

# Water & Sewerage Services Price Control 2015-21

Final Determination – Annex K  
Capital Investment  
December 2014



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# Water and Sewerage Services Price Control 2015-21 Final Determination Annex K Capital Investment

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# 1.0 Introduction

- 1.1.1 This Annex to the PC15 final determination sets out the Utility Regulator's assessment of the capital investment proposed by NI Water for the PC15 period.
- 1.1.2 The provision of water and sewerage services is a capital-intensive business. The network of water mains and sewers extends to 26,700 km and 15,000 km respectively. Water resources, water treatment works, pumping plant and wastewater treatment works require substantial structures, mechanical and electrical plant and instrumentation. NI Water estimates the gross replacement costs of its current assets as £9.1 billion (March 2013).
- 1.1.3 The company must invest to maintain these assets to ensure improvements in service, support development as well as meet the requirements for drinking water quality and environmental compliance.
- 1.1.4 NI Water has set out its plan for capital investment in PC15 within the indicative allocation of £990m for water and sewerage services in the Executive's Investment Strategy (ISNI). The company has concluded that this will not allow it to deliver all the improvements that are required or desirable in the PC15 period. The plan is therefore a compromise between competing priorities. While the prioritisation of the constrained plan has been agreed through consultation with key stakeholders, the key stakeholders have raised concerns over the level of funding available through ISNI and have called for increased investment. It should be noted that some of the future investment priorities set out in this Guidance are mandatory and driven by European legislation. Failure to implement these European requirements could result in infraction and substantial fines for the Executive, leading to reduced investment in public services.
- 1.1.5 We asked NI Water to assess the long term need for investment so that its business plan was set in a long term context. The company has estimated that it could invest £1.4bn efficiently in PC15 if funding was available. The company has also indicated that a further £1bn may be necessary to address strategic drainage issues and comply with shellfish water and bathing water requirements- with investment proposed in the current plan limited to £10m to undertake investigations and studies. Any significant additional investment that has not been identified within the current funding envelope, would have implications for consumers increasing the charge they pay. The company's estimate of £1.6bn adds in the order of 25% to long term revenue requirements and charges for future non-domestic consumers. PC15 provides a space for investigation of options and careful assessment of costs and benefits to ensure that these strategic issues can be addressed in a sustainable way and at the lowest reasonable cost.
- 1.1.6 The planning assumption of £990m is expressed in nominal terms. The purchasing power of this budget will be eroded by inflation over time. We have analysed and reported investment in real terms (adjusted for inflation) using a common price base of 2012-13 prices.
- 1.1.7 Our assessment of the capital programme is presented in the following sections. These sections follow the key steps in our analysis, moving from an indicative

public expenditure capital budget, through the assessment of an efficient investment programme to identify the potential for additional outputs in PC15 and the potential for future capital investment.

- Section 2 Consultation Response Summary
- Section 3 Capital Budget
- Section 4 Capital Inflation
- Section 5 Capital Maintenance Investment
- Section 6 Individual Programmes of Work
- Section 7 Scope for Additional Outputs

## 2.0 Consultation Response Summary

2.1.1 The content of this Annex and the scope of work it describes broadly follows the content of the same Annex in the draft determination. The assessment is based on the scope of work proposed by NI Water in its business plan which was developed and prioritised in conjunction with the Principal Stakeholders. The scope of works was presented in the draft determination and available for consultation. No respondents commented on the scope or prioritisation of the work which could be carried out within the available level of funding. However:

- The Northern Ireland Environment Agency (NIEA) reinforced its disappointment over the level of investment allocated to the enhancement of prioritised water and sewerage services for the PC15 period. NIEA noted that this will significantly impact the delivery of the prioritised programme of work and impact on the quality of the environment; and
- While the Drinking Water Inspectorate (DWI) was able to confirm its support for some of the outputs included in the draft determination, it had not yet received sufficient information from NI Water to support the nominated outputs included in the draft determination. DWI also emphasised that it expects NI Water to deliver its statutory drinking water quality requirements. Where the Inspectorate identifies significant non-compliance with the regulations, it will continue to assess the need to take forward enforcement in ensuring NI Water complies with its regulatory duty.

2.1.2 We recognise the concerns expressed by the quality regulators in respect of the overall level of funding. We have worked within the capital budget indicated in the Social and Environmental Guidance. We recognise that the company could commit a higher level of efficient investment and this would add value should additional public expenditure become available.

2.1.3 In the absence of DWI's support for the nominated outputs included in the draft determination, we could have taken the decision to remove these outputs from the final determination, releasing funding for other priority outputs. However we are aware that subsequent to the receipt of consultation responses there has been further engagement between DWI and the company in relation to ongoing and emerging risks. We have therefore concluded that, in the light of the potential risks identified by both parties and the plans to undertake further treatability studies, it would be appropriate to retain some of the enhancement investment proposed by the company pending completion of the studies and further risk assessments.

2.1.4 We also recognise that issues may emerge and priorities may change during PC15. The final determination includes a Change Control Protocol already established between stakeholders. We have also made provision for a mid-term review which will allow priorities to be reset for the final three years of the price control if necessary.

2.1.5 The key changes made to our determination of capital investment is as follows:

- We have amended our estimate of capital income for the PC15 period to reflect updated information from NI Water on income received in the last four years;
- We have confirmed the 'minded to' position on capital inflation we set out in the draft determination and we have adopted RPI as the index we will use to adjust for capital inflation during PC15;
- The efficiency challenge on capital inflation has been adjusted from 9.1% in the draft determination to 7.0% in the final determination (see Annex L);
- We have made a range of minor adjustments to our assessment of individual sub-programmes to reflect additional information provided by the company in its response to the draft determination; and
- We have adjusted our assessment to take account of the revised outcome of PC13 based on the latest best estimates provided by the company (see Annex I) and the impact that this has had on the PC15 programme.

## 3.0 Capital Budget

### 3.1. Public expenditure capital budget

- 3.1.1 NI Water's investment plan for PC15 is based on the indicative allocation of £990M for water and sewerage services in the Executive's Investment Strategy (ISNI) for investment planning purposes. This budget is expressed in nominal terms.
- 3.1.2 Our final determination is based on the same indicative allocation of £990m (nominal) which the Department for Regional Development (DRD) confirmed we should use for planning purposes in the Social and Environmental Guidance.
- 3.1.3 However, our price control determination is set in the context of the wider public expenditure environment and spending constraints going forward. In November 2014, DRD issued a consultation on the "Draft Budget 2015-16: Spending and saving proposals within the Department for Regional Development". This signals a lower level capital funding for 2015-16 than indicated in the Social and Environmental Guidance on which we have based our determination.
- 3.1.4 To ensure that NI Water is able to finance its functions within its current governance arrangements, we have entered into a Memorandum of Understanding and Consequent Written Agreement (CWA) with DRD. In the event of reductions in public expenditure for water and sewerage services we will work with NI Water to ensure that it delivers the best possible package of business plan outputs within the final public expenditure allocation. To do so, we will work with other stakeholders to agree changes to outputs and / or prices if appropriate.

### 3.2. Capital budget adjustments

- 3.2.1 A number of adjustments are applied to the public expenditure capital budget to arrive at the capital expenditure available for NI Water to invest in maintaining and adding to its asset base over PC15. These adjustments take account of:
- Accounting allocations in respect of the Public Private Partnership (PPP) schemes which treat water and wastewater and dispose of sewage sludge under concession arrangements with NI Water;
  - A reconciliation adjustment between UK GAAP and IFRS accounting guidelines; and
  - The capital grants and contributions which NI Water receives in respect of infrastructure charges for new connections.
- 3.2.2 Our assessment of the capital expenditure available for NI Water to invest in PC15 is shown below.

**Table 3.1 - Public expenditure budget reconciliation (£m nominal)**

	15-16	16-17	17-18	18-19	19-20	20-21	PC15
PE capital budget used	155.0	158.0	163.0	167.0	171.0	176.0	990.0
Alpha PPP maintenance	-1.2	-0.5	-1.8	-1.3	-1.5	-0.2	-6.5
Residual interest in off balance-sheet PPP	-3.6	-3.6	-3.7	-3.8	-3.9	-4.0	-22.7
IFRS infrastructure renewal charge adjustment	1.0	1.1	1.1	1.1	1.1	1.1	6.5
Capital grants and contributions	6.3	6.5	6.7	6.7	7.0	7.2	40.5
Capital grants and contributions transferred to deferred credits	-0.8	-0.8	-0.8	-0.8	-0.9	-0.9	-4.9
NI Water gross capital budget	156.8	160.7	164.5	168.9	172.7	179.2	1002.8

### PPP and IFRS adjustments

3.2.3 We have accepted the adjustments set out by NI Water for Alpha PPP maintenance, the residual interest in off balance-sheet PPP and the IFRS infrastructure renewals charge adjustment.

### Capital grants and contributions

3.2.4 The company receives capital grants and contributions in respect of new connections including: infrastructure connection charges; connection costs, reasonable cost contributions for requisition and sewer adoption income. These grants and contributions provide a source of income to part fund the associated capital works.

3.2.5 The company has estimated future grants and contributions based on 4300 new connections to the water service per annum, with 83% of these also connected to the sewerage service. This is consistent with recent levels of development following the major reduction in development activity after the credit-crunch.

3.2.6 We have based our estimate of future income on the company's projected level of development activity and the average level of development income for the four year period 2011-15, as shown in Table 3.2. Thirty percent of income from infrastructure charges has been allocated to deferred credits.

3.2.7 In its response to the draft determination, the company challenged our use of historic averages to estimate a higher level of income in PC15 than the company's projections. The company subsequently revised its estimate for PC15 upwards and provided a latest best estimate of capital income in PC13. The revised estimate for capital income for PC13 was materially higher than the estimate in the business plan submission.

3.2.8 We remain convinced that using an average level of historic income is a reasonable way for estimating future income where the estimated level of

development remains constant. For the final determination, we have maintained our approach and adjusted the projected capital income upwards based on the latest best estimate of income for PC13. Based on information provided by the company we have adjusted this estimate to reflect an expected reduction in sewer adoption income at the start of PC15 and a subsequent reduction half way through PC15.

**Table 3.2 – Projected grants and contributions (2012-13 prices)**

Source of grants and contributions	£m/a
Water service infrastructure charges	1.3
Other water service grants and contributions (connection costs, requisitions and mains diversions)	2.0
Sewerage service infrastructure charges	1.0
Other sewerage service grants and contributions (connection costs, requisitions and adoption charges)	1.4
Total	5.7

3.2.9 Changes in expenditure on connections due to changes in activity should be accompanied by an equivalent change in income. We expect the company to make reasonable predictions of development activity, costs and income and manage within these budgets for the price control period.

## 4.0 Capital Inflation

### 4.1. Introduction

4.1.1 NI Water's capital investment is constrained by public expenditure budgets which are set in nominal terms. The outputs which can be delivered will be affected by inflation which will reduce the real purchasing power of the budget. In its business plan, NI Water repeatedly highlighted the risk of capital works inflation could growing during the PC15 period than currently assumed as a significant risk to delivery of the PC15 outputs.

4.1.2 In its business plan submission, NI Water adopted capital inflation projections which were prepared by our consultants First Economics based on an assessment of future input price inflation and productivity improvements (see Annex O for more detail). However, NI Water noted that:

*“Most indicators suggest that the construction industry is recovering in Great Britain and the normal boom and bust cycle will return. Construction inflation is very volatile and the actual value of COPI may significantly exceed this projection. This is likely due to the relatively low rates for work being offered in the market as contractors have cut overheads and margin to survive during the recession.”*

4.1.3 Historically, we have used the Construction Output Price Index for New Works (COPI) prepared by The Building Cost Information Service of RICS (BCIS) as a means of adjusting the capital programme for inflation.

4.1.4 COPI in 2013-14 is already higher than that assumed by the company in its business plan submission. If this continued over the 6 year PC15 price control the impact would be material. For example, NI Water has estimated that if capital inflation ran 1% per annum higher than currently projected this would reduce the real purchasing power of the nominal capital budget by £34m.

4.1.5 In view of this sensitivity, we have given careful consideration to the allowance for capital inflation in the business plan and the mechanisms which should be in place to manage that risk. We have concluded that divergence between the construction market in Great Britain and Northern Ireland means that continuing to use COPI to reflect capital inflation may not meet our duty to protect consumers over the PC15 period.

4.1.6 In our draft determination we described:

- The approach used to adjust for capital inflation in PC10 and PC13;
- The need to consider an alternative approach to capital inflation; and
- An assessment of alternative approaches covering:
  - The rate of frontier shift affecting water industry capital costs (see Annex O);

- Long term trends in COPI and RPI; and
  - The divergence between construction volumes and construction inflation in Northern Ireland and GB.
- 4.1.7 We concluded that we were minded to use RPI as a reasonable projection of capital inflation for NI Water in the medium term and we intend to use RPI as a means of monitoring delivery of the capital programme.
- 4.1.8 We noted that we would welcome views on this approach and the balance of risks between consumers and NI Water that it entails. We indicated we would welcome views on any alternative approaches which would both address the issues we raised and provide a more robust mechanism for managing the risks of capital inflation. Specifically, we sought views on:
- a. Our conclusion that COPI, the measure we have used to adjust for capital inflation, may not be relevant to the future NI Water industry given the current divergence of the local construction market and the GB market;
  - b. Whether an alternative approach to estimating future construction inflation by calculating a frontier shift is appropriate or whether we should rely on a simpler approach that construction inflation will follow RPI in the long term; and
  - c. Whether, after making a reasonable pre-estimate of inflation, NI Water is best placed to manage inflation risk over the medium term of a price control and we should not apply retrospective adjustments for inflation in subsequent price controls.

## 4.2. Response to draft determination

- 4.2.1 CCNI and NI Water provided feedback on capital inflation in their response to the draft determination:
- CCNI noted that, in view of the potential impact of inflation on the service received by NI consumers, there is benefit in examining more closely the potential to develop a local price effects mode for NI;
  - NI Water agreed that divergence between the construction market in Great Britain and Northern Ireland means that continuing to use COPI to reflect capital inflation may not meet the Utility Regulator's duty to protect consumers and NI Water from the risk of inflation; and
  - NI Water suggested an approach based on Real Price Effects (RPE) would allow adjustment based on the input costs experienced in Northern Ireland appropriate to the work type executed. Input costs could be monitored on the basis of an agreed basket of indices with weightings based on NI Water's capital programme. (Similar to the approach set out in Annex O).

### 4.3. Conclusions on capital inflation

- 4.3.1 Historically, we have used COPI prepared by BCIS as a means of adjusting the capital programme for inflation.
- 4.3.2 We have prepared an estimate of future capital inflation in the water industry which is based on published indices for a typical mix of investment relevant to the water industry and includes an allowance for future productivity assessments. This suggests that future capital inflation will follow projected RPI in the medium term.
- 4.3.3 We have also assessed the long term trends of COPI and RPI. This shows that construction inflation as measured by COPI has followed RPI over the long term, with short term volatility driven by change in construction volume.
- 4.3.4 The construction sector in Great Britain and Northern Ireland has diverged in recent years. The GB construction sector did not experience the depth of recession in NI, which was driven by a collapse in the private housing sector and private commercial sectors. There is evidence that the GB construction sector is beginning to recover with over-heating in the construction sector in the south-east of England. There is no strong evidence of a similar recovery in Northern Ireland to drive increased volumes.
- 4.3.5 This means that construction sector inflation in the south-east of England will drive increases in a national COPI index which will not be representative of the capital inflation experienced by NI Water. In these circumstances, continuing to use COPI as a means for adjusting NI Water's capital programme for inflation in PC15 will not best serve NI Water's consumers.
- 4.3.6 We do not apply COPI in any other sector we regulate. In the gas and electricity sectors we set prices assuming that capital inflation will move broadly in line with RPI. We do not apply retrospective adjustments and the company carries the risk of managing capital inflation both in its procurement policy and financing delivery.
- 4.3.7 Following further engagement with NI Water, it has not been possible to identify a set of indices specific to NI Water which would provide a robust Real Price Effects measure of capital inflation.
- 4.3.8 We have concluded that we should adopt RPI as the basis for estimating and adjusting for capital inflation over PC15. We have based our estimates of future capital inflation on the latest available estimate of future RPI which are incorporated in the financial model as follows:

**Table 4.1 – RPI indices used to model capital inflation the determination.**

	Base Year						
	12/13	15/16	16/17	17/18	18/19	19/20	20/21
RPI (year average).	244.675	266.800	275.871	285.250	294.949	304.977	315.346

- 4.3.9 We will monitor delivery in PC15 using RPI to deflate nominal capital costs. We will adjust the RCV at the end of PC15 using RPI to create an opening balance for PC21.

## 5.0 Capital Maintenance Investment

### 5.1. NI Water's estimate of capital maintenance investment

5.1.1 NI Water's proposals for capital maintenance investment in PC15 are summarised in Table 5.1 - NI Water's summary of capital maintenance expenditure (£m 2012-13 prices), reproduced from the company's business plan.

**Table 5.1 - NI Water's summary of capital maintenance expenditure (£m 2012-13 prices)**

	PC10 Annual Average	PC13 Annual Average	PC15 Annual Average Unconstrained	PC15 Annual Average Constrained
Water infrastructure	18.4	20.6	21.6	14.2
Water non-infrastructure	15.4	12.7	32.2	21.2
Wastewater infrastructure	11.5	9.1	16.0	10.5
Wastewater non-infrastructure	30.9	27.8	52.3	34.4
Management & general	-	-	included	included
Total	76.2	70.2	122.1	80.3

5.1.2 In its assessment of the investment needed to maintain the service, the company has concluded that an increase in investment of 74% from PC13 levels is necessary (the unconstrained case). This scale of increase would have a significant impact on the long term cost of water and sewerage services. It would have an immediate impact on costs to customers and taxpayers with an increase in maintenance costs transferring direct to revenue. The estimated unconstrained maintenance budget would use 87% of the available budget. Once investment to meet growth was considered, there would be no room for improvements to water quality, the environment or consumer service.

5.1.3 With this in mind, NI Water has proposed a constrained budget of £80.3m in 2012-13 prices. The company has emphasised the risk that this places on serviceability and the potential that expenditure will have to increase even further in the future to address a backlog. The company has suggested that the proposed mid-term review should include a review of capital maintenance investment in the light of improved asset information and serviceability trends. We have accepted this proposal. We have set out the need for the company to develop its plan to close gaps identified in its asset maintenance planning capability. In preparing this plan, the company should consider the timing of the mid-term review and programme its activities to provide the information necessary to support any change in asset maintenance investment.

5.1.4 Within the overall increase in expenditure, the company has altered the balance of its programme with a reduction in water infrastructure investment and a

substantive increase in water non-infrastructure investment. The increase in water non-infrastructure is driven by a bottom up assessment of maintenance at water treatment works, reflecting the age profile of these assets.

- 5.1.5 In our approach to asset maintenance planning for PC15, we identified a range of techniques which are typically used to assess medium to long term asset maintenance need:

**Top down expenditure analysis**

- a. The projection of historical expenditure;
- b. Econometric analysis of expenditure by other companies; and
- c. Depreciation approach based on modern equivalent asset valuation.

**Asset maintenance outcomes**

- d. Assessment of historical serviceability trends; and
- e. Historical assessment of condition and performance.

**Asset maintenance plans**

- f. Specific asset maintenance plans identifying outputs and expenditure; and
- g. Forward looking risk based approach which takes account of how asset serviceability deteriorates over time and analyses the cost of running or replacing the asset to drive a cost effective or cost beneficial asset management plan.

- 5.1.6 In its business plan submission the company has made use of:

- a. An estimate of historical expenditure which shows investment in PC10 and PC13 at or below levels projected for PC15;
- b. Specific asset maintenance plans developed for non-infrastructure assets using expert panels, augmented by an assessment of asset life-cycle, to estimate replacement over the longer term; and
- c. Condition assessment programmes for service reservoirs and trunk mains.

- 5.1.7 There has been no significant use of forward looking risk based approaches which take account of deterioration and running costs. This is an area that the company plans to develop during the early years of PC15.

- 5.1.8 During our engagement with the company on the business plan submission, we noted significant improvements in the quality of data available and the quality of the assessments being undertaken compared to previous price controls. Previous investment in asset data, systems and processes, such as the Asset Data Acquisition project and the use of mobile work management systems, has facilitated this work. For example we noted:

- The development of formal methodologies for the prioritisation of investment in service reservoirs and water mains;
- Improved quality and granularity of non-infrastructure asset data, which will provide the basis for collecting information on proactive and reactive maintenance from the mobile works management system; and
- A comprehensive and well structured bottom up assessment of medium term investment needs for treatment works and pumping stations which used expert panels and challenge panels.

5.1.9 We welcome these developments which will provide an improved understanding of asset maintenance investment into the future. However, at this stage, the data and processes are in their initial development. Many are being applied for the first time and have not benefited from feedback as they are applied repeatedly. They lack supporting information on how the assets are deteriorating over time to confirm that any backlog identified is a true backlog rather than a steady state. As a result, we do not have sufficient evidence to accept the outcome of this work as a means of supporting any significant increase in asset maintenance investment, in particular the suggested stepped increase of 74% from PC13 levels of investment. In view of this, we have considered alternative top down assessments to arrive at a reasonable level of investment for PC15.

## **5.2. Utility Regulator’s assessment of capital maintenance investment**

5.2.1 We have adopted the following approach to determining capital maintenance investment in the absence of a strong case to support the level of increased investment identified by the company:

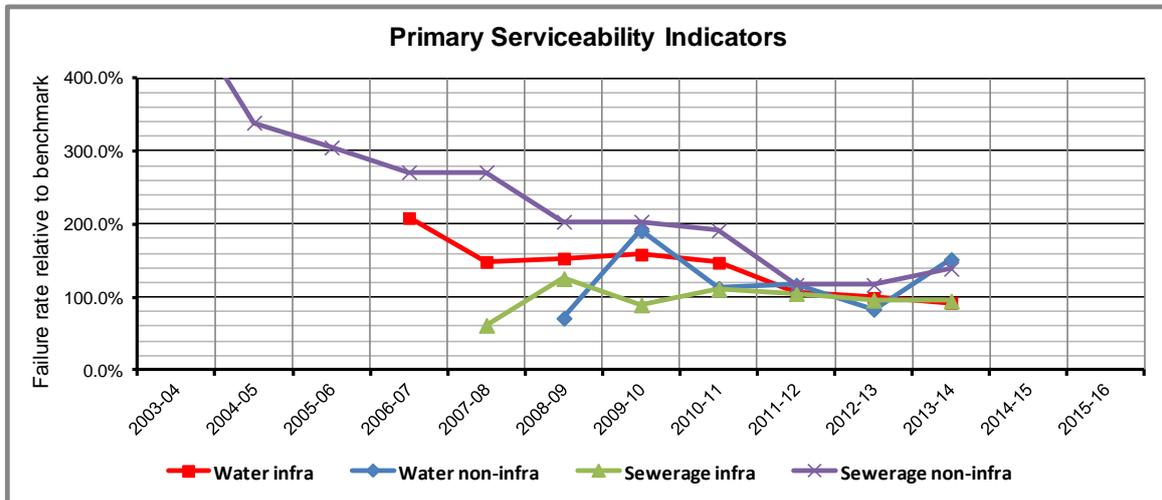
- a. We have reviewed recent trends in serviceability;
- b. We have reviewed recent trends in capital maintenance investment;
- c. We have completed an econometric assessment of capital maintenance investment, expanding the range of techniques employed to allow us to triangulate to a reasonable determination; and
- d. We have applied an on-going efficiency adjustment over the PC15 period.

### **Serviceability trends**

5.2.2 Serviceability is the capability of an asset to provide a service. It is a broad measure based on a mix of service indicators, asset performance indicators and sub-threshold indicators which balance consumer experience and the underlying performance of the assets. Focusing asset maintenance planning on serviceability, rather than the condition or performance of the assets, will ensure that investment targets consumer outcomes in the short term and the right level of capital maintenance investment is maintained in the medium and long term.

5.2.3 Annex G describes our approach to serviceability and provides our first assessment of serviceability for PC13. We have concluded that the current trend in serviceability is stable following improvements driven by investment over the last decade (see Figure 5.1)

**Figure 5.1 - Primary serviceability indicators**

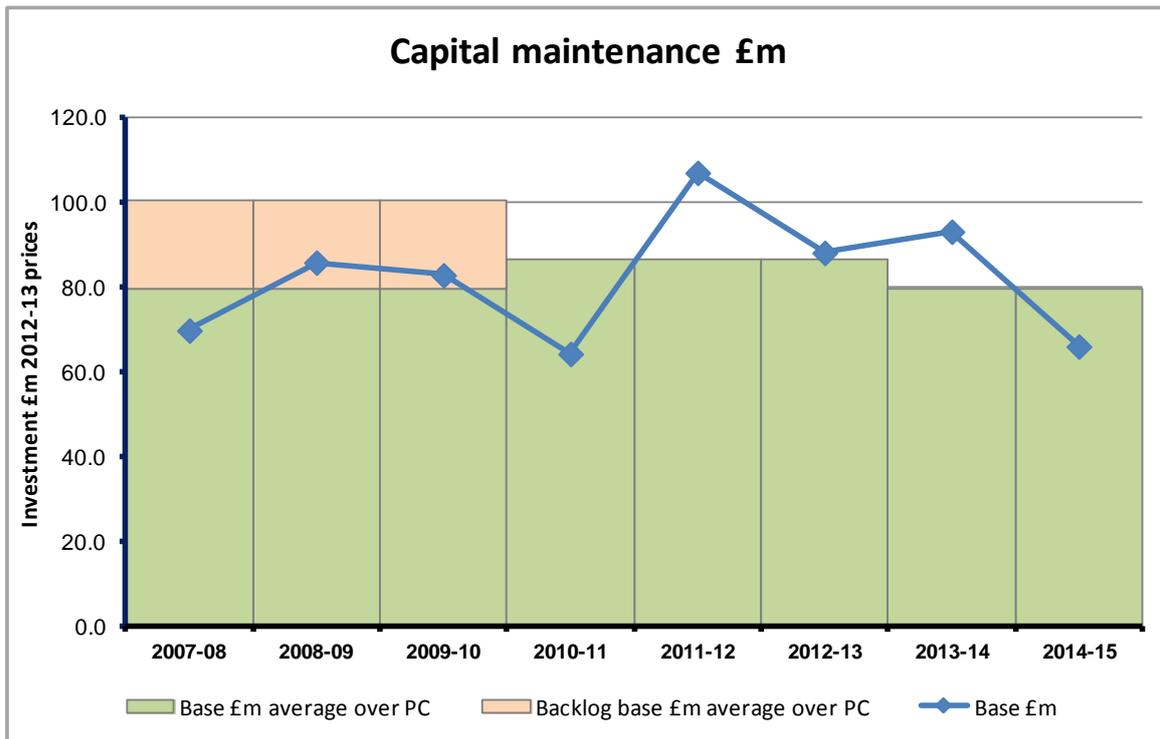


5.2.4 Because serviceability is stable at present, it is reasonable to assume that capital maintenance investment in the recent past has been adequate. That is not to say that an increase in investment will not be necessary in the future. But it does indicate that a significant stepped increase in investment is not warranted.

**Assessment of historical spend**

Historical capital maintenance investment from 2007-08 is shown on Figure 5.2.

**Figure 5.2 - Capital maintenance investment trends (£m 2012-13 prices)**



5.2.5 During the three year Strategic Business Plan period 2007-10, the company allocated some investment to enhancement as ‘backlog base maintenance’ to improve the assets and catch up on under-investment in previous years. Average investment in real terms over various periods is set out in Table 5.2.

**Table 5.2 – Average capital maintenance investment (£m 2012-13 prices)**

	£m
Average over 2007-08 to 2014-15	£90m
Average over 2007-08 to 2014-15 excluding backlog base	£82m
Average 2010-11 to 2014-15	£84m

5.2.6 We do not draw any strong conclusion from the fluctuation in investment between years or between price control periods. The fluctuation between years is driven by investment decisions within annual budget limits.

5.2.7 Our broad conclusion is that serviceability has been maintained at an average level of investment of £82m per annum.

### Econometric assessment of capital maintenance

5.2.8 We undertook an econometric analysis of capital maintenance investment, comparing NI Water with historical expenditure by companies in England & Wales. The scope and conclusions of this analysis is reported in Annex J – Capital maintenance modelling.

5.2.9 We considered five different models of varying complexity and considered variants of some models to test sensitivity. The models were used to predict an average capital maintenance spend and an upper quartile capital maintenance spend for NI Water. The results of this analysis are summarised in Table 5.3.

**Table 5.3 – Capital maintenance econometric modelling outcome (2012-13 prices)**

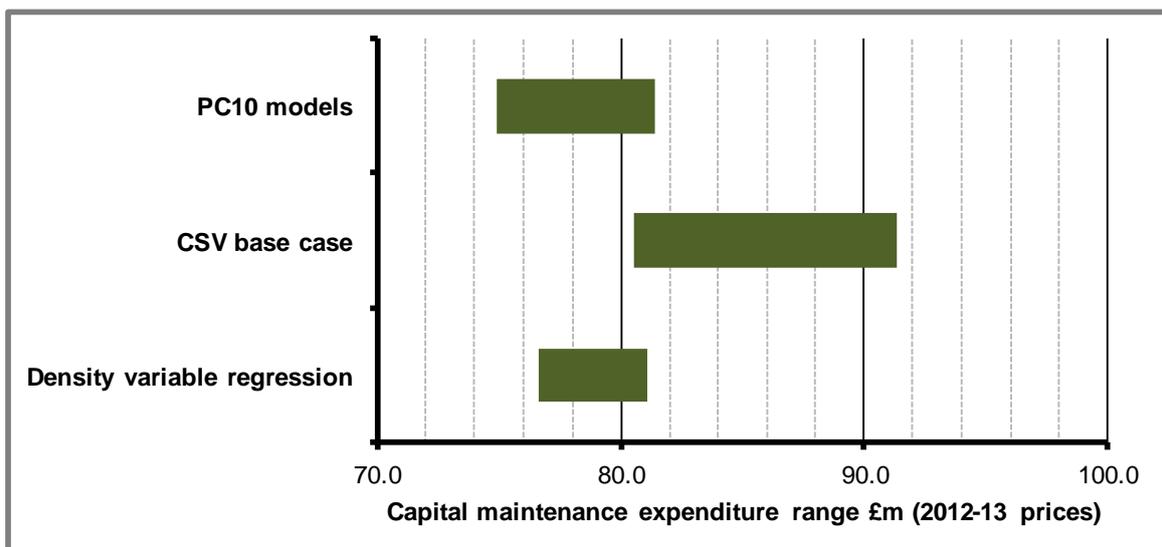
Models	Average Predicted CM Spend (£m)	Upper Quartile Predicted CM Spend (£m)	Alternate Upper Quartile Predicted CM (£m)
PC10 models	81.41	74.60	74.94
CSV Base case	91.33	81.92	80.52
Density variable regression	81.11	75.74	76.62
Unit costs – average	92.74	85.02	86.54
Historic cost analysis	92.59	N/A	N/A

Note: figures adjusted for PPP and regional prices

5.2.10 The simple unit cost model makes an assumption that factors which reflect the density of the service are constant between companies. This is a weak assumption, particularly in the case of NI Water which serves a more rural area than other companies, as reflected in simple density measures such as length of water main per property and length of sewer per property. We have not taken this model into account in reaching our determination.

5.2.11 The range from average predicted spend to alternative upper quartile predicted spend by the first three models in Table 5.3, is shown on Figure 5.3.

**Figure 5.3 – Capital maintenance econometric ranges**



5.2.12 In PC10 we used a central estimate from the econometric model to determine capital maintenance investment. Taking account of the development of NI Water, we have concluded that it would be appropriate to consider a more

challenging frontier position to determine asset maintenance investment in PC15.

- 5.2.13 Given the relative quality of the models and the range of predicted expenditure, we have concluded that a reasonable allowance for asset maintenance investment in 2012-13 prices is £80m, at the average predicted expenditure from the PC10 and density variable regression models and the upper quartile predicted expenditure from the CSV model. This is consistent with historical levels of expenditure and higher than the allowance for PC13.

### **On-going efficiency adjustment**

- 5.2.14 Because we have included an upper quartile estimate in our triangulation of capital maintenance expenditure, we have not applied any further catch-up efficiency adjustment based on the Cost Base assessment.
- 5.2.15 Having established an econometric level of investment based on historical spend, we have applied an on-going efficiency adjustment of 0.6% to reflect efficiency improvement in the economy generally. This was applied from a base year of 2012-13, giving an average annual capital maintenance expenditure over PC15 of £77.4m in 2012-13 prices.

## 6.0 Individual Programmes of Work

### 6.1. Introduction

- 6.1.1 In this section we provide a more detailed commentary on the programme and the level of investment proposed by NI Water for PC15.
- 6.1.2 The programme of work proposed by the company is constrained by the available public expenditure budget of £990m in nominal terms. The company has concluded that it could spend £1.4bn efficiently over PC15. It has identified a further £900bn would be necessary to complete all the work necessary to meet the Social & Environmental Guidance, including substantial work to improve drainage in Belfast, improve water quality in Belfast Lough and meet the requirements of revised European Union directive on shellfish waters and bathing waters.
- 6.1.3 We agree with the company that the programme of work is constrained and there is further investment which would deliver benefits and could be delivered efficiently. However, any future increase in expenditure needs to be well planned to allow it to be delivered efficiently and on the highest priority outputs. NI Water has indicated that any substantial increase in investment should be phased into the second half of PC15 and we agree with this approach. There is a clear need to signal any substantial increase in expenditure as early as possible to allow enough time to develop sustainable solutions and deliver them efficiently.
- 6.1.4 Our assessment of the programme is presented by sub-programmes. These sub-programmes provide a practical sub-division of the overall investment plan based on similar types of assets, similar purpose of the investment and NI Water's management of the programme. It provides an aid for understanding.

### 6.2. Our approach to assessing capital cost estimates

- 6.2.1 We have taken a number of steps to satisfy ourselves that the programme of work is reasonably costed:
- We commissioned an audit by the Reporter which covered a range of estimates across the programme. The Reporter did not identify any material issues in the way the programme was costed. The Reporter did raise concerns about the level of risk, and/or optimism bias applied to estimates, particularly those where there is still significant uncertainty in the solution. At times the Reporter was able to provide confirmation that the unit costs of NI Water were as good as, or lower than, those experienced in the GB water industry;
  - We asked the Reporter to confirm that the cost estimates were consistent with the Cost Base. This provides us with confidence that any Cost Base

efficiency adjustment is relevant to the investment programme; and

- We reviewed the costs proposed by the company against historical run-rates of expenditure and high level unit costs seen in the delivery of PC10 and PC13, to provide top-down confirmation that the overall cost is reasonable.

6.2.2 As an additional challenge on the company's cost estimates, we asked a cost consultant to prepare a business plan level estimate for 4 schemes included in the company's business plan. These estimates were prepared using an extensive database of costs from across the water industry in England & Wales and reflect the average out-turn cost of work in England & Wales. The average out-turn cost of these schemes was 12% less than those proposed by NI Water. While we do not give significant weight to a comparison based on a small sample of schemes, we take comfort that:

- The analysis suggests that the costs proposed by NI Water are reflective of costs in the wider industry; and
- The variance on this small sample is similar to the Cost Base efficiency challenge derived by comparing standard costs from NI Water with standard costs in England & Wales.

6.2.3 Overall, we concluded that the business plan costs were a reasonable reflection of the company's costs for the base year except where there remains substantive uncertainty on the scope and costs of the works. Where this is the case, the mid-term review provides an opportunity for the company to provide updated costs based on a more detailed assessment of need. The company should ensure that projects are profiled accordingly.

6.2.4 Following the draft determination, the company provided an update of the PC13 and PC15 delivery programmes based on its latest best estimates of investment in PC13. This had a marginal impact on the outputs which will be delivered in PC15. The figures presented in this Annex are those presented in the business plan and have not been updated to reflect the revised submission from the company.

### **6.3. Sub-programme 00 – Capitalised salaries and on-costs**

#### **Background**

6.3.1 NI Water incurs internal costs to manage the delivery of its capital programme which include costs of staff and internal support facilities. These salaries and on-costs are capitalised in the company's accounts and form a necessary part of the overall capital investment.

6.3.2 In Table 3.3 of its business plan, NI Water identified capitalised salaries and on-costs separately from the individual projects and programmes of work in its capital investment plan. We have followed this approach in our assessment of the capital investment submission.

### Assessment of NI Water's proposed investment

- 6.3.3 NI Water proposes a rising level of capital investment from £11.1m in the 2012-13 base year, to an average of £12.2m over PC15. This increase is attributed to:
- Reviewing the application of current capitalisation policies;
  - Recruitment of additional staff to carry out specific functions relating to catchment management, asset strategy and flood risk management; and
  - Recruitment of additional engineering and procurement staff to manage the capital programme.
- 6.3.4 The recruitment of additional engineering and procurement staff comes after a period of staff reduction through natural wastage and VER/VS initiatives. It also comes at a time when there has been significant reduction in the capital programme, but a steady increase in the cost of internal staff capitalised to manage that programme. The company has justified the increase in staffing by pointing to the higher level of resource required to work on progressively smaller schemes and to work more closely with a range of stakeholders to deliver integrated sustainable solutions.
- 6.3.5 It is not for the Utility Regulator to determine the staffing levels of the company for individual functions, or how the company balances the use of internal staff and external consultants to deliver its capital programme. We assess the company's overall capital efficiency through a Cost Base which compares standard costs in England & Wales with those in NI Water at a 2012-13 base year. These standard costs make an allowance for capitalised salaries and on-costs.
- 6.3.6 In our draft determination, we did not include any of the additional capitalised costs on the basis that we assess capital efficiency against a 2012-13 Cost Base and any subsequent additions of capitalised salaries and on-costs will erode efficiency
- 6.3.7 Following representations from NI Water, we have reviewed this approach for the final determination and made an allowance of £1.4m of enhancement expenditure in 2012-13 prices over PC15 for additional staff to carry out specific functions relating to catchment management, asset strategy and flood risk management.
- 6.3.8 The base maintenance element of this sub-programme is 55% and this is accounted for in the overall allocation for base maintenance. Adjusting for the enhancement element of capitalised salaries and on-costs and allowing funding for additional staff will allow the company to deliver an additional £2.2m of additional enhancement outputs.

## 6.4. Sub-programme 01 – Base maintenance (water)

### Background

6.4.1 This sub-programme identifies the funding for general capital maintenance of water non-infrastructure assets which is not covered in other programmes of work. As a matter of convenience, it also captures a range of general investment in non-infrastructure assets. The constrained and unconstrained investment in water resources is shown below.

	Unconstrained	Constrained	% reduction	Base
Assessment of requirements at WTWs to operate effectively in extreme cold			0%	100%
PC15 Base Maintenance at Water Supply Non-Infra Sites			-15%	100%
Service Reservoir Assessments - Site Access			-10%	100%
Buildings - Water Treatment Sites - Water Regulation Compliance & Energy Efficiency Programme			-4%	37%
Flood Resilience at NIW Water Supply Sites - Appraisal Study			0%	100%
Recovering Energy Within the Water Distribution System			-51%	0%
Hydro Power from Raw Water - Feasibility Study			-85%	0%
WPS Pump Efficiency Capital Investment Phase 1			0%	100%
Sub-Meters Water			-34%	0%
WTW Treatability Studies			0%	30%
<b>Total</b>	<b>40.348</b>	<b>31.994</b>	<b>-21%</b>	<b>88%</b>

### Assessment of base maintenance (water) investment

#### Requirement for WTWs to operate effectively in extreme cold

6.4.2 The company has identified modifications to ventilation at water treatment works to reduce the risks of freeze thaw impacts. We consider this investment reasonable.

**PC15 base maintenance at water supply non-infra sites**

- 6.4.3 The company has assessed base maintenance at water supply non-infra structure sites (water treatment works and water pumping stations) using a combination of expert panel assessment and life cycle analysis. We had the opportunity to review the methodology and outcome of this analysis and consider it to be a step forward in the company's asset maintenance planning approach.
- 6.4.4 The approach was informed by improved asset data used to prepare asset schedules, asset age and repair activity. Expert panels including operators and asset planners verified the asset information, identified immediate maintenance needs and decided the likely life of the assets. Where an immediate need was not identified, an asset replacement profile was determined from the installation date and likely life of the asset. The cost of asset replacement was estimated from historic costs of similar work.
- 6.4.5 We recognise that the process adopted by the company could be improved by further collection and analysis of asset data such as:
- Asset lives informed by comprehensive information on replacement dates;
  - Improved information on asset replacement costs to ensure that the costs are robust and inclusive of the cost of replacing associated assets; and
  - Improved data on the type and cost of asset repairs, short of full asset replacement, to optimise the life of the asset.
- 6.4.6 Having followed a rigorous methodology, we consider it reasonable for the company to apply a limited constraint to this critical budget pending the development of better informed assessments.

**Buildings - water treatment sites - water regulation compliance & energy efficiency programme**

- 6.4.7 See Section 6.22 for our assessment of energy efficiency and renewable energy generation measures.

**Service Reservoir Assessments - Site Access**

- 6.4.8 The company has identified investment in its service reservoirs to improve access. This investment addresses one of the recommendations included in the Utility Regulator's report into the 2010-11 freeze thaw and should ease operations during any future major incident.

**Flood resilience at NIW water supply sites - appraisal study**

- 6.4.9 The company reports that it has assessed flooding risk at all water treatment works. The works were generally found to be at low risk. An allowance has been made to deflect run-off and seal duct chambers and openings below the Q100 level. We have included the investment proposed by the company in the final determination.

- 6.4.10 Given the critical nature of these assets we would question why the assessment has been made on a Q100 event. We recommend that the company consider the impact of flooding events with longer return periods to understand the extent of work required to provide additional protection.
- 6.4.11 We also recommend that the company undertakes an assessment of flood risk at water booster pumping stations.

#### **Recovering energy within the water distribution system**

- 6.4.12 See Section 6.22 for our assessment of energy efficiency and renewable energy generation measures.

#### **Hydro power from raw water**

- 6.4.13 See Section 6.22 for our assessment of energy efficiency and renewable energy generation measures.

#### **WPS Pump Efficiency Capital Investment Phase 1**

- 6.4.14 See Section 6.22 for our assessment of energy efficiency and renewable energy generation measures.

#### **Sub-meters water**

- 6.4.15 See Section 6.22 for our assessment of energy efficiency and renewable energy generation measures.

#### **WTW treatability studies**

- 6.4.16 NI Water plans to carry out treatability studies at 13 sites for which no study has been carried out for a number of years. It is intended to carry out these treatability studies within the first three years of PC15. The company has estimated a cost of £40k per site.
- 6.4.17 We recognise the need to review the effectiveness of treatment at water treatment works to ensure that the assets are maintained and emerging risks are identified and addressed. Therefore we have included the investment proposed by the company in the final determination.
- 6.4.18 The prioritisation, timing and scope of the proposed studies should be agreed with the Drinking Water Inspectorate. The company should programme this work to ensure that DWI has adequate information and sufficient time to assess the company's conclusions and, if appropriate, support the investment for inclusion in the delivery programme at the mid-term review or PC21.

## **6.5. Sub-programme 02 – Base maintenance (sewerage)**

### **Background**

- 6.5.1 This sub-programme identifies the funding for general capital maintenance of water non-infrastructure assets which is not covered in other programmes of

work. As a matter of convenience, it also captures a range of general investment in non-infrastructure assets. The constrained and unconstrained investment in water resources is shown below.

	Unconstrained	Constrained	% reduction	Base
PC15 Base Maintenance (Sewerage)			-34%	100%
WWTW - Assessment of requirements at WWTWs for Freeze Thaw			0%	100%
Buildings - WWTWs-Water Regulation Compliance & Energy Efficiency Programme			0%	29%
Appraisal of Energy Efficiency at Waste Water Pumping Stations			0%	100%
Electricity generation from wind power			0%	0%
Sub Meters – sewerage			-34%	0%
2019 Odour & IPPC Strategies			0%	100%
<b>Total</b>	<b>179.278</b>	<b>119.594</b>	<b>0%</b>	<b>97%</b>

### Assessment of base maintenance (sewerage) investment

#### Base maintenance sewerage

- 6.5.2 The company has assessed base maintenance at sewage non-infra structure sites (wastewater treatment works and sewage pumping stations) using a combination of expert panel assessment and life cycle analysis. We had the opportunity to review the methodology and outcome of this analysis and consider it to be a step forward in the company’s asset maintenance planning approach.
- 6.5.3 The approach was informed by improved asset data used to prepare asset schedules, asset age and repair activity. Expert panels including operators and asset planners verified the asset information, identified immediate maintenance needs and decided the likely life of the assets. Where an immediate need was not identified, an asset replacement profile was determined from the installation date and likely life of the asset. The cost of asset replacement was estimated from historic costs of similar work.
- 6.5.4 We recognise that the process adopted by the company could be improved by further collection and analysis of asset data such as:
- Asset lives informed by comprehensive information on replacement dates;
  - Improved information on asset replacement costs to ensure that the costs

are robust and inclusive of the cost of replacing associated assets; and

- Improved data on the type and cost of asset repairs, short of full asset replacement, to optimise the life of the asset.

6.5.5 Having followed a rigorous but developing methodology, we consider it reasonable for the company to apply a constraint to this critical budget pending the development of better informed assessments.

#### **Water regulation compliance and water efficiency programme**

6.5.6 See Section 6.22 for our assessment of energy efficiency and renewable energy generation measures.

#### **Energy efficiency at wastewater pumping stations**

6.5.7 See Section 6.22 for our assessment of energy efficiency and renewable energy generation measures.

#### **Electricity generation from wind power**

6.5.8 See Section 6.22 for our assessment of energy efficiency and renewable energy generation measures.

#### **Sub-meters – sewerage**

6.5.9 See Section 6.22 for our assessment of energy efficiency and renewable energy generation measures.

#### **2019 Odour and IPPC strategies**

6.5.10 The company has set out the need to complete a study to inform its future sludge strategy and begin long term planning for the completion of the Omega PPP concession and the return of the existing incineration assets. The study is funded as the base maintenance, the scope and timing is something the company should consider within the overall capital maintenance budget.

## 6.6. Sub-programme 03 – Water resources

### Background

- 6.6.1 NI Water abstracts water from 31 sources which, following treatment, provides a total distribution input of 558 Mld.
- 6.6.2 In 2012, the company published an updated Water Resources Management Plan that assessed water supply and demand and the long term security of water resources. It did not identify a need for additional resources in the medium term, but recommended additional trunk mains to improve connections into areas with a supply deficit. This sub-programme covers investment in resources. Investment in trunk mains is covered sub-programme 05.
- 6.6.3 The constrained and unconstrained investment in water resources is shown below. The company has not constrained investment in this area. The proposed activities include the maintenance of impounding reservoirs, preparation of future plans for water resources and drought management, sustainable management of its catchments and data collection to allow it to better manage abstractions.

	Unconstrained	Constrained	% reduction	Base
Impounding Reservoirs On-site Action Plans. (Reservoirs Bill)			0%	100%
Camlough Impounding Reservoir Dam Survey. (Condition Assessment)			0%	100%
Water Resource and Supply Resilience Guidance			0%	0%
Sustainable Catchment Management			0%	46%
Abstraction Monitoring			0%	10%
<b>Total</b>	<b>11.188</b>	<b>11.188</b>	<b>0%</b>	<b>69%</b>

### Assessment of water resources investment

#### Impounding reservoirs inspection and maintenance

- 6.6.4 The planned introduction of a Reservoirs Bill will make the inspection and maintenance of impounding reservoirs mandatory. NI Water has broadly complied with the requirements of the draft bill for some time, following introduction of legislative requirements in Great Britain. Inspections were carried out in 2006 and since then a programme of maintenance works has been carried which was completed in PC13.
- 6.6.5 The company plans to undertaken a new round of inspections in the first half of PC15 and has made an allowance of funds for further maintenance starting in the second half of PC15. The approach and allowance appears reasonable.

Given the work undertaken to date, there is a low risk that major investment will be required in the short term. However, the extent of work is a matter to be assessed during the inspections. Should the company find that the inspections expose a material issue which requires immediate action it should raise this in the planned mid-term review for our consideration. We would expect the planned inspections to provide the basis for a clear plan for impounding reservoir maintenance in PC21.

### **Camlough Impounding Reservoir**

- 6.6.6 NI Water currently abstracts water from Camlough Reservoir which is treated at Camlough WTW and supplies to Newry and the surrounding area. The company does not own the reservoir or the dam and we understand that there may be no owner. In these circumstances, the planned Reservoirs Bill will make the 'operators' who manage draw-off from the reservoirs responsible for the safety of the reservoir. NI Water could be one such operator sharing this responsibility.
- 6.6.7 In view of this, the company commissioned an inspection of the dam by a Reservoir Inspecting Engineer who has identified the work necessary to secure the safety of the dam and estimated the costs. As one of two potential 'operators' under the proposed Reservoirs Bill, the company has made provision for half these costs in its plan. We consider this approach to be reasonable.
- 6.6.8 The company is also considering the long term future of Camlough WTW following the completion of the Castor Bay to Newry trunk main. In doing so it must balance issues of efficiency, water quality and the resilience of water resources in an area which was adversely affected in the freeze thaw. If the company decides that Camlough WTW is no longer necessary, it could cease to be an operator of the reservoir. The company should assess this and advise us on the future of Camlough WTW before the maintenance work on the dam is committed and confirm its obligations in respect of the dam.

### **Water resource and supply resilience plans**

- 6.6.9 NI Water has begun the process of updating its water resources management plan and the preparation of a drought management plan in a combined water resource and supply resilience plan. This work should be complete in 2017.
- 6.6.10 We were concerned that the previous water resources management plan did not incorporate short term peaks in demand (critical period) resulting in uncertainty in the need, timing and scope of works. The future plan should address this issue.
- 6.6.11 The new plan might expose risks to supply not previously identified which will require additional capital investment not included in this determination. The company should include any immediate need for additional investment in the planned mid-term review for our consideration.
- 6.6.12 The company is to address the specific issues raised on the proposed Carmoney to Strabane trunk main during the development of the water resource and supply resilience plan before construction work is committed. In particular, the company should obtain confirmation of the abstraction licence at Carmoney WTW and assess the reliable yield from the River Faughan. The company

should assess the trunk main option within the mix of options proposed to secure water supply.

### **Sustainable catchment management**

- 6.6.13 Sustainable catchment management planning (SCAMP) covers a broad range of activities in upstream catchments which aim to redress degradation of the landscape which can accelerate run-off and reduce water quality. Typical examples of activities are: working with farmers to reduce pesticide run-off; slowing run-off from peat bogs; managing fire risk on heather and managing livestock to reduce contamination of water courses. As a major owner of upland catchment, SCAMP provides NI Water with a framework for responsible and sustainable management of, landscape, biodiversity and heritage.
- 6.6.14 In previous price controls NI Water has sought limited and gradually increasing funding for SCAMP activities. Within this funding, the company has delivered an impressive range of activities, engaging with and obtaining the support and input of a wide range of other interested parties in doing so. For PC15, the company has proposed a further increase in funding for SCAMP. We consider this an important focus for the company, with the potential to deliver real benefits to consumers and we have included the proposed investment in the final determination.
- 6.6.15 The business case the company presented to us was couched in general terms identifying a range of obligations, objectives and general activities. The company has proposed investment to prepare catchment management plans for all catchments which will determine the scope of future work. In the absence of any detail, it is not possible to determine whether the company has proposed a reasonable level of funding. Nor is it possible to determine appropriate output measures for a plan of work which involves activities whose benefits will only be seen in the long term. In view of this, the company should prepare an annual report on the development of its SCAMP programme for the Utility Regulator, to demonstrate that the activities undertaken are useful and long term benefits are being realised. In addition, we would expect the company to provide a clearer plan of SCAMP activities in advance of the planned mid-term review and in its plans for PC21.

### **Abstraction monitoring**

- 6.6.16 Over PC15 NI Water's abstraction licences will be reviewed by NIEA to ensure that they comply with the EU Water Framework directive. The company expects that additional investment in monitoring equipment will be required to comply with the new licence requirements. However, at this stage we have no detail of the activities or costs required. We have included the funding requested by the company in anticipation of the need. We expect the company to provide further information for our consideration when it is available with a substantive update for the mid-term review.
- 6.6.17 The review of abstraction licences may result in reductions in the abstraction volume to ensure that sufficient water remains in rivers to maintain good environmental status. It is therefore important that future development of water resources takes account of any such reduction before investment is committed.

## 6.7. Sub-programme 04 – Water treatment works

### Background

- 6.7.1 NI Water operates 20 water treatment works which deliver 322 Mld into supply. A further 4 WTWs are operated by the Alpha PPP concession, delivering a further 237 Mld into supply.
- 6.7.2 NI Water must maintain its water treatment works to secure their performance, both to maintain the high quality of water into supply and secure the volume of water into supply.
- 6.7.3 There has been sustained investment in NI Water's water treatment works in recent years to meet the standards required in the EU drinking water directive. As a result, the investment identified in the PC15 Business Plan focuses on major upgrades for individual treatment works to maintain compliance. The general on-going maintenance work is included in Sub-programme 01. The constrained and unconstrained investment in water treatment works is shown below. The company has indicated that further work will be required at Lough Bradan WTW but has deferred this investment to PC21.

	Unconstrained	Constrained	% reduction	Base
Caugh Hill WTW - Upgrade of Wash Water Treatment Facilities Feasibility Study			0%	100%
Carmoney WTW DAF process Optimisation			0%	100%
Derg WTW - Upgrade of Filters and Chemical Dosing			0%	100%
Killyhevlin WTW and Dorisland WTW – GAC			0%	0%
Caugh Hill Treatability Output			0%	11%
Glenhordial Sludge Press			0%	100%
Treatability - Glenhordial, Dorisland and Killyhevlin			0%	66%
PSCMD PC15 (Water)			0%	0%
Lough Bradan			-100%	100%
<b>Total</b>	<b>34.734</b>	<b>26.734</b>	<b>33%</b>	<b>57%</b>

- 6.7.4 In its response to the draft determination, DWI noted that a process had been implemented to allow NI Water to provide information to DWI to enable it to assess and, if appropriate, support schemes to improve drinking water quality in PC15. It is DWI's opinion that there was insufficient evidence in the regulatory risk assessment and insufficient detail in 'Annex A' returns to allow DWI to provide technical support for the water quality schemes proposed by NI Water in its business plan. DWI was unable to support any of the nine water treatment nominated outputs included in the draft determination

- 6.7.5 In the absence of DWI's support for any of the nominated outputs included in the draft determination, we could have taken the decision to remove these outputs from the final determination, releasing funding for other priority outputs. However we are aware that, subsequent to the receipt of consultation responses, there has been further engagement between DWI and the company in relation to ongoing and emerging risks. We have therefore concluded that, in the light of the potential risks identified by both parties and the plans to undertake further treatability studies, it would be appropriate to retain some of the enhancement investment proposed by the company pending completion of the studies and further risk assessments. We would expect NI Water to set out a clear programme for the completion of these studies and the submission of Annex A returns (or undertakings if enforcement action is considered) to support investment proposals in its PC15 Monitoring Plan.

## Assessment of water treatment works investment

### Major water treatment works upgrades

- 6.7.6 The company has identified major treatment works upgrades at Caugh Hill and Carmoney WTWs. We have reviewed this investment and conclude that there is no strong evidence for the need for major upgrades at these plant at present. It is likely that the historic water quality issues used to support investment have been mitigated or resolved by recent investment. There is a need to review performance over the medium term and consider alternative solutions before committing to major investment at these works. The company should set out a programme of work to complete these assessments.
- 6.7.7 Much of the investment proposed was funded through base maintenance which we have determined from a top down process. We have not made a specific deduction of this maintenance investment which may be necessary to deal with emerging maintenance issues which have yet to be identified.
- 6.7.8 We have retained the enhancement investment proposed for Caugh Hill in the programme. We will review this allowance when the company has assessed the need for future investment and agreed the need for any improvements with the DWI.
- 6.7.9 We take the same view on investment proposed for Lough Braden. The plant was upgraded in the recent past. The company has not provided information to demonstrate the current risks which justify the investment indicated.
- 6.7.10 We note that the risks identified in these schemes were not apparent in the Drinking Water Safety Plans and the company had not provided sufficient information to the Drinking Water Inspectorate to allow it to support the investment. We would expect the risk assessment underpinning major investment to take place within the Drinking Water Safety Plans and that sufficient information would be provided to the Drinking Water Inspectorate to allow it to support major investment in water treatment works.
- 6.7.11 For the Derg WTW the company has proposed a significant expansion of the sludge dewatering capacity to cater for an increase in raw water solids and turbidity when the plant begins to treat water from the new abstraction on the

Strule. There is an opportunity to reduce the level of investment by choosing where water is abstracted from in times when the rivers are in spate and the solids load is high. The company should consider this opportunity as it develops its plans for the works. The work is allocated to base maintenance. The company should prioritise this work within the overall base maintenance allowance.

- 6.7.12 Investment in Killyhevlin and Dorisland WTW GAC plant is for the completion of investment already included in the PC13 determination.

#### **Minor water treatment works upgrades**

- 6.7.13 The company has identified a range of minor upgrades at Glenhordial, Dorisland and Killhevlin WTW's including improvements to coagulation and filtration to improve the performance of the works. We have accepted the need for on-going investment to introduce new technology such as auto-coagulation to secure water supply.

#### **PSCEMD PC15 (Water)**

- 6.7.14 The Preservation of Services and Civil Emergency Measures Directive requires NI Water to secure water supply assets. The company has prepared a plan of works.
- 6.7.15 DRD is the competent authority in respect of PSCEMD works. We have confirmed the level of investment for the final determination having taken advice from DRD on the scope of works necessary.

## **6.8. Sub-programme 05 – Water trunk mains**

### **Background**

- 6.8.1 In the recent past the company has adopted a strategy of reducing the number of water treatment works and increasing the interconnectivity between supply areas to make greater use of larger, more reliable sources and reduce single source reliance. A key part of that strategy was the introduction of additional trunk mains to improve connectivity and further work is planned.
- 6.8.2 The constrained and unconstrained investment in water trunk mains is shown below. The company has indicated that further work is necessary to complete a loop of trunk mains from Dungannon and Coleraine linking the west to the Lough Neagh and River Bann sources, but has deferred this investment to PC21.

	Unconstrained	Constrained	% reduction	Base
Carland to Cookstown Trunk Main			0%	0%
Ballydougan to Newry Main Link Reinforcement			0%	4%
Carmoney to Strabane Strategic Link Watermain			0%	0%
Glencuil to Cabragh Strategic Link Watermain			-100%	0%
Killyhevlin to Lough Bradan Link Watermain			-100%	0%
<b>Total</b>	<b>29.980</b>	<b>12.630</b>	<b>-58%</b>	<b>0%</b>

### Assessment of trunk main investment

6.8.3 The Reporter has reviewed the cost of the trunk main schemes proposed by NI Water and confirmed that they are based on recent schemes undertaken by NI Water and competitive compared to costs in England & Wales.

#### Carland to Cookstown Trunk Main

6.8.4 This proposed trunk main provides an additional supply into the Cookstown area fed from Castor Bay WTW. The trunk main partially addresses a supply deficit in the Central Water Resource Zone under dry year annual average conditions. It will provide resilience in an area which was badly affected in the 2010-11 freeze thaw event.

6.8.5 We have accepted the need for this trunk main based on the Water Resources Management Plan and the lack of local water supply resilience exposed by the 2010-11 freeze thaw. In its revised investment profile the company has moved the delivery of this main from 2016 to 2021. The company should review this change and confirm that it is not detrimental to consumers.

#### Ballydougan to Newry Main Link Reinforcement

6.8.6 The Ballydougan to Newry trunk main was planned as a PC13 nominated output. We understand that investment has been delayed and the trunk main will not be delivered until the first year of PC15.

#### Carmoney to Strabane Strategic Link Watermain

6.8.7 The proposed trunk main provides a connection from Carmoney WTW into the area currently served by the Derg WTW.

6.8.8 Historically, the Derg WTW was fed from an abstraction from the river Derg. Flows in the river reduce quickly in dry spells in the summer making the supply unreliable. The company has recently completed a new abstraction from the river Strule to the Derg WTW which provides a more resilient supply. Although the Strule is more reliant than the Derg, it too can experience low flows in times of more severe drought. As part of the new abstraction licence for the

Strule/Derg, NI Water is required to take further measures to reduce the risk that it will need to exceed the Strule/Derg abstraction limit in times of drought to maintain water supplies. The Carmoney to Strabane trunk main is the proposed solution.

- 6.8.9 We have concerns that the proposed trunk main is not a robust drought measure. It is fed by water abstracted from the river Faughan which, like the rivers Strule and Derg, flows from mountains subject to Atlantic weather patterns. There is a clear risk that low flows will occur in the river Faughan at the same time as low flows in the rivers Strule and Derg. If this is the case, it might not be possible to use the trunk main in times of drought as intended. However, there is strong justification for investment to improve resilience in the Omagh area which relies primarily on Derg WTW for its water supply.
- 6.8.10 The company plans to deliver this scheme in 2017-18. This provides an opportunity to resolve the issues we have raised in the past regarding the potential co-occurrence of drought in the Strule/Derg and the Faughan. In advance of investment being committed, we expect the company to:
- a. Obtain confirmation that the abstraction licence from the Faughan will be maintained and not subject to a future sustainability reduction or other restriction.
  - b. Confirm the reliable yield from the Faughan at Carmoney.

#### **Future trunk mains**

- 6.8.11 The company has plans for additional trunk mains to connect the area served by Killyhevlin WTW (at Enniskillen) to the supply from Castor Bay WTW and to reinforce the supply into the Omagh area currently served by Lough Bradan and Glenhordial WTWs.
- 6.8.12 There is an opportunity in the proposed water resources and resilience plan to confirm the need for these trunk mains and set out a clear operating plan to show how they would operate under a range of conditions including long term drought and freeze thaw conditions.

## **6.9. Sub-programme 06 – Service reservoirs and clear water tanks**

### **Background**

- 6.9.1 Service reservoirs are included in the water distribution network to balance short term water supply and distribution, typically over a day. The storage they provide limits the risk of large scale interruptions to supply due to failures of water treatment works, booster pumping stations and trunk mains. Clear water tanks (CWTs), located at water treatment works, serve the same general purpose.
- 6.9.2 The constrained and unconstrained investment in service reservoirs and clear water tanks is shown below. The company has prioritised investment in PC15

on three CWT’s located at water treatment works. The company has identified work to increase the capacity of 11 service reservoirs on the distribution network which will be deferred to PC21.

	Unconstrained	Constrained	% reduction	Base
Killyhevlin Clear Water Tank			0%	34%
Drumaroad WTW Clear Water Tank			0%	0%
Lough Fea CWB			0%	41%
11 additional reservoir capacity upgrades			-100%	0%
<b>Total</b>	<b>31.438</b>	<b>17.685</b>	<b>-44%</b>	<b>17%</b>

### Assessment of service reservoir and clear water tank investment

- 6.9.3 The company has chosen to prioritise investment to increase the capacity of clear water tanks at three water treatment works. The company has advanced a number of reasons for increasing the capacity of these clear water tanks.
- 6.9.4 We did not feel that the initial PC15 submission explained the need for these schemes clearly enough and asked the company to provide additional clarification to support its original business case. A substantial amount of additional information was provided in response. This attempted to provide further justification of the need for the schemes but still didn’t clearly demonstrate the historic performance issues they would address.
- 6.9.5 In view of the additional information provided by the company in response to the draft determination, we have concluded that there is sufficient information to retain the investment in the PC15 programme. In particular, the risks associated with the lack of adequate clear water basins at Killyhevlin and Lough Fea WTWs, which are relatively isolated, suggests a strong case for enhancing the resilience of these treatment works. However the additional information provided did not evaluate the current risks and the extent to which those risk would be reduced by the proposed investment. The company should provide this assessment in advance of committing the investment to allow the UR to determine whether the investment is economically justified.

## 6.10. Sub-programme 07 – Service reservoir rehabilitation

### Background

- 6.10.1 Service reservoirs provide balancing storage for potable water during distribution to consumers. Maintaining the integrity of service reservoirs to limit contamination from the ingress of water or soil is essential to maintain the quality of water supplied. NI Water undertakes a regular programme of reservoir inspections and rehabilitation to ensure that water quality is maintained.

6.10.2 The constrained and unconstrained investment in service reservoir rehabilitation is shown below. In addition to work on service reservoir rehabilitation, the company has included investment in service reservoir security and a programme of sample tap replacement in this sub-programme.

	Unconstrained	Constrained	% reduction	Base
Service Reservoir Enhanced Security Phase 2			0%	0%
Service Reservoir Rehabilitation			0%	100%
Sample Taps at Service Reservoirs			0%	100%
Total	18.771	18.771	0%	89%

### Assessment of investment in service reservoir rehabilitation programme

#### Service Reservoir Enhanced Security Phase 2

6.10.3 The Preservation of Services and Civil Emergency Measures Direction requires NI Water to secure water supply assets. The company has prepared a plan of works. The Reporter has reviewed this and confirmed that the costs appear reasonable compared to experience of similar works in England & Wales.

6.10.4 DRD is the competent authority in respect of PSCEMD works. We have confirmed the level of investment for the final determination having taken advice from DRD on the scope of works necessary.

#### Service Reservoir Rehabilitation

6.10.5 In PC13, the company has developed a risk based assessment of its service reservoirs drawing on asset data, water quality data, the timing of previous rehabilitation work and routine drain-down and inspection of the reservoirs.

6.10.6 The level of investment in service reservoir rehabilitation is a matter of judgement which takes account of the rate and impact of historical investment, an assessment to identify future risks and any information the company may have on the rate of deterioration of the assets.

6.10.7 Based on the historic rates of expenditure and the work done by the company when developing its risk based assessment of service reservoirs, we consider the level of investment appropriate.

6.10.8 For the future, continuing to update the risk based assessment of service reservoirs will allow the company to prioritise investment and inform decisions on the rate of future investment.

#### Sample Taps at Service Reservoirs

6.10.9 The company has included investment to replace the sampling taps at all service reservoirs to ensure the quality of samples used for both operational and

statutory quality monitoring. We recognise the need to ensure that samples taken can be relied on.

- 6.10.10 The company has assumed that the sample taps at all service reservoirs need to be replaced. We have introduced a new output measure to monitor the delivery of this investment.

## 6.11. Sub-programme 08 – Water mains rehabilitation

### Background

- 6.11.1 NI Water provides treated water to consumers through water distribution mains with an estimated total length of 26,700 km. The length of mains per property is twice the average for water service providers in England & Wales, consistent with a consumer base distributed over smaller communities in a rural environment.
- 6.11.2 The constrained and unconstrained investment in water mains is shown below. The constraint reflects a lower level of mains replacement than the company considers reasonable in the medium term.

	Unconstrained	Constrained	% reduction	Base
PC15 Rehab Programme	191.000	112.811	-41%	34%
<b>Total</b>	<b>191.000</b>	<b>112.811</b>	<b>-41%</b>	<b>34%</b>

### Assessment of investment in water main rehabilitation

- 6.11.3 This sub-programme covers a planned programme of mains rehabilitation. Other investment in water mains, including the provision of water mains in new developments, mains requisition and reactive repairs, are included in Sub-programmes 10 and 23.
- 6.11.4 We have reviewed the investment in mains rehabilitation and our initial assessment indicates that it is based on recent historic costs.
- 6.11.5 The constrained investment programme will allow the company to replace or reline 905km of water mains over the 6 year PC15 period. This is an overall replacement rate of 0.5% and, at a superficial level, suggests that the average life of the current water mains is expected to be 200 years. However, we know that NI Water's water-mains are relatively young compared to those in England & Wales, with a high proportion of mains constructed since 1960 as water supply was extended to the rural community.
- 6.11.6 At present, this is an advantage as it means a low rate of mains replacement should be sustainable. However, the rate of mains replacement is likely to rise in the future. The age profile suggests that when the wholesale replacement of mains constructed since 1960 becomes necessary, the replacement rate could rise as high as 2% per annum, four times the PC15 rate. At present, NI Water is not financed to make provision to meet these future costs. Current customers

and taxpayers are paying less than the long term cost of maintaining the assets. Future customers and taxpayers are likely to pay more.

- 6.11.7 At present, NI Water does not have the ability to estimate deterioration rates for water mains to confirm that the PC15 replacement rate is adequate. In accepting the current mains replacement rate we note:
- a. The replacement rate remains higher than those in England & Wales where water mains are older on average; and.
  - b. That mains burst rates have reduced in recent years and interruptions to supply due to equipment failure have remained constant (see Annex G – regarding serviceability).
- 6.11.8 To address the uncertainty over current and future rates of mains replacement there is a need for the company to develop a methodology for estimating future watermain deterioration to provide a basis for future replacement rates.

## 6.12. Sub-programme 09 – Leakage

### Background

- 6.12.1 Some level of leakage is inherent in the operation of a pressurised water distribution network. While leakage is waste both in terms of the water abstracted and the financial and social costs of treatment and distribution, NI Water must balance this against the cost of reducing leakage to determine an economic level of leakage. NI Water has prepared an economic level of leakage assessment for PC15 and has put in place plans to gradually reduce leakage below this economic level during PC15.
- 6.12.2 The constrained and unconstrained investment in leakage is shown below. The company has only applied a minor constraint on this programme which it plans to absorb as an additional efficiency.

	Unconstrained	Constrained	% reduction	Base
Leakage	16.559	16.285	-2%	79%
<b>Total</b>	<b>16.559</b>	<b>16.285</b>	<b>-2%</b>	<b>79%</b>

### Assessment of leakage investment

- 6.12.3 The company has provided a detailed programme of leakage investment including capitalisation of detection and repair costs; long term maintenance of capital plant including valves, meters, and software; and, investment to extend pressure management and improve the integrity of DMAs.
- 6.12.4 The Reporter has reviewed the programme of works and costs and considers them to be reasonable and consistent with the economic level of leakage assessment. We have confirmed that the future investment, which will continue to maintain and reduce leakage, is consistent with recent historic expenditure.

We consider the programme of work well scoped and reflective of current and historic costs.

### 6.13. Sub-programme 10 – Ops capital (water)

#### Background

6.13.1 NI Water manages part of the delivery of its capital programme through its operational teams, which carry out smaller schemes to address immediate needs. Half the work focuses on minor capital maintenance of water assets. The enhancement element of the investment covers:

- New connections to water supply;
- Provision of water mains in new developments; and,
- Lead communication pipe replacement where prompted by a failed water quality sample taken as part of the company's sampling programme, or at the request of a consumer.

6.13.2 The constrained and unconstrained investment in Ops capital (water) is shown below.

	Unconstrained	Constrained	% reduction	Base
Ops Capital (Water)	44.500	38.545	-13%	51%
<b>Total</b>	<b>44.500</b>	<b>38.545</b>	<b>-13%</b>	<b>51%</b>

#### Assessment of Ops capital (water) investment

6.13.3 The company has made an estimate of investment based on projections of historic activities and costs and a bottom up assessment of need.

6.13.4 Pending further development of asset maintenance planning, we have taken a top down view of the total capital maintenance budget including investment under this sub-programme.

6.13.5 The company's estimate of activities and unit rates for enhancement investment (new connections, water mains in new development and reactive lead pipe replacement) appear to be consistent with current costs and we have accepted the company's estimates.

### 6.14. Sub-programme 12 – Sewerage

#### Background

6.14.1 This sub-programme covers a wide range of maintenance and enhancement investment relating to the sewerage network.

6.14.2 The constrained and unconstrained investment in sewerage is shown below. The constraint reflects a lower level of replacement than the company considers reasonable in the medium term.

	Unconstrained	Constrained	% reduction	Base
Maintaining serviceability			-58%	100%
Internal flood alleviation			-51%	6%
UID programme			-60%	25%
Strategic drainage study			0%	0%
Enhancement projects			-54%	16%
Polluted water overflows			0%	100%
CSO monitoring			0%	0%
<b>Total</b>	<b>185.607</b>	<b>88.816</b>	<b>-52%</b>	<b>43%</b>

## Assessment of sewerage investment

### Maintaining serviceability

6.14.3 The company has set out a programme of work to maintain the serviceability of its sewerage network including sewers, pumping mains, overflows. In this final determination, the funding for maintenance work has been determined using a top down approach.

6.14.4 The company's plan to maintain serviceability of its sewerage network includes investment of £5.1m to separate surface water from the combined sewerage system. The plan is to discharge surface water to local water courses, freeing capacity in the main sewerage network, reducing the risk of flooding and the impact of pollution from intermittent discharges. Surface water separation has the potential to play a major part in improving the sewerage system in a sustainable way. The level of funding proposed by the company is small in relation to the potential scale of the problem and the potential benefits it might deliver. The proposed level of investment provides an opportunity to set the way forward for storm water separation. With this in mind, the company should apply the investment to:

- Assess the opportunity for storm water separation across the sewerage system;
- Develop a method for assessing the costs and benefits of storm-water separation which would allow future investment to be prioritised; and,
- Undertake a structured programme of storm water separation in a range of different types of development which will allow the costs and benefits to be demonstrated and barriers to storm water separation to be addressed.

6.14.5 NI Water has been funded to deliver a range of flood alleviation and improvements to UIDs. It is possible that the most cost effective way of

delivering these outputs will include storm water separation. The company has already made provision for storm water separation in some of the solutions it has costed for PC15. The funding for storm water separation is in addition to this and should deliver additional outputs. The company should identify storm water separation which contributes to the delivery of funded PC15 objectives separately from the work carried out under the storm water separation funding

### **Internal flood alleviation**

- 6.14.6 The company set out plans to address the risk of internal flooding at 62 properties during the PC15 period. A substantive part of the investment is in a single scheme to resolve flooding at Sicily Park Belfast. Much of the remainder of the programme was not defined for the Business Plan and an average unit rate was used to estimate costs. Feasibility studies are currently underway to define the scope of works.
- 6.14.7 The company shall provide an annual report on property flooding alleviation and mitigation providing an update on the DG5 flooding register, progress on feasibility studies to identify solutions and progress in delivery of investment and delivery of outputs.

### **UID programme**

- 6.14.8 The UID programme includes significant carry over from PC13. The cost of completing this work is not dissimilar from the cost determined in PC13 and the works is now committed. As a result, we have not reassessed these costs for PC15.
- 6.14.9 The company has provided additional information on the UID schemes proposed for PC15. On the basis of this and the Reporter's audit, we have accepted the scope and cost estimates as a reasonable basis for the Business Plan and determination.

### **Strategic drainage study**

- 6.14.10 The company has included funding for a strategic drainage study which will analyse the major drainage systems which discharge to bathing waters and shellfish-waters. The work will include a strategic assessment of Belfast's drainage systems to resolve pollution and flooding issues. A total investment of £10m has been allocated between this sub-programme and sub-programme 16.
- 6.14.11 It is expected that the study will identify a need for substantial investment in sewerage and wastewater treatment facilities. NI Water has suggested that the investment required might exceed £750m.
- 6.14.12 In response to the draft determination, the company provided a programme of work leading to the production of a business case for investment to resolve strategic drainage issues by March 2020. We expect the company to report progress on its strategic drainage study throughout PC15.

**Polluted water overflows**

6.14.13 The company has included an allowance for investment to address misconnection of foul water discharges into storm water sewers and pollution from the storm water outfall. The company notes that any such investment will be dependent on further policy decisions on responsibility for these discharges.

6.14.14 We have included the funding requested by the company in the determination. We expect the company to report progress on the investigation and remediation of polluted storm-water overflows including enforcement action taken by various authorities and any remediation action undertaken.

**CSO monitoring**

6.14.15 The company has set out a plan for investment in the provision of spill frequency and duration monitors at combined sewer overflows and emergency overflows. The work targets overflows in the vicinity of bathing waters and shellfish waters which have been agreed with NIEA.

**6.15. Sub-programme 16 – Wastewater treatment works – new starts**

**Background**

6.15.1 This sub-programme covers improvements to wastewater treatment works to comply with new consents. It includes a range of other general programmes of work at wastewater plant to secure performance. The constrained and unconstrained budgets are shown below.

	Unconstrained	Constrained	% reduction	Base
WWTW upgrades			-63%	29%
Backsiphonage Risks at NIW Sites			-89%	0%
Odour and IPPC Strategies			-72%	0%
PSCMD PC15 (Wastewater)			-57%	0%
Flow monitoring at WWTW			0%	0%
Strategic drainage study			0%	0%
Belfast WWTW WFD/SWD			-100%	0%
Total	317.720	84.954	0%	24%

**Assessment of wastewater treatment works investment**

**WWTW upgrades**

- 6.15.2 NI Water has included investment for 20 schemes to improve wastewater treatment works to meet new standards or address growth. Four of these schemes are carry over from PC10/13. The sixteen PC15 schemes will deliver improvements to 19 treatment works.
- 6.15.3 The company has prepared estimates for investment in 80 works. The programme has been severely constrained with the prioritisation of the remaining work agreed with NIEA.
- 6.15.4 The Reporter has reviewed a sample of the estimates. The costs were generally considered reasonable but some concern was expressed on the level of risk applied. We have benchmarked the costs against the costs of treatment works upgrades delivered by NI Water and the future costs appear to be similar to past costs.

#### **Backsyphonage Risks at NIW Sites.**

- 6.15.5 NI Water has identified a significant number of wastewater treatment works sites with a water supply which does not have the required air-gap to prevent back-syphonage. The company estimated the cost of providing air-gaps at all sites as £16m but has only made provision for £2m of investment in the constrained programme.
- 6.15.6 The company should continue to assess any risk of back-syphonage as part of its Drinking Water Safety Plans.

#### **Odour and IPPC Strategies**

- 6.15.7 The company has included an allowance for odour and IPPC compliance based on an assessment of need for individual works. We have included this investment in the determination. The company should develop a plan for the implementation of PPC requirements for Odour Management which should be prioritised and agreed with NIEA. The company shall report progress against the delivery of this plan.

#### **PSCEMD PC15 (Wastewater)**

- 6.15.8 The Preservation of Services and Civil Emergency Measures Directive requires NI Water to secure wastewater treatment assets. The company has prepared a plan of works.
- 6.15.9 In the draft determination, we expressed reservations about investment of this scale in the security of wastewater treatment assets. DRD is the competent authority in respect of PSCEMD works. We have reviewed the proposed investment with DRD and understand that a reduced scope of works will be adequate in PC15. We have reduced the proposed investment to £0.4M, allocating the balance of £4m to the delivery of additional enhancement outputs.

#### **Flow monitoring at WwTW**

- 6.15.10 The company has provided an estimate of investment to complete the provision of flow monitoring at wastewater treatment works greater than 250PE to ensure

that the works comply with their current consents and allow the consents to be reviewed against accurate flow data.

### **Strategic drainage study**

- 6.15.11 The company has included funding for a strategic drainage study which will analyse the major drainage systems which discharge to bathing waters and shellfish-waters. The work will include a strategic assessment of Belfast's drainage systems to resolve pollution and flooding issues. A total investment of £10m has been allocated between this sub-programme and sub-programme 16.
- 6.15.12 It is expected that the study will identify a need for substantial investment in sewerage and wastewater treatment facilities. NI Water has suggested that the investment required might exceed £750m.
- 6.15.13 In response to the draft determination, the company provided a programme of work leading to a business case for investment to resolve strategic drainage issues by March 2020. We expect the company to report progress on its strategic drainage study throughout PC15.

### **Belfast WWTW WFD/SWD**

- 6.15.14 The major unfunded project for Belfast WWTW provides a marker for a major upgrade of the works which the company believes necessary. Determining the scope of this work will form a key outcome of the strategic drainage study.

## **6.16. Sub-programme 17 – Small WWTW programme**

### **Background**

- 6.16.1 NI Water operates 782 small wastewater treatment works which serve a population equivalent (PE) less than 250. Of these, 143 serve a PE in the range 20-49 and 164 serve a PE in the range 50-249.
- 6.16.2 In recent years the company has undertaken a programme of works to upgrade these small works and agreed priorities for investment with NIEA. This work has focused on works serving a PE in the range 50-249.
- 6.16.3 In PC15, the company plans to continue this programme of work and deliver a further 45 upgrades, focusing on works assessed as unsatisfactory by NIEA in 2013.
- 6.16.4 By the end of PC15, the company should have improved almost all works in the 50-249 PE range which were deemed to be unsatisfactory at 2013. The company reports that this would leave 48 works in this range which have not been subject to or identified for interventions and must be maintained.
- 6.16.5 At 2013 nineteen works in the 20-49 PE range were deemed to be unsatisfactory. However, the company has advised us that a desk top exercise carried out by NIEA has identified 50 works which may be required to achieve an ammonia standard of 5 mg/l and a further 32 works which may be required to

meet an ammonia standard less stringent than 5 mg/l. No allowance has been made for improvements to these works in the PC15 programme.

	Unconstrained	Constrained	% reduction	Base
Small Rural WWTW Programme PC15	22.500	11.711	-48%	40%
<b>Total</b>	<b>22.500</b>	<b>11.711</b>	<b>-48%</b>	<b>40%</b>

### Assessment of small wastewater treatment works investment

- 6.16.6 A clear programme of work has been identified based on works deemed to be unsatisfactory in 2013, although we understand that changes may be necessary to reflect changing priorities.
- 6.16.7 The company has costed the proposed programme of work on cost algorithms derived from out-turn costs from previous schemes. The Reporter had the opportunity to assess the cost data used to form the algorithms and our own analysis allowed us to confirm that the costs had been applied in a reasonable way.
- 6.16.8 The estimated cost of the investment assumes that the company will continue to replace existing plant with rotating biological contactors (RBCs). Given the passage of time and the shift to smaller works, we believe that there is a need to review the process selection to ensure that it remains the best technical solution in the long term.
- 6.16.9 The company has advised us that, at present, there is no plan to secure land to allow low energy sustainable solutions to be used, pending the outcome of pilot trials currently underway. With the need to continue to deliver solutions and the time required to secure land once an opportunity is identified, it seems that there is little realistic chance of delivering sustainable low energy solutions for the foreseeable future other than on an ad hoc basis. We would welcome a more strategic approach which might allow more sustainable solutions to be delivered.

## 6.17. Sub-programme 18 – Ops capital (sewerage)

### Background

- 6.17.1 NI Water manages part of the delivery of its capital programme through its operational teams which carry out smaller schemes to address immediate needs. The investment is dominated by minor capital maintenance of sewerage assets. The enhancement element of the investment covers new connections to the sewerage system and sewer adoption costs.

	Unconstrained	Constrained	% reduction	Base
Ops Capital (Sewerage)	57.500	44.847	-22%	91%
Total	57.500	44.847	-22%	91%

### Assessment of Ops capital (sewerage) investment

- 6.17.2 The company has made an estimate of investment based on projections of historic activities and costs and a bottom up assessment of need.
- 6.17.3 Pending further development of asset maintenance planning we have taken a top down view of the total capital maintenance budget including investment under this sub-programme.
- 6.17.4 The company's estimate of activities and unit rates for enhancement investment (new connections and sewer adoption) appear to be consistent with current costs and we have accepted the company's estimates.

## 6.18. Sub-programme 19 – Metering

### Background

- 6.18.1 NI Water has around 66,000 non-domestic meters which it uses for billing purposes. These meters need to be maintained or replaced as they age to ensure that meter readings and therefore bills remain reasonably accurate. Meters are replaced both as a result of reactive maintenance activities and through a proactive programme based on age.
- 6.18.2 The company also installs new meters on new domestic and non-domestic properties and on existing non-domestic properties which previously didn't have a meter installed.
- 6.18.3 This sub-programme covers the majority of activity associated with maintaining, replacing and installing the company's meter stock.
- 6.18.4 The constrained and unconstrained investment in metering is shown below.

	Unconstrained	Constrained	% reduction	Base
Installation of water meters and separations	22.618	22.618	0%	88%
Total	22.618	22.618	0%	88%

### Assessment of meter investment

- 6.18.5 This is the first time that NI Water has developed comprehensive proposals for proactive replacement of its small diameter revenue meters based on age. It has based its assessment on a replacement age of 17 years which the Reporter

has confirmed is consistent with the approach adopted by water and sewerage companies in England and Wales. The company has identified a backlog of meters that are already over 17 years old in addition to those that will reach the age threshold during PC15. This backlog has doubled the rate of meter replacement in PC15 and has resulted in a step change from previous budgetary requirements. The company plans to address the entire backlog during PC15 and to spread this evenly over the business plan period.

- 6.18.6 Since the draft determination, we have assessed the company's proposals in respect of meter replacement. In our assessment we noted that the substantial pro-active meter replacement programme should reduce the level of reactive meter replacement. We also noted that the on-going reactive meter replacement programme would address some of the backlog of old meters included in the estimate for pro-active meter exchange. As a result, we concluded that the level of investment in reactive and proactive meter replacement might be up to 20% lower than estimated by the company. We recognise that this estimate is uncertain as we have used assumptions in the absence of detailed information from the company. However, it emphasises the potential to apply simple asset analysis to balance pro-active and reactive work leading to an overall reduction in cost.
- 6.18.7 While we believe that the programme of meter replacement in PC15 can be delivered for less than the company estimated, we have not made a specific adjustment to the investment programme. The proposed investment is base maintenance. In the absence of more detailed information from the company we have based our assessment of asset maintenance investment for PC15 on a range of econometric and top-down estimating techniques. We expect the company to work within this budget and we have not made further adjustments for specific issues identified in the company's plan.
- 6.18.8 In addition to its normal metering activities, the company has included a small amount of investment in the first year of PC15 to undertake a trial using Automatic Meter Reading (AMR) equipment. The use of such equipment would allow the company to read 'difficult to read' meters, such as those located in premises with limited opening times and meters in dangerous locations such as carriageways.

## 6.19. Sub-programme 20 – Management & General

### Background

- 6.19.1 The category of 'management and general' covers the capital assets required to support the general delivery of services which are not directly related to the operational water and sewerage service assets. It includes the provision and maintenance of general facilities and accommodation, vehicles, information technology (including hardware and software) and the updating of network records.
- 6.19.2 The constrained and unconstrained investment in management and general is shown below.

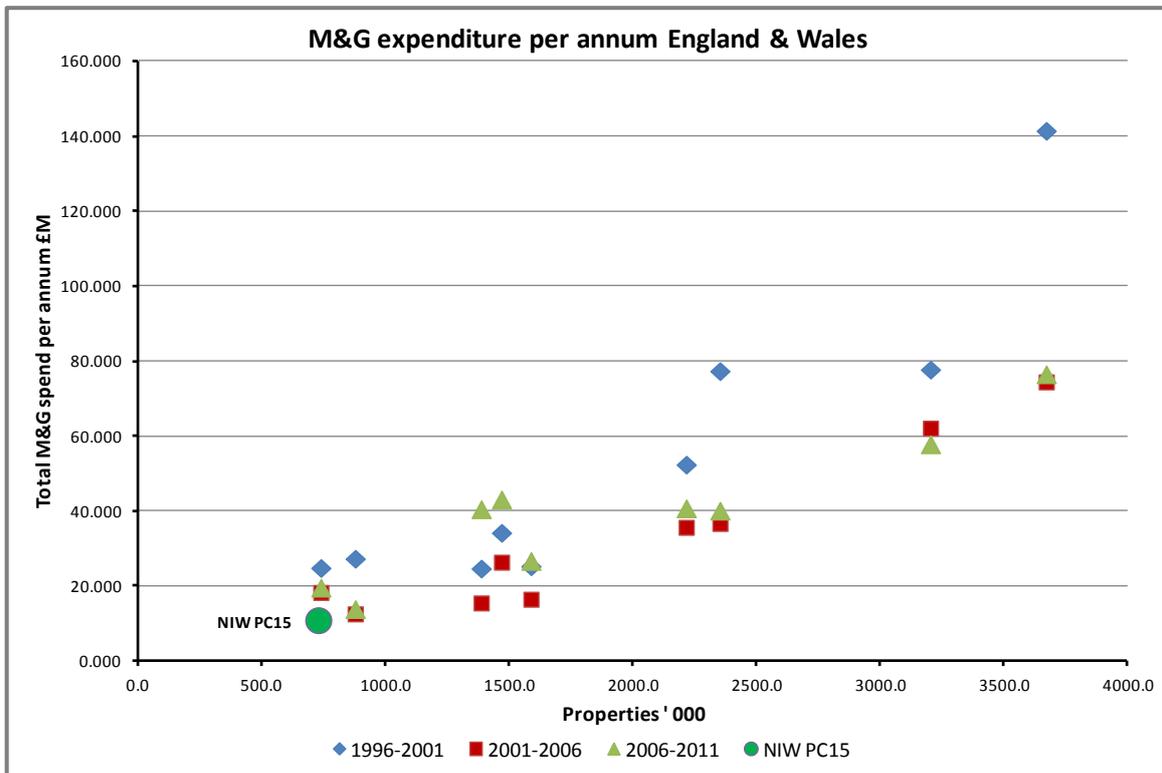
	Unconstrained	Constrained	% reduction	Base
M&G expenditure total	90.000	65.000		

**Assessment of management and general investment**

6.19.3 Figure 6.1 below shows historical Management and General investment in England & Wales averaged over three 5 year periods. NI Water’s proposed investment in PC15 is at the lower end of the historic investment range taking account of the size of the company. This could raise a question of whether the company is adequately funded in an class of investment which is essential to support the delivery of service.

6.19.4 To address this question, the company needs to prepare a clear long term plan for capital maintenance investment which will allow it to assess costs and risks and ensure that the right level of investment is made. In the short term, it must ensure that the funding is spent to best effect between competing priorities.

**Figure 6.1 - M&G expenditure England & Wales (£m/a)**



6.19.5 We asked the Reporter to review the proposals for Management & General investment. The Reporter conducted a sample audit which covered 67% of the proposed investment. The Reporter concluded that there was an identified need for the proposed investment and drew attention to the use of historic costs, historic run-rates and framework rates for costing elements of the programme. The Reporter noted that the risk of not achieving the objectives within the constrained funding had not been assessed in detail at this stage. The Reporter recommended that NI Water prepares more detailed and robust cases containing detailed costs and risks and assessments of benefits so that the

Utility Regulator is able to give appropriate consideration to the scope, timing and cost effectiveness of the proposed investment.

- 6.19.6 However, given the proposed level of investment relative to England & Wales and the outline information already provided by the company, we consider it appropriate to include the level of investment requested in the determination.
- 6.19.7 In the draft determination, we asked the company to provide further information on element of its plan. In response to the information provided, we note the following:
- The company has further work to do to develop the business case for the proposed Head Office rationalisation. We would expect the company to update us on its plans by the mid-term review if it intends to make this investment in PC15; and
  - The company has provided an indication of the work it will undertake on its ICAT strategy. We expect the company to update us on the success of its trial project and the benefits delivered before embarking on subsequent investment.

## 6.20. Sub-programme 23 – Water mains new and renew

### Background

6.20.1 The sub-programme of water mains new and renew covers water mains requisitions, public realm schemes and other programmes of work for the provision or repair of water mains outside the main programme of planned watermains rehabilitation. It also covers the proposed programme of proactive lead pipe replacement. The constrained and unconstrained budgets are shown below.

	Unconstrained	Constrained	% reduction	Base
First time water provision (requisitions)			0%	0%
Public realm and roads schemes			0%	100%
Trunk main maintenance			0%	59%
Lead pipe replacement programme			0%	0%
Strategic crossings			-50%	100%
Total	27.342	25.542	-7%	53%

### Assessment of investment in water mains new and renew

#### First time water provision

6.20.2 The sub-programme of work for first time water provision covers the requisition of water mains connecting new developments to the existing distribution system. The company has estimated the cost of the works on the basis of historical run rates with an allowance for strategic development projects based on an assessment of costs for the Police and Fire training college, the Granville industrial development and a major housing development. NI Water must service developments in response to demand which will determine actual costs. The assessment of future costs on the basis of historical demand appears reasonable.

#### **Public realm and roads schemes**

6.20.3 Public realm and roads schemes covers the costs of repair and diversion of water mains as a consequence of work carried out by other bodies. Public realm work covers water mains improvements in advance of the development of high quality paved areas, particularly pedestrian areas in urban centres. Road schemes cover the repair and diversion of water mains in advance of roads works. NI Water must respond to this type of development. The assessment of future costs on the basis of historical demand appears reasonable.

#### **Trunk main maintenance**

6.20.4 NI Water has proposed a specific programme of trunk mains rehabilitation for the first time. NI Water has recognised that trunk mains laid over the last 60-100 years will reach the end of their useful life. The company has begun an assessment of these mains and made assumptions about the level of investment that will be required. The company has included investment for 2.5 km per annum rising to 5km per annum. While further work is required to assess the condition of mains, this cautious rate of intervention appears reasonable. We would expect the company to continue its investigations and be in a position to provide a more robust case for investment for the mid-term review.

#### **Lead pipe replacement programme**

6.20.5 The company has proposed a proactive lead pipe replacement programme to replace 1,844 lead communication pipes per annum. The estimated costs reflect NI Water's current framework rates.

#### **Strategic crossings**

6.20.6 The company plans to complete an assessment of the condition of pipework attached to railway crossing, major road crossings and pipe bridges. Because of their location, these assets are difficult to access for inspection and repair. The consequence of failure is high and the risk of pipe failure causing a major interruption to supply is high. The key objective is to complete the identification and initial assessment of these high risk assets. The company has made an allowance for investment within the overall base maintenance budget. The company should update the Utility Regulator if a significantly higher short term investment need is identified following completion of the initial surveys.

### **6.21. Sub-programme 24 – New and renew sewerage**

## Background

6.21.1 The sub-programme of new and renew sewerage covers sewer requisitions, public realm schemes and other programmes of work for the provision or repair of sewers outside the main programme of planned sewer rehabilitation. The constrained and unconstrained budgets are shown below.

	Unconstrained	Constrained	% reduction	Base
First time Sewerage (sub-programme 24A)			0%	0%
Public realm and roads schemes			0%	100%
Strategic crossings			-50%	100%
Total	22.030	20.230	-8%	25%

### First time sewerage provision

6.21.2 The sub-programme of work for first time sewerage provision covers the requisition of sewers connecting new developments to the existing sewerage network. The company has estimated the cost of the works on the basis of historical run rates with an allowance of strategic development projects based on an assessment of costs for the Police and Fire training college, the Maze development and major housing developments. NI Water must service developments in response to demand which will determine actual costs. The assessment of future costs on the basis of historical demand appears reasonable.

### Public realm and roads schemes

6.21.3 Public realm and roads schemes cover the costs of repair and diversion of sewers as a consequence of work carried out by other bodies. Public realm work covers sewer improvements in advance of the development of high quality paved areas, particularly pedestrian areas in urban centres. Road schemes cover the repair and diversion of sewers in advance of roads works. NI Water must respond to this type of development. The assessment of future costs on the basis of historical demand appears reasonable.

### Strategic crossings

6.21.4 The company plans to complete an assessment of the condition of pipework attached to railway crossing, major road crossings and pipe bridges. Because of their location, these assets are difficult to access for inspection and repair. The consequence of failure is high and the risk of pipe failure causing a major pollution incident is high. The key objective is to complete the identification and initial assessment of these high risk assets. The company has made an allowance for investment within the overall base maintenance budget. The company should update the Utility Regulator if a significantly higher short term investment need is identified following completion of the initial surveys.

## 6.22. Energy efficiency and renewable energy generation

6.22.1 In its business plan, the company set out proposals for energy efficiency schemes and renewable energy generation which would reduce the cost of energy purchase over PC15, under the following headings:

- water regulation compliance and water efficiency programme (water buildings);
- recovering energy within the water distribution system;
- hydro power from raw water;
- WPS pump efficiency;
- sub-meters, water;
- water regulation compliance and water efficiency programme (sewage buildings);
- energy efficiency at wastewater pumping stations;
- electricity generation from wind power; and
- sub-meters – sewerage.

6.22.2 In its response to the draft determination the company maintained the broad scope of work headings, but revised the detailed work which will be carried out within an overall funding envelope. Based on the company's estimates, the benefits of this programme of work will be:

Cumulative energy reduction (GWhr/a)	15-16	16-17	17-18	18-19	19-20	20-21
From renewable energy generation	0.0	0.0	0.8	2.2	3.7	4.5
From energy efficiency measures	0.0	2.0	4.9	6.6	7.3	7.3
<b>Total</b>	<b>0.0</b>	<b>2.0</b>	<b>5.7</b>	<b>8.8</b>	<b>11.0</b>	<b>11.8</b>

In addition to existing renewable generation plant  
Assumes that new schemes will come on-line at the end of each year.

6.22.3 We welcome these proposal and will monitor the delivery of energy efficiency and renewable energy generation throughout PC15. However, we note that in the context of a total energy consumption of 295 GWhr/a (2013-14) the proposed activity in PC15 will only off-set 4% of current energy consumption by the end of PC15. We expect the company to continue to develop additional renewable energy generation and energy efficiency schemes to allow it to present appropriate schemes for funding in the future.

- 6.22.4 NI Water's proposals include installing electricity sub-meters on water treatment works and wastewater treatment works sites to enable closer scrutiny of electricity consumption and allow energy savings to be identified and quantified.
- 6.22.5 A feasibility study is underway and the company notes that the costs in the business plan are estimations which may change. There is no estimate of the benefits which might be identified as part of this work.
- 6.22.6 We recognise the need for sound information to allow the company to identify energy consumption and drive down energy consumption and we are aware of this type of work being undertaken elsewhere in the water industry for the same reason. Therefore we have included the investment proposed by the company in the final determination. However, in the absence of scope, costs and benefits, we are not in the position to confirm that the investment is beneficial. The company should provide us with information on the benefits of this work based on trials as soon as possible to demonstrate that the investment is beneficial before embarking on wide spread sub-metering.

### **6.23. Major scheme development for the mid-term review**

- 6.23.1 Through our assessment of the capital programme we have identified investment in a number of major schemes where the benefits are not yet confirmed or the scheme has not been developed in adequate detail to allow us to make an informed decision. These schemes are scheduled for construction after the mid-term review. The company should provide us with an update on these schemes as part of the mid-term review for our determination:
- Head Office rationalisation;
  - Caugh Hill WTW water quality improvements;
  - Carmoney to Strabane trunk main;
  - Moygashel WWTW upgrade; and
  - North Ards WWTW upgrade.

## 7.0 Scope for Additional Outputs

7.1.1 Within a fixed nominal budget, any adjustment to the capital programme will impact on the outputs which can be delivered.

7.1.2 In our determination of the capital programme we have made a number of adjustments which increases the scope of additional outputs which can be delivered as follows:

- We have amended the assumptions for capital inflation to align with RPI from 2012-13;
- We have made an adjustment for additional income;
- We have determined a lower level of capital maintenance compared to the company in real terms, freeing investment for additional outputs;
- We have applied a Cost Base efficiency factor of 7.0% to the pre-efficiency enhancement expenditure in the company's plan; and
- We have made a specific adjustment to the programme in respect of capitalised salary and on-costs funding.
- We have made a specific adjustment to funding of work to secure wastewater treatment works to reflect a reduction in the scope of works.
- We have included the delivery of Greyabbey WWTW which was not included in the company's updated programme submitted in response to the draft determination.

The impact of these adjustments on the enhancement investment available to deliver additional outputs is shown on Table 7.6.

**Table 7.6 – Scope for additional outputs (£m)**

	2012-13 prices	nominal
Reduction in outputs due to inflation adjustment	-0.7	-0.4
Adjustment for additional income	3.3	4.0
Adjustment for UR capital maintenance assessment	16.6	21.1
Additional output fund from efficiency	23.5	27.8
Add capitalised salary adjustment	2.2	2.6
Add PSCMD scope adjustment	4.0	4.7
Adjust for delivery of Greyabbey WWTW	-3.3	-4.2
Total	45.7	55.7