south east water

2014 Price Review
Business Plan Supporting Appendices
Outcomes Cost Modelling

Published 2 December 2013

Executive Summary

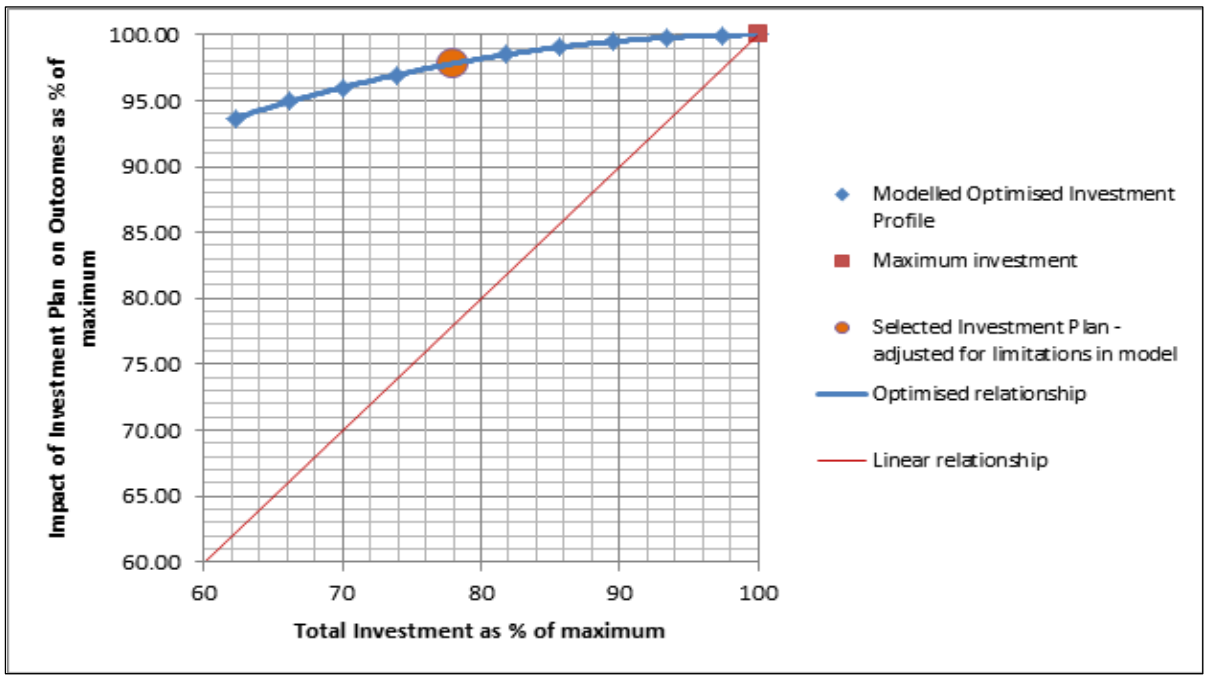
To ensure that our investment plan delivers the outcomes that our customers have told us best meet their expectations we have introduced a new approach to prioritising and optimising our proposed investment plan.

At the heart of the new approach is a new programme optimisation decision support tool. The tool has been designed to link with our investment delivery processes and will be used quarterly to update the capital programme to ensure continuing focus on the delivery of outcomes.

The tool consists of a model that describes the relationship between our outcomes and each investment area of the overall plan. The model is used to allocate funding to investment areas to give the optimum outcomes for a given investment level.

We have used the new tool to understand the impact of different investment scenarios on the delivery of outcomes and ultimately to optimise the investment plan as shown in Figure 1;

Figure 1 Impact on outcomes of different investment levels



We have also used it to calculate the investment associated with each outcome and the results are shown below;

Table 1 Total investment by outcome

Outcome	£m
Reliable supply	159.5
Low leakage	34.3
Long term stability	92.0
Environmental performance	21.3
Effective service	51.9
Clean water	34.0
Meet statutory obligations	107.0
Total	**500.0**

(Note; pre-efficiency, excluding contributions and including Retail and Wholesale)

The capital investment over the period 2015-2020 (2015-20) is shown in £m against each of the outcomes groupings. It can be seen that outcomes related to reliable supply attract £159.5m. Environmental performance attracts £21.3m.

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Section 1. Introduction

This appendix describes the work we have carried out to embed outcomes into our business planning.

To embed outcomes delivery we have developed a mapping and optimisation process at programme level that considers all of the components of the 2015-20 Capex programme. Each investment area has been mapped to the outcomes so that the relationship between expenditure and outcomes performance is understood and can be measured in future. Investment areas with higher positive impacts on outcomes can be prioritised compared to activities that have relatively little impact on outcomes delivery.

Section 2. Optimisation Approach

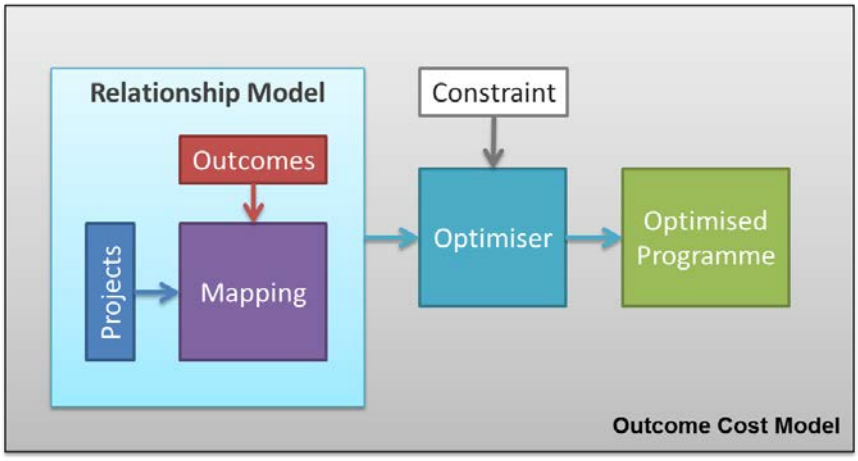
Optimising delivery of outcomes – approach

To ensure that our investment plan delivers the outcomes that our customers have told us best meet their expectations we have introduced a new approach to prioritising and optimising our proposed investment plan.

At the heart of the new approach is a new programme optimisation decision support tool. The tool has been designed to link with our investment delivery processes and will be used quarterly to update the capital programme to ensure continuing focus on the delivery of outcomes.

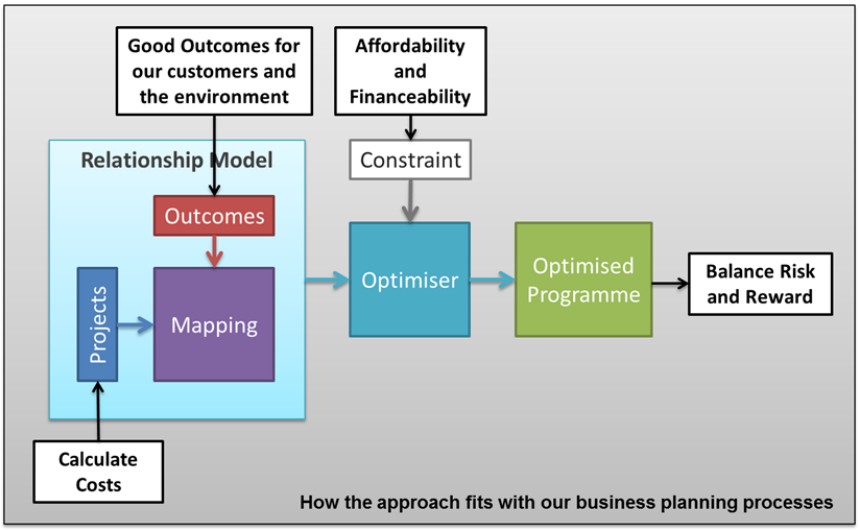
The tool consists of a model that describes the relationship between our outcomes and each investment area of the overall plan. The model allocates funding to investment areas to give the optimum outcomes for a given investment level.

Figure 2 Components of the outcome cost model



We have used the new tool to understand the impact of different investment scenarios on the delivery of outcomes and ultimately to optimise the investment plan. It provides a method of balancing outcome delivery against affordability and financeability and the following diagram demonstrates how the approach fits with our business planning processes.

Figure 3 How the modelling approach is integrated with the key aspects of business planning



Strategy Management Investment Manager

Our approach is based on tools and methodologies successfully deployed in other industries to support the planning, prioritisation and execution of large-scale capital investment programmes. The key benefit of this process is that it optimises against a range of business decision variables including, in this case, outcomes.

Use in development of the business plan

We have derived a profile that describes the relationship between investment and outcome performance. The profile shows the best overall outcome performance for given levels of investment and was used in the decision regarding the appropriate level of total investment.

We have identified the level of investment required for each investment area that gives the best overall impact on outcomes. We have also calculated the contribution of each investment area to each outcome and, from that, the total investment associated with the delivery of each outcome.

Basic Model Function

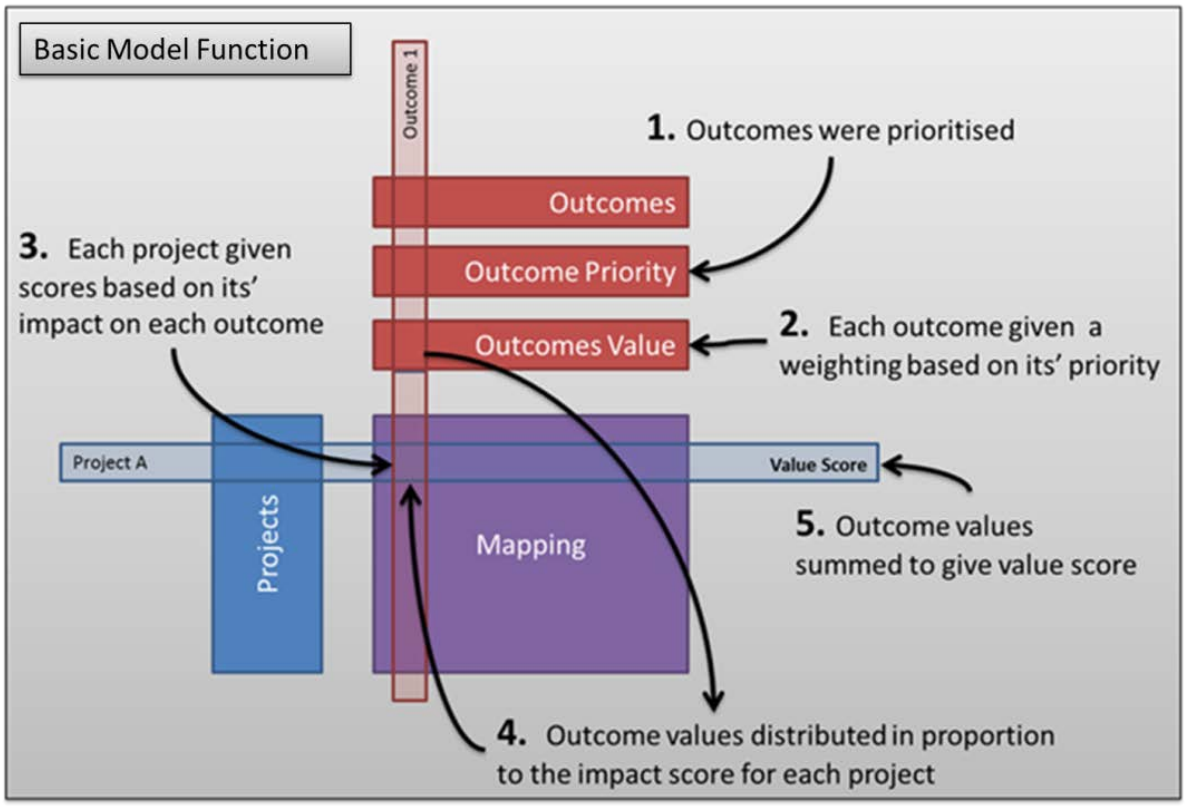
The model uses weighted scoring to generate score for each investment area that is proportional to its overall impact on the outcomes. The steps are:

1. The Company's outcomes were prioritised and given a weighting (the **outcome value**).
2. The impact of each investment area on each outcome was determined and given an **impact score.**
3. The **outcome value** was distributed to the investment areas in proportion to their **impact score**.
4. The **distributed outcome values** were then summed for each investment area to give an overall **outcome value score**.
5. The **outcome value score** was used to prioritise investment areas.

An investment area with a large impact on a number of important outcomes has a higher **outcome value score** than one with less impact on fewer, less important outcomes. The model selects

investment areas that provide the overall best cumulative **outcome value score** within the overall financial constraint.

Figure 4 Basic function of the model diagram



Outcome Data

All company outcomes have been included in the model, although for simplicity some have been merged. Where outcomes relate to the total level of expenditure, rather than the impact of individual programmes, they have been included in the optimisation routine as the constrained total investment level.

All company outcomes and weightings are detailed in table 2

Table 2 Outcomes used in model and weightings

Outcome Category	Priority / Obligation	Outcome	Outcome used in cost model	Weighting
Customer	Clean Water	Customers consider the appearance of their water to be acceptable	Customers consider the quality of their water to be acceptable	3
		Customers consider the taste and smell of their water is acceptable		
	Low Leakage	Customers consider the level of leakage is acceptable	Customers consider the level of leakage is acceptable	7
	Effective Service	Customers consider their direct interaction experience to be positive	Customers consider their direct interaction experience to be positive	15
	Affordable Bills	Customers consider bills to be value for money and affordable	Represented in model by the constraint on the total level of investment and individual programme constraints	-
	Reliable Supply	Customers consider their water supply is of sufficient pressure	Customers consider their water supply to be reliable	2
		Customers consider the frequency and duration of supply interruptions is acceptable		
		Customers consider the frequency of water supply restrictions to be acceptable		
Compliance	Water Quality	We are compliant with water quality regulations	We are compliant with our statutory obligations, regulations and license conditions	30
	Environment	We are compliant with environmental obligations		
	Health and Safety	We are compliant with health and safety obligations		
	National Security	We are compliant with national security obligations		
	Other	We are compliant with statutory obligations and license conditions		
Sustainability	Long term stability	We will invest in our assets to protect the service for the future	We will invest in our assets to protect the service for the future	2
	Environmental Performance	We will reduce our impact on the environment	We will reduce our impact on the environment	1
	Financial Stability	We will be a financially responsible company providing reasonable returns to our investors	Represented in model by the constraint on the total level of investment and individual programme constraints	-

Outcome weightings have been derived from the financial incentives allocated to them, which in turn is derived from the customer willingness to pay data. Where there was no financial measure an assumption has been made based on the relative priority with other, financially-based incentives.
For verification the calculated weightings have been compared to willingness-to-pay, other customer engagement data, and a survey of expert company opinion**.**

Analysis has shown that the model is particularly sensitive to changes in outcome priorities and weightings. This is to be expected as the purpose of the model is to react to changes in priority of outcomes. The weightings have been derived from the real financial value of the incentives associated with each outcome and are therefore considered appropriate.

Wholesale and Retail Outcomes

The model allows for any combination of outcomes to be switched on or off. Analysis can therefore be done at a wholesale, retail or company level.

Mapping categories and weighting

The categories used to capture the impact of investment areas on outcomes and the resulting weightings were selected based on experience in other industries and calibrated during the pilot phase. Tests indicate that model results are not sensitive to minor changes in weightings.

Table 3 Mapping categories and weightings

Mapping categories and weightings		
Category	**Description**	**Weighting**
Major	Investment area has a major direct impact on the outcome. It is critical to success.	9
Medium	Investment area has an impact on the outcome. It is necessary but not critical	3
Minor	Investment area has a minor or indirect impact on outcome. It is not critical	1
None	Investment area has no impact on outcome	0

Input data – Investment Areas

Dealing with differences in scale

The investment plan includes investment areas of very different scales. It was found during the pilot phase that this skewed the results in favour of smaller investment areas, as these were mapped as having disproportionately high outcome value scores.

A target investment area cost was determined, and those within 25% were deemed to be within the target band and therefore of a comparable scale.

A number of larger investment areas were split into smaller investment areas, each with costs within the target band. Where possible, investment areas of a similar nature within larger investment areas were grouped and their impact on outcomes reassessed.

Where two or more smaller investment areas impact outcomes in a similar way, they were grouped together.

Where this was not possible, the mapping for the investment area was reviewed to ensure that it was not disproportionate to the scale of the investment area.

Variation of value score within an investment area

The basic model assumes that the value delivered by the component projects within an investment area are the same. This is not necessarily the case as early parts of investment area may deliver much of the value, with later parts delivering less. There are a number of investment areas that can have their investment reduced without significant change to their impact on outcomes. Adjustments have been made to a number of investment areas within the model to reflect this.

Investment costs

Costs used in the model for capital maintenance have been based on the total funding required before any constraints or risk-based judgements have been applied.

Optimising the investment plan

We have followed the following process to identify the optimum level of funding for each investment area;

1. The optimum combined value score and therefore the best outcome delivery has been calculated for a series of investment scenarios resulting in the profile below
2. The profile shows how customer outcomes are impacted by changing levels of investment and was used to inform our decision on the appropriate level of total investment.
3. Once we had set our total level of investment, we determined the optimum level of funding for each investment area.
4. This result was then adjusted for model limitations as described above to give a list of investment areas, their allocated funding and the overall impact on outcomes
5. We then used the model to calculate the investment associated with each outcome. The results are shown in figure 5.

Section 3. Model Results

Presentation of Results

The results of the optimisation process are presented in figures 5, 6 and table 4. The graphical and tabular results show the high level outputs of the model.

Figures 5 and 6 show the optimum profile shown against the linear profile. The key point to note is that the optimiser enables us to gain an understanding of the relationship between investment and value achieved against outcomes. Where we are testing scenarios against a total investment of less than 100%, i.e. we have reduced out wholesale capital investment budget, we note that reducing investment by as much as 23% only reduces that value of the outcomes achieved by some 2%.

In future we will be able to revise the outcomes optimiser should our customers decide that the importance of one or more outcomes has changed. For example, if there was an exceptional drought event it may be that the weighting for **customers consider their water supply to be reliable** would be increased. The model would revise the forward programme, selecting schemes with greater emphasis to reliability of supply. A choice would have to be made whether investment overall would increase or alternatively investment could remain as per the planned expenditure profile but there would be a reallocation of investment.

The granularity limits shown in Table 3 below highlight the level of potential inaccuracy in the model resulting from the assumption that projects within investment areas are equally important. It is evident from the relatively narrow corridor that for the purposes of business decision making, there is little need to examine the programme at a more granular level.

Figure 5 Profile of maximum outcome score against total investment

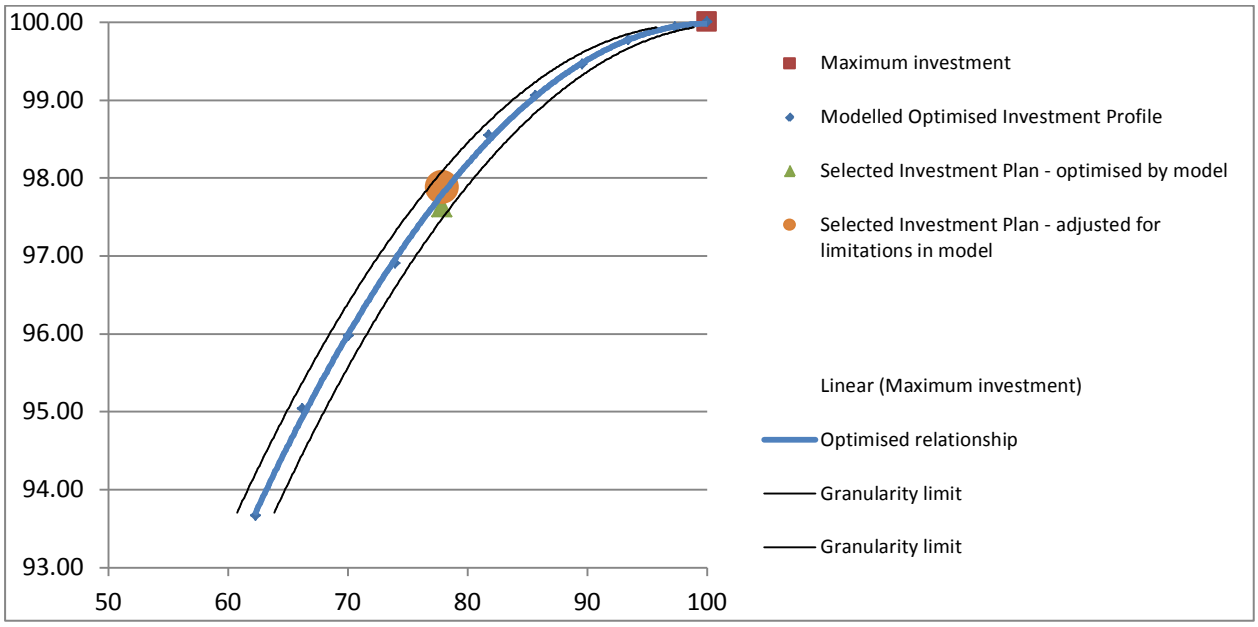


Figure 6 compares the optimised relationship with a linear investment/outcomes value relationship. This illustrates the increase in value to our business that the tool brings in terms of demonstrating the optimum investment options against a range of values.

Figure 6 Profile of maximum outcome score against total investment showing comparison with non-selective reduction in spend (linear relationship)

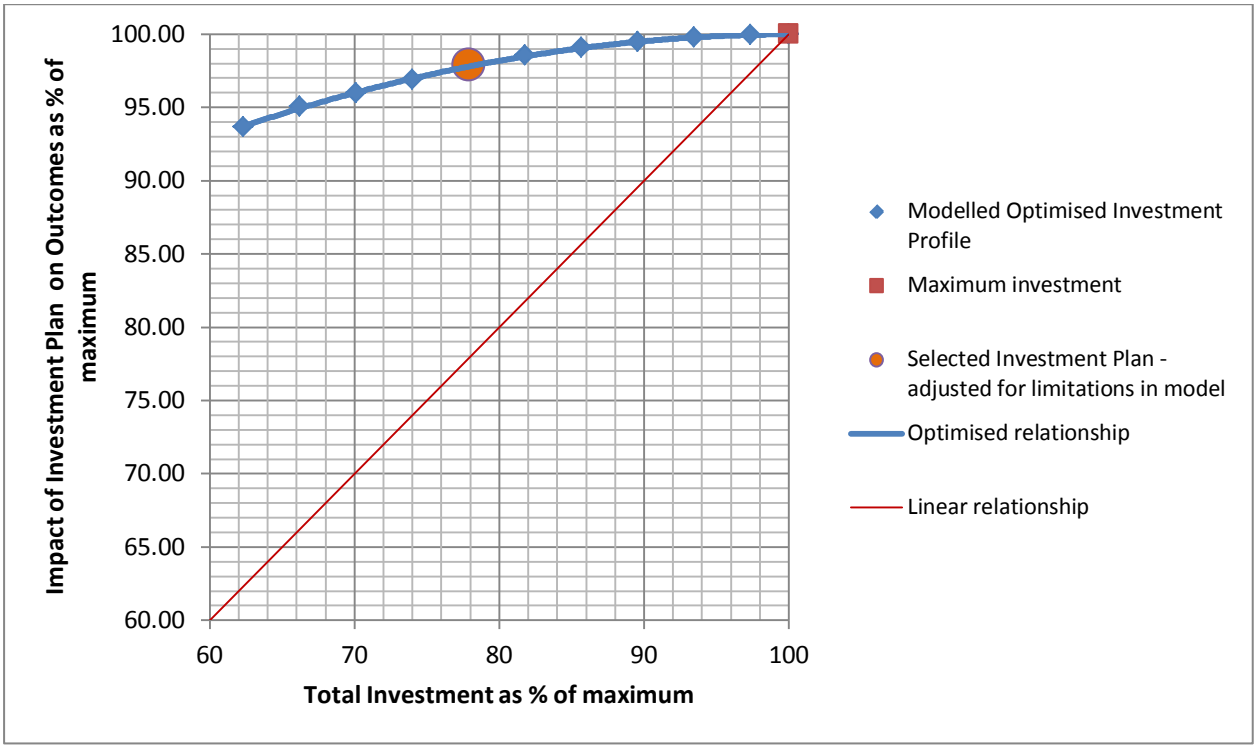


Table 4 shows the output of the optimiser for a given scenario. The investment areas selected are highlighted in green. Where partial implementation is recommended the investment area is shown as amber and investment areas deselected are show as grey.

The optimiser allows for multiple scenarios to be tested and displayed side by side but for this example only one scenario is shown. The score value which is an indicator of the outcomes value achieved specifically by a given investment area is provided and this is useful for our managers to weigh up the borderline cases.

The % invested is also given which is of use where 'partial investment' is selected and the overall investment is then shown.

Note; Costs shown on the following figures and tables are pre-efficiency, exclude contributions, and refer to total company investment (i.e. include wholesale and retail investment).

Table 4 Investment by investment area

Investment area	P2 Preferred, Max Investment Adjusted	New value score	% Invested	Investment (£K)
Boreholes - Flood Prevention (Resilience)	Selected	0.61	100.00	2,815
Boreholes - Planned and Capitalised Repair	Selected	0.73	100.00	6,689
Capital Programme Management Part 1	Selected	1.11	100.00	8,802
Capital Programme Management Part 2	Selected	1.11	100.00	8,802
Decrease WTW Outage (WO)	Not Selected	0.00	0.00	0
DEFRA Advice Notes 3/3A (SEMD)	Selected	3.18	100.00	5,376
Developer Mains Diversions	Selected	2.62	100.00	2,169
DMA Reorganisation	Partial	0.17	33.00	1,485
Failure to Deliver Resource Part 1	Selected	1.11	100.00	10,499
Failure to Deliver Resource Part 2	Selected	1.05	100.00	10,499
Failure to Deliver Resource Part 3	Partial	0.03	11.00	1,155
Failure to Deliver Resource Part 4	Not Selected	0.00	0.00	0
Failure to Deliver Resource Part 5	Not Selected	0.00	0.00	0
H&S	Selected	1.04	100.00	2,137
Inadequate Disinfection	Not Selected	0.00	0.00	0
M&G - Buildings (HQ, Offices) (Retail)	Selected	0.19	100.00	410
M&G - Buildings (HQ, Offices) (Wholesale)	Selected	0.33	100.00	1,640
M&G - Electrical Testing	Selected	1.04	100.00	2,537
M&G - Equipment Replacement	Selected	0.49	100.00	5,342
M&G - Hydraulic Models Update	Selected	0.47	100.00	1,985
M&G - IS Infrastructure (Retail)	Partial	1.88	84.00	6,539
M&G - IS Infrastructure (Wholesale)	Partial	2.08	84.00	9,809
M&G - Meter Replacement	Selected	1.21	100.00	4,276
M&G - Revenue Meter Replacement	Selected	0.60	100.00	2,467
M&G - Transport (Retail)	Selected	0.19	100.00	321
M&G - Transport (Wholesale)	Selected	0.33	100.00	4,721
Mains & Comms Replacement Rank 1 Part 1	Selected	1.46	100.00	8,384
Mains & Comms Replacement Rank 1 Part 2	Selected	1.46	100.00	8,384
Mains & Comms Replacement Rank 2 Part 1	Selected	1.46	100.00	9,839
Mains & Comms Replacement Rank 2 Part 2	Selected	1.38	100.00	9,839
Mains & Comms Replacement Rank 3 Part 1	Selected	0.40	100.00	11,613
Mains & Comms Replacement Rank 3 Part 2	Partial	0.34	84.00	9,755
Mains & Comms Replacement Rank 4 Part 1	Not Selected	0.00	0.00	0
Mains & Comms Replacement Rank 4 Part 2	Not Selected	0.00	0.00	0
Mains & Comms Replacement Rank 5 Part 1	Not Selected	0.00	0.00	0
Mains & Comms Replacement Rank 5 Part 2	Not Selected	0.00	0.00	0
Metaldehyde Catchment Management	Partial	1.09	66.00	4,160
Meters - Optional	Selected	1.21	100.00	3,129
Meters - Selective & Universal Part 1	Selected	3.29	100.00	9,549
Meters - Selective & Universal Part 2	Selected	3.29	100.00	9,549
Meters - Selective & Universal Part 3	Selected	3.29	100.00	9,549
Meters - Selective & Universal Part 4	Selected	3.29	100.00	9,549
Meters - Selective & Universal Part 5	Selected	3.29	100.00	9,549

Investment area	P2 Preferred, Max Investment Adjusted	New value score	% Invested	Investment (£K)
MNI - Capitalised Repairs	Selected	0.71	100.00	4,484
MNI - Interventions Part 1	Selected	0.79	100.00	10,591
MNI - Interventions Part 2	Selected	0.55	100.00	10,591
MNI - Interventions Part 3	Selected	0.40	100.00	10,591
MNI - Interventions Part 4	Selected	0.36	100.00	10,591
MNI - Interventions Part 5	Selected	0.32	100.00	10,591
MNI - Interventions Part 6	Partial	0.15	55.00	5,825
MNI - Interventions Part 7	Not Selected	0.00	0.00	0
NEP Part 1	Selected	6.19	100.00	10,309
NEP Part 2	Partial	0.33	29.00	2,990
New Mains Development Part 1	Selected	4.70	100.00	9,003
New Mains Development Part 2	Selected	4.70	100.00	9,003
PR19 Business Plan Submissions	Selected	0.56	100.00	7,252
Raw Water Deterioration Schemes	Selected	3.43	100.00	8,912
Raw Water Mains	Selected	0.59	100.00	1,780
Reactive Comm Pipes Resulting From CMP Part 1	Selected	2.06	100.00	7,188
Reactive Comm Pipes Resulting From CMP Part 2	Selected	1.69	100.00	7,188
Reactive Maintenance Bursts	Selected	2.84	100.00	8,272
Reactive Maintenance Comm Pipes Part 1	Selected	2.84	100.00	10,406
Reactive Maintenance Comm Pipes Part 2	Selected	2.84	100.00	10,406
Reactive Maintenance Comm Pipes Part 3	Selected	2.84	100.00	10,406
Reactive Maintenance Comm Pipes Part 4	Selected	2.84	100.00	10,406
RMS Part 1 (MNI)	Selected	0.61	100.00	3,756
RMS Part 2 (IRE)	Selected	0.58	100.00	3,756
Service Reservoirs including Reservoir Repairs	Selected	0.60	100.00	5,506
Statutory Reservoir Repairs, Reservoir Cleaning, Sluice Valves	Selected	1.21	100.00	2,000
Supply Failure Part 1	Selected	0.30	100.00	10,802
Supply Failure Part 2	Selected	0.29	100.00	10,802
Supply Failure Part 3	Partial	0.22	76.00	8,210
Supply Failure Part 4	Not Selected	0.00	0.00	0
Velocity Failure	Partial	0.05	24.00	2,380
WRMP Groundwater Part 1	Selected	0.56	100.00	8,643
WRMP Groundwater Part 2	Selected	0.56	100.00	8,643
WRMP Leakage /Demand Management	Partial	0.81	48.00	3,199
WRMP Surface Water	Selected	0.56	100.00	1,157
WRMP Water Reuse	Selected	0.66	100.00	2,170
WRMP Water Transfers	Selected	0.66	100.00	9,666
WRMP WTW Part 1	Selected	0.56	100.00	9,799
WRMP WTW Part 2	Selected	0.56	100.00	9,799
WRMP WTW Part 3	Selected	0.56	100.00	9,799

We have also used the model to calculate the investment associated with each outcome and the results are shown below;

Table 5 Investment by outcome

Outcome	£m
Reliable supply	159.5
Low leakage	34.3
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Clean water	34.0
Meet statutory obligations	107.0
Total gross capital investment	500.0

The gross capital investment over the period 2015-2020 (2015-20) is shown in £m against each of the outcomes groupings. It can be seen that outcomes related to reliable supply attract £159.5m. environmental performance attracts £21.3m.

Section 4. Conclusion

The adoption of an outcomes based optimisation tool has enabled us to gain a clear understanding of the relationship between investment and outcomes delivery.

The optimiser demonstrates that we have been able to reduce our total wholesale capital requirement by some 23% while only losing 2% of the outcomes delivery. This is considered to represent good value for customers and it has enabled us to manage our business risk in the outcomes environment.

Adoption of the outcomes tool is innovative but the optimiser outputs are at a level where we can gain a clear understanding of the impact of the decisions that we are making. It follows that we have been able to embed outcomes into our programme development process in a transparent manner.
The optimisation tool is set at a high level whereby the overall business plan is broken down into relatively large investment areas. This enables us to re-run the model testing a wide range of scenarios both for PR14 and in business as usual mode during 2015-20 to ensure that we are now and will continue to focus on outcomes delivery while managing investment and business risk effectively.