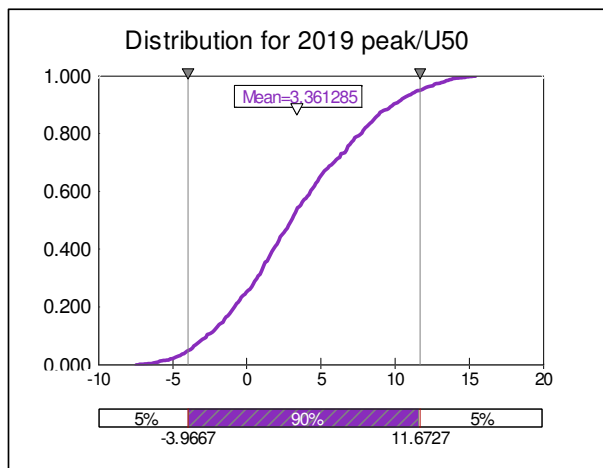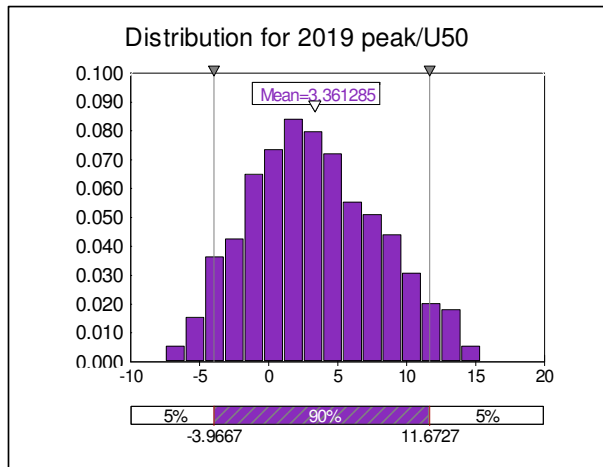Distribution for 2019 peak/U50

Distribution for 2019 peak/U50

Regression Sensitivity for 2019 peak/U50

Summary Information	
Workbook Name	RZ2_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	607
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 17:11
Simulation Stop Time	08/11/2013 17:13
Simulation Duration	00:01:38
Random Seed	50

Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-13.37	5%	-6.94
Maximum	27.01	10%	-4.84
Mean	5.83	15%	-3.06
Std Dev	8.20	20%	-1.85
Variance	67.29288391	25%	-0.57
Skewness	0.155685349	30%	0.80
Kurtosis	2.326005268	35%	1.92
Median	5.35	40%	3.25
Mode	-0.59	45%	4.19
Left X	-6.94	50%	5.35
Left P	5%	55%	6.58
Right X	19.73	60%	7.85
Right P	95%	65%	9.08
Diff X	26.67	70%	10.48
Diff P	90%	75%	11.90
#Errors	0	80%	13.30
Filter Min		85%	15.13
Filter Max		90%	17.01
#Filtered	0	95%	19.73

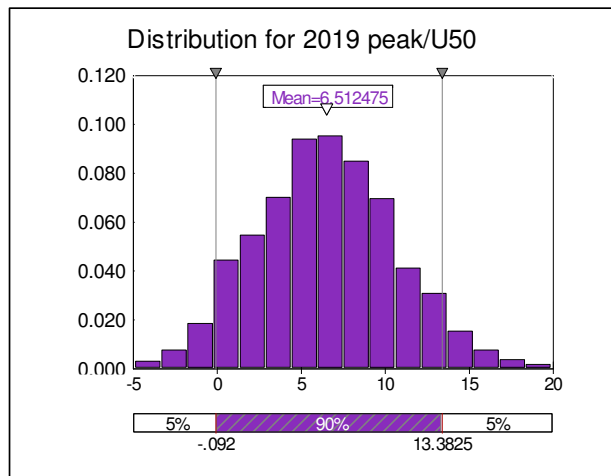| Sensitivity			
Rank	Name	Regr	Corr
#1	S8, WRZ 2 / 20	0.971	0.985
#2	D1, RZ2 / 2019/	0.141	0.182
#3	S6, Barcombe /	0.075	0.075
#4	S4, Weir Wood	0.055	0.057
#5	D2, RZ2 / 2019/	0.051	0.079
#6	S6, Rathfinny /	0.018	-0.038
#7	S6, Poverty Bot	0.015	0.013
#8	S6, Groombridg	0.010	-0.002
#9	S6, Cow wish /	0.007	-0.049
#10	D3, RZ2 / 2020/	0.005	0.728
#11	S6, Eridge / 202	0.003	0.041
#12	S6, Hempstead	0.003	0.077
#13	S6, Saddlescom	0.003	0.024
#14	S6, Cockhaise V	0.002	0.025
#15	S6, Clayton / 20	0.002	0.038
#16	S5, Rathfinny /	0.002	0.013

Simulation Results for
RESOURCE ZONE 3 - PEAK - 2019

Distribution for 2019 peak/U50

Mean=3,361285

5%	90%	5%
-3.9667		11.6727

Distribution for 2019 peak/U50

Mean=3,361285

5%	90%	5%
-3.9667		11.6727

Regression Sensitivity for 2019 peak/U50

Std b Coefficients

| Summary Information	
Workbook Name	RZ3_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	653
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 17:41
Simulation Stop Time	08/11/2013 17:43
Simulation Duration	00:01:40
Random Seed	50

Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-7.45	5%	-3.97
Maximum	15.39	10%	-2.71
Mean	3.36	15%	-1.60
Std Dev	4.68	20%	-0.85
Variance	21.88641409	25%	-0.07
Skewness	0.226060037	30%	0.70
Kurtosis	2.468286734	35%	1.20
Median	2.97	40%	1.81
Mode	2.10	45%	2.38
Left X	-3.97	50%	2.97
Left P	5%	55%	3.56
Right X	11.67	60%	4.29
Right P	95%	65%	4.90
Diff X	15.64	70%	5.83
Diff P	90%	75%	6.78
#Errors	0	80%	7.70
Filter Min		85%	8.56
Filter Max		90%	9.85
#Filtered	0	95%	11.67

Sensitivity			
Rank	Name	Regr	Corr
#1	S8, WRZ 3 / 20	0.986	0.991
#2	S4, Darwell Res	0.087	0.094
#3	D2, RZ3 / 2019/	0.079	0.038
#4	S6, Wallers Hav	0.030	0.075
#5	S6, Darwell Res	0.017	0.035
#6	S6, Cornish / 20	0.010	-0.012
#7	S6, Friston & De	0.009	0.020
#8	S6, Powder Mill	0.009	0.052
#9	D3, RZ3 / 2020/	0.008	0.722
#10	S6, Birling Farm	0.006	0.004
#11	S6, Sweet Willo	0.005	0.018
#12	S6, Crowhurst B	0.005	0.007
#13	S6, Wallers Hav	0.004	-0.013
#14	S6, Water Work	0.003	0.004
#15	S6, Hazards Gre	0.003	-0.042
#16	2019/20 / L30	0.002	0.008

Simulation Results for
## RESOURCE ZONE 4 - PEAK - 2019

Distribution for 2019 peak/U50

Mean=6,512475

5%	90%	5%
-.092		13.3825

Distribution for 2019 peak/U50

Mean=6,512475

5%	90%	5%
-.092		13.3825

Regression Sensitivity for 2019 peak/U50

Label	Value
S8, WRZ 4 / 2019/20/G40	.735
D1, RZ4 / 2019/20/L45	.567
D2, RZ4 / 2019/20/G89	.219
S6, Bray Gravels / 2019/20.../J39	.175
S6, Boxalls Lane Chalk / 2.../J30	.131
S6, College Avenue / 2019/.../J40	.095
S6, Lasham / 2019/20/J34	.079
S6, West Ham Park / 2019/2.../J38	.062
S6, Cookham / 2019/20/J27	.051
S6, Beenhams Heath (includ.../J43	.05
S6, West Ham PS / 2019/20/J37	.036
D3, RZ4 / 2020/21/I75	.026
S6, Boxalls Lane GS / 2019.../J31	.016
2019/20/L38	.014
2014/15/J36	.012
2009/10/H35	.011

Std b Coefficients

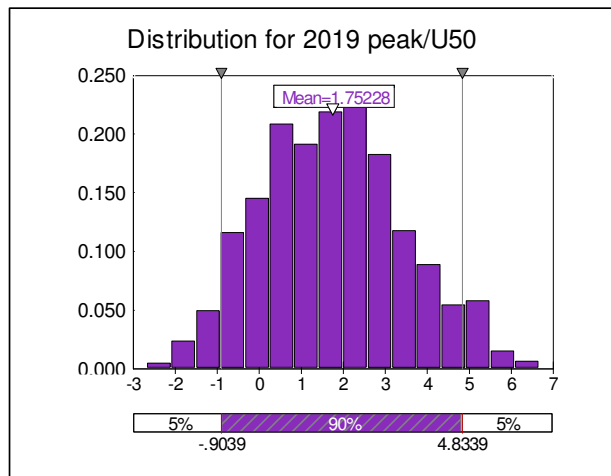| Summary Information	
Workbook Name	RZ4_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	590
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 18:04
Simulation Stop Time	08/11/2013 18:06
Simulation Duration	00:01:36
Random Seed	50
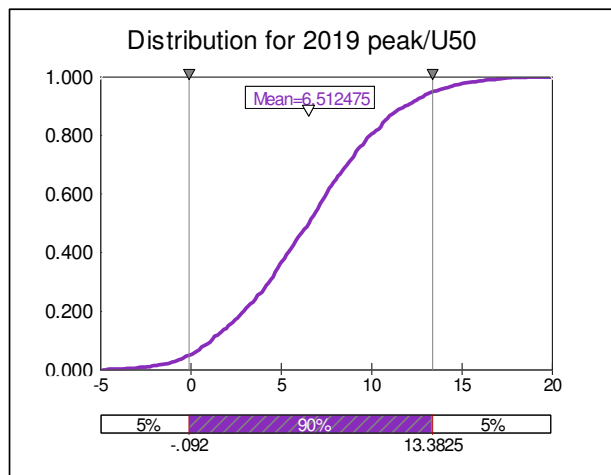
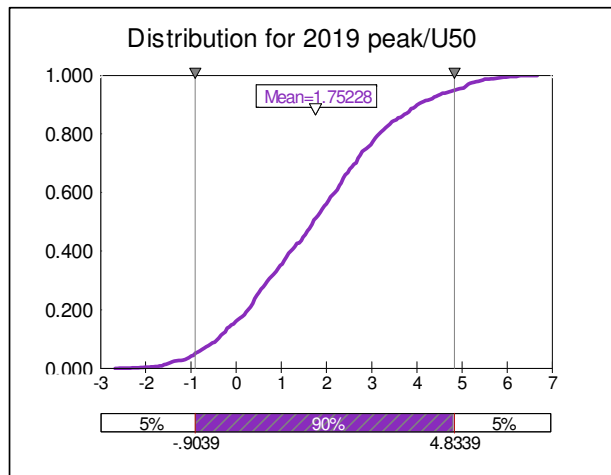| Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-4.87	5%	-0.09
Maximum	19.92	10%	1.15
Mean	6.51	15%	2.06
Std Dev	4.13	20%	2.87
Variance	17.02722177	25%	3.63
Skewness	0.136699159	30%	4.34
Kurtosis	2.882676342	35%	4.81
Median	6.52	40%	5.37
Mode	7.64	45%	5.90
Left X	-0.09	50%	6.52
Left P	5%	55%	7.04
Right X	13.38	60%	7.48
Right P	95%	65%	8.02
Diff X	13.47	70%	8.66
Diff P	90%	75%	9.21
#Errors	0	80%	9.90
Filter Min		85%	10.73
Filter Max		90%	11.84
#Filtered	0	95%	13.38
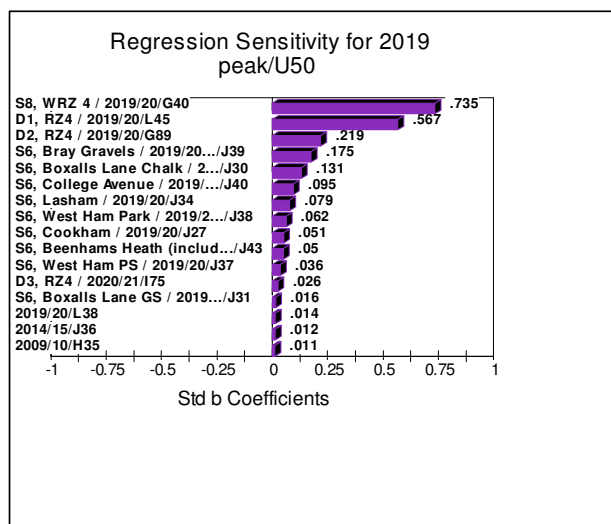
Sensitivity			
Rank	Name	Regr	Corr
#1	S8, WRZ 4 / 20	0.736	0.717
#2	D1, RZ4 / 2019/	0.567	0.549
#3	D2, RZ4 / 2019/	0.221	0.201
#4	S6, Bray Gravel	0.177	0.206
#5	S6, Boxalls Lan	0.132	0.108
#6	S6, College Ave	0.094	0.111
#7	S6, Lasham / 20	0.078	0.057
#8	S6, West Ham F	0.063	0.088
#9	S6, Cookham / 2	0.050	0.033
#10	S6, Beenhams	0.048	0.034
#11	S6, West Ham F	0.035	0.061
#12	D3, RZ4 / 2020/	0.026	0.543
#13	S6, Boxalls Lan	0.018	0.033
#14	S6, Itchel / 2019	0.017	-0.014
#15	S6, Tongham / 2	0.016	0.012
#16	S6, Woodgarsto	0.015	0.025

Simulation Results for
## RESOURCE ZONE 5 - PEAK - 2019

Distribution for 2019 peak/U50

Mean=1.75228

| | 5% | 90% | 5% |
| -.9039 | | | 4.8339 |

Distribution for 2019 peak/U50

Mean=1.75228

| | 5% | 90% | 5% |
| -.9039 | | | 4.8339 |

Regression Sensitivity for 2019 peak/U50

	Std b Coefficients
S8, WRZ 5 / 2019/20/G41	.918
D1, RZ5 / 2019/20/L46	.272
D2, RZ5 / 2019/20/G90	.211
S6, Greatham / 2019/20/J29	.085
S6, Headley park / 2019/20.../J37	.056
S6, Sheet / 2019/20/J40	.035
D3, RZ5 / 2020/21/I76	.014
2009/10/H31	.014
S6, Oakhanger (including o.../J34	.013
2019/20/L31	.011
2019/20/L28	.011
S6, Tilford Meads / 2019/2.../J25	.011
2014/15/J32	.01
2019/20/L23	.009
2019/20/L25	.008
2009/10/H28	.007

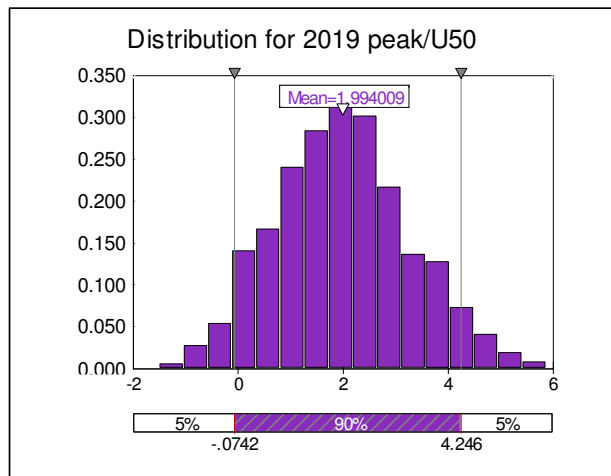| Summary Information	
Workbook Name	RZ5_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	510
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 18:16
Simulation Stop Time	08/11/2013 18:18
Simulation Duration	00:01:34
Random Seed	50

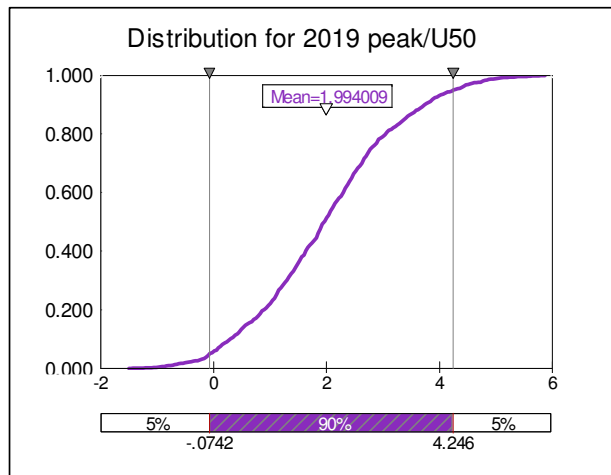| Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-2.67	5%	-0.90
Maximum	6.67	10%	-0.42
Mean	1.75	15%	-0.07
Std Dev	1.70	20%	0.25
Variance	2.896005242	25%	0.46
Skewness	0.213882516	30%	0.70
Kurtosis	2.619213946	35%	0.97
Median	1.69	40%	1.21
Mode	1.65	45%	1.50
Left X	-0.90	50%	1.69
Left P	5%	55%	1.93
Right X	4.83	60%	2.18
Right P	95%	65%	2.37
Diff X	5.74	70%	2.63
Diff P	90%	75%	2.89
#Errors	0	80%	3.17
Filter Min		85%	3.56
Filter Max		90%	4.02
#Filtered	0	95%	4.83
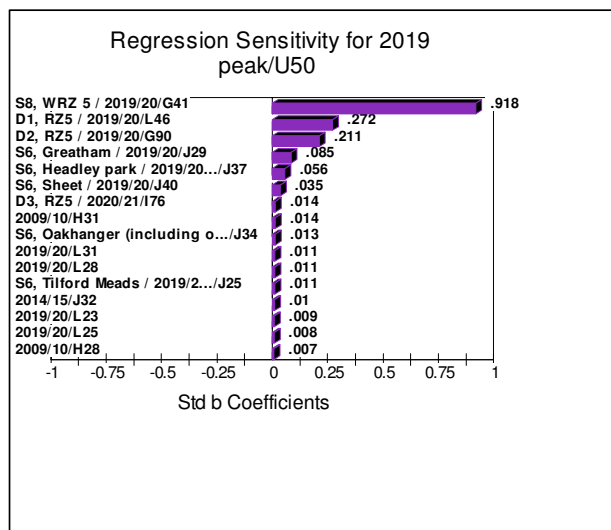
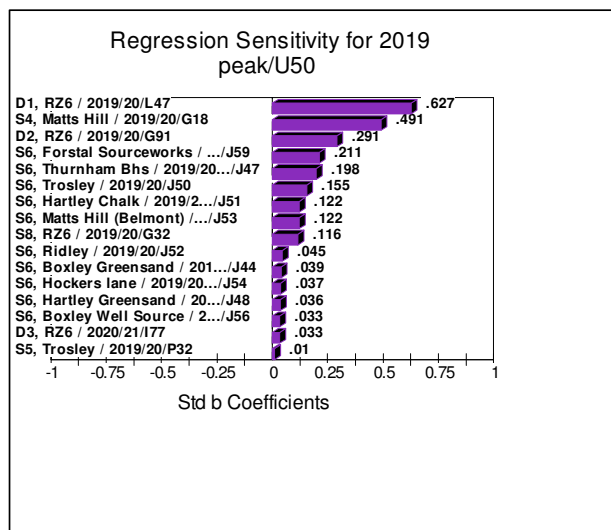| Sensitivity			
Rank	Name	Regr	Corr
#1	S8, WRZ 5 / 20	0.924	0.934
#2	D1, RZ5 / 2019/	0.271	0.211
#3	D2, RZ5 / 2019/	0.215	0.219
#4	S6, Greatham /	0.084	0.124
#5	S6, Britty Hill / 2	0.067	0.016
#6	S6, Headley pan	0.057	0.021
#7	S6, Sheet / 2019	0.032	0.023
#8	S6, Oakhanger	0.014	0.045
#9	D3, RZ5 / 2020/	0.013	0.706
#10	S6, Tilford Mead	0.011	0.029
#11	2019/20 / L31	0.011	0.027
#12	2014/15 / J31	0.010	0.007
#13	2014/15 / J24	0.010	-0.008
#14	2019/20 / L32	0.009	0.001
#15	S6, Hindhead To	0.009	0.049
#16	2009/10 / H32	0.009	-0.009

Simulation Results for
RESOURCE ZONE 6 - PEAK - 2019

Distribution for 2019 peak/U50

Mean=1.994009

5%	90%	5%
-.0742		4.246

Distribution for 2019 peak/U50

Mean=1.994009

5%	90%	5%
-.0742		4.246

Regression Sensitivity for 2019 peak/U50

	Std b Coefficients
D1, RZ6 / 2019/20/L47	.627
S4, Matts Hill / 2019/20/G18	.491
D2, RZ6 / 2019/20/G91	.291
S6, Forstal Sourceworks / …/J59	.211
S6, Thurnham Bhs / 2019/20…/J47	.198
S6, Trosley / 2019/20/J50	.155
S6, Hartley Chalk / 2019/2…/J51	.122
S6, Matts Hill (Belmont) /…/J53	.122
S8, RZ6 / 2019/20/G32	.116
S6, Ridley / 2019/20/J52	.045
S6, Boxley Greensand / 201…/J44	.039
S6, Hockers lane / 2019/20…/J54	.037
S6, Hartley Greensand / 20…/J48	.036
S6, Boxley Well Source / 2…/J56	.033
D3, RZ6 / 2020/21/I77	.033
S5, Trosley / 2019/20/P32	.01

Summary Information

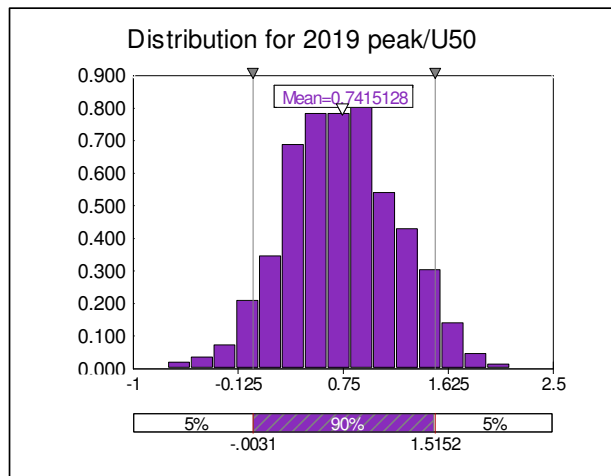| Workbook Name	RZ6_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	629
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 18:26
Simulation Stop Time	08/11/2013 18:28
Simulation Duration	00:01:58
Random Seed	50

Summary Statistics

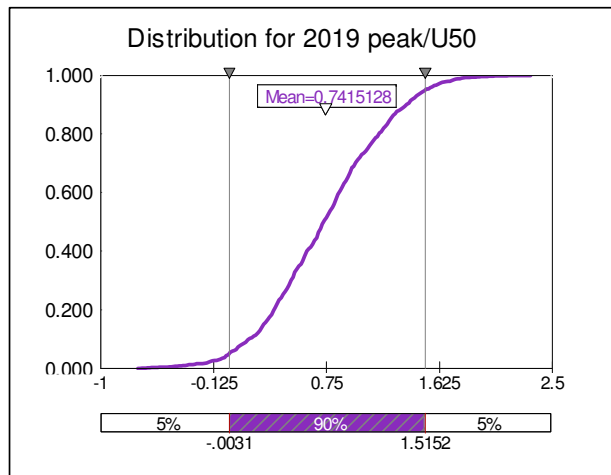| Statistic	Value	%tile	Value
Minimum	-1.50	5%	-0.07
Maximum	5.87	10%	0.30
Mean	1.99	15%	0.59
Std Dev	1.29	20%	0.87
Variance	1.66326124	25%	1.11
Skewness	0.178080897	30%	1.29
Kurtosis	2.789730725	35%	1.47
Median	1.96	40%	1.63
Mode	2.64	45%	1.84
Left X	-0.07	50%	1.96
Left P	5%	55%	2.12
Right X	4.25	60%	2.29
Right P	95%	65%	2.44
Diff X	4.32	70%	2.63
Diff P	90%	75%	2.79
#Errors	0	80%	3.04
Filter Min		85%	3.37
Filter Max		90%	3.73
#Filtered	0	95%	4.25

Sensitivity

Rank	Name	Regr	Corr
#1	D1, RZ6 / 2019/	0.630	0.667
#2	S4, Matts Hill / 2	0.495	0.545
#3	D2, RZ6 / 2019/	0.295	0.276
#4	S6, Forstal Sour	0.212	0.206
#5	S6, Thurnham E	0.197	0.209
#6	S6, Trosley / 20	0.159	0.164
#7	S6, Hartley Cha	0.123	0.138
#8	S6, Matts Hill (B	0.121	0.089
#9	S8, RZ6 / 2019/	0.116	0.382
#10	S6, Paddleswor	0.049	-0.017
#11	S6, Ridley / 201	0.047	0.061
#12	S6, Boxley Gree	0.040	0.049
#13	S6, Hockers lan	0.037	0.073
#14	S6, Hartley Gree	0.036	0.033
#15	S6, Boxley Well	0.035	0.052
#16	S6, Ryarsh / 20	0.033	0.011

D-6

Simulation Results for
RESOURCE ZONE 7 - PEAK - 2019

Distribution for 2019 peak/U50

Mean=0.7415128

5%	90%	5%
	-.0031	1.5152

Distribution for 2019 peak/U50

Mean=0.7415128

5%	90%	5%
	-.0031	1.5152

Regression Sensitivity for 2019 peak/U50

D1, RZ7 / 2019/20/L48	.598
S8, WRZ7 / 2019/20/G33	.582
D2, RZ7 / 2019/20/G92	.27
Burham / 2019/20/G16	.269
DO estimate / 2019/20/I19	.259
DO estimate / 2019/20/I16	.248
Bewl Bridge SW / 2019/20/G15	.196
DO estimate / 2019/20/I17	.155
DO estimate / 2019/20/I21	.135
DO estimate / 2019/20/I23	.095
DO estimate / 2019/20/I18	.062
D3, RZ7 / 2020/21/I78	.028
S5, Goudhurst / 2014/15/N16	.02
S5, Goudhurst / 2019/20/P16	.02
S5, Goudhurst / 2019/20/P17	.005
S5, Lamberhurst / 2019/20/P18	.005

Std b Coefficients

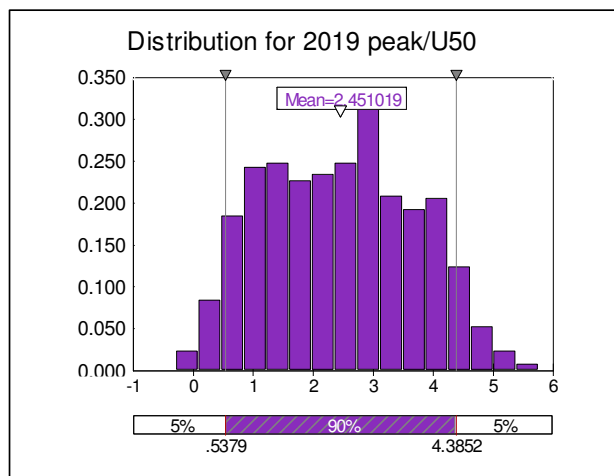| Summary Information	
Workbook Name	RZ7_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	308
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 18:39
Simulation Stop Time	08/11/2013 18:40
Simulation Duration	00:01:32
Random Seed	50

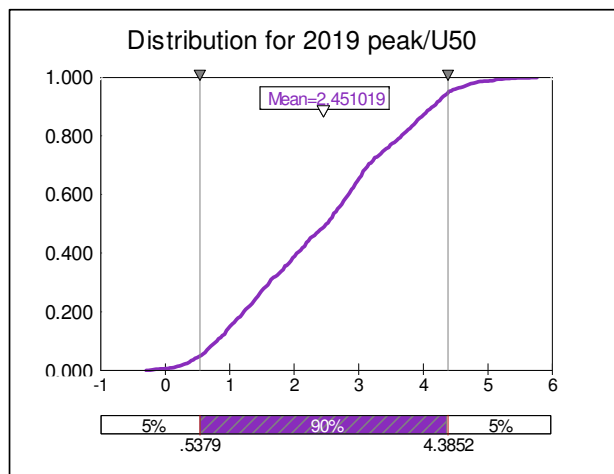| Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-0.71	5%	0.00
Maximum	2.33	10%	0.15
Mean	0.74	15%	0.26
Std Dev	0.47	20%	0.34
Variance	0.219146979	25%	0.41
Skewness	0.062438971	30%	0.47
Kurtosis	2.892320616	35%	0.54
Median	0.72	40%	0.60
Mode	0.59	45%	0.68
Left X	0.00	50%	0.72
Left P	5%	55%	0.80
Right X	1.52	60%	0.85
Right P	95%	65%	0.91
Diff X	1.52	70%	0.97
Diff P	90%	75%	1.07
#Errors	0	80%	1.16
Filter Min		85%	1.24
Filter Max		90%	1.37
#Filtered	0	95%	1.52
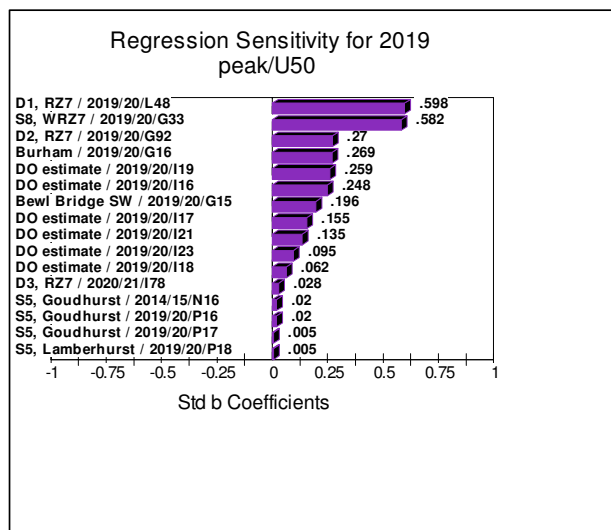
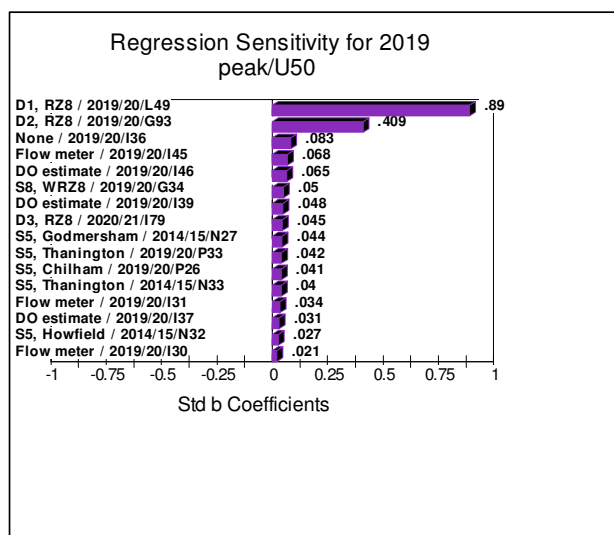| Sensitivity			
Rank	Name	Regr	Corr
#1	D1, RZ7 / 2019/	0.599	0.575
#2	S8, WRZ7 / 201	0.582	0.514
#3	D2, RZ7 / 2019/	0.270	0.230
#4	Burham / 2019/2	0.269	0.231
#5	DO estimate / 2	0.259	0.236
#6	DO estimate / 2	0.248	0.231
#7	Bewl Bridge SW	0.195	0.176
#8	DO estimate / 2	0.155	0.097
#9	DO estimate / 2	0.135	0.077
#10	DO estimate / 2	0.095	0.071
#11	DO estimate / 2	0.062	0.077
#12	D3, RZ7 / 2020/	0.028	0.429
#13	S5, Goudhurst /	0.020	0.022
#14	S5, Goudhurst /	0.020	-0.013
#15	S5, Goudhurst /	0.005	0.049
#16	S5, Goudhurst /	0.005	0.000

Simulation Results for
RESOURCE ZONE 8 - PEAK - 2019

Distribution for 2019 peak/U50

Mean=2,451019

5%	90%	5%
.5379		4.3852

Distribution for 2019 peak/U50

Mean=2,451019

5%	90%	5%
.5379		4.3852

Regression Sensitivity for 2019 peak/U50

D1, RZ8 / 2019/20/L49	.89
D2, RZ8 / 2019/20/G93	.409
None / 2019/20/I36	.083
Flow meter / 2019/20/I45	.068
DO estimate / 2019/20/I46	.065
S8, WRZ8 / 2019/20/G34	.05
DO estimate / 2019/20/I39	.048
D3, RZ8 / 2020/21/I79	.045
S5, Godmersham / 2014/15/N27	.044
S5, Thanington / 2019/20/P33	.042
S5, Chilham / 2019/20/P26	.041
S5, Thanington / 2014/15/N33	.04
Flow meter / 2019/20/I31	.034
DO estimate / 2019/20/I37	.031
S5, Howfield / 2014/15/N32	.027
Flow meter / 2019/20/I30	.021

Std b Coefficients

Summary Information	
Workbook Name	RZ8_v4.6.xls
Number of Simulations	1
Number of Iterations	1000
Number of Inputs	572
Number of Outputs	2
Sampling Type	Monte Carlo
Simulation Start Time	08/11/2013 18:48
Simulation Stop Time	08/11/2013 18:49
Simulation Duration	00:01:34
Random Seed	50

Summary Statistics			
Statistic	Value	%tile	Value
Minimum	-0.29	5%	0.54
Maximum	5.76	10%	0.80
Mean	2.45	15%	0.99
Std Dev	1.24	20%	1.21
Variance	1.539637308	25%	1.42
Skewness	0.080286341	30%	1.61
Kurtosis	2.142735722	35%	1.84
Median	2.50	40%	2.04
Mode	3.06	45%	2.25
Left X	0.54	50%	2.50
Left P	5%	55%	2.67
Right X	4.39	60%	2.84
Right P	95%	65%	2.98
Diff X	3.85	70%	3.14
Diff P	90%	75%	3.38
#Errors	0	80%	3.66
Filter Min		85%	3.90
Filter Max		90%	4.14
#Filtered	0	95%	4.39

Sensitivity			
Rank	Name	Regr	Corr
#1	D1, RZ8 / 2019/	0.895	0.896
#2	D2, RZ8 / 2019/	0.414	0.357
#3	None / 2019/20	0.082	0.123
#4	Flow meter / 20	0.067	0.042
#5	DO estimate / 2	0.061	0.026
#6	DO estimate / 2	0.050	0.036
#7	S8, WRZ8 / 201	0.050	0.100
#8	S5, Godmersha	0.044	0.005
#9	S5, Chilham / 20	0.044	-0.021
#10	D3, RZ8 / 2020/	0.043	0.107
#11	S5, Godmersha	0.042	0.048
#12	S5, Chilham / 20	0.042	0.060
#13	S5, Thanington	0.042	0.081
#14	S5, Thanington	0.041	0.040
#15	DO estimate / 2	0.033	0.063
#16	Flow meter / 20	0.032	0.064