Water and Sewerage Service
Price Control 2010-13

Draft Determination Main Report – Annex B
Capital Maintenance Assessment

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Water and Sewerage Revenue and Charges Price Control 2010-2013

Draft Determination Main Report

Annex B – Capital Maintenance Assessment

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B1. Capital Maintenance Assessment

B1.1. Background

1.1.1. This chapter summarises the approach taken by the Utility Regulator in establishing an appropriate level of capital maintenance for NI Water over the course of the PC10 period. This has proved difficult for both NI Water and the Regulator as adequately trended information on both costs and serviceability is not readily available. Under such circumstances a triangulation of three different approaches has been adopted:

1. Re-running the capital maintenance econometric models

2. Utilising England and Wales trended information to establish industry average unit costs

3. Using the cost base estimations of efficiency catch-up and apply these percentages to the pre-efficiency capital base maintenance projections estimated by NI Water

1.1.2. As part of the assessment of NI Water efficiency performance, the Utility Regulator has endeavoured to re-run the Ofwat suite of capital maintenance econometric models (last used by them in 2006-07) with updated data. These models attempt to establish relationships between maintenance costs and explanatory variables common to all companies. In previous years Ofwat used these models combined equally with the findings of the cost base, to assess efficient levels of capital maintenance expenditure.

1.1.3. In addition to the econometric models, the Utility Regulator has produced industry wide unit costs analyses in an effort to enhance the robustness and reliability of results. The results of this work have been used to predict what an 'efficient' level of capital spend might be for maintaining NI Water's network.

1.1.4. The final methodology involves accepting the pre-efficient level of base maintenance as established by the company forecasts. For the most part, NI Water has estimated base expenditure by trending what historic data they have and making an assessment of the serviceability of assets. The Utility Regulator has then applied efficiency assumptions derived from the cost base analysis to these figures, in order to establish what is considered to be an efficient level of base maintenance. By using these three methods the Utility Regulator hopes to establish a reasonable estimate as to what can be realistically expected of NI Water in relation to its base maintenance expenditure.

1.1.5. This chapter explains each analysis, the relative merits and disadvantages and the resulting levels of maintenance expenditure arrived at for each methodology. A final level of investment is then determined based upon these analyses.

B1.2. Econometric Model Methodology

1.2.1. The capital maintenance methodology is similar to the opex analysis in that it combines a mixture of regression and unit cost models split by water and sewerage functional area. The form of the water models are shown below:

Table 1.1 - Water Service Models

Functional Area	Model Type	Explanatory Variables
Water Distribution Infrastructure	Log regression	Connected properties per length of main
Water Distribution Non-infrastructure	Log regression	Service reservoir and water tower capacity per pumping station capacity
Water Management & General	Log regression	Proportion of billed non-household properties
Water Resource & Treatment	Unit cost	Total connected properties

1.2.2. The sewage models are constructed as follows:

Table 1.2 - Wastewater Service Models

Functional Area	Model Type	Explanatory Variables
Sewerage Infrastructure	Log regression	Number of CSO's[1] per length of sewer
Sewerage Treatment	Log regression	Total number of works divided by the total load received at works
Sewerage Non-infrastructure	Unit cost	Total number of pumping stations
Sludge Treatment and Disposal	Unit cost	Weight of dry solids disposed
Sewerage Management and General	Unit cost	Number of billed properties

[1] Combined sewer overflows

1.2.3. The dependent variable is represented by the cost in each area. The approach is slightly different to the opex models in that the actual cost is representative of a five year average[2] (from 2003-04 to 2007-08) rather than simply current year data. The five years of financial data are uplifted to constant prices and averaged to account for the 'lumpiness' often found in capital expenditure. Companies may not spend uniformly on maintenance year on year but have peaks and troughs as the need arises, taking an average allows for what might be considered reasonable expenditure for a particular company in a single year. It also helps to mitigate the risk that unfair or lenient targets are set depending on the level of expenditure in the current year.

1.2.4. It is the intention of the Utility Regulator to replicate the Ofwat capex econometric and unit cost models with the updated CMER data. Our aim is to gain an insight into the average base maintenance expenditure that could be expected for NI Water. The approach does not assess frontier expenditure since the benchmark would normally be set by Ofwat after analysis of both cost and performance of assets.

1.2.5. Re-running the models does not mean the Utility Regulator is attempting to establish an efficiency gap or catch-up targets in the classical sense. The Utility Regulator is aware that the financial information for NI Water's actual costs may not be totally robust as historical data was not subjected to the current level of scrutiny under AIR reporting requirements.

1.2.6. The sole purpose will therefore be to estimate an appropriate average level of base maintenance expenditure, given significantly robust explanatory variable data, and assess against NI Water predictions for PC10. A similar approach was undertaken by WICS for the 2006-10 determination and by NERA when setting efficiency targets for NI Water for 2009-10.[3]

B1.3. The Scottish Example

1.3.1. In many ways the experience in Scotland is of particular relevance to the current situation in Northern Ireland. As part of their Strategic Review of Charges for 2006-10 (SR06), the Water Industry Commission for Scotland (WICS) faced many of the same challenges now confronting the Utility Regulator. In order to assess the capital maintenance requirement for Scottish Water, WICS adopted something akin to the Ofwat four stage approach i.e.

Stage A: Maintaining serviceability of customers to date

Stage B: Is the future period different?

Stage C: Scope for improvements in efficiency

Stage D: Impact of the improvement programme

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[2] In some cases a four year average has been used as the split by sewerage sub-area was not available

[3] See NERA report – Setting Efficiency Targets for NIW for 2009-10: Final report for NIAUR

1.3.2. However, at that point in time (2003-04) WICS had difficulty estimating the baseline maintenance at stage A due to the fact that no reliable record of historical capital maintenance existed in Scotland.[4] To add further problems, there was not the same level of serviceability reporting in Scotland that Ofwat had at their disposal. Indeed, the established approach in England and Wales was to look at an average of 10 years historical expenditure and compare with at least 5 years of serviceability indicators when assessing baseline capital maintenance requirements.

1.3.3. In order to circumvent this problem of data scarcity, WICS was able to estimate Stage A costs by undertaking two steps. The first measure involved running the capital maintenance econometric models. This allowed WICS to establish what an average English and Welsh company would spend on base maintenance if they were operating Scottish Water's assets. This was not a simplistic process as the explanatory variables used (1997-98 data) were not available and had to be back-cast for Scottish Water.

1.3.4. The second element required an adjustment for local operating conditions. WICS recognised that averagely efficient expenditure would not be totally suitable as account had to be taken of both special factors and the assessed level of inefficiency within Scottish Water. As a consequence, WICS estimated inefficiency using the cost base, and added this uplift to the predicted costs from the econometric models.

1.3.5. At present NI Water does not possess the historic financial data that would help to establish required base maintenance. The Utility Regulator therefore sees merit in completing the capital maintenance models for the same purpose as WICS did in Scotland. It is also important to note that WICS has used the econometric approach for SR10, in spite of the fact that Ofwat no longer operates the models.

B1.4. The Water Models

1.4.1. **Water Distribution Infrastructure Expenditure** - The capex water distribution infrastructure (CWDI) model is a regression where costs per main are explained by the number of connected properties per length of main. The independent variable is representative of connection density. The positive sign of the coefficient indicates that as connection density rises, so too will maintenance costs. This model is representative of the fact that it is reasonable to expect base maintenance costs to be higher in urban areas where more expensive, larger mains exist.

[4] See WICS Strategic Review of Charges 2006-10: The Final Determination, Chapter 16, p159

1.4.2. The Ofwat model in 2006-07 had the following statistical properties:

Table 1.3 - Ofwat 2006-07 water distribution infrastructure model

Water Service:	**Water Distribution Infrastructure Expenditure**	
Data:	CMER, June Returns	
Modelled cost:	Ln (annual average water distribution infrastructure functional cost [£m], divided by length of main [km])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-4.875	0.706
Ln (number of connected properties [000's], divided by length of main)	0.821	0.261
Form of Model:	Ln modelled cost = -4.785 + 0.821 * ln {connected props / length of main}	
Statistical Indicators:	Number of observations = 22	R^2 = 0.331
	Model standard error = 0.277	F test = 0.005

1.4.3. Remodelling using 2007-08 financial data and explanatory variables from 2002-03, our revised model has the following structure:

Table 1.4 - NIAUR 2007-08 water distribution infrastructure model

Water Service:	**Water Distribution Infrastructure Expenditure**	
Data:	CMER, June Returns	
Modelled cost:	Ln (annual average water distribution infrastructure functional cost [£m], divided by length of main [km])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-4.419	0.813
Ln (number of connected properties [000's], divided by length of main)	0.922	0.303
Form of Model:	Ln modelled cost = -4.419 + 0.922 * ln {connected props / length of main}	
Statistical Indicators:	Number of observations = 22	R^2 = 0.317
		F test = 0.006

1.4.4. The results indicate very little change from the Ofwat model. The diagnostics appear reasonable with a statistically significant independent variable. It should be noted that for this model Ofwat makes a quality adjustment to the actual company costs to allow for different allocation policies for Section 19 quality undertakings. In the absence of any more information, the Utility Regulator has assumed that these percentages remain the same in the updated model.

1.4.5. **Water Distribution Non-Infrastructure** - This model estimates the base capital maintenance associated with above ground water distribution assets. The explanatory variable is the ratio of storage capacity to pumping station capacity. This was considered important as Ofwat were of the opinion that high costs would be experienced by those who had a high storage capacity; perhaps by virtue of larger or more numerous facilities which incurred more expenditure. The last Ofwat regression had the following format:

Table 1.5 - Ofwat 2006-07 water distribution non-infrastructure model

Water Service:	**Water Distribution Non-Infrastructure**	
Data:	CMER, June Returns	
Modelled cost:	Ln (annual average water distribution non-infrastructure functional cost [£m], divided by pumping station capacity [kW])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-5.793	0.522
Ln (service reservoir and water tower capacity [Ml], divided by pumping capacity [kW)	0.886	0.203
Form of Model:	Ln modelled cost = -5.793 + 0.886 * ln {storage capacity / pumping station capacity}	
Statistical Indicators:	Number of observations = 22	R^2 = 0.487
	Model standard error = 0.558	F test = 0.000

1.4.6. Remodelling using updated financial and explanatory variable data results in a regression of the form:

Table 1.6 - NIAUR 2007-08 water distribution non-infrastructure model

Water Service:	**Water Distribution Non-Infrastructure**	
Data:	CMER, June Returns	
Modelled cost:	Ln (annual average water distribution non-infrastructure functional cost [£m], divided by pumping station capacity [kW])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-5.943	0.439
Ln (service reservoir and water tower capacity [Ml], divided by pumping capacity [kW)	0.724	0.182
Form of Model:	Ln modelled cost = -5.943 + 0.724 * ln {storage capacity / pumping station capacity}	
Statistical Indicators:	Number of observations = 22	R^2 = 0.442
		F test = 0.001

1.4.7. The updated model appears to be a good predictor of distribution non-infrastructure costs. The R^2 value is little changed from before and the t-ratio on the independent variable is highly significant. As expected, the sign on the explanatory coefficient is positive.

1.4.8. **Water Management and General** - As part of the econometric analysis, this model attempts to estimate the base capital spend required to maintain assets allocated to management and general. Such assets include the preservation of offices, depots, vehicles, telemetry, computers, mobile plant and the updating of network records etc. Costs are anticipated to be influenced by billed properties (the scale variable) and the proportion of billed non-household properties (explanatory variable). It is expected that billed non-domestic customers will have a higher impact on cost due to additional billing and metering requirements associated with such customers. In 2006-07 the Ofwat model had the following format:

Table 1.7 - Ofwat 2006-07 water management and general model

Water Service:	**Water Management and General**	
Data:	CMER, June Returns	
Modelled cost:	Ln (annual average water M&G cost [£m], divided by billed properties [000's])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-5.463	0.246
Proportion of billed non-household properties	8.580	3.211
Form of Model:	Ln modelled cost = -5.463 + 8.580 * proportion of non-household properties	
Statistical Indicators:	Number of observations = 21	R^2 = 0.273
	Model standard error = 0.202	F test = 0.015

1.4.9. Updating the explanatory variable data from 1997-98 to 2002-03 and using the financial five year average, our model now has the following statistical properties:

Table 1.8 - NIAUR 2007-08 water management and general model

Water Service:	**Water Management and General**	
Data:	CMER, June Returns	
Modelled cost:	Ln (annual average water M&G cost [£m], divided by billed properties [000's])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-5.851	0.457
Proportion of billed non-household properties	13.151	6.090
Form of Model:	Ln modelled cost = -5.851 + 13.151 * proportion of non-household properties	
Statistical Indicators:	Number of observations = 22	R^2 = 0.189
		F test = 0.043

1.4.10. In the updated model the sign of the coefficient is as expected and the variable is statistically significant. In general this model is not as proficient as the Ofwat regression as the descriptive statistics (R^2, t-ratio and F test) have declined to some extent, although it is not clear why this should be the case. The R^2 value is quite low, suggesting that the model's predictive power with respect to management and general base maintenance has declined.

1.4.11. In order to improve the descriptive statistics, NIAUR investigated reconstructing the model using a simple five year average for financial data rather than a logarithmic value. The results of the analysis are highlighted below.

Table 1.9 - NIAUR 2007-08 revised water management and general model

Water Service:	**Water Management and General**	
Data:	CMER, June Returns	
Modelled cost:	(Annual average water M&G cost [£m], divided by billed properties [000's])	
Explanatory Variables:	Coefficient	Standard Error
Constant	0.00165	0.0026
Proportion of billed non-household properties	0.0874	0.0342
Form of Model:	Modelled cost = 0.00165 + 0.0874 * proportion of non-household properties	
Statistical Indicators:	Number of observations = 22	$R^2 = 0.246$
		F test = 0.019

1.4.12. The revised model represents an improvement in the descriptive statistics as the values of the coefficient of determination (R^2), F-test and t-ratio of the independent variable have improved. This would indicate that the revised model, while representing the same logic as the Ofwat regression, is a better model for predicting costs.

1.4.13. **Water Resource and Treatment** - The water resource and treatment model is represented by a simple unit cost approach. This methodology attempts to predict the base maintenance spend on areas such as water treatment works, boreholes, aqueducts etc. This is achieved by dividing each company's average annual expenditure by the total connected properties and finding a weighted industry average. Ofwat considers that connected properties are the major cost driver in this area, although it should be recognised that asset age, utilisation and condition will also have an impact.

1.4.14. In 2006-07 the weighted average cost was £10.013 per property (£10.43 when uplifted to 2007-08 prices). For the updated data the industry average unit cost (excluding NI Water) is:

Table 1.10 - NIAUR 2007-08 water resource and treatment model

Water Service:	Water Resource and Treatment
Data:	CMER, June Returns
Unit cost:	£/connected property
Industry 5 year average spend	£272.812m
Total industry connected properties	23.8076m
Weighted average unit cost:	£11.459 per property
Number of observations	22

1.4.15. The £11.46 per property represents an increase in the cost of resource and treatment base maintenance, in real terms.

B1.5. The Sewage Models

1.5.1. **Sewerage Infrastructure** - Sewerage infrastructure expenditure is predicted using a logarithmic regression. Cost drivers for the model are represented by sewer length (the scale variable) and the number of combined sewer overflows (CSO's). Sewer length will obviously have a positive influence on cost, as it will require more expenditure to maintain larger and longer sewers. Ofwat further reasons that the number of CSO's in the network will drive outlay for companies upwards as they are generally larger and more costly to replace than foul sewers. The last Ofwat model had the following properties:

Table 1.11 - Ofwat 2006-07 sewerage infrastructure model

Water Service:	**Sewerage Infrastructure**	
Data:	CMER, June Returns	
Modelled cost:	Ln (annual average sewerage infrastructure functional cost [£m], divided by sewer length [km])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-6.187	0.182
Ln (number of CSO's divided by sewer length [km)	0.341	0.052
Form of Model:	Ln modelled cost = -6.187 + 0.341 * ln {CSO's / length of sewer [km]}	
Statistical Indicators:	Number of observations = 62	R^2 = 0.414
	Model standard error = 0.406	F test = 0.000

1.5.2. When updating this model it has not been possible to take a five year average by including the 2007-08 financial data. Although the total company data is available, Ofwat no longer require Table 32a. Consequently no sub-area information is available for the WaSC's. As a second best alternative, the Utility Regulator has taken the available four years financial data, uplifted to constant prices (2007-08) and used the resulting mean. Reconstructing the model we find:

Table 1.12 - NIAUR 2007-08 sewerage infrastructure model

Water Service:	**Sewerage Infrastructure**	
Data:	CMER, June Returns	
Modelled cost:	Ln (annual average sewerage infrastructure functional cost [£m], divided by sewer length [km])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-6.439	0.174
Ln (number of CSO's divided by sewer length [km)	0.257	0.051
Form of Model:	Ln modelled cost = -6.439 + 0.257 * ln {CSO's / length of sewer [km]}	
Statistical Indicators:	Number of observations = 59	R^2 = 0.311
		F test = 0.000

1.5.3. The descriptive statistics of the model are reasonably good. The t-ratio of the independent variable indicates that it is strongly significant. The explanatory variable also has the expected positive coefficient, illustrating that sewer overflows are more expensive to maintain and replace.

1.5.4. The explanatory power of the model, as indicated by the R^2 value, has declined to some extent. Although the value is still acceptable, the reason may be due to the fact that the number of observations has fallen since sub-areas have changed. Furthermore, the use of a four year average may have had an impact in that it has failed to 'smooth' the lumpiness of the capital expenditure as well as the five years average would have.

1.5.5. **Sewage Treatment** - The sewage treatment model attempts to explain capital maintenance expenditure on non-infrastructure assets such as sewage treatment works, sludge holding tanks and terminal pumping stations. It is anticipated that costs will be impacted by the load received at the works (scale variable) and the total number of works. This conforms to our prior assumption that the more any assets are used, the higher their costs to maintain.

1.5.6. The independent variable of number of works per load is important since economies of scale may be in place. The reasoning is that smaller works require more maintenance spend per load treated than larger, more efficient works. Therefore as the number of treatment works per load increase, so too will base maintenance (positive coefficient). The previous Ofwat model had the following format:

Table 1.13 - Ofwat 2006-07 sewage treatment model

Water Service:	**Sewage Treatment**	
Data:	CMER, June Returns	
Modelled cost:	Ln (annual average sewage treatment functional cost [£m], divided by total load received at treatment works [kg BOD_5/day])	
Explanatory Variables:	Coefficient	Standard Error
Constant	-7.905	0.278
Ln (total number of works divided by total load received at treatment works [kg BOD_5/day])	0.180	0.041
Form of Model:	Ln modelled cost = -7.905 + 0.180 * ln {number of works / total load received at sewage treatment works [kg BOD_5/day]}	
Statistical Indicators:	Number of observations = 59	R^2 = 0.249
	Model standard error = 0.472	F test = 0.000

1.5.7. Since sub-area data is not available for 2007-08, the Utility Regulator has again used a simple four year average. The results of the updated model are illustrated below:

Table 1.14 - NIAUR 2007-08 sewage treatment model

<table>
<tr><th>Water Service:</th><th colspan="2">Sewage Treatment</th></tr>
<tr><td>Data:</td><td colspan="2">CMER, June Returns</td></tr>
<tr><td>Modelled cost:</td><td colspan="2">Ln (annual average sewage treatment functional cost [£m], divided by total load received at treatment works
[kg BOD_5/day])</td></tr>
<tr><td>Explanatory Variables:</td><td>Coefficient</td><td>Standard Error</td></tr>
<tr><td>Constant</td><td>-7.727</td><td>0.334</td></tr>
<tr><td>Ln (total number of works divided by total load received at treatment works [kg BOD_5/day])</td><td>0.184</td><td>0.048</td></tr>
<tr><td>Form of Model:</td><td colspan="2">Ln modelled cost = -7.727 + 0.184 * ln {number of works / total load received at sewage treatment works [kg BOD_5/day]}</td></tr>
<tr><td rowspan="2">Statistical Indicators:</td><td>Number of observations = 56</td><td>R^2 = 0.212</td></tr>
<tr><td></td><td>F test = 0.000</td></tr>
</table>

1.5.8. Updated model results are much the same as the previous version with no notable differences observed.

1.5.9. **Sewerage Non-Infrastructure** - Predicted costs for sewerage non-infrastructure are calculated using an industry weighted average unit cost. Base maintenance allocated to this functional area reflects expenditure on all pumping stations associated with the sewer system, excluding terminal pumping stations. As a consequence the relevant indicator used is cost per pumping station.

1.5.10. In 2006-07 the weighted average cost was £3.783m per thousand pumping stations (£3.940m when uplifted to 2007-08 prices). For the updated data the E&W industry average unit cost (excluding NI Water) is:

Table 1.15 - NIAUR 2007-08 sewerage non-infrastructure model

Water Service:	Sewerage Non-Infrastructure
Data:	CMER, June Returns
Unit cost:	£m/number of pumping stations [000's]
Industry 5 year average spend:	£84.940m
Total pumping stations [000's]:	19.322
Weighted average unit cost:	£4.396m per thousand pumping stations
Number of observations	10

1.5.11. The unit cost is on average £4.396m maintenance spend per 1000 pumping stations per annum. This is almost a 12% real term increase on the previous years figure.

1.5.12. **Sludge Treatment and Disposal** - Ofwat have adopted a unit cost model to estimate reasonable levels of sludge treatment and disposal base maintenance. The unit cost utilised is expenditure per thousand tonnes of dry solids (ttds) disposed. This appears to be a reasonable indicator in that it would be expected that costs would be closely correlated with sludge disposal.

1.5.13. In 2006-07 the weighted average unit cost was £81.659 (000's) per ttds (£85.042 when uplifted to 2007-08 prices). Re-running the model using the updated data results in the following:

Table 1.16 - NIAUR 2007-08 sludge treatment and disposal model

Water Service:	Sewerage Non-Infrastructure
Data:	CMER, June Returns
Unit cost:	£/ttds
Industry 5 year average spend:	£90.401m
Total sludge dry solids disposed [ttds]:	1,519.046
Weighted average unit cost [£000's per ttds]:	£59.512 per ttds
Number of observations	10

1.5.14. The updated model highlights the fact that it costs the industry on average £59,512 for every thousand tonnes of dry solids disposed of. This represents a significant decrease from the previous Ofwat figure. At face value, the data would appear to indicate improving levels of efficiency. Although base maintenance expenditure has increased in real terms, this has been far out-stripped by the increase in sludge solids disposed, possibly suggesting economies of scale and better use of the asset base.

1.5.15. **Sewerage Management and General** - This model reflects base maintenance expenditure on various infrastructure and non-infrastructure assets on the wastewater side of the business. Such assets include maintaining land, buildings, laboratories, depots, computers, telemetry etc. Ofwat considers that costs will be influenced by the number of billed properties, so this variable represents the denominator in the unit cost model.

1.5.16. In 2006-07 the weighted average industry cost was £7.196 per billed property (£7.49 when uplifted to 2007-08 prices). Excluding NI Water, the revised weighted average is highlighted in the table below.

Table 1.17 - NIAUR 2007-08 sewerage management and general model

Water Service:	Sewerage Management and General
Data:	CMER, June Returns
Unit cost:	£/billed property
Industry 5 year average spend:	£159.378m
Total billed properties:	21,902,380
Weighted average unit cost [£/billed property]:	£7.277
Number of observations	10

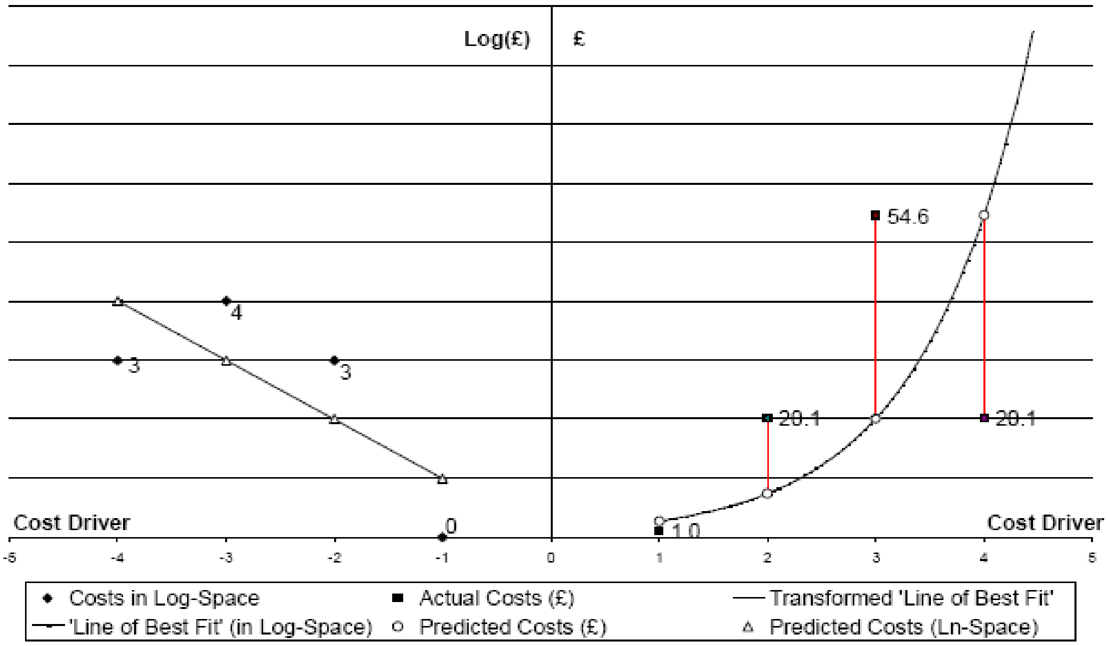
1.5.17. The updated unit cost shows very small nominal growth, which then represents a real terms decrease. The difference is however relatively minimal, indicating that base expenditure has remained fairly constant per billed property.

B1.6. Smearing Adjustments

1.6.1. As part of the modelling process, most of the dependent cost variables are transformed into logarithmic values in order to normalise the data. From the Ordinary Least Squares (OLS) methodology a line-of-best-fit is derived based on the industry average. Predicted costs are then calculated by retransforming the data back to £ sterling using the exponential function.

1.6.2. The issue with the retransformation is that the results produced will be biased and underestimated to some extent.[5] When using the OLS methodology the programme will define a best fit line that will minimise the residuals. As a consequence, the sum of the error terms will equal zero. Taking the exponent of zero gives a value of one. Unfortunately, when the exponent of each individual observation is calculated and an average produced, the value is greater than one. The difference represents the fact that when the best fit values are produced on the retransformed scale, the residuals no longer sum to zero. Instead, the error term has a positive value indicating that predicted costs are underestimated. NERA have demonstrated this diagrammatically below.

Figure 1.1 - NERA graphical representation of retransformation problem



1.6.3. The diagram illustrates the costs in the transformed (logged) scale on the left along with predicted and actual costs in the retransformed scale on the right. Although the residuals sum to zero in the transformed scale, it can be seen that this is not the case when retransformed. These predicted costs do not represent unbiased estimators. A smearing adjustment is therefore required.

1.6.4. The Utility Regulator has undertaken to allow for smearing where appropriate. This does not include the unit cost models for water treatment, sewerage non-infrastructure, sludge treatment and sewerage management and general. Neither is an

[5] A full explanation of the smearing problem can be found in: NERA report – Setting Efficiency Targets for NIW for 2009-10: Final report for NIAUR, Appendix F.

adjustment required for water management and general as the revised model did not utilise log transformations in the regression. The results of this adjustment are highlighted below.

Table 1.18 - Effect of smearing adjustment on NI Water predicted costs[6]

Capital Maintenance Expenditure by Service Area	NI Water Model Predicted Expenditure (£m)	Mean of Ofwat Model Residuals	NI Water Predicted Expenditure after Smearing (£m)
WDI	12.13	1.046	12.69
WDNI	9.11	1.156	10.53
WM&G	7.14	n/a	7.14
WR&T	8.77	n/a	8.77
Capex Water Total	37.14		39.12
SI	10.27	1.083	11.12
ST	24.54	1.154	28.33
SNI	3.24	n/a	3.24
ST&D	1.91	n/a	1.91
SM&G	4.44	n/a	4.44
Capex Sewage Total	44.40		49.04
Total Base Maintenance	81.54		88.16

1.6.5. As a result of the smearing adjustment, predicted average costs have risen to £88.16m, an increase of approximately 8% on the original estimate. This estimation represents a truer reflection of what an averagely efficient company would spend on base maintenance given NI Water's assets.

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[6] N.B. Some figures may not add exactly due to rounding – All figures in the document are in 2007-08 prices unless otherwise stated

B1.7. Findings of the Econometric Approach

1.7.1. Updating the capital maintenance models has allowed the Utility Regulator to estimate a reasonable average level of base maintenance expenditure in each service area for NI Water. The revised regressions exhibit acceptable descriptive statistics and an implicit logic which support their use in predicting capital expenditure. Arguably there are concerns with using the models, given that Ofwat has not undertaken their reconstruction at PR09. However, the models have a long established history within the water industry, having been constructed in consultation with companies. The coefficients of the updated models are also closely aligned with previous years, indicating that the relationships still hold true. The Utility Regulator therefore still sees merit in updating the analysis for use within the PC10 process.

1.7.2. Although the purpose of the exercise was not to establish an efficiency gap, it is worthwhile comparing the costs (5 year average) of NI Water with the predicted costs for the purposes of information.

Table 1.19 - Actual versus modelled costs (2007/08 prices)

Service Area	Actual Expenditure (£m) (5 year average 2003-04 to 2007-08)	Model Predicted Expenditure after Smearing (£m)
Water Distribution Infrastructure	27.80	12.69
Water Distribution Non-Infrastructure	3.61	10.53
Water Management & General	7.00	7.14
Water Resource and Treatment	9.78	8.77
Capex Water Total	48.19	39.12
Sewerage Infrastructure	14.88	11.12
Sewage Treatment	13.36	28.33
Sewerage Non-Infrastructure	4.39	3.24
Sludge Treatment & Disposal	1.94	1.91
Sewerage Management & General	4.80	4.44
Capex Sewage Total	39.37	49.04
Total Base Maintenance	87.56	88.16

1.7.3. The data suggests that NI Water is currently spending slightly less than an averagely efficient company, but only by a very small percentage. This conclusion is not however fair or robust as the historic financial information was not subject to the same level of scrutiny as current data.

1.7.4. What the data does indicate is that base costs of £88.2m per annum (£265m over PC10) are close to the pre-efficient figure predicted by NI Water. This is not surprising as the findings of the cost base indicated that NI Water are close to an averagely efficient company if no regional price adjustment is taken into account. If the econometric results are adjusted by 17% to reflect this advantage, the Utility Regulator could reasonably expect base maintenance to be in the region of £73m per annum.

1.7.5. This would represent a robust challenge for the company so targeted savings have been profiled to be achieved over the three years of PC10. Adding in a frontier shift of 0.4% per annum, the efficiency profile is therefore illustrated below.

Table 1.20 - Econometric model efficiency profile

	2010/11	2011/12	2012/13
Catch-up year on year	6.02	6.02	6.02
Frontier shift	0.4	0.4	0.4
Overall compounded improvement profile	6.40%	12.38%	17.99%

1.7.6. Applying these percentages to the capital maintenance findings results in a capital maintenance allowance as follows.

Table 1.21 - NIAUR proposed allowance using econometric approach (2007/08 prices)

	2010/11	2011/12	2012/13	Total
Water Infra base	11.875	11.116	10.405	33.396
Water Non-Infra base	24.744	23.162	21.680	69.587
Total Water Base	36.620	34.278	32.085	102.983
Sewerage Infra base	10.409	9.743	9.120	29.272
Sewerage Non-Infra base	35.493	33.223	31.098	99.813
Total Sewerage Base	45.902	42.966	40.218	129.085
Total Base Maintenance	82.522	77.244	72.303	232.068

1.7.7. The maintenance profile allows a capital spend of £232m over the three year PC10 period. This equates to £77m expenditure per annum, some £7m less than the £84m per annum proposed by the company.

1.7.8. An allowance must also be made for the impact of the transfer of PPP assets to private contractors. Since such costs will be covered by unitary charges, they will need to be removed from the capital maintenance allowance. The impact of the PPP transfer is discussed later in the report.

B1.8. Unit Cost Methodology

1.8.1. As stated in the introduction, the Utility Regulator carried out additional unit cost analyses in an effort to triangulate (using Econometric, Cost Base & Unit Costs analyses) around a robust estimate of capital maintenance at PC10 going forward. The unit cost comparisons performed for this aspect of the overall efficiency analysis were as follows:

Table 1.22 – Water capital maintenance unit cost analysis (All England and Welsh Companies)

Cost / Dependant Variable	Data Source	Explanatory Data	Data Source
Total Base Maintenance	T21	Connected Property	T2
Total Base Maintenance	T21	Winter Population	T2
Total Base Maintenance	T21	Distribution Input	T10
Total Base Maintenance	T21	Length of Main	T11
Total Base Maintenance	T35	Connected Property	As above
Total Base Maintenance	T35	Winter Population	As above
Total Base Maintenance	T35	Distribution Input	As above
Total Base Maintenance	T35	Length of Main	As above
IRE	T35	Connected Property	As above
IRE	T35	Winter Population	As above
IRE	T35	Distribution Input	As above
IRE	T35	Length of Main	As above
MNI	T35	Winter Population	As above

Table 1.23 - Sewage base maintenance unit cost analysis (E&W WaSC's only)

Cost / Dependant Variable	Data Source	Explanatory Data	Data Source
Total Base Maintenance	T22	Connected Property	T13
Total Base Maintenance	T22	Length of Sewer	T16
Total Base Maintenance	T22	Connected Population	T13
Total Base Maintenance	T22	Population Equivalent	T15
Total Base Maintenance	T36	Connected Property	As above
Total Base Maintenance	T36	Length of Sewer	As above
Total Base Maintenance	T36	Connected Population	As above
Total Base Maintenance	T36	Population Equivalent	As above
IRE	T36	Length of Sewer	As above
IRE	T36	Connected Property	As above
MNI	T36	Connected Population	As above
MNI	T36	Population Equivalent	As above

1.8.2. The methodology for calculating the predicted capital unit costs for NI Water comprised a six step process summarised below:

Step1: Collate capital cost and explanatory data from June Returns.

Step 2: inflate costs to 2007/08.

Step 3: calculate 'Total Industry averages' for capital cost data.

Step 4: calculate 'Total Industry averages' for the explanatory data.

Step 5: calculate 'Average Industry unit costs'.

Step 6: apply 'Average Industry unit costs' to NI Water's 2007/08 explanatory data to produce predicted capital maintenance costs.

1.8.3. The dependent variable in this case i.e. capital base maintenance (or some element thereof) is defined as the amount of money spent in order to maintain a company's network and assets at their current level of serviceability.

1.8.4. As with the econometric models, the data selected for the unit costs analysis covered historic periods of time between four and eight years (depending on availability).

1.8.5. This span of time, and the subsequent averaging of the figures goes some way to mitigate the effect of ‘lumpy’ investment profiles, i.e. capital investment is often committed with ‘peaks and troughs’ rather than across a smooth profile, driven by a combination of needs in a given year, external drivers such as more stringent compliance to water treatment/discharge consents and incentive to outperform efficiency targets at the earliest opportunity.

1.8.6. By using this method, i.e. summing and averaging the amount of capital investment for each company in the industry, the Utility Regulator avoids using a ‘peak’ or ‘trough’ year upon which to model predicted costs for NI Water (or modelled costs significantly higher (or lower) than was actually the case).

1.8.7. The cost data came from two separate sources within the June Returns, Tables 21 & 35 for water, and Tables 22 & 36 for sewerage:

Table 1.24 - Source data for unit cost methodology

Cost	Water	Sewage
Total Base Maintenance	T21 L33	T22 L32
IRE	T35 L2	T36 L2
MNI	T35 L5	T36 L5
Total Base Maintenance (IRE + MNI)	N/A	N/A

1.8.8. This cost data was then inflated[7], summed (i.e. a figure produced for what the entire industry might spend in a given year) and averaged over the available time period.

[7] It had been the expectation of the Utility Regulator to use COPI in order to inflate these costs (given that they are capital in nature) however the Ofwat econometric methodology uses RPI. In order to maintain comparability, RPI was also used by NIAUR.

B1.9. Findings of the Unit Cost Approach

1.9.1. The table below shows the unit costs results in the same format[8] as the econometric results in order to compare and contrast the findings:

Table 1.25 - Comparison of unit cost estimates to NI Water actual and econometric approaches

	NI Water Actual (2007/08)	Econometric (Predicted)	Capital Unit Costs (Predicted Range)	Capital Unit Costs (Preferred Estimate)	Total Capital Unit Costs (Preferred Estimate)
Water IRE	19.78	12.69	13.107 - 17.223	13.11	
Water MNI	19.36	26.44	17.84	17.84	
Water Capex Total (IRE + MNI)	39.13	39.12	30.947 - 35.063	30.95	30.49
Sewage IRE	6.20	11.12	6.246 - 10.231	10.23	
Sewage MNI	23.30	37.92	16.00 - 20.945	20.95	
Sewage Capex Total (IRE + MNI)	29.49	49.04	22.246 - 31.176	31.18	28.24
Total Capex	68.63	88.16	53.193 - 66.239	62.12	58.73
NB - Some figures may not add due to rounding.					

1.9.2. The 'Preferred Estimates' using unit costs were decided using the Utility Regulator's opinion of the most appropriate explanatory factor available from our original analysis and these are explained below:

Water Preferred Estimates

- **Water IRE**: The most appropriate explanatory factor was considered to be Connected Properties. Length of main is considered unrepresentative for NI Water as the long length of rural main vastly over-estimates predicted costs, and Distribution input has factors associated with it (i.e. leakage) that could

[8] For comparability purposes only the T35 / T36 versions of Capital Maintenance have been used. The length of main explanatory factor has also been excluded as it is considered unrepresentative.

leave its use open to question. While winter population turned out to be a good proxy, it is considered better suited as a 'non-infrastructure' explanatory, and so Connected Properties was chosen.

- **Water MNI**: Winter population was the only explanatory factor modelled against Water MNI, and thus represents the preferred estimate.
- **Water Total Capital Maintenance**: For the preferred estimate for Total Capital Maintenance, Connected Properties has been chosen over Winter Population. While the two produced similar predicted costs, the Regulator considers Connected Properties the more representative in terms of 'straddling' the infrastructure / non-infrastructure divide, although either variable would have been reasonable.

Sewage Preferred Estimates

- **Sewage IRE:** For Sewage IRE, Km of sewer was considered the most appropriate factor to use; it is a good indicator of infrastructure costs, and does not have the same issues associated with it as NI Water's length of main figure.
- **Sewage MNI:** The preferred estimate for sewage MNI was considered to be connected population. This has been chosen as it is considered a more appropriate measure of non-infrastructure costs compared to Population Equivalent.
- **Sewage Total Capital Maintenance:** For consistency with the Water preferred estimate, and for broadly the same reasons, the Regulator considers Connected Properties to be the most appropriate explanatory factor as it provides a broader scope in terms of infrastructure / non-infrastructure.

1.9.3. The data suggests predicted unit costs of £53m - £66m per annum given NI Water's assets, with £62.1m (£186m over PC10) as the preferred estimate. These findings are however open to debate, particularly in relation to maintenance non-infrastructure costs. The reason being that MNI costs are focused on various different activities from treatment works to management and general expenditure. Given the variety of expenditure, one particular type of unit cost is unlikely to be a very accurate predictor of cost.

1.9.4. Applying the RPA to the preferred estimate, as was the process for the econometric models, the unit cost approach predicts average expenditure of £51.6m per annum. As with the other methodologies, it would not be expected that such efficiencies would be achieved immediately. Therefore, profiling these efficiencies over three years and including a frontier shift of 0.4%, gives the following efficiency targets:

Table 1.26 - Unit cost model efficiency profile

	2010/11	2011/12	2012/13
Catch-up year on year	6.02	6.02	6.02
Frontier shift	0.4	0.4	0.4
Overall compounded improvement profile	6.40%	12.38%	17.99%

1.9.5. Applying these percentages to the unit cost findings (£62.1m per annum), results in a capital maintenance allowance as follows:

Table 1.27 - NIAUR proposed allowance using unit cost approach (2007/08 prices)

	2010/11	2011/12	2012/13	Total
Water Infra base	12.269	11.484	10.749	34.502
Water Non-Infra base	16.700	15.632	14.632	46.964
Total Water Base	28.969	27.116	25.382	81.466
Sewerage Infra base	9.577	8.964	8.391	26.932
Sewerage Non-Infra base	19.605	18.351	17.178	55.134
Total Sewerage Base	29.182	27.316	25.568	82.066
Total Base Maintenance	58.151	54.431	50.950	163.532

1.9.6. The Utility Regulator is of the opinion that the unit cost models are not as robust as the other approaches. It is considered that the level of expenditure provided for is unrealistically low for NI Water at this stage. Unit costs are useful for predicting certain types of expenditure, but may not be realistic for other costs.

B1.10. Cost Base Approach

1.10.1. The final methodology employed by the Utility Regulator involved application of the cost base findings. The main assumption of the analysis is that NI Water estimates of the pre-efficient base maintenance cost profile is representative of what the company might expect to spend. From this expenditure profile the Utility Regulator has applied efficiency targets based on the analysis of standard unit costs provided by water and sewerage companies (known as the cost base).

1.10.2. The cost base is a mechanism to assess capital efficiency by comparison of standard industry unit costs. Efficiency percentages are weighted depending upon the level of investment envisaged within a particular service area (i.e. water infrastructure, sewerage non-infrastructure etc). In previous price reviews Ofwat has used the cost base, along with econometric models to set capital maintenance efficiency targets. The cost base is further used as the principal tool in setting capital enhancement efficiency objectives.

1.10.3. This approach has advantages in that it is a transparent and fairly simplistic process in that efficiency percentages are applied to NI Water estimates of pre-efficient base costs. Use of the cost base can be considered reasonably robust as the process has withstood scrutiny from the Competition Commission and is the preferred method of assessment utilised by Ofwat. Although this is the first proper cost base the company has been asked to complete, the Utility Regulator has been impressed with the quality of the return provided. This has been borne out by audits completed by the Reporter and an independent comparability & consistency check (to the England and Wales industry) undertaken by Mott McDonald. The Regulator is therefore content that the relative efficiency percentages based on cost base are robust enough to set efficiency targets.

1.10.4. The major issue with this process is the assessment of pre-efficient costs completed by NI Water. This is an unenviable task given that robust historical financial and serviceability data has not been available to either the Utility Regulator or the company. Assessment of the business plan would appear to suggest that the company has used the little trended information available in order to forecast maintenance costs in the PC10 period. Based on a similar exercise completed by the Utility Regulator, annual expenditure by service area was estimated at £87.56m broken down as follows:

Table 1.28 - Analysis of NI Water historic capital spend (2007/08 prices)

Company	2003-04	2004-05	2005-06	2006-07	2007-08	Average
Water Resource & Treatment	15.659	16.848	8.707	5.426	2.240	9.776
Water Distribution Infrastructure	21.603	27.045	33.715	36.909	19.752	27.805
Water Distribution Non-Infrastructure	2.858	7.648	1.696	0.604	5.255	3.612
Water Management & General	6.972	1.995	4.213	9.935	11.887	7.001
Sewerage Infrastructure	21.491	33.703	5.023	8.299	5.900	14.883
Sewerage Non-Infrastructure	7.888	4.435	1.588	1.364	6.680	4.391
Sewage Treatment	8.459	16.851	15.727	12.277	13.461	13.355
Sludge Treatment & Disposal	1.715	4.767	1.080	0.864	1.263	1.938
Sewerage Management & General	1.143	0.333	6.060	14.287	2.188	4.802
NB - Some figures may not add due to rounding.						

1.10.5. Projected over three years this gives:

Table 1.29 - Projected PC10 base maintenance using historic averages (2007/08 prices)

Company	20010-11	2011-12	2012-13	PC10 Total
Water Resource & Treatment	9.776	9.776	9.776	29.328
Water Distribution Infrastructure	27.805	27.805	27.805	83.414
Water Distribution Non-Infrastructure	3.612	3.612	3.612	10.836
Water Management & General	7.001	7.001	7.001	21.002
WATER TOTAL	48.193	48.193	48.193	144.580
Sewerage Infrastructure	14.883	14.883	14.883	44.649
Sewerage Non-Infrastructure	4.391	4.391	4.391	13.172
Sewage Treatment	13.355	13.355	13.355	40.066
Sludge Treatment & Disposal	1.938	1.938	1.938	5.814
Sewerage Management & General	4.802	4.802	4.802	14.406
SEWERAGE TOTAL	39.369	39.369	39.369	118.107
OVERALL TOTAL	87.562	87.562	87.562	262.687

1.10.6. The total value of £262m is reasonably close to that forecast by NI Water (£267.9m) in its PC10 Business Plan, and suggests their allocation is similar to historical levels. However the fact still remains that neither the company nor the Utility Regulator has confidence that such historical data was allocated correctly in terms of a QBEG (Quality, Base, Enhancement and Growth) split. Furthermore, we are aware that some material amount of expenditure has been incorrectly allocated as backlog base rather than base maintenance. For these reasons, the analysis may not be totally reliable.

B1.11. Findings of the Cost Base Approach

1.11.1. Despite these qualifications, the Utility Regulator has endeavoured to adopt such an approach in an effort to give a range of projections. From the cost base study it is estimated that the total scope for catch-up to the upper quartile performing company within the England and Wales industry is 20.9%. This figure has been arrived at using a regional price adjustment (RPA) of 0.83 to account for lower construction costs in Northern Ireland. Of this efficiency scope, the Utility Regulator requires catch-up of 60% in-line with the WICS approach of SR02 (but decreased pro-rata due to one less year in the price control period). This equates to a 12.5% target over the three years, resulting in catch-up of 4.37% per annum (geometric mean). Added to this, a frontier shift of 0.4% per annum is considered achievable based on recent Ofwat allowances and analyses conducted on their behalf by Reckon.

1.11.2. The overall compounded improvement profile is illustrated below.

Table 1.30 - Efficiency improvement estimated by the cost base approach

	2010/11	2011/12	2012/13
Catch-up year on year	4.37	4.37	4.37
Frontier shift	0.40	0.40	0.40
Overall compounded improvement profile	4.75%	9.27%	13.58%

1.11.3. When applied to NI Water figures this gives a base maintenance allocation of:

Table 1.31 - NIAUR proposed allowance using the cost base analysis (2007/08 prices)

	2010/11	2011/12	2012/13	Total
Water Infra base	20.340	18.901	19.574	58.815
Water Non-Infra base	19.750	15.734	13.916	49.400
Total Water Base	40.090	34.635	33.489	108.214
Sewerage Infra base	12.840	12.230	11.563	36.633
Sewerage Non-Infra base	35.838	32.930	29.965	98.734
Total Sewerage Base	48.678	45.161	41.528	135.367
Total Base Maintenance	88.768	79.796	75.018	243.581

1.11.4. The results of this investigation estimate annual expenditure of £81m base maintenance over the three year PC10 period. This is £3m per annum less than the post efficiency figures proposed by the company. It also represents savings of £24.4m on the pre-efficiency figures.

B1.12. Conclusions

1.12.1. Given the lack of information available on historic costs and serviceability, the Utility Regulator has undertaken three separate methodologies in an effort to establish an appropriate level of capital maintenance spend for PC10. The methodologies included:

- Use of econometric models to predict averagely efficient base maintenance costs;
- Application of industry average unit costs to NI Water assets; and,
- Incorporation of cost base efficiency targets alongside pre-efficient expenditure; to predict an efficient level of expenditure.

1.12.2. The table below highlights the findings:

Table 1.32 - Comparison of different methodologies (2007/08 prices)

Methodology	NI Water	Econometrics	Unit Cost	Cost Base
NI Water Pre-Efficiency Cost (£m)	£267.9m	£267.9m	£267.9m	£267.9m
Proposed Allowance (£m)	£252.3m	£232.1m	£163.5m	£243.6m
Ave. Per Annum Expenditure (£m)	£84.1m	£77.3m	£54.5m	£81.2m

1.12.3. Depending on the methodology used, the range of post efficiency base costs goes from £164m to £252m for the PC10 period. The Utility Regulator is of the opinion that a target in the middle of the range would be the most appropriate for NI Water. Consequently a figure of £232.1m (12% reduction) derived from the econometric analysis is the recommended allowance.

1.12.4. The econometric approach is considered robust in that it is not dependent on questionable financial data. It was the preferred methodology for WICS in previous price reviews and has been utilised again in their most recent draft determination. Updating of the models has indicated that the cost relationships are still valid and results can be depended upon.

1.12.5. This allowance further represents a compromise of approaches since the value is within the proposed range. This reflects an acceptance that no one single methodology can be relied upon as totally accurate. Given the limited information available, capital spend of £232m appears to be a reasonable determination.

1.12.6. In terms of the allocation split between infrastructure and non-infrastructure the Utility Regulator has taken a separate view from the econometric models (although the overall allowance remains unchanged). This is due to the fact that certain models may not accurately reflect NI Water's situation. For instance, there is a belief that infrastructure costs may be underestimated due to the effect of outlying length of mains. This is balanced by the over-estimation of sewerage non-infrastructure expenditure due to the impact of a very large number of small WWTW's. As a consequence the Utility Regulator is proposing to change the allocation between IRE and MNI. Besides the reallocation, a further £10m will be added to the water infrastructure capital costs to reflect the bottom up analysis of expected costs in this area.[9]

1.12.7. In addition, the Utility Regulator must make appropriate allowance for the transfer of PPP assets. This has proven difficult given that the Utility Regulator has no information on base maintenance spend at individual sites or treatment works. In answer to our PC10 Business Plan query,[10] the company has commented that £0.12m and £0.32m per annum is avoided as a result of the transfer of water and wastewater assets to Alpha and Omega respectively. Over the PC10 period this would result in a reduction of £1.3m to the base maintenance budget.

1.12.8. The Utility Regulator is unconvinced by this figure and does not believe it is representative of the level of costs that will be avoided. This doubt is raised by virtue of data presented both within NI Water's PC10 Business Plan and Annual Information Return 2009 (AIR09). Within chapter B7 the company have given a breakdown of the Alpha unitary charge which allocates £2.6m to capital maintenance over the PC10 period. Furthermore, the AIR09 has indicated that IRE of £4.924m has been allocated to the Alpha scheme alone for a single year. In addition, the econometric models include base maintenance of £1.9m per annum for sludge disposal alone, which will no longer be required in the PC10 period. This very limited data leads to the conclusion that the estimate provided by NI Water in the PC10 Business Plan query process was unrealistic.

1.12.9. The Utility Regulator has not had proper time to consider the PPP impact on base maintenance fully. As a consequence, the need has arisen to make certain assumptions. These include:

- Alpha is considered to have a capital value of £108.5m[11];
- Omega is assumed to have a capital value of £136m[12];
- The assets have a life-span of 35 years; and,
- Straight line depreciated has been applied.

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[9] This figure is explained further within the main report.

[10] NIAUR PC10 Query 69, Issued 8th July 2009 - Answered 23rd July 2009

[11] Source: Information provided by the company to NIAUR in answer to a query in January 2009. The data provided a value of £111.7m but was deflated to 2007/08 prices

[12] Source: Omega OBC, NPV analysis of disposal values uplifted to 2007/08 prices.

1.12.10. Adopting such an approach leads to the following conclusions:

Table 1.33 - Impact on PC10 Base Maintenance (2007/08 prices)

	2010/11	2010/11	2012/13	Total
Alpha	£3.100m	£3.100m	£3.100m	£9.299m
Omega	£3.884m	£3.884m	£3.884m	£11.653m
Total	£6.984m	£6.984m	£6.984m	£20.951m

1.12.11. Based on this approach, the Regulator has assumed that base maintenance will be reduced by £7m per annum, totalling £21m over the PC10 period. In order to verify the reasonableness of this figure, comparison was made between England and Wales base maintenance spend on MNI as a proportion of the asset value. This analysis suggested that maintenance spend was approximately 2.43% of the non-infrastructure asset replacement cost for both water and sewerage. Applying these percentages to the assumed capital values of Alpha and Omega gives:

Table 1.34 - Impact on PC10 Base Maintenance (2007/08 prices)

	2010/11	2010/11	2012/13	Total
Alpha	2.578	2.578	2.578	7.733
Omega	3.299	3.299	3.299	9.896
Total	5.876	5.876	5.876	17.629

1.12.12. The two methodologies indicate a range of £18m - £21m of base maintenance being avoided as a result of PPP. Given the limited information, the Utility Regulator has adopted a cautious approach and excluded £18m (£6m per annum) from the capital maintenance budget to allow for the transfer of PPP assets. These adjustments give a final allowance as follows:

Table 1.35 - Adjustments to capital maintenance spend (2007-08 prices)

	NI Water	Utility Regulator
Econometric analysis (pre-regional price adjustment)		£ 265 m
Adjustment for regional price base		£ -32 m
Allowance equivalent to the capital maintenance of PPP plant included in the econometric models.		£ -18 m
Addition of water infrastructure capital costs based on projected activity and expenditure.		£ 10 m
Total capital maintenance investment included in the draft determination	£ 252 m	£ 224 m
Note – Figures may not add due to rounding		

1.12.13. The final capital maintenance allowance of the Regulator is £74.7m per annum, some £9.3m less than that proposed by NI Water. It is the opinion of the Utility Regulator that the NI Water proposed efficiency targets are insufficiently challenging and do not properly account for the transfer of PPP assets. The Utility Regulator has therefore proposed a level of base maintenance costs which it considers to be reasonable in order to maintain services, yet sufficiently challenging while leaving some scope for out-performance.