2014 Price Review
Business Plan Supporting Appendices
Network Management

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Executive Summary

This appendix summarises our approach to Network Management.

The appendix focuses on three elements of our approach to network management, which are:-

1. The development of our Water Resources Management Plan (WRMP) which sets out how we will supply water to each water resource zone (WRZ)
2. How we use regional network strategies to ensure that water can be delivered given our increasing demand in the long term and growing population in 2015-20 and beyond
3. How we optimise the daily operation of our sources to ensure we operate as efficiently as we can within the constraints we have.

As a company we operate with limited spare capacity in design events (dry years). This means our ability to optimise is reduced. It also means we have an extensive investment programme in new water resources and demand management schemes to manage the supply demand balance, and just as importantly, have additions in our network to distribute the water effectively. Those new supply schemes are not always close to where the demand is.

In normal years we have some flexibility to operate our sources and use MISER our optimisation tool, to determine our approach to optimisation, this is driven by the desire to keep operating costs as low as possible. We cannot operate our sources on a totally economic analysis because of constraints such as licences, impacts on the environment and ensuring we do not deplete resources for subsequent years.

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Section 1. Background

This Appendix is structured into two parts. The first part summarises our approach to network management and in particular focuses on:-

- How we operate our network (given we have no spare capacity under design conditions);
- Our approach to improving our network as demand changes via our regional network strategies
- Our approach to optimisation to minimise costs;

The second part provides specific responses to the questions posed by Ofwat.

Our Approach to Network Management

Like other companies in the South East of England, faced with rising populations and new properties as well as a slowly growing commercial demand, under design conditions we currently operate with no spare capacity in our supply demand balance. In cool or wet years we do have spare capacity and we can optimise our use of sources, but in dry or hot years we have to utilise our sources to the maximum of their deployable output.

There are three broad elements to Network Management.

1. The first is maintaining the supply demand balance at a network level by developing new schemes (either demand management or supply schemes) in a timely manner. We have used the WRSE project to help define our supply demand balance, and this is included in our Revised Water Resources Management Plan (rWRMP)
2. In key areas of our network our mains and service reservoirs are also at capacity and, as in previous submissions, we have identified significant investment required to ensure;
    a. existing supplies can be distributed in a more flexible way;
    b. that new supplies can be utilised in the network;
    c. That peak demands can be met
    d. and that supplies can be maintained to existing and new customers as new connections are made and existing commercial demands (mainly from the agricultural sector) increase.

    Essentially network strategies are required to ensure we have a flexible system to distribute water, thus minimising our investment in new water resource schemes and also ensuring levels of service are met during outage events. They are key to the delivery of our WRMP.
3. Thirdly, in years where demand is at or below average we can optimise sources to minimise costs, whilst ensuring we do not increase risk on next year's supplies or on the environment

The approach we have adopted for both our supply demand balance and network strategies is consistent with the WRMP Guideline. We will develop new supplies and demand management options in a timely manner, but there will not be surpluses of water in our plan in design events. Our strategy, as set out in our rWRMP, broadly consists of three phases:

- An initial phase of demand management to reduce consumption
- A second phase of maximising the output from existing sources, which requires regional strategies to distribute the new water obtained
- A final phase of investment in new schemes to increase local abstraction or transfer water

from neighbouring water companies. This third stage will also require future investment in our distribution network.

This investment will meet levels of service, but it is important to recognise that throughout the planning period, and especially in 2015-20, all our sources will be operated at full capacity during hot years or during a drought. The rWRMP is a stand-alone document and is not described here in any detail. The link between the rWRMP and Network Strategies is key to how we manage the network and the links are described below.

Network Strategies and the rWRMP

In order to manage our network we have to invest in it, in particular to incorporate new growth. We have identified Network Strategies which will allow us to deliver the increases in demand that will occur from both existing sources and new resource schemes. Like our rWRMP, our approach to optimising mains has been to make the best use of what we have initially, by developing all-mains models, and then identifying new mains to meet increasing demand.

As described above the WRMP ensures there is sufficient water available to supply the additional properties but Network Strategies are also required to identify the investment required to transfer water from new or existing sources to areas of growth. Without this expenditure there will be an increase in low pressure complaints and interruptions in some areas. It is also important that proposals for 2015-20 are part of a long term investment strategy for growth for the trunk main transfer system for our eight Water Resource Zones.

The costs of Network Strategies are essentially independent of the supply scheme selected because a supply scheme will take the water to the service reservoir nearest to its point of entry into the RZ. The network strategies allow that water to then be distributed to areas of growth. In our experience it has been very difficult to allocate costs of these network strategies to developments because the costs have to be born before the development is built, and because of the nature of development it is difficult to allocate the costs to a specific development scheme.

Network strategies also support the work to transfer water from neighbouring companies, for instance our network has the lowest capacity at the ends of our supply areas, whilst bulk transfers are almost always delivered to a supply boundary. Network strategies help us to ensure we can fully utilise transfers, consistent with current guidance and the Water White Paper.

The Network Strategy studies undertaken for the 2014 Price Review (PR14) are based around maintaining the supply/demand balance in each Resource Zone (RZ) over the 25 year planning horizon. We have calibrated hydraulic models available of its entire supply network which were used: -

1. To identify whether existing assets are sufficient to accommodate planned water resource and demand developments

2. To determine the scope of works necessary to deliver the resources outputs to meet future demand whilst maintaining adequate levels of service.

Other objectives were also specified:

3. To continue our policy of creating a true system of trunk mains for bulk water transfers, allowing for greater resilience and control.

4. To facilitate the use and integrity of district metered areas for local distribution systems, together with associated flow measurement and pressure management to control and identify leakage.

5. To assess the provision and availability of storage in accordance with our policy and identify schemes to maintain those standards.

6. To identify opportunities to improve control within the network by inclusion of remotely controlled equipment via corporate telemetry systems.

7. To develop all the above objectives into an integrated investment strategy to meet the forecast developments in water resources and customer demands.

Three 25 year horizon "long term" models were produced which show the water resources and demands forecast for each group of resource zones in 2040 together with further snapshots of the development of the supply/demand balance at 2015 , 2020 and 2025.

Once our supply and network capacity are linked we can consider how to optimise that network on a daily basis. This is described below.

All mains models and Local Network Strategy

The network models also enable us to investigate how local changes to the configuration of the distribution network may also improve the efficiency of the network, by optimising the use of resources and reducing leakage through better pressure management. In 2005-2010 models were available in RZ 6, 7 and 8 and these were used to identify opportunities for optimisation which would involve the installation of pressure reducing valves, meters and sometimes boundary valves. In some locations laying short lengths of main enables small areas to be rezoned to allow an overall lowering of pressures in the network without failing levels of service to any customers. This not only reduces night lines but also losses due to burst mains where pressures are more stable.

We continued with the relatively small investment required to achieve benefits in the Eastern area into 2010-15 but also embarked on an All mains model build programme for RZ 1-5 as it was important to understand the impact of new development and other changes on the water supply network. These models were used in the development of the regional network strategy described above and also in the assessment of measures to optimise network performance locally. During 2010-15 small schemes that have immediate financial benefit in Opex or deferred capital investment have been prioritised. An explanation of the benefits and their financial value is set out in the Supporting Appendix: Network Strategy.

The plan for 2015-20 is to progress schemes which defer resource development through demand management as part of our WRMP. They will be more effective if designed within the context of the regional supply strategy but this has also given us the opportunity to reconsider our requirement for some of the larger regional schemes in the current financial climate on the basis that some risk can be removed through smaller local activity.

Cost Optimisation

One of our key initiatives for 2015-20 is to further enhance our network optimisation. This means

that in years where we have spare capacity we can focus on delivering water at the lowest cost without risking future supplies or by impacting on the environment.

We utilises Miser, developed by Tynemarch, which is a highly configurable and flexible suite of decision-support tools for optimal water management, asset and resource planning. Miser is in regular use within the water industry to solve a wide variety of operational and investment planning problems including:

1. Monthly production planning;
2. Water resources planning;
3. Pump scheduling;
4. Investment planning;
5. Outage analysis.

Miser, simply described, consists of modelled detailed trunk mains lay outs, reservoir capacities, demand nodes at DMA level, source borehole capacities, treatment work outputs and licence and transfer constraints. The model is highly configurable so cost constraints, such as peak and off peak energy costs, chemical costs, maintenance cost etc. can be included within the optimisation tool.

The primary reason for using Miser is to minimise operating cost during years where we have flexibility in how we operate sources. Costs at each stage of water supply (e.g. abstraction, process, high-lift, booster pumping, imports) are included in the model and Miser will minimise the total cost of operation. Miser handles a wide range of cost-related features (such as seasonal variations, unit costs varying with flow, pump efficiencies and electricity tariff structures) to ensure accurate modelling. To ensure this optimisation remains within the physical constraints of the network Miser includes capacity information both held in our databases and derived from hydraulic models.

For 2010-15 we utilised Miser to deliver 2 key activities to assist in delivering cost efficiencies:

Production Planning / water budgeting
This application involves optimisation of system operation over the medium-term (e.g. 1-2 years at a monthly or weekly time-step) to plan storage levels, source outputs, licence abstractions, strategic transfers, monthly cost profiles and so on.

Within the constraints of water resourcing water budgets are generated from an optimised position to provide a bottom-up analysis of expenditure requirements. Additionally Miser can be reset/optimised on a regular basis to take account of the current standing. This is particularly key when considering potential drought planning and ensures network optimisation is maintained, but without risking supplies in subsequent periods.

Costs at each stage of water supply (e.g. abstraction, process, high-lift, booster pumping, imports) can be included in the model and Miser will minimise the total cost of operation. Miser handles a wide range of cost-related features (such as seasonal variations, unit costs varying with flow, pump efficiencies and electricity tariff structures) to ensure accurate modelling.

Pump Scheduling
This application is under current development and involves optimisation over the short-term (e.g. next 1-7 days) taking into account diurnal variations, electricity tariffs and more detailed constraints to plan operation such as works and pumping station outputs, valve operation and service reservoir levels.

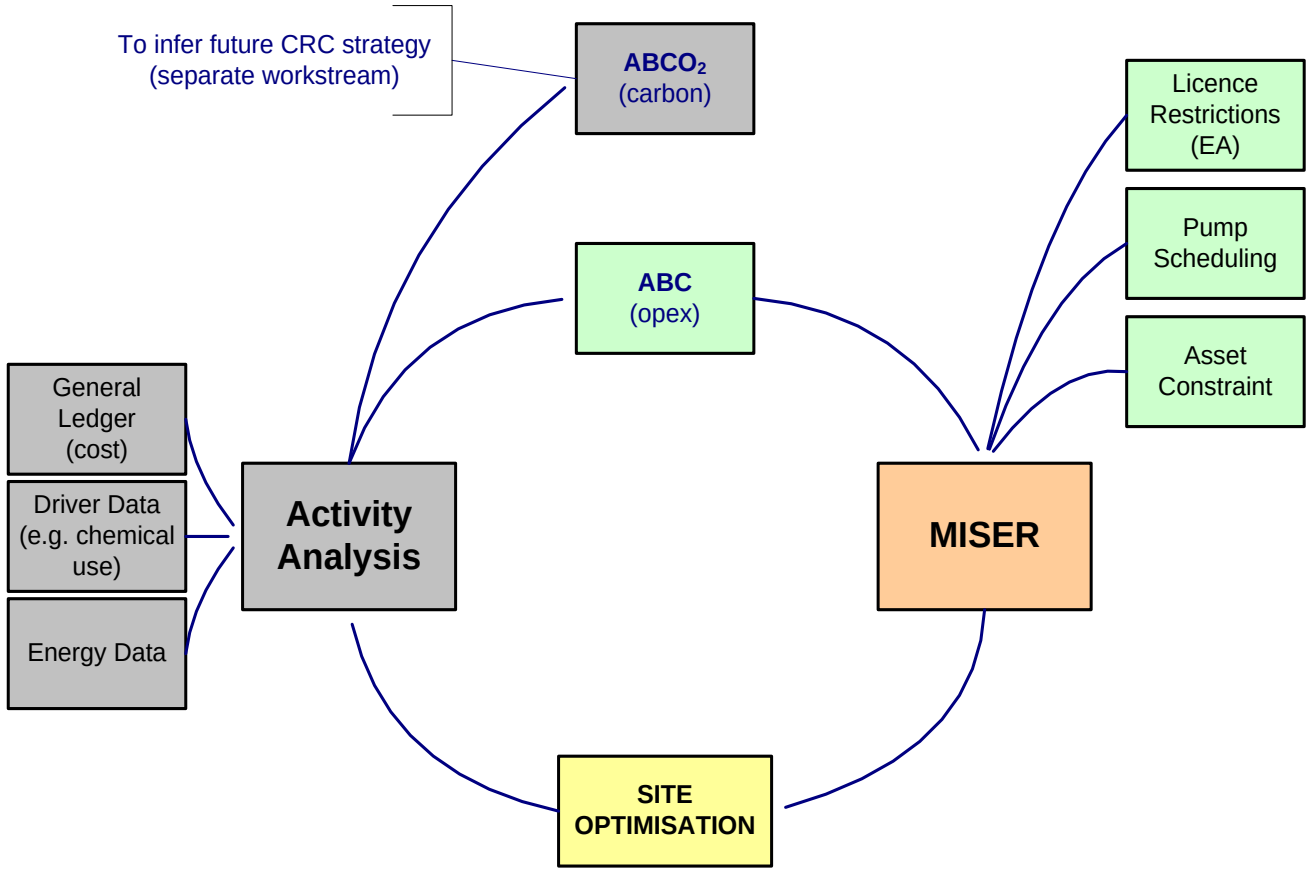
A pump scheduling trial in RZ5 has already been carried out by Tynemarch and it is envisaged that the modelling could be extended across the region to optimise within-day operation for cost and energy minimisation. Initially these models would be used in an offline mode (i.e. without a connection to our telemetry systems) to identify potential for immediate savings, to develop operating guidelines (such as pump priority tables and reservoir control curves), and to assess the benefits of progressing to automated daily production of operating schedules within an on-line application.

The above tools would work in tandem with an activity based costing (ABC) system that is able to periodically review variable cost at all sites to ensure optimisation is kept current, and that suggested optimisation of assets maintain their level of efficiency.

We include a series of logical constraints in Miser to ensure that we operate sources so that they are protected from over over-abstraction or to ensure we do not rely on sources which have the highest environmental impacts. For instance although groundwater is generally cheaper than surface water, we can ensure that we operate a mix of sources in any year so that we do not deplete groundwater reserves for the future. The use of Miser will ensure that in years where we can, we will maximise efficiency and at the same time ensure we do not increase risk to levels of service in future years.

The flow diagram below outlines the core Miser system, including licence restrictions (i.e. abstraction) from the Environment Agency, pump scheduling data, and other significant asset constraints.

Figure 1 Flow diagram: Miser integration



Commentary on the Table A4:

The costs presented in Table A4 include the following components:-

Staff:-		
Network Modeller	0.5 FTE	£26,700 (per annum)
Miser Modeller	1 FTE	£53,400 (per annum)
Commercial Team	1 FTE	£44,500 (per annum)
Total	2.5 FTE	£124,600 (per annum)

Tools:-		
Miser Software	£20,000	£20,000 (per annum)
Miser Licence	£4,500	£4,500 (per annum)
Total	£24,500	£24,500 (per annum)

Section 2. Questions and Responses

Question 1: Physical balancing and cost minimisation

Q1. Please describe your processes for mitigating short run mismatches of supply and demand (by short run we mean the period over which the network configuration is fixed and there is limited scope to balance supply and demand by changing the mix of water sources).

It is important that it is recognised that we operate with no supply demand surplus. There is little spare capacity in a normal year and no spare capacity in a dry year. We also experience high peak demands which can occur rapidly after relatively short hot dry periods (such as seen in July 2013). For this reason we do not have a great deal of flexibility in how we operate our sources. Furthermore, we are groundwater dependent (i.e. we have lots of small sources) so we cannot release large amounts of surface water storage to meet changes in demand. This is a very different situation from companies with supply demand surpluses and who can make strategic decisions about how to operate stored supplies such as large impounding reservoirs.

There are four key elements to our network planning:-

1. Our Water Resources Management Plan (WRMP) is used to define the yields of our existing sources and also identify the new schemes required to meet our supply demand balance. The yields of our sources (deployable outputs or DOs), including bulk supplies and transfers, are updated after each drought event or any change from external factors, such as the National Environment Programme (NEP). We retain a list of the yields of each source which is a benchmark in our short run planning.

2. Separately we have data on the costs of operating each source or group of sources based on power, chemicals and any other costs. Our Bulk Supplies have a range of variable and fixed Opex costs which are agreed with supplying companies. Some of these Opex costs are incurred whether we take a supply or not.

3. We have to strike a balance between reducing Opex costs (which involves maximising abstraction from our lowest Opex sources), reducing the impact on the environment (generally operating within our licences and maximising AIM), and ensuring supply is met.

There are two methods we use to do this:-

Firstly, prior to each new financial year, we produce an annual production plan, with monthly time steps, which provides a prediction of how we will operate sources based on risk. This production plan focuses on compliance to licence and environmentally sensitive sites. The production plan does take into account the hydrological position at the start of the year.

Once produced, the production plan identifies how sources will be operated on a monthly basis assuming historic demand profiles (adjusted for any growth in population or changes in large commercial demands). The production plan ensures that we can:-

1. Meet reasonable expectations of monthly demands (including target headroom)
2. Operate our sources within licence over the year and according to the DOs identified for the WRMP.
3. Ensure that there is resilience so that in the event of a dry year we can meet levels

of service

4. Any known significant planned outages are accounted for in the plan and, if necessary, we re-schedule works so that levels of service can be maintained.

Secondly, in order to understand the costs of the Production Plan we use an optimisation tool (Miser). Miser is also used to identify a range of reasonable Opex costs based on alternative scenarios to the production plan.

4. The final element of our planning is a monthly production planning review. This review considers the actual use of sources in the prior months to meet demand, and any forward looking impacts. So, for instance, if there has been an outage incident the planning review meeting will identify how next month's plan needs to account for that outage. Also the planning meeting will ensure that licences are not at risk of being exceeded, review control curves on reservoirs to understand the current position of surface water storage and agree any changes to the next month's plan given possible changes in demand or planned outage/capital maintenance. We use a SCADA system to ensure that daily licences are not exceeded during any peaks in each monthly period.

In the event of a drought a fifth element comes into play, which is a series of regularly convened drought meetings as set out in our drought plan. These identify changes required to meet demand given that DOs may not be achieved. Specific operational data is collected from each source on a weekly basis and mapped against calculations of DOs to identify if a sources' DO is a risk of not being met. Hydraulic modelling is carried out to assess where network changes will enable us to maximise our use of the water that is available. Meetings are also held with neighbouring water companies which provide bulk supplies to ensure that the bulk supplies are available or, if not, ensure we understand the timings and magnitude of any deficiencies. Triggers in the drought plan are used to identify what measures the company should make in terms of temporary use bans or permits and orders.

So in summary, during normal operations it is the Miser modelling supported by monthly production meetings which are used to identify and mitigate any short term mismatches in supply demand planning, based on strategic company data used to prepare the Water Resources Strategy. During droughts the approach is elevated and additional information is used to determine how the supply demand balance can be met, and what additional measures may be needed. These meetings consider the outputs from Miser and hydraulic modelling. The drought situation and Miser reports are both used to inform how the company will operate sources.

In the event of an unplanned outage or incident, Operational Teams will identify any short term responses to the prevailing situation this often involves the interrogation of our all mains modelling software that is capable of modelling changes to the network in terms of demand and supply and provides options to ensure service is maintained via local interventions such as valve changes and alterations to site outputs. These all mains models are a new addition to our optimisation capacity and are used on a regular basis to assess the effect on our network of any form of impact such as bursts, request for new developments, drought and outages.

Q2. Please outline the main factors that influence your choice between different options for balancing short run supply and demand, including the following:

a. the different parameters or cost drivers that are optimised, including whether you explicitly take into account the cost of energy (including different energy tariffs and pump curves), cost of water treatment and maintenance costs;

As highlighted in the response to Q1, we are a company with no surplus supply demand balance in a dry year and limited surplus in a normal year.

As we cannot readily predict if a year is likely to be dry or normal, our overall planning objective is to ensure risks are acceptable and minimise costs.

Our Miser model does include cost data for individual sources (separately power and chemicals) and we use this information to identify the likely Opex budget for the year. We also use Miser to undertake some sensitivity analysis to identify the range of costs given different assumptions; these sensitivity tests are part of our overall approach to production planning.

b. any other factors that are taken into account, including resilience/security of supply, abstraction licence conditions, resource availability, storage capacity, minimum reservoir levels and water quality;

As described above, the overriding principle we have to adopt is to manage security of supply efficiently whilst ensuring we do not breach our licences or risk meeting levels of service in subsequent years. Our production planning focuses on cost minimisation; security of supply, abstraction licences, resource availability, existing storage levels and planned outage. However we also take into consideration the impact of blending water from different sources, turnover, flow velocities and reversals on water quality standards.

We have underlying standards for storage, flow and pressure built into any design changes to the network, for example when assessing the need for network strategy investment to support growth in the region. This approach ensures current service levels are maintained.

c. timeframe over which these factors are taken into account and how frequently they are reset/recalculated;

A new WRMP is produced every five years (and reviewed annually) and Deployable Outputs, Bulk Supply Agreements and overall demands are calculated for each WRMP along with calculations of target headroom which we include in our production planning.

Our drought plan is also updated approximately every five years and identifies the monitoring we put in place to ensure adequate supplies are provided beyond a 1:10 year event.

Production plans are produced annually and take into account current hydrological conditions and reasonable expectations of demand.

Production planning meetings occur monthly but operational decisions (e.g. due to outage) are taken more frequently (often daily).

We aim to update our all mains models every five years particularly in areas of growth and change. Miser is also updated every five years in association with the business plan and also to include specific schemes as they are commissioned.

In the event of a drought, internal drought planning meetings occur monthly, but a range of external meetings will also occur, and operational meetings may well occur weekly or daily.

d. an explanation of any differences in approach across different parts of your network.

The approach described above is applied consistently to all 8 of our WRZs.

3. Please describe your processes for optimising your network over the medium run. By medium run we mean the period, over which the network configuration is fixed, but there is scope to use different combinations of water sources and demand side measures to balance supply and demand.

For us our medium run period would be considered as 'the next five year period' and would be defined in the preceding WRMP. For example in our WRMP14 we have identified the range of schemes, based on economic assessment, benefits to resilience and customer preference that will ensure we meet levels of service. This WRMP is linked to network strategies in the business plan so that the water identified in the rWRMP can be delivered to customers efficiently. These network strategies and the WRMP are implemented in the 5 year period.

In 2010-15, demand was higher than we had predicted it would be, so we took the strategic decision to invest in additional supplies to ensure LoS were met, however this is unusual and not something we would normally envisage doing. The need for this investment was underlined by the drought of spring 2012 which followed the two dry winters of 2010/11 and 2011/12.

During a five year period, if capital maintenance is required at a particular site, we would use the production planning process often supported by hydraulic modelling of different demand scenarios to phase the maintenance programme, perhaps over a number of years, to ensure levels of service are met.

To select between sources on a more regular basis we utilise the Miser tool as described earlier that contains a number of factors for consideration in the optimisation of sources, driven largely by cost but constrained on licence and both current and future risk.

4. Please outline the main factors that influence your choice between different options for balancing medium run supply and demand, including the following:

a. the different parameters or cost drivers that are optimised, including whether you explicitly take into account the cost of energy (including different energy tariffs and pump curves), cost of water treatment and maintenance costs;

Our WRMP submissions use an economic optimisation tool to identify efficient investment to meet demands in the next AMP period. Within the modelling we include existing Opex costs from current sources and then calculate Opex, Capex and Capital Maintenance for new schemes. In some cases it is possible that new schemes may be cheaper than existing sources however, current Guidelines and EA licensing policies mean it is difficult to implement new supply schemes, even if they are cheaper than existing sources. The same is not true of demand management schemes, which the EA would support even if there was a surplus of water and they were economic to implement.

A key element of our WRMP planning is the Economic Level of Leakage (ELL) and Sustainable ELL. We provide a range of costed options which might meet the supply demand balance and offer those to our economic model. During 2010-15 we extended our pressure (logging) management beyond that which was planned at the start of the period, and this gave us some economic efficiencies.

Miser is also used for this optimisation as previously described.

b. any other factors that are taken into account, including resilience/security of supply, abstraction licence conditions, resource availability, storage capacity, minimum reservoir levels and water quality;

As with our short-run planning, our medium run planning is framed by the over-arching principle that we must meet LoS against a backdrop of no spare capacity. The comments provided to the short run planning questions apply to the medium run planning, but are underlined by the fact that we were able to increase investment in water resources during 2010-15 because demand was higher than we predicted it would be.

c. the timeframe over which these factors are taken into account and how frequently they are reset/recalculated;

Our medium term planning is essentially undertaken during the preparation of the WRMP and business plan. Annual reviews are undertaken as part of the Annual Return and decisions can be made at this point.

d. an explanation of the extent that different water sources and demand side measures are used to balance supply/demand over time;

Now that we have compulsory metering in progress we can, in the medium run, influence customer behaviour and this is now part of our WRMP. We can normally therefore assess demand management and supply based entirely on economic analysis.

However, because we operate with no surplus, our medium run planning is very sensitive to small changes in the supply demand balance. For instance our 2015-20 programme is greatly impacted by sustainability reductions identified by the EA or changes in bulk supply agreements with other companies. What can happen as a result is that we can, at the start of each five year period, have a SOSI score of less than 100. This means that schemes which are not truly economic, but which can be delivered quickly, may be selected instead of schemes which are better in the long-run, but cannot be delivered to meet medium run deficits.

e. an explanation of whether alternative optimisation scenarios are modelled, and if so how frequently; and

Our planning for the medium run follows the statutory WRMP process, so our optimisation modelling tends to occur in the year prior to publication of the dWRMP. We do undertake additional optimisation between dWRMP and fWRMP as a response to representations made by stakeholders.

As part of our planning we undertake a broad range of optimisation runs, which include different scenarios and assumptions. We use these ranges of results to identify the most resilient set of schemes (following the principles of Adaptive Planning).

Development of our Network Strategies also occurs every five years for the business plan.

As stated earlier, in the short run Miser can be operated on a daily basis to minimise opex.

f. an explanation of any differences in approach across different parts of your network.

The approach we adopt is the same for all 8 of our WRZs.

5. Please outline the resources your company employs in undertaking its water network management functions. For example, this could include staff levels, control rooms, telemetry and automatically operated equipment.

The WRMP, which sets out our medium run plans, includes a range of staff, consultants and third party stakeholders. Consultants are employed to use our current all mains models to develop the associated network strategy. Costs for the next WRMP are estimated to be £3.1m prior to efficiencies.

For medium and short run planning we have water resources and operational staff who are mainly focussed on production planning and water resources management. This is estimated at 2FTE. The Miser modelling is a significant investment of approximately £0.25m. We have staff specifically trained in using and updating Miser.

The all mains models are used to explore the viability of proposed short run strategies under appropriate peak or average demand conditions. With annual support fees below £10K, staff and associated overheads are the only additional costs.

Our control room employs 2 staff (FTE) at any time to monitor and respond to live data.
Our SCADA system provides live data back to the control room and key staff. For the past year a network modeller has also been available on a standby basis to provide assistance in minimising disruption to customers as a result of an unplanned incident.

During a drought the resources applied to the management of the Network increase considerably. Internal staff are allocated to new roles, Directors take a hands-on approach to the daily management of the situation and consultants are engaged to collect data, provide advice, engage with third parties and backfill hydraulic modelling roles. The Opex cost of the drought between February and May 2012 was £1.14m.

6. Using specific examples, please describe how any recent and future planned network management related investments in your water business were considered and justified (including cost minimisation and other objectives such as resilience/security of supply).

During 2010-15 we recognised risks to LoS as a result of demands being higher than forecast. We undertook to deliver a range of schemes to increase resilience and deployable output. These include new groundwater sources at Saints Hill and Eridge. During the drought of spring 2012 we undertook a broad range of demand management measures, including rapid installation of pressure management devices, to reduce demand. Hydraulic modelling enabled us to select effective locations and optimise settings. We also increased our leakage detection effort to identify and fix more leaks quicker.

In 2015-20 we propose a series of measures to reduce demand, including further leakage reduction and water efficiency programmes. These measures are justified to meet demand, but are selected using economic optimisation. As described earlier, it is possible that that starting deficits may result in selection of options which are not economic or resilient in the long term, and can result in poor investment. Because of this risk we have decided not to adopt the latest changes in some of Southern Water's DO assessments for shared resources immediately, but instead phase them in by 2025. .

Question 2: Supporting the development of market/commercial arrangements

7. When optimising your network, what factors do you consider when deciding whether to use your own water resources, or to contract with other companies for bulk supply in order to ensure efficiency?

We are a member of the WRSE group. As such we have excellent access and communications with neighbouring companies on a range of bulk supply options. We have access to reasonable estimates of costs and yields for all these options, and use the regional WRSE model to ensure our plan includes all bulk supplies offered by neighbouring companies.

Specifically we have the Capex, fixed and variable Opex costs for each scheme, along with environmental and carbon costs. These costs, along with the yield data, are used to identify which bulk supplies are economic and provide resilience.

We are confident that our long and medium run optimisation modelling treats the costs, risks and benefits of transfers.

In the short run, because of our Supply Demand Balance situation we have few options but to use all bulk transfers offered to us. In wet years we may be able to cut back on bulk transfers if it is appropriate to do so, and bulk transfers are generally the most expensive of our supply options.

8. Please describe how you would or do adjust your optimisation processes to take into account the input of water by a third party. This should include what activities you do or would do to ensure water quality and customer service standards are maintained.

We have engaged with third party suppliers in the development of our dWRMP, through both direct approaches and via the consultation process. Very few third party suppliers (other than those from neighbouring water companies) have been identified, however we will continue to try to identify them.

In the event of a new third party supplier, we would need to understand the impacts on our supply demand balance. Unless the third party supply was considerable, and meant our supply demand balance was in surplus, we would seek to include the third party in our approaches set out in our response to Question 1. In particular we would need to understand the impacts on our production plan at the start of the year, and each month. Water quality legislation or standards may affect the way in which additional sources can be assimilated in our supply regime and this is investigated by measures including laboratory testing and hydraulic modelling.

Question 3: Efficient coordination of activities

9. Please explain how planned maintenance outages are coordinated on your water network, including how you take account of the interests of third party suppliers and customers.

Coordination of planned maintenance, including the possibility of outage, is included in our annual and monthly production planning but also brought to the attention of operational staff at weekly meetings. If past experience or modelling indicates that planned maintenance means a potential impact on LoS then the maintenance will be rephrased to reduce the potential impact.

In the event of an unplanned incident, then co-ordination is led by our operations team, including

the Operations Director.

Question 4: Longer-term decision making

10. Please describe how your long-term planning/investment planning takes into account network management processes and issues. For example, do the costs of short-term balancing factor into your investment decisions?

Our long term planning in our WRMP process includes a detailed assessment of supply demand balance data. We recognise our network is a constraint and have developed network models to allow us to link our strategic plans with investment in infrastructure. We include a review of network constraints in our planning and identify a set of network strategies to be implemented – co-ordinated alongside our strategic water resources investment.

In addition, we identify a range of strategic transfers, between zones, which allow us to move water as our network develops. This builds more resilience into our network and ensures that investment benefits are maximised.

Our production plan identifies operational constraints and lessons learned from operational experience, including how we can improve our network. The production planning approach ensured feedback to the WRMP process. For example, if our operations teams or production planners identify that a source is not able to produce its DO, options for remedying the situation will be included in the next WRMP, and selected if it economic to do so.

Our planning allows for estimates of unplanned outage but also takes into account planned outage.

Our drought plan provides the additional assurances required to meet demand in events beyond design conditions, and where Deployable Outputs may not be achieved for hydrological reasons.